

**REFERENCE LIST OF FURNITURE AND EQUIPMENT FOR
SECONDARY SCHOOL
IN 2026/2027 SCHOOL YEAR
ADOPTING STANDARD SCHEDULE OF ACCOMMODATION**

TABLE OF CONTENT

<i>Part I</i>	<i>List of Furniture and Equipment by Function</i>	<i>Appendix</i>	<i>Updated Cost in 2026 (rounded)</i>
	Computer Assisted Learning Room	1	259,400
	Conference Room	2	18,000
	General Furniture and Equipment	3	1,556,200
	Guidance Activity Room	4	10,700
	Interview Room 1	5	6,300
	Interview Room 2	6	6,300
	Language Room	7	128,500
	Multi-purpose Area	8	44,400
	Multi-purpose Room	9	14,600
	Preparation Room for IT Teaching Materials	10	39,100
	Student Activity Centre	11	35,800
	School Library	12	152,000
	Staff Common Room	13	24,800
	Tuck Shop-cum-Central Portioning Area	14	145,700
	Sub-total:		2,441,900
<i>Part IIa</i>	<i>List of Furniture and Equipment by Subjects</i>		
	Audio Visual Aids	15	74,200
	Music	16	234,300
	Physical Education	17	444,200
	Visual Arts	18	379,300
	Design and Technology	19	423,900
	Home Economics Room 1	20	186,300
	Home Economics Room 2	21	78,300
	Integrated Science (S1 - S3)	22	395,800
	Computer Subject Room	23	191,200
	Sub-total:		2,407,500
<i>Part IIb</i>	<i>List of Furniture and Equipment by New Senior Secondary (NSS) Subjects</i>		
	SS Biology	24	546,700
	SS Chemistry	25	475,500
	SS Physics	26	571,200
	SS Music	27	23,300
	SS Geography	28	274,400
	SS Visual Arts	29	-
	SS Design and Applied Technology	30	89,500
	SS Information and Communication Technology	31	-
	SS Technology and Living:		
	Food Science & Technology Strand	32a	8,100
	Fashion Clothing and Textiles Strand	32b	1,600
	SS Physical Education	33	51,400
	Total Cost *		6,891,000

* Assuming that all SS subjects are to be offered at the same time by a school, adjustment for shared items is done in calculating the total F&E cost.

**Reference List of Furniture and Equipment
for Secondary School**

Room : Computer Assisted Learning Room

Item No	Description	Quantity
1	Microcomputer workstation	41 sets
	<u>Computer peripherals</u>	
2	Printer or Printer cum Scanner (small)	4
	<u>Audio/Video equipment</u>	
3	Headphones	41
4	Media player (DVD/VCD/CD/Bluetooth/USB)	1
5	Smart TV	1
6	Digital video camera	1
7	Projection system and screen	1
	<u>Other furniture and equipment</u>	
8	Dehumidifier	2
9	Vacuum cleaner	1
10	Notice board	3
11	Fire extinguisher	2
12	Teacher chair	1
13	Student chair	40
14	Bookcase / storage cabinet	1
15	Blackout curtains	1 set
	Total Cost for Room	259,400

Reference List of Furniture and Equipment
for Secondary School

Room : Conference Room

Item No	Description	Quantity
1	Small conference table	8
2	Office chair	24
3	Projection system with screen	1
	Total Cost forRoom	18,000

**Reference List of Furniture and Equipment
for Secondary School**

Room : General Furniture and Equipment

Item No	Description	Quantity
<u>30 CLASSROOMS</u>		
1	Projection system with screen	30
2	Teacher chair	30
3	Student chair	1,080
4	Student desk	1,080
5	Umbrella stand	30
6	Teacher desk	30
7	Lockers, 9 doors	20 sets
<u>COMPUTER EQUIPMENT ITEM</u>		
8	Microcomputer workstation	30
9	Computer server equipment	1 set
<u>3 REMEDIAL TEACHING ROOMS</u>		
10	Teacher chair	3
11	Student chair	30
12	Student desk	60
13	Teacher desk	3
14	Bookcase / storage cabinet	3
15	Microcomputer workstation	3
<u>PRINCIPAL'S OFFICE AND 2 DEPUTY PRINCIPAL'S OFFICES</u>		
16	Notice board	3
17	Bookcase / storage cabinet	3
18	Office chair (headmaster)	3
19	Office chair	6
20	Office desk / reading desk	3
21	4-drawer cabinet with safe	1
22	4-drawer file cabinet	2
23	Filing tray	6
24	Microcomputer workstation	3
<u>CAREERS MASTER'S/ MISTRESS'S OFFICE</u>		
25	4-drawer file cabinet	1
26	Office chair	2
27	Office desk / reading desk	1
28	Notice board	1
29	Bookcase / storage cabinet	1
<u>DISCIPLINE MASTER'S OFFICE</u>		
30	4-drawer file cabinet	1
31	Office chair	2
32	Office desk / reading desk	1
33	Notice board	1
34	Bookcase / storage cabinet	1
<u>SCHOOL SOCIAL WORKER'S OFFICE</u>		
35	4-drawer file cabinet	1
36	Office chair	2
37	Office desk / reading desk	1
38	Notice board	1
39	Bookcase / storage cabinet	1
<u>General Office</u>		
40	Key storage board	1
41	Notice board	2
42	4-drawer file cabinet	4
43	Drawer tray file cabinet	1
44	First-aid cabinet	1
45	Office chair	6
46	Bookcase / storage cabinet	1
47	Office desk / reading desk	2

Item No	Description	Quantity
48	Typist rack	1
49	Umbrella stand	1
50	Office desk / reading desk	1
51	Filing tray	6
52	Electric stapler	1
53	Punch binder	1
54	Facsimile machine	1
55	Microcomputer workstation	3
56	Time stamp machine	1
57	Labeller	1
58	Laminator	2
	Printing Room & Security Store	
59	Bookcase / storage cabinet	1
60	Printer or printer cum scanner (large)	1
61	Printer or printer cum scanner (small)	1
	<u>3 STAFF ROOMS</u>	
	Computer Equipment Item	
62	Microcomputer workstation	50
63	Printer or printer cum scanner (large)	1
64	Printer or printer cum scanner (small)	1
65	Notice board	8
66	Bookcase / storage cabinet	8
67	Teacher chair	52
68	Umbrella stand	4
69	Small conference table	4
70	Office desk / reading desk	50
71	Water dispenser	2 sets
	<u>MEDICAL INSPECTION ROOM</u>	
72	First-aid cabinet	1
73	Office chair	8
74	Medical examination couch	1
75	Medical examination 2-step platform	1
76	Folding screen	1
77	Office desk / reading desk	2
78	Automated external defibrillator	1
	<u>STORE ROOM</u>	
79	Floor polisher	1
80	Ladder (short)	1
81	Ladder (tall)	1
	<u>PANTRY</u>	
82	Refrigerator	1
83	Electric tea urn	1
	<u>ASSEMBLY HALL</u>	
84	Student chair	760
85	Lectern with stand	1
86	Pedestal fan	12
87	Public address system (stationed or portable)	1 set
88	Stage curtains	1 set
89	Curtain for high level windows	1 set
90	Small conference table	1
	Total Cost for Room	1,556,200

**Reference List of Furniture and Equipment
for Secondary School**

Room : Guidance Activity Room

Item No	Description	Quantity
1	Small conference table	2
2	Office chair	10
3	Notice board	1
4	4-drawer filing cabinet	2
5	Bookcase / storage cabinet	1
6	Sofa (2-seater)	2
7	Tea table	1
Total Cost for Room		10,700

**Reference List of Furniture and Equipment
for Secondary School**

Room : Interview Room 1

Item No	Description	Quantity
1	Small round table	1
2	Tea table	1
3	Office chair	4
4	Sofa (2-seater)	2
5	Bookcase / storage cabinet	1
	Total Cost for Room	6,300

**Reference List of Furniture and Equipment
for Secondary School**

Room : Interview Room 2

Item No	Description	Quantity
1	Small round table	1
2	Tea table	1
3	Office chair	4
4	Sofa (2-seater)	2
5	Bookcase / storage cabinet	1
Total Cost for Room		6,300

**Reference List of Furniture and Equipment
for Secondary School**

Room: Language Room

Item No	Description	Quantity
1	Student chair	41
2	Classroom student desk	14
3	Microcomputer workstation	21
4	Projection system and screen	1
5	Bookcase / storage cabinet	3
Total Cost for Room		128,500

**Reference List of Furniture and Equipment
for Secondary School**

Room : Multi-purpose Area

Item No	Description	Quantity
1	Student chair	240
2	Folding table and benches	20 sets
3	First-aid cabinet	1
4	Ceramic whiteboard	2
	Total Cost for Area	44,400

**Reference List of Furniture and Equipment
for Secondary School**

Room : Multi-purpose Room

Item No	Description	Quantity
1	Office desk / reading desk	2
2	Student chair	82
3	Bookcase / storage cabinet	2
4	Folding table and benches	2 sets
	Total Cost for Room	14,600

**Reference List of Furniture and Equipment
for Secondary School**

Subject : Preparation Room for IT Teaching Materials

Item No	Description	Quantity
	<u>COMPUTER EQUIPMENT ITEMS</u>	
1	Microcomputer workstation	5
	<u>Computer peripherals</u>	
2	Printer or printer cum scanner (small)	3
	<u>Other equipment</u>	
3	Dehumidifier	1
4	Vacuum cleaner	1
5	Ceramic whiteboard	1
6	Fire extinguisher	1
	<u>Furniture</u>	
7	Office desk / reading desk	1
8	Teacher chair	9
9	Bookcase / storage cabinet	1
	Total Cost for Room	39,100

**Reference List of Furniture and Equipment
for Secondary School**

Room : Student Activity Centre

Item No	Description	Quantity
	<u>Furniture</u>	
1	Student chair	2
	<u>Equipment</u>	
2	Smart TV	2
3	Media player (DVD/VCD/CD/Bluetooth/USB)	2
4	Blackout curtains	1 set
5	Projection system with screen	1
6	HIFI system	2
7	Microphone	4
	Total Cost for Room	35,800

**Reference List of Furniture and Equipment
for Secondary School**

Room : School Library

Item No	Description	Quantity
1	Bookend set	100
2	Trolley	2
3	CD Cabinet	1
4	Office chair	5
5	Office desk / reading desk	15
6	Headphones	4
7	Library books (Including cataloguing tool books for teacher-librarian)	1
8	Step stool	3
9	Student chair	60
10	Ceramic whiteboard	1
11	Microcomputer workstation	8
12	Printer or printer cum scanner (small)	1
13	Automated library system	1
14	Barcode laser scanner	1
15	Media player (DVD/VCD/CD/Bluetooth/USB)	1
16	Magazine Shelf	2
17	Book Display Shelf	1
	Total Cost for Library	152,000

**Reference List of Furniture and Equipment
for Secondary School**

Room : Staff Common Room

Item No	Description	Quantity
	<u>FURNITURE</u>	
1	Sofa (3-seater)	1
2	Sofa (2-seater)	2
3	Long folding table	1
4	Teacher chair	12
5	Bookcase / storage cabinet	1
6	Tea table	1
7	Trolley	1
	<u>EQUIPMENT</u>	
8	Smart TV	1
9	Media player (DVD/VCD/CD//Bluetooth/USB)	1
10	Refrigerator	1
11	Microwave oven	1
12	Electric hot water kettle (small)	1
	Total Cost for Room	24,800

**Reference List of Furniture and Equipment
for Secondary School**

Room: Tuck Shop-cum-Central Portioning Area

Item No	Description	Quantity
	<u>Facilities</u>	
1	3-cabinet electric bain marie	1
2	Cooker for vegetables	1
3	Rice cooker	10
4	Boiler for drinking water	1
5	Dishwasher	1
6	Refrigerator for tuck shop	1
	<u>Furniture</u>	
7	Working table / kitchen table	5
8	Trolley for transfer/collection of food/trays	10
9	Kitchen shelf	2
	Total Cost for Area	145,700

**Reference List of Furniture and Equipment
for Secondary School**

Subject : Audio-visual Aids

Item No	Description	Quantity
1	Media player (DVD/VCD/CD/Bluetooth/USB)	15
2	Smart TV	2
3	Projection system and screen	2
4	Visualizer	2
5	Digital video camera	2
6	Video tripod	1
7	Bookcase / storage cabinet	2
Total Cost for Subject		74,200

Note: All electrical appliances should be in compliance with the existing Electrical Products (Safety) Regulations.

**Reference List of Furniture and Equipment
for Secondary School**

Subject : Music

Item No	Description	Quantity
	FURNITURE	
1	<u>Student chair</u>	40
2	<u>Teacher table</u>	2
3	<u>Teacher chair</u>	2
4	<u>Blackout curtains</u>	1 set
	MUSICAL INSTRUMENTS / EQUIPMENT	
	<i>Pianos</i>	
5	<u>Upright School Model Piano 1</u>	1
6	<u>Upright Piano Cover</u>	1
7	<u>Grand Piano 2</u>	1
8	<u>Grand Piano Cover</u>	1
	<i>Unpitched Percussion Instruments</i>	
9	<u>Triangle</u> 15 cm, with beater and holder	2
10	<u>Solo Triangle</u> 24 cm, with beater and holder	2
11	<u>Pair of Wooden Castanets</u> Mounted on a wooden handle	2
12	<u>Pair of Finger Castanets</u>	2
13	<u>Two-tone Tubular Woodblock</u> With beater and holder	2
14	<u>Tambour</u> 25 cm vellum	2
15	<u>Tambourine</u> 25 cm vellum, with jingles and wooden frame	2
16	<u>Sleigh Bells</u> With 10 bells and handle	2
17	<u>Pair of Cymbals</u> 26 cm	1
18	<u>Cymbal</u> 40 cm, with stand and soft beater	1
19	<u>Pair of Wooden Maracas</u> Mexican style or fish style	1
20	<u>Cabasa</u> Standard size	1
21	<u>Guiro</u>	1
22	<u>Pair of Claves</u> Rosewood, large size	1
23	<u>Pair of Bongo Drums with Stand</u>	1
24	<u>Snare Drum</u> With stand and beaters	1
25	<u>Bass Drum</u> With stand and beater	1
	<i>Pitched Percussion Instruments</i>	
26	<u>Soprano Glockenspiel</u> - single row - C major scale c" - c#" with additional F# and Bb - 19 individual removable bars (20 X 4 mm) complete with case and one pair of double-headed beaters	1
27	<u>Chromatic Glockenspiel</u> - tenor-alto range c" - c#" with additional F# and Bb - 26 individual removable bars (20 X 4 mm) double row with chromatic scale together with case and one pair of double-headed rubber beaters	1
28	<u>Soprano Xylophone (Rosewood)</u> - single row - C major scale c" - c#" with additional F# and Bb - 14 individual bars (40 X 15 mm) complete with one pair of single-headed beaters	1
29	<u>Tenor-alto Xylophone (Rosewood)</u> - diatonic c' - c#" with additional F# and Bb - 19 individual bars (40 X 15 mm) complete with one pair of single-headed beaters	1

Item No	Description	Quantity
30	<u>Bass Xylophone (Rosewood)</u> - diatonic c' - a" with additional F# and Bb - 16 individual bars (40 X 18 mm) complete with one pair of single-headed beaters	1
31	<u>Set of Chime Bars</u> - single notes c" - c#"" accurately - tuned and mounted on a tuned wood or metal resonator - 26 individual notes forming a chromatic scale as specified above - with a pair of medium-hard rubber single-headed beaters <i>Other Instruments</i>	1
32	<u>Descant Recorder / Soprano Recorder</u> Baroque fingering	4
33	<u>Treble Recorder / Alto Recorder</u> Baroque fingering	4
34	<u>Guitar</u>	1
35	<u>Melodica</u> 36 notes	1
36	<u>Portable Electronic Keyboard</u> With transformer and stand - 61 full-size keys - 32-note polyphonic sounds or more - MIDI in/out <i>Music Stand</i>	1
37	<u>Music Stand</u> - desk adjustable (Pipe : 30 mm diameter) - with wide, folding legs <i>Chinese Percussion Instruments</i>	20
38	<u>Pair of Dajingbo (大京鈸一對)</u>	1
39	<u>Pair of Xiaojingbo (小京鈸一對)</u>	1
40	<u>Pair of Dabo, 40 cm (大鈸一對, 40厘米)</u>	1
41	<u>Wuyinmuyu with Stand and Beaters (五音木魚連架及棒子)</u>	1
42	<u>Zhonghuyinluo with Beater (中虎音鑼連棒子)</u>	1
43	<u>Jingluo with Beater (京鑼連棒子)</u>	1
44	<u>Xiaoluo with Luo Pian (小鑼連鑼片)</u>	1
45	<u>Stand for Luo and Bo (鑼查架一套)</u>	1
46	<u>Pair of Pengling (碰鈴一對)</u>	1
47	<u>Dabukyu with Beaters, Rosewood (花梨木大卜魚連棒子)</u>	1
48	<u>Shadi with Stand and Beaters (沙的連架及棒子)</u>	1
49	<u>Wuyingu with Stand and Beaters (五音鼓連架及棒子)</u>	1
50	<u>Zhangu with Stand and Beaters (戰鼓連架及棒子)</u>	1
51	<u>Shuangpigu with Stand and Beaters (雙皮鼓連架及棒子)</u> <i>Audio-visual Equipment</i>	1
52	<u>Projection system with screen</u>	1
53	<u>Media player (DVD/VCD/CD/Bluetooth/USB)</u> - conforming to all region code - capable of CD, VCD and DVD playback - connection to the stereo speakers below	1
54	<u>Microcomputer workstation</u> - DVD-RW Drive - MIDI-compatible - installation of music notation/sequencing software - connection to the stereo speakers below	1 set
55	<u>Pair of Stereo Speakers</u> - with amplification (Amplifier Power Output: 50W+50W RMS) - woofer ≥f 200mm - connection to the multimedia computer system and DVD player	1
56	<u>Mixer</u> - 8-12 Channels including Balance / Unbalance Microphone and Line Inputs with: Aux Channels with Send and Return EQ (Equalisation) <i>Other Electronic Equipment</i>	1
57	<u>Dehumidifier</u> <i>A Collection of Self-chosen Teaching Materials</i>	2 1 set
58	<u>Audio-visual materials (such as CDs, DVDs)</u>	
59	<u>Music Software (such as notation and/or sequencing software)</u>	
60	<u>Wall Charts</u>	
61	<u>Music Scores / Music Books</u>	
62	<u>Teachers' Reference Books</u>	
	Total Cost for Subject	234,300

Notes:-

- 1 School may consider using an 88-key digital piano with acoustics and touch similar to an upright piano.
- 2 School may consider using an 88-key digital piano with acoustics and touch similar to an upright piano.

**Reference List of Furniture and Equipment
for Secondary School**

Subject : Physical Education

Item No	Description	Quantity
	Part I - GENERAL EQUIPMENT	
	<i>Athletics</i>	
1	<u>Discus (rubber)</u> Weight : 1 kg Diameter :180 - 182 mm Thickness at centre : 37 - 39 mm Thickness of rim : 12 mm	2
2	<u>Discus (rubber)</u> Weight : 1.5 kg Diameter : 200 - 205 mm Thickness at centre : 37 - 42 mm Thickness of rim : 12 mm	2
3	<u>High jump cross bar (C)</u> Fibreglass, circular, with square ends. (AAA specifications)	1
4	<u>High jump stands</u> Two cross pieces at bottom of the stand to make a firm base with stays fixed diagonally to post. Sliding metal buckles for adjustment of height should be provided. Height : 1,830 mm	1 pair
5	<u>Hurdle</u> Adjustable plastic or foam training hurdle. Height can be adjusted to 762 mm, 840 mm, 914 mm, 990 mm and 1,067 mm.	12
6	<u>Relay baton (C)</u> Made of light aluminum.	20
7	<u>Javelin</u> For practice use, aluminum with cord grip and blunt plastic tips Weight : 600 gm	1
8	<u>Javelin</u> For practice use, aluminum with cord grip and blunt plastic tips Weight : 700 gm	1
9	<u>Shot (indoor)</u> Plastic case with vacuum moulded cap, lead shot filled. Weight : 3 kg	3
10	<u>Shot (indoor)</u> Plastic case with vacuum moulded cap, lead shot filled. Weight : 4 kg	3
11	<u>Shot (indoor)</u> Plastic case with vacuum moulded cap, lead shot filled. Weight : 5 kg	1
	<i>Dance</i>	
12	<u>Tambour or hand drum</u> With beater Dia : 250 - 300 mm	1
13	<u>Drum</u> With sticks Dia. : 250 - 800 mm	1
14	<u>Tambourine</u> With head & jingles Dia. : 250 - 300 mm	1
15	<u>Media player (DVD/VCD/CD/Bluetooth/USB)</u> (with or without cassette deck/minidisk deck) Conforming to all region code Capable of CD, VCD and DVD playback (with or without cassette deck/ minidisk deck) total output not less than 200 W PMPO, with built-in CD player, auto CD recording, synchro-start editing and tape duplication, and remote control functions, capable of operating on DC 6 - 12V and 220 - 240V 50 Hz single phase AC, bonded to earth through 3-core supply cable fitted with a 3-pin appropriately fused B.S.S. plug.	1 set
16	<u>Amplifier with portable microphone</u> <i>Gymnastics</i>	1
17	<u>Gymnastic mat</u> With Velcro corners, 1500 mm x 1000 mm x 60 mm	6
18	<u>Balance beam</u> Wooden beam with steel base. Layer is elastic and covered with non-slippery material. Local-made beam not recommended. Height : 700 - 1,200 mm, adjustable in 50 mm intervals Length : 5,000 10 mm Width of beam : 100 mm	1
19	<u>Low balance beam</u> Wooden beam with steel base. Layer is elastic and covered with non-slippery material. Height : 600 - 900 mm, adjustable in 100 mm interval Length : 3,500 mm Width of beam : 100 mm	1
20	<u>Gymnastic mat</u>	12

Item No	Description	Quantity
21	a) Airex (Swiss), sponge rubber Size : 1,523 mm x 1,219 mm x 32 mm OR b) Sarneige (French) Size : 1,523 mm x 1,219 mm x 40 mm <i>[School should choose either (a) or (b)]</i> <u>Horizontal bar</u> Made of polished steel with cable & hooks, may be fixed on floor for stability. Local-made bar not recommended. Bar : 2,400 2 mm (length), 28 mm $\pm$ 0.1 mm (dia.) Height of the bar : 1,200 - 2,500 mm, adjustable in 200 mm interval	1
22	<u>Parallel bars (with or without trolley)</u> With foot board. Remaining part made of steel or cast iron. Local-made bars not recommended. Bars : 3,500 10 mm (long) Dist. between bars : 420 - 480 mm Dist. of pivot points : 2,300 $\pm$ 3 mm Height of bars : 1,550 - 1,800 mm	1
23	<u>Spring board</u> Surface must be covered with non-slippery layer of strong elastic material. The elasticity must be most effective at the highest point. Local-made board not recommended Length : 1,200 5 mm Width : 600 3 mm Thickness : 120 - 140 mm (front brim)	2
24	<u>Uneven parallel bars (with or without trolley)</u> With foot board. The bars should be made of wood with braces to prevent total breaking. Local-made bars not recommended. Bar : 3,500 mm (length); Cross section of bar : 41 - 48 mm Distance between 2 bars (vertical plane) : 420 - 480 mm (easily adjustable) Height of upper bar : 2,300 10 mm Height of lower bar : 1,500 10 mm	1
25	<u>Vaulting box</u> In 5 sections, with casters, made of pinewood. Top cover made of best quality cow hide leather. Stuffing at top panel should be outstanding, firm and evenly distributed. Bottom : 1,300 mm x 900 mm Top : 1,300 mm x 350 mm Height : 1,000 mm <i>Racket Games</i> <i>(Badminton)</i>	2
26	<u>Badminton racket (C)</u>	40
27	<u>Shuttlecock (practice) (C)</u>	6 doz.
28	<u>Shuttlecock (competition) (C)</u>	6 doz.
29	The feather should be 16 pieces with the length of 64 - 78 mm	
29	<u>Badminton net (C)</u>	2
30	<u>Badminton stand</u>	2 pairs
31	Portable with solid base. Height : 1,550 mm <i>(Table tennis)</i>	
31	<u>Table tennis ball (C)</u>	72
32	<u>Table tennis bat (C)</u>	40
33	Wooden bladed, could be covered with plain pimpled rubber or sponge and pimpled rubber. The two faces should be in 2 different contrast dark colour.	
33	<u>Table tennis net & clamp (C)</u>	4 sets
34	<u>Table tennis table</u>	4
35	Hardwood or plywood or particle board in dark green or dark blue, could be folded and moved on rollers. Dimension : 2,740 mm x 1,525 mm Thickness : 16 - 30 mm Height : 762 mm (regular) <i>Swimming</i>	
35	<u>Kick board (C)</u>	40
36	<u>Swimming cap or rubber wrist band (C)</u>	45
37	<i>Team Games</i>	
37	<u>Match timer</u>	1
38	With start, stop & reset buttons. Two sweep hands recording minutes and seconds.	
38	<u>Number bib</u>	4
39	No. 1-15 /set, of light weight and made of nylon or cloth.	
39	<u>Score board</u>	1
40	Heavy duty plastic, 6-digit scorer with display on both sides for competitions, foldable.	
40	<u>Pump or compressor unit with metre</u>	1
	200 - 220V, 50 Hz, single phase A.C., earthed B.S.S. fused plug, 200W approx. 500g/sq. cm max. working pressure, without air receiver. Electric component & cabling conform to the latest B.S.S., earthing through 3 core supply cable.	

Item No	Description	Quantity
	<i>(Basketball)</i>	
41	<u>Basketball (size 6) (C)</u> For girls. Synthetic.	20
42	<u>Basketball (size 7) (C)</u> For boys. Synthetic.	20
43	<u>Basketball (size 6) (C)</u> For girls. Leather.	5
44	<u>Basketball (size 7) (C)</u> For boys. Leather.	5
45	<u>Basketball stand with protective pad, fibreglass backboard and ring</u> For open playground, specification must conform to the latest International Basketball Rules. Basketball stands should be adequately secured or anchored to the ground) (Price includes installation.)	2 pairs
46	<u>Basketball ring net (C)</u>	2 pairs
	<i>(Football)</i>	
47	<u>Football (size 4) (C)</u> Leather	20
48	<u>Football (size 5) (C)</u> Leather	20
	<i>(Handball)</i>	
49	<u>Handball (size 2) (C)</u> Synthetic	20
50	<u>Handball (size 3) (C)</u> Synthetic	20
51	<u>Handball (size 2) (C)</u> Leather	5
52	<u>Handball (size 3) (C)</u> Leather	5
53	<u>Handball goal with net (with or without trolley, and with or without anchors)</u> Post made of wood, metal or light metal painted in 2 contrasting colours. (Specifications must conform to the latest rules of the International Handball Federation) <i>(School should choose either type; i.e. with or without trolley/with or without anchors)</i>	1 pair
54	<u>Handball net (C)</u> Made of hemp or nylon.	1 pair
	<i>(Volleyball)</i>	
55	<u>Volleyball (practice) (C)</u> Leather. Regular size.	24
56	<u>Volleyball (competition) (C)</u> Leather, better quality. Regular size.	10
57	<u>Volleyball (soft) (C)</u> Made of foam material with PU cover Regular size.	20
58	<u>Volleyball net (C)</u> With 6.35 mm (dia.) flexible wire cable through the top edge canvas cover. Net : 9,500 mm x 1,000 mm Mesh : 100 mm Vertical tape : 1,000 mm x 50 mm Length of wire cable : 16,000 mm	1
59	<u>Volleyball post (with or without sockets)</u> Made of iron. Adjustable height. Dia. of post : 76 mm (Price includes installation.) <i>[School should specify either "with sockets" or "without socket".]</i>	1 pair
60	<u>Volleyball umpire stand</u>	1
61	<u>Rugby (Size 5) (C)</u> PU Cover or Leather.	10
62	<u>Rugby Tag</u> Team set: 10 pcs	2 sets
	<i>Fitness</i>	
63	<u>Bar bell</u> 1 stand and 1 bar. Weights : 7.5 kg (2 pcs) 5 kg (2 pcs) 2.5 kg (2 pcs) 2 kg (2 pcs) 1.25 kg (6 pcs) 1 kg (2 pcs) 0.5 kg (2 pcs) 0.25 kg (2 pcs)	1 set
64	<u>Dumb bell</u> Weight : 1.5 - 1.8kg	4 pairs

Item No	Description	Quantity
65	<u>Dumb bell</u> Weight : 2.5-2.7 kg	4 pairs
66	<u>Dumb bell</u> Weight : 3.5-3.7 kg	4 pairs
67	<u>Medicine ball</u> Rubber. Weight :1.5 - 1.8 kg	2
68	<u>Medicine ball</u> Rubber. Weight : 2.2 -2.7 kg	2
69	<u>Medicine ball</u> Rubber. Weight : 3.6 - 3.7 kg	2
70	<u>Skinfold calipers</u> Made of plastic, alloy or steel. Measuring scale : 0 - 50 mm, 1 mm interval	2
71	<u>Sit and reach box</u> Made of sturdy wood or comparable construction material. Measuring scale: should extend from about 9 - 50 cm with the 23 cm mark exactly in line with the vertical plane against which the feet will be placed.	2
72	<u>Inclined pull-up stand</u> Poles and bars made of steel Platform made of plywood Elastic rubber band 160 cm long Height: adjustable chinning bar between 25 cm and 155 cm. Foldable and lockable stand	2
73	<u>Handgrip dynamometer</u>	2
74	<u>Sphygmomanometer (digital)</u>	1
75	<u>Metronome</u> <i>Miscellaneous</i>	1
76	<u>Balance bench</u> With/ without two hooks at one end, made of hardwood or pinewood or fibre glass. Flank : 3,000 -3,350 mm x 250 mm Height : 350 mm Rib : 100 mm (width) 60 mm (thickness)	6
77	<u>Bean bag (C)</u> Made of good quality twill in bright colours, containing plastic beads or beans.	40
78	<u>Plastic bar</u> Smoothly finished. Length : 900 - 1,000 mm Dia. : 20 mm	20
79	<u>Plastic bar</u> Smoothly finished. Length : 1,200 - 1,500 mm Dia. : 20 mm	20
80	<u>Coloured band (C)</u> Made of braided cotton or nylon in bright colours. Length : 1,060 mm Width : 30 mm	40
81	<u>Hoop (large) (C)</u> Made of plastic or smoothly finished cane. Joint to be bonded, riveted and covered with resin glue. Dia. of hoop : 800 mm Dia. of cane : 20 mm	10
82	<u>Hoop (medium) (C)</u> Made of plastic or smoothly finished cane. Joint to be bonded, riveted and covered with resin glue. Dia. of hoop : 600 mm Dia. of cane : 20 mm	20
83	<u>Jump rope (C)</u> Length : 3,000 mm	40
84	<u>Jump rope (C)</u> Length : 7,000 mm	6
85	<u>Measuring tape</u> Made of steel, fibreglass or fabric. Length : 50 m	2
86	<u>Polypad</u> Made of strong urethane foam rubber. Cover made of strong canvas or nylon reinforced vinyl. Size : 2,440 mm x 1,830 mm x 200 mm (Schools must specify the material of the cover)	12
87	<u>Playground marker cone</u> Made of hard-wearing plastic. a) Height: 350 - 400 mm Base: 250 mm x 250 mm b) Height: 160 – 300 mm Base: 130-230 mm x 130-230 mm c) Height: 50 mm x 150 mm	24 20 20

Item No	Description	Quantity
88	Base: square or round <u>Multi-purpose marker cone set</u> Made of Plastic, with holes Height: 425 - 500 mm Base : 240 x 240 mm Pole: Length 1,600 mm with diameter : 250 mm	12
89	<u>Stop watch</u> 1/100 second. Measures accumulated split times.	8
90	<u>Quoit (C)</u> Rubber, in various colours. Dia. : 165 mm Weight : 280 g Dia. of rubber ring : 25 mm	40
91	<u>Weighing scale (digital)</u> With weight and body fat indicator	2
92	<u>Triangular body height measuring tape</u> Pull down when measuring height	2
Part II - FURNITURE FOR STORAGE OF EQUIPMENT		
93	<u>Plastic storage box</u> Size : 680 - 740 mm x 470 - 500 mm x 455 - 470 mm (H)	4
94	<u>Storage cabinet</u>	1
95	<u>Rack</u> Made of wood or metal with shelves. size : 1,830 mm x 610 mm x 1,675 mm (H)	1
96	<u>Basket drawers</u> Made of wire mesh/fibre with handle; Size:840mm (L) x 460mm(W) x 430 mm(H)	4
97	<u>Ballcages with casters (with or without lid)</u>	4
98	<u>Storage Trolley (with side door or sliding door)</u> made of wire-mesh, with adjustable shelves and non-marking multi-direction swivel casters. 1,500 x 1,500 x 650 mm Dia. of caster : 100 mm (School should choose either type; i.e. with side door or sliding door)	1
99	<u>Mat trolley (horizontal, with or without handle)</u> for gymnastic mats, made of painted G.I. tube, with swivel non-marking rubber multi-direction swivel casters. Length : 1,800 mm Width : 1,200 mm Diameter of tube : 25 mm Diameter of caster : 220 mm (Schools should choose either type; i.e. with or without handle)	1
100	<u>Polypad Trolley (vertical)</u> Made of painted G.I. tube with non-marking rubber multi-direction swivel casters. Length : 2,450 mm Width : 850 mm Height : 2,200 mm Dia. of tube : 25 mm Dia. of caster : 220 mm	2
Total cost for subject		444,200

**Reference List of Furniture and Equipment
for Secondary School**

Subject : Visual Arts

Item No	Description	Quantity
	<u>FURNITURE</u>	
1	<u>Working table</u> Working, 1,830 mm (L) x 920 mm (W) x 760 mm (H), formica top, mat finish, fixed teakwood leg, with open shelf underneath	10
2	<u>Wooden Panel for Working Table Tops</u> For working table tops 1,930 mm x 1,020 mm, about 12.7 mm thickness, with timber rail edges	10
3	<u>Stool</u>	40
4	<u>Teacher desk</u>	1
5	<u>Teacher chair</u>	1
6	<u>Cupboard with lock for media storage</u>	1
7	<u>Plan Chest</u> Steel, approx. 1,200 mm (W) x 915 mm (D) x 625 mm overall, fitted with 5 equal drawers	2
8	<u>First-aid Cabinet</u>	1
9	<u>Blackout Curtains</u>	1 set
	<u>EQUIPMENT</u>	
10	<u>Trolley</u> Stainless steel, with 3 tiers	1
11	<u>Hair Dryer (blower with handle)</u> For drying prints including hot and cold air, approx. 1,000W / 220V / 50Hz AC (or use standard specifications "spec. 60/07/02 C(6)" issued by the Electrical and Mechanical Services Department)	2
12	<u>Domestic Iron</u> Operating on approx. 1,000W / 220V / 50 Hz AC. With adjustable thermostat control and indicating self- resetting (e.g. General Electric, National)	2
13	<u>Paper Trimmer</u> Rotary trimming blade, cut length 610 mm. The maximum thickness of cut is about 3 mm	1
14	<u>Drawing Board</u> Plywood, 8mm thick, size A2 (420 mm x 594 mm)	40
15	<u>Palette</u>	40
16	<u>Light Box for Screen Printing</u>	1
17	<u>Squeegee for Screen Printing</u> Assorted sizes: (20 nos.)	1 set
18	<u>Etching Press</u> Steel bed plate size at least 330 mm x 660 mm x 6 mm approx. With upper and lower rollers. Four-arm spoked drive wheel. Fitted with one sheet of felt blanket and one oiler	2
19	<u>Scissors</u> 150 mm, stainless steel	40
20	<u>Staple Gun</u> (e.g. Rapid 13 or equivalent)	5
21	<u>Stapler</u> (e.g. Max. HD-10 or equivalent)	40
22	<u>Staple Remover</u> (e.g. Max. R2 or equivalent)	5
23	<u>Knife</u> 130 mm blade	40
24	<u>Woodblock Cutters</u> Heavy duty, 6 shapes in box, with grind stone and baren	40 boxes
25	<u>Lino Dabber</u>	40
26	<u>Bench Hook</u>	40
27	<u>Plastic Mug</u> 100 mm diameter	40
28	<u>Palette Knife</u> 100 mm blade	10
29	<u>Paper Cutter</u> With chipable, retractable blade and safety lock (e.g. N.T. Cutter, S200 or equivalent)	40

Item No	Description	Quantity
30	<u>Mat Cutter with Guide Rail</u> For picture frames cutting. (e.g. Logan Model 440 or equivalent)	1
31	<u>Oval and Circle Cutter</u> (e.g. Logan Model 201 3-step oval and circle cutter or equivalent)	1
32	<u>Ruler</u> Plastic, 450 mm	40
33	<u>Ruler</u> Wooden or plastic, 1 meter long	1
34	<u>T-square, A1</u> Hardwood, length of blade 920 mm	2
35	<u>T-square, A2</u> Hardwood, length of blade 650 mm approx.	5
36	<u>Set Square</u> Plastic, 45°, 60°, 30°, 200 mm in set	5 sets
37	<u>Cutting Mat</u> Plastic, 3 layers structure (soft P.V.C. sandwiches hard P.V.C. board), double sided usage, 300 mm x 450 mm, 3 mm thickness	40
38	<u>Lino Roller</u> 100 mm - 5 nos. 150 mm - 5 nos. 270 mm - 2 nos. (rubber)	1 set
39	<u>Claw Hammer</u> 450 g head	2
40	<u>Screw Driver</u> 100 mm blade length, 6 mm tip	2
41	<u>Screw Driver</u> 150 mm blade length, 8 mm tip	2
42	<u>Hand Drill</u> 6 mm capacity, overall length about 330 mm	2
43	<u>Hand Saw</u> Length 400 mm, 10 points per 25 mm	1
44	<u>Pliers</u> Round nose, overall length 150 mm	10
45	<u>Pliers</u> Combination, overall length 150 - 250 mm	10
46	<u>Pincers</u> Carpenter, overall length 150 - 250 mm	2
47	<u>Tenon Saw</u> Length 250 mm, 11 to 20 points per 25 mm	1
48	<u>Hacksaw</u> Adjustable, to take blades up to 310 mm	2
49	<u>File</u> Needle, second cut, 12 assorted shapes	1 set
50	<u>File</u> Flat, rough with handles, overall length about 250 mm	1
51	<u>File</u> Flat, smooth, with handles, overall length about 250 mm	1
52	<u>Rasp</u> (Chinese style - small size)	1
53	<u>Chisels</u> Firmer, square edge, with handles, 6 mm/10 mm/12 mm/20 mm (2 of each size)	1 set
54	<u>Gouges</u> Firmer outcannelled, with handles, 6 mm/10 mm/12 mm (4 of each size)	1 set
55	<u>Centre Punch</u>	2
56	<u>Nail Punch</u> Point diameter 2 mm and 3 mm (one of each)	2
57	<u>"G" Clamp</u> 100 mm	1
58	<u>"G" Clamp</u> 150 mm	1
59	<u>Stainless Steel Ruler</u> 300 mm	2

Item No	Description	Quantity
60	<u>Stainless Steel Ruler</u> 600 mm	1
61	<u>Drying Rack</u> Steel, spray painted, 50 tiers with spring action for shelves. Size of wire mesh shelves : 700 x 920 mm, approx., mesh opening not larger than 200 x 200 mm. Overall dimension: 740 x 940 x 1,350 mm, approx. with four rollers (80 mm diam. approx.)	1
62	<u>Teacher Reference Books</u>	1set
63	<u>Electric Ceramic Kiln</u> (a) Framework : The kiln shall be robustly constructed and the kiln door shall be mounted on strong hinges allowing easy but firm closing. There shall be a spy-hole situated in the door for cone sighting. If the kiln is a side-loading type, it shall be provided with an integral metal stand. (b) Firing Chamber : Firing chamber capacity shall be about 80 litres and shall be lined with low conductivity materials and faced with special high temperature refractory insulation bricks. (c) Heating element : The heating elements shall be made of long lasting high temperature wire and shall not be more than 6KW and at 200V. The elements shall be securely carried. (d) Control : For the control and regulation of firing, the ceramic kiln shall be fitted with the following items : (i) an energy regulator; (ii) a temperature indicator/control device incorporated with thermocouple; (iii) an automatic time controller for predetermined firing control. (e) Firing temperature : The maximum firing temperature shall be 1,260°C or above. The heat-up time required to reach 1,000°C shall not be more than 8 hours. (f) Safety : The ceramic kiln shall be suitable and safe to use in schools. It shall be equipped with at least three electrical safety precautions : (i) a warning light which glows whenever the elements are live; (ii) a door-operated switch to disconnect the electrical automatically as the door is opened; (iii) a key-operated switch/door lock, or has provision for fitting a padlock for the kiln door to prevent unauthorized opening of the kiln. (g) Accessories : (i) Bat, refractory, about 15 mm thickness, size to match the kiln; (12 pcs) (ii) Prop, tubular, about 100 mm long. (20 pcs)	1
64	<u>Potters' Kick Wheel</u> All moving parts fitted with bearings (wheel-head 250 mm)	4
65	<u>Turntable</u> 250 mm diam. for pottery	10
66	<u>Clay Storage Bin with Lid</u> Water proof, plastic, min., capacity, 35 litres	4
67	<u>Turning Tools</u> Assorted shapes, 4 in a set	4 sets
68	<u>Modelling Tools</u> Wood, assorted shape, 10 in a set	10 sets
69	<u>Rolling Pin</u> Wooden, 510 mm long approximately, for rolling clay	10
70	<u>LED Spotlights</u> 3 pieces of LED spotlight (continuous, daylight) with tripod stand for photography	1
71	<u>IT Equipment for Visual Arts</u> (A) <u>Microcomputer workstation for graphic use, teacher</u> Specifications: with software items for: word processing graphic picture and photo processing video editing presentation animation (B) <u>Microcomputer workstation for graphic use, student</u> Specifications: with software items for: word processing graphic picture and photo processing video editing presentation animation (C) <u>Pressure Sensitive Drawing Tablet</u> - Pressure levels: 1,024 - Active area: 15 x 20 cm (D) <u>Digital Camera with Accessories</u> Specifications: for High Definition photo and video shooting with AVI and HDMI tripod moisture proof plastic box for storage (F) <u>Printer or printer cum scanner (small)</u>	1
		5
		1
		4
		1
72	<u>Projection system with screen</u>	1
	Total Cost for Subject	379,300

**Reference List of Furniture and Equipment
for Secondary School**

Subject : Design & Technology

Item No	Description	Quantity
	<u>(A) FURNITURE</u>	
1	<u>Square woodwork bench</u> 1,070 mm (L) x 1,070 mm (W) x 760 mm (H)	2
2	<u>Square woodwork bench</u> 1,070 mm (L) x 1,070 mm (W) x 800 mm (H)	3
3	<u>Design table</u> 1,800 mm (L) x 1,000 mm (W) x 760 mm (H), heavy-duty tabletop covered with light-covered plastic laminated sheet, sturdy metal underframe.	3
4	<u>Demo Bench</u> 1,800 mm (L) x 800 mm (W) x 700 mm (H), heavy-duty tabletop covered with light-coloured plastic laminated sheet, sturdy metal underframe.	1
5	<u>Stool</u> Stackable, 460 mm height, made from plastics or hardwood.	20
6	<u>Trolley</u> Stainless steel, 4 shelves, rubber casters	2
7	<u>Bin for inflammable fluids</u> 760 mm (L) x 450 mm (W) x 380 mm (H) (20 SWG G.I.)	2
8	<u>Cabinet, first aid</u>	1
	<u>(B) COMPUTER-AIDED DESIGN WORKSTATION & TECHNOLOGY KITS</u>	
9	<u>Computer workstation</u>	21
10	<u>Integrated software pac</u> MS Chinese/English Office (Standard suite) (Education Version)	21
11	<u>3-D CAD software</u> Inventor/SolidWorks /ProENGINEER or equivalent (Education Version)	21
12	<u>Animation software</u> 3D Studio VIZ or equivalent (Education Version)	21
13	<u>Computer graphics software</u> - CorelDRAW or equivalent (Education Version)	21
14	<u>CAL on Electronics</u> Interactive, simulate electronic circuits (Education Version)	1
15	<u>Printer or printer cum scanner (small)</u>	1
16	<u>Digital video camera</u>	4
17	<u>Mechanisms kit</u> for introduction of mechanical components, structures and forces, completed with building instruction sheets and storage unit. Class pack is preferable.	2
18	<u>Pneumatics kit</u> for constructing simple pneumatic systems, completed with teacher's manual and instruction sheets. An air pump unit (without cylinder) should be included.	1
19	<u>Robotics kit</u> Robotics kit, completed with interface, capable of simulating a variety of manufacturing processes such as pick and place, sorting, assembling. (Site license preferable)	3
20	<u>Learning kit for electronics</u> DC operated electronics system with decisions module containing AND, OR, NOT gates and other accessories such as micro-switch, sensors, battery, connecting leads. Completed with teacher's manual & worksheets. Class pack is preferable.	1
21	<u>Learning kit for computer / microcontroller control</u> completed with the following essential elements:- - flowchart-based control software - text-based control software - interface with i/o ports/adapters - set of digital i/o devices and sensor devices - motorised model e.g. 'Buggy' or manufacturing unit - building guide and publication resource Site license of software is preferable, if applicable.	3
22	<u>Laser Cutter and Engraver</u> Completed with odour reduction and exhaust system	1
	<u>(C) PLASTICS & ELECTRICAL EQUIPMENT</u>	
23	<u>Strip heater</u> for heating acrylic sheets, 500 mm length, 220V 50Hz single phase A.C., 1 kW approx., electrical components and cabling conform to the latest B.S.S. earthing through 3-core supply cable.	1
24	<u>Oven (curing)</u>	1

Item No	Description	Quantity
25	220V, approx. 1,000W, single phase, up to 300oC, electrical components and cabling conformed to the latest B.S.S. earthing through 3-core supply cable, exterior temperature 50oC at max. optimum temperature, safety door interlock, firing chamber approx. 250 x 300 x 450 mm. <u>Vacuum former (manual)</u> capable of blank size 300 mm x 300 mm end up to 2 mm thick sheet. Heating element is 1.5 kW. Vacuum pump is self-contained unit, 200W. Electrical components and cabling conform to the latest B.S.S. Operated on 220V, 50 Hz single phase A.C. and earthing through 3 core supply cable.	1
26	<u>Multimeter</u> battery operated.	4
27	<u>Glue gun</u> for 11mm dia. glue-sticks, double insulated, 220V 50 Hz A.C.	10
28	<u>Electric soldering iron with stand</u> 220V 50 Hz, single phase A.C., 25W.	4
29	<u>Electric soldering iron with stand</u> 220V 50 Hz, single phase A.C., 125W.	1
30	<u>Electric soldering iron with stand</u> 220V 50 Hz, single phase A.C., 240W.	1
31	<u>Hand engraver</u> 220V 50 Hz single phase A.C., variable stroke control, electrical components and cabling conformed to the latest B.S.S., earthing through 3 core supply cable.	1
32	<u>Power hand drill with accessories</u> single phase, 220V 50 Hz 2 speed - 1,150 r.p.m. and 2,300 r.p.m., double insulation, heavy duty motor with ball bearings, capacity 10 mm, earthing through 3 core supply cable.	1
33	<u>Solid state D.C. power supply</u> mains input 220V A.C. 50 Hz, Output 0 - 20V D.C., 0 - 2A approx. on-off switch with indicator lamp, earthing through 3 core supply cable.	2
34	<u>(D) MACHINERY</u> <u>Drilling machine</u> bench model, 13 mm drilling capacity, 100 mm spindle travel, chuck and adequate chuck guard, push button starter with overload protection and no-volt release unit with operating coil designed for 220V, 370W, 3 phase, 380V 50 cycles AC motor, safety belt guard. (To comply with E. & M. standard specification and F. & I. U. Ord. & Regulations)	2
35	<u>Circular saw</u> bench, 250 mm, tilt-arbor depth of cut at 45o, 50 mm, depth of cut at 90o, 70 mm max., quick release safety guard fitted to riving knife, precision machined rip-fence locks back and front of table with single lever, fine adjustment through rack and pinion, extra heavy close grained cast iron table unit size 700 x 700 mm. 1.5 Kw, 3 phase, 380V, 50 cycle motor A.C. supply. Push button starter with no-volt release unit with coil designed to operate at 220V with over-load protection; accessible door for saw dust removal. (To comply with F. & I. U. Ord. & Regulations)	1
36	<u>Chip extractor for woodworking machine</u> mobile extractor, 220V, 50 Hz single phase A.C., motor driven at 560W with airflow rate 0.2m3/s approximately. Supplied with 2.5 m long flexible hose of 100 mm dia. Electrical components and cabling conform to the latest B.S.S., earthing through 3-core supply cable.	1
37	<u>Power disc sander</u> bench type, 260±50 mm dia. Disc, with 550W motor, single phase, 220V, 50 cycles A.C. supply, mounted on solid cast iron bases. Fitted with fixed disc guard covering the major part of disc, leaving only the portion of the disc in use, and supplied with dust extraction port. Push button overload and no-volt release starter for 220V supply. (To comply with latest F. & I.U. Ord. & Regulations.)	1
38	<u>Jigsaw</u> bench model, stroke of blade 25 mm, 400 mm throat, size of table approx. 200 x 225 mm, 720 strokes per min. 200 W motor, single phase, 220V, 50 cycles A.C. supply, earthing through 3 core supply cable. Safety guard must be included.	2
39	<u>Metalworking lathe</u> metric model, 250 mm, on cabinet base to admit 560 mm between centres, with 560W 3-phase motor and lever controlled gear change mounted inside the cabinet base, push button starter with overload protection and no-volt release unit with operating coil designed for 220V. Electrical equipment to be fully tropicalised and suitable for 380V, 50Hz, 3 phase A.C., emergency stop button at convenient position, chuck guard with safety interlocking device, suds pump and fitting, single phase low voltage lighting unit preferably 24V but not exceeding 50V and saddle limit switch (electrical/mechanical). Accessories include:- (i) 125 mm 3-jaw self centring chuck and backplate (ii) 150 mm 4-jaw independent chuck and backplate (iii) Rear splash guard for cabinet base (iv) Drill chuck 12.5 mm capacity (v) Set of toolholders for 4-way toolpost	1
40	<u>Double-ended grinder</u> bench type, spindle speed at 2,100 rpm approx.; 200 dia. Grinding wheels; wheel guards made from heavy steel plate, adjustable tool rests, safety eye shields; 560W motor, push button overload and no-volt release starter, suitable for 380V, 3 phase, 50Hz A.C. supply. (To comply with E&M standard specifications and F & I U Ord. & Reg.)	1
41	<u>(E) HAND TOOLS</u> <u>Bench hook</u> Beech, size 150 x 250 mm	20
42	<u>'Carborundum' stone</u> silicon carbide, rectangular type, one side coarse and one side fine	1
43	<u>Abrasive wheel dresser</u> suitable for dressing up to 510 mm dia. Dia of cutters 33 mm	1
44	<u>Adjustable tap wrench</u> bar type 6 - 12 mm	2

Item No	Description	Quantity
45	<u>Adjustable tap wrench</u> bar type 1.5 - 6 mm	2
46	<u>Bevel</u> Sliding blade 188 mm, hardwood stock with brass protected ends and brass lever locking nut	2
47	<u>Bit</u> countersink rosehead, 13 mm dia. straight shank dia. 5 mm	2
48	<u>Bit</u> forstner, straight shank 19 mm dia	1
49	<u>Bit</u> forstner, straight shank 13 mm dia	1
50	<u>Bit</u> countersink rosehead, 10 mm dia. straight shank dia. 5 mm	2
51	<u>Bit</u> forstner, straight shank 25 mm dia	1
52	<u>Brace</u> ratchet 200 mm sweep, alligator jaws, ball-bearing head.	2
53	<u>Brace bit</u> Centre, fast cutting 25 mm dia., square shank	1
54	<u>Brace bit</u> Centre, fast cutting 19 mm dia., square shank	1
55	<u>Brace bit</u> Centre, fast cutting 16 mm dia., square shank	1
56	<u>Brace bit</u> centre, fast cutting 13 mm dia., square shank	1
57	<u>Brace bit</u> centre, fast cutting 10 mm dia., square shank	1
58	<u>Brace bit</u> solid centre auger (Jenning Pat.) 16 mm dia	1
59	<u>Brace bit</u> solid centre auger (Jenning Pat.) 13 mm dia	1
60	<u>Brace bit</u> solid centre auger (Jenning Pat.) 10 mm dia	1
61	<u>Brace bit</u> solid centre auger (Jenning Pat.) 6 mm dia	1
62	<u>Brace bit</u> solid centre auger (Jenning Pat.) 19 mm dia	1
63	<u>Bract bit</u> Centre, fast cutting 22 mm dia., square shank	1
64	<u>Bradawl</u> 38 mm blade, with pinned end size, hardwood handle	4
65	<u>Calipers</u> outside firm joint, 200 mm	1
66	<u>Calipers</u> inside 150 mm, firm joint	1
67	<u>Calipers</u> outside 150 mm, firm joint	3
68	<u>Centre punch</u> 5 mm point dia x 100 mm long, round head	10
69	<u>Chisel</u> bevel edge 25 mm, plastic handle	10
70	<u>Chisel</u> bevel edge, 19 mm blade, plastic handle	10
71	<u>Chisel</u> bevel edge 16 mm, plastic handle	10
72	<u>Chisel</u> bevel edge 13 mm, plastic handle	10
73	<u>Chisel</u> bevel edge 10 mm, plastic handle	10
74	<u>Chisel</u>	10

Item No	Description	Quantity
75	bevel edge 6 mm, plastic handle <u>Chisel</u>	20
76	square edge, firmer, 19 mm ash handle <u>Chisel</u>	20
77	square edge, firmer, 13 mm ash handle <u>Chisel</u>	20
78	square edge, firmer, 6 mm ash handle <u>Chisel</u>	5
79	sash mortice, 13 mm blade, beech handle <u>Chisel</u>	10
80	sash mortice, 8 mm blade, beech handle <u>Chisel</u>	20
81	sash mortice, 6 mm blade, beech handle <u>Cold chisel</u>	2
82	flat, octagon steel, 12 mm blade width x 150 mm long <u>Cold chisel</u>	1
83	cross cut, octagon steel, 6 mm blade width x 150 mm long <u>Compasses</u>	2
84	wing 200 mm <u>Cork</u>	4
85	rubbing block <u>Cramp</u>	12
86	'G' ribbed, 150 mm <u>Cramp</u>	12
87	'G' ribbed, 100 mm <u>Cramp</u>	12
88	'G' ribbed, 50 mm <u>Cramp</u>	4
89	'G' ribbed, 200 mm <u>Cramp</u>	4
90	sash, 900 mm length out of steel bar <u>Cramp</u>	4
91	sash, 600 mm length out of steel bar <u>Die stocks for circular die</u>	2
92	21 mm, O.D. <u>Die stocks for circular die</u>	2
93	25 mm, O.D. <u>Dividers</u>	2
94	150 mm quick solid nut, spring type <u>Set of drill morse</u>	2
95	twist, straight shank, H.S.S <u>Drill</u>	2
96	hand, 8 mm capacity, machine cut gears and pinion, double pinion with all bright parts plated <u>Enamel trough</u>	1
97	152 x 250 x 50 mm <u>Engineer steel square</u>	10
98	150 mm <u>Engineers' combination pliers</u>	2
99	150 mm <u>Engineers' H.S.S. hand taps</u>	2
100	metric M3 x 0.5 (set of 3) <u>Engineers' H.S.S. hand taps</u>	2
101	metric M5 x 0.8 (set of 3) <u>Engineers' H.S.S. hand taps</u>	2
102	metric M6 x 1 (set of 3) <u>Engineers' H.S.S. hand taps</u>	2
103	metric M8 x 1.25 (set of 3) <u>Engineers' H.S.S. hand taps</u>	2
	metric M10 x 1.5 (set of 3)	

Item No	Description	Quantity
104	<u>Face shield</u> for general eye and face protection, with 200 mm adjustable clear vizor and adjustable crown strap	2
105	<u>File card</u> 50 mm wide, 100 mm long.	6
106	<u>File</u> taper, saw, slim, 150 mm	6
107	<u>File</u> taper, saw, extra slim 100 mm	6
108	<u>File</u> half round, 2 nd cut, 200 mm	5
109	<u>File</u> round, 2 nd cut, 200 mm	5
110	<u>File</u> square, 2 nd cut, 200 mm	5
111	<u>File</u> surform, 250 mm blade, plastic handle	2
112	<u>File</u> hand, safe edge, bastard, 250 mm	20
113	<u>File</u> hand, safe edge, 2 nd cut, 200 mm	10
114	<u>Gauge</u> cutting, beechwood head and half round stock, brass facing strips and plastic thumbscrew	1
115	<u>Gauge</u> marking, beechwood head plastic thumbscrew and stock	20
116	<u>Gauge</u> mortice, rosewood head and stock, brass facing strips on stock, thumbscrew operated slide, knurled screw for fixing stock	2
117	<u>Gloves</u> leather	1
118	<u>Hacksaw</u> adjustable, 230 mm telescopic pattern, depth of bow 90 mm, hard wood handle	20
119	<u>Hammer engineers' ball pein</u> ash handle, 900 g	1
120	<u>Hammer</u> claw, 450 g Adze eye	1
121	<u>Hammer</u> Warrington, 226 g, ash handle	5
122	<u>Hand lever operated shear</u> length of blade 180 mm for cutting plate and round steel.	1
123	<u>Hand riveter</u> capable of riveting 2.4, 3.2, 4 and 4.8 mm diameter rivets by means of inter-changeable nose-pieces	2
124	<u>Hand vice</u> 50 mm width x 125 mm drop forged steel, bright jaws, spring type	2
125	<u>Knife</u> marking, plastic handle, steel blade 150 mm overall length	10
126	<u>Letter stamps</u> 5 mm (27 in case)	1
127	<u>Level</u> spirit, multi-view, plastic body, 230 mm long	2
128	<u>Machine vice</u> 100 mm jaw width, 32 mm depth of jaw, jaw opening 75 mm. Suitable for holding round and square sections, with knurled handle.	2
129	<u>Mechanic vice</u> 100 mm jaws, with plastic vice grips	20
130	<u>Machinist scriber</u> 115 mm long	10
131	<u>Machinists screwdriver</u> 267 mm overall, chrome vanadium blade, 8 mm square x 150 mm long securely pinned in handle	1
132	<u>Mallet</u> carpenter, beechwood head and handle 125 mm	20
133	<u>Mitre block</u>	1

Item No	Description	Quantity
134	beechwood, 300 mm x 100 mm x 50 mm <u>Mitre square</u>	2
135	250 mm fixed blade, rosewood handle <u>Needle file</u>	3
136	round handle 140 mm warding, 3 square <u>Needle file</u>	6
137	round handle 140 mm warding <u>Nippers, end cutting, 125 mm</u>	2
138	<u>Nippers, side cutting, 125 mm</u>	5
139	<u>Number stamps, 5 mm (9 or 10 in case)</u>	1
140	<u>Odd leg calipers</u>	2
141	firm joint, 125 mm <u>Oil can</u>	1
142	valve spout, 85 c.c. conical tin spring valve <u>Philips driver set</u>	2
143	<u>Piercing saw frames</u>	2
144	adjustable, blade length up to 150 mm, depth of bow 70 mm <u>Pincers</u>	4
145	carpenter, 150 mm <u>Plane</u>	20
146	smoothing, adjustable iron <u>Pliers</u>	1
147	combination, 150 mm insulated <u>Pliers</u>	1
148	end cutter, 150 mm <u>Pliers</u>	5
149	flat nose, smooth jaw, 125 mm <u>Pliers</u>	5
150	round nose, 125 mm <u>Punch</u>	2
151	centre, 10 mm dia. knurled <u>Rasp</u>	6
152	wood, 200 mm, half round, hardwood handle, smooth <u>Rasp</u>	6
153	wood, 200 mm, flat, hardwood handle, smooth <u>Rasp</u>	6
154	wood, 200 mm, half round, hardwood handle, bastard <u>Rasp</u>	6
155	wood, 200 mm, flat, hardwood handle, bastard. <u>Respirator</u>	4
156	soft PVC face mask, micro foam filter, adjustable plastic headband <u>Round split dies, H.S.S.</u>	2
157	metric M3 x 0.5, 21 mm O.D. <u>Round split dies, H.S.S.</u>	2
158	metric M5 x 0.8, 21 mm O.D. <u>Round split dies, H.S.S.</u>	2
159	metric M6 x 1, 21 mm O.D. <u>Round split dies, H.S.S.</u>	2
160	metric M8 x 1.25, 25 mm O.D. <u>Round split dies, H.S.S.</u>	2
161	metric M10 x 1.5, 25 mm O.D. <u>Rule</u>	20
162	stainless steel, 300 mm, graduated in inches and mm <u>Rule</u>	4
163	stainless steel, 600 mm, graduated in inches and mm <u>Safety goggle/spectacle</u>	20
164	comply with B.S.S. or equivalent <u>Saw set</u>	1
165	<u>Saw</u>	20

Item No	Description	Quantity
166	coping, 163 mm coping saw blade, pinned ends, depth of bow 120 mm. <u>Saw</u>	1
167	cross cut, 600 mm skewback, 8 T.P.I. beech handle <u>Saw</u>	1
168	keyhole, hardwood handle <u>Saw</u>	2
169	keyhole, blades, 250 mm, fine <u>Saw</u>	1
170	panel, 500 mm 10 T.P.I. beech handle <u>Saw</u>	1
171	rip, 650 mm, 6 T.P.I. beech handle <u>Saw</u>	20
172	tenon, brass back 250 mm, beech handle. <u>Saw</u>	10
173	piercing <u>Screwdriver</u>	6
174	cabinet pattern, 150 mm blade. <u>Screwdriver</u>	2
175	cabinet pattern, 200 mm blade <u>Screwdriver</u>	6
176	engineer fluted, plastic handle 100 mm <u>Screwdriver</u>	6
177	engineer fluted, plastic handle 75 mm <u>Sheetmetal bender</u>	1
178	bench type hand-operated, capable of bending steel sheets 0.6 mm thick and aluminum sheets 1.5 thick <u>Spanner set</u>	2
179	double end type, 6 mm - 24 mm <u>Spokeshave</u>	5
180	metal, flat bottom, adjustable iron, 250 mm long 50 mm cutter <u>Spokeshave</u>	5
181	metal, round bottom, adjustable iron, 250 mm long 50 mm cutter <u>Square</u>	2
182	mitre combination, 300 mm <u>Tape measuring</u>	5
183	3 m long, high impact electroplated chrome finish case, automatic rewind with locking switch <u>Tinmen's boxwood mallets</u>	4
184	75 mm, ash handle <u>Tinmen's groove punches</u>	1
185	3 mm <u>Tinmen's groove punches</u>	1
186	5 mm <u>Tinmen's groove punches</u>	1
187	6 mm <u>Tinmen's rivet sets</u>	1
188	3 mm <u>Tinmen's rivet sets</u>	1
189	5 mm <u>Tinmen's rivet sets</u>	1
190	6 mm <u>Tinmen's snips</u>	4
191	straight blade 250 mm <u>Tinmen's snips</u>	4
192	curved blade 250 mm <u>Trysquare</u>	1
193	300 mm rosewood stock faced with brass, blade secured with brass diamonds <u>Trysquare</u>	20
194	150 mm rosewood stock faced with brass, blade secured with brass diamonds. <u>Tweezers</u>	8
	pointed, stainless steel, 200 mm	

Item No	Description	Quantity
195	<u>Universal surface gauge</u> one pillar, height 300 mm base length 75 mm, base width 75 mm	1
196	<u>Vee-blocks and clamp</u> cast iron, 50 mm x 40 mm sq., 40 mm dia. Capacity, two 90° vees having different capacities, vees truly centre	1
197	<u>3D Printer</u> Using FDM / SLA printing technology or equivalent Minimum print volume 150x150x150mm	1
198	<u>3D scanner</u> Depth Precision ± 0.05 mm Minimum scan volume 100x100x100mm	1
199	<u>Vinyl cutter</u> Minimum cutting width 290mm	1
Total Cost for D&T		423,900

**Reference List of Furniture and Equipment
for Secondary School**

Subject : Home Economics (Room I)

Item No	Description	Quantity
	<u>FURNITURE</u>	
1	<u>First-aid cabinet</u>	1
2	<u>Student chair</u>	1
3	<u>Stool</u>	24
4	<u>Work table</u>	11
5	<u>Trolley</u>	2
	<u>EQUIPMENT</u>	
	<i>Appliances - Gas</i>	
6	<u>Cooker</u> Domestic, Asian style, free standing, consists of 4 burners (2 middle burners and 2 big burners with inner and outer rings), automatic ignition, height 200 mm approx., with flame failure devices.	7
7	<u>Cooker</u> Domestic, full size, completed with automatic ignition, consists of a separate grill compartment, 4 - burner hotplate of 2 sizes, with flame failure devices for the burners and the oven.	5
	<i>Appliances - Electrical</i>	
8	<u>Cooker</u> Domestic, consists of 4 radiant rings with 2 economy mini/maxi rings, with control panel for different functions, i.e. grill and oven, oven temperature in degree Celsius ranged from 150°C - 250°C, should be suitable for use on 200 - 220 Volts, 50Hz., 60 Ampere power supply.	1
9	<u>Dish Washer</u> with a capacity of washing 12 culinary sets, 2 washing temperatures and 4 - 6 washing programmes, stainless steel tub, adjustable basket.	1
10	<u>Dryer, Tumble</u> capable of drying 3 - 5 kg dry weight of wash with 2 temperature settings, loading of heaters shall be of 2,000W approx.	1
11	<u>Hot Water Pot</u> Electric, with a capacity of 3 litres, water level indicator, boil and reboil function, detachable lid with power of 600 - 700W.	1
12	<u>Induction Cooker</u> On/Off switch with different power level control, ceramic top plate, overheat sensor, protection fuse with power of 1,300 - 1,600W.	1
13	<u>Iron</u> electric, steam with thermostat, loading of 1,200W or above.	2
14	<u>Mixer</u> electric : (a) Egg beater 3 - 5 speed control with 2 beaters and 2 dough hooks, with/without stand and bowl with power of 150 - 180W.	6
	(b) Liquidizer 2 - 4 speed control switch, glass container with 1 - 1.5 litre capacity, detachable blades with power of 400 - 750W.	6
15	<u>Multi-purpose Food Preparation Machine</u> stainless steel bowl (approximately 4.3 litre capacity), with special attachments : e.g. Dough hook, Whisk, K-beater, Pasta Extruder, Multi-Mill and Mincer with power of 600 - 700 W.	1
16	<u>Oven, Microwave</u> electric, oven capacity of approximately 23 litre, loading of 900W, fully automatic with timer, safety door lock and at least 3 microwave settings.	2
17	<u>Processor, Food</u> stainless steel blade with different functions, e.g. slicing, shredding, grating, chopping with safety lock device, bowl volume of at least 1- litre capacity, with blender and juice extractor attachments with power of 500 - 700W.	2
18	<u>Refrigerator</u> Net capacity of 300 - 450 litres, frost-free type	2
19	<u>Rice Cooker</u> electric, medium (capacity for 6 - 8 persons), automatic release button, hinge spring for auto lid opening, with power of 600 - 650W.	3
20	<u>Rice Cooker</u> electric, small, (capacity for 2 - 4 persons) automatic release button, hinge spring for auto lid opening, with power of 300 - 450W.	3
21	<u>Washing Machine</u> fully automatic with selectable programmes for washing and spin drying, capable of washing 5 kg dry weight of wash, front loading, provided with a cold and hot water washing facility.	1
	<u>MISCELLANEOUS</u>	
22	<u>Blanket</u> Fire Fighting	1
23	<u>Board</u> Ironing, metal : (a) Sleeve (b) Standard	2 2

Item No	Description	Quantity
24	<u>Drying Equipment</u> portable, indoor, durable steel frame with rust proof and rounded drying line fittings, adjustable multi-position, additional rubber fittings on the feet for improved stability.	2
25	<u>Water Purifier</u> free standing or built in type with replaceable filter, contain filter cartridge life checker and safety valve to prevent damage to purifier.	7
	<u>SMALL EQUIPMENT</u>	
	<i>Bamboo-Wooden-Cane Utensils</i>	
26	<u>Board</u> Chopping, 30 cm to 33 cm dia.x 4 cm approx.	13
27	<u>Board</u> Chopping, Oblong, 35 cm x 22 cm x 2.5 cm approx.	13
28	<u>Cake Mould</u> small	6
29	<u>Cake Mould</u> medium	6
30	<u>Chopsticks</u> Bamboo	23
31	<u>Chopsticks</u> Bamboo, extra long	23
32	<u>Panstand</u>	24
33	<u>Pin</u> Rolling, Wooden, Chinese	13
34	<u>Pin</u> Rolling, Wooden, Western	13
35	<u>Spoon</u> Wooden, small	24
36	<u>Steamer</u> Bamboo with cover, 14 cm dia.	13
37	<u>Steamer</u> Bamboo with cover, 28 - 30 cm dia.	6
38	<u>Tray</u> Service <i>Metal (aluminum, stainless steel etc.)/Plastic Utensils</i>	3
39	<u>Board</u> Chopping, Plastic, 18 cm x 25 cm approx.	13
40	<u>Board</u> Chopping, Plastic, 35 cm x 20 cm approx.	13
41	<u>Bowl</u> Washing-up, Plastic, 35 cm dia. approx.	24
42	<u>Bucket</u> Plastic with lid, 10-13 litres	7
43	<u>Colander</u> Plastic, Chinese	13
44	<u>Colander</u> Stainless Steel	13
45	<u>Container</u> Storage, Plastic, (set of 3)	2
46	<u>Container</u> Stainless Steel for oil, 1-1.5 litres	3
47	<u>Container</u> Cutlery, Plastic	13
48	<u>Cutters</u> Pastry (set) - assorted sizes/shapes	12
49	<u>Cutters</u> Pastry (set) - fluted/plain	12
50	<u>Dish</u> Soap, Plastic	7
51	<u>Dredger</u> Flour	13
52	<u>Dust pan</u>	1

Item No	Description	Quantity
53	with handle <u>Grater</u>	13
54	combining 3 sizes of teeth <u>Jug</u>	2
55	Water, Plastic, with cover <u>Kettle</u>	7
56	Stainless steel, 2 litres to 4.5 litres <u>Ladle</u>	13
57	Draining, Stainless Steel, 12.5 cm dia. approx. <u>Ladle</u>	2
58	Soup, Stainless Steel, horizontal handle <u>Ladle</u>	6
59	Soup, Stainless Steel, vertical handle <u>Ladle</u>	6
60	Rice, Stainless Steel <u>Mould</u>	46
61	Jelly, Plastic, small <u>Mould</u>	6
62	Jelly, 0.5 litre <u>Pan</u>	13
63	Stainless Steel, 1 litre, 12.5 cm dia. approx. <u>Pan</u>	12
64	Stainless Steel, 1.7 litre, 15 cm dia. approx. <u>Pan</u>	12
65	Stainless Steel, 2.5 litre, 18 cm dia. approx. <u>Pan</u>	12
66	Stainless Steel, 3 litre, 20 cm dia <u>Pan</u>	7
67	Milk, Non- stick/Stainless Steel, 12.5 cm dia. approx. <u>Pan</u>	1
68	Stainless Steel, Heavy Quality Machine Base, 1 litre, 12.5 cm dia. approx. <u>Pan</u>	1
69	Stainless Steel, Heavy Quality Machine Base, 2 litres, 15 cm dia. approx. <u>Pan</u>	1
70	Stainless Steel, Heavy Quality Machine Base, 3 litres, 18 cm dia. approx. <u>Pan</u>	2
71	Stainless Steel, Heavy Quality Machine Base, with basket for deep frying, 5.7 litres, 22 cm dia. approx. <u>Pan</u>	13
72	Frying, Flat, good quality, 17 cm/20 cm dia. approx. <u>Plate</u>	34
73	Stainless Steel, 17 cm dia. approx. <u>Plate</u>	34
74	Stainless Steel, 22 cm dia. approx. <u>Scale</u>	5
75	Weighing, Electronic, for kitchen use, with maximum capacity of 2 kg, readability of 1 g, Battery or D.C. supply. <u>Scale</u>	3
76	Weighing, Kitchen, 2 kg approx. <u>Scraper</u>	13
77	Plastic <u>Sieve</u>	13
78	with handle, 18 cm dia. approx. <u>Sink Tidy</u>	7
79	Plastic <u>Slicer</u>	6
80	Egg <u>Slice</u>	13
81	Fish, Small <u>Spoon</u>	13
	Measuring (set of 3-4)	

Item No	Description	Quantity
82	<u>Sprinkler</u> for laundry	2
83	<u>Steamer</u> Stainless Steel (set of 3 & cover), 30 cm dia. approx.	6
84	<u>Strainer</u> Tea, with stand	2
85	<u>Tin</u> Baking, Loaf	6
86	<u>Tin</u> Baking, Oblong	12
87	<u>Tin</u> Baking, Oblong, shallow, 28 cm x 18 cm approx.	12
88	<u>Tin</u> Baking, Round, 17 cm approx.	24
89	<u>Tin</u> Baking, Round, deep, 15 cm dia. approx.	6
90	<u>Tin</u> Baking, Round, deep, 20 cm dia. approx.	6
91	<u>Tin</u> Baking, Sheet	12
92	<u>Tin</u> Baking, 6/9 holes, medium	24
93	<u>Tin</u> Baking, 12 holes, small	12
94	<u>Tin</u> Baking, 12 holes, medium	24
95	<u>Tin</u> Baking, Square, shallow, 20 cm x 20 cm approx.	6
96	<u>Tray</u> aluminum, oblong, 28 cm x 21 cm approx.	12
97	<u>Tray</u> aluminum, small, 35 cm x 25 cm approx.	18
98	<u>Tray</u> aluminum, medium, 45 cm x 33 cm approx.	13
99	<u>Tray</u> aluminum, large, 48 cm x 38 cm approx.	13
100	<u>Tray</u> Cooling , Wire	25
101	<u>Tripod</u> for steaming	13
102	<u>Turntable</u> cake	2
103	<u>Whisk</u> Egg, Spiral	13
104	<u>Whisk</u> Egg, Rotary	4
105	<u>Wok</u> Stainless Steel, 33 cm/35 cm dia.	13
106	<u>Wok Chaan</u> Stainless Steel, with wooden handle	13
107	<u>Wok Cover</u> aluminum/ Stainless Steel, 30 cm/32.5 cm dia. approx. (N.B. All pans, kettles etc. should have non-conductive handles)	13
	<u>Brushes</u>	
108	<u>Broom</u> Sweeping	1
109	<u>Brush</u> Clothes	2
110	<u>Brush</u> Nail, Plastic, single-sided	13

Item No	Description	Quantity
111	<u>Brush</u> Pastry	26
112	<u>Brush</u> Scrubbing, 15 cm length	13
113	<u>Brush</u> Vegetable	25
114	<u>Mop</u> Floor, complete with handle <i>China and Glassware1</i>	1
115	<u>Basin</u> Pudding, 0.5 litre	13
116	<u>Bottle</u> Soya Sauce, small	12
117	<u>Bottle</u> Soya Sauce, large	6
118	<u>Bowl</u> Mixing, 23 cm dia. approx.	13
119	<u>Bowl</u> Mixing, 26 cm dia. approx.	13
120	<u>Bowl</u> Utility, 11 cm dia. approx.	38
121	<u>Bowl</u> Utility, 15 cm dia. approx.	38
122	<u>Casserole</u> with Lid, Heatproof Glass, round, 0.5 litre	13
123	<u>Casserole</u> with Lid, Heatproof Glass, round, 1 litre	13
124	<u>Chinese Pattern, Chinaware (Plain/Rice):</u> (a) Bowl, Tea (b) Bowl, small, 9 cm dia. approx. (c) Bowl, large, 11 cm dia. approx. (d) Dish, 7 cm dia. approx. (e) Dish, Bone, 9 cm dia. approx. (f) Dish, 9 cm dia. approx. (for soya sauce) (g) Dish, 13 cm dia. approx. (h) Plate, 18 cm dia. approx. (i) Plate, 23 cm dia. approx. (j) Plate, Oval, 20 cm long approx. (k) Serving Bowl, deep, 15 cm dia. approx. (l) Serving Bowl, shallow, 16 cm dia. approx. (m) Spoon, Serving (n) Spoon, Soup, small	24 24 24 24 24 6 24 12 12 6 6 12 6 24 24 12 12
125	<u>Coloured Glazed Earthenware/Chinaware</u> (a) Basin, Sugar (b) Jug, Milk (c) Pot, Coffee, 0.8 litre approx. (d) Pot, Tea, 0.4 litre approx. (e) Pot, Tea, 0.7 litre approx. (f) Pot, Hot water (g) Cup, Tea, with Saucer (h) Plate, 18 cm dia. approx. (i) Plate, 23 cm dia. approx. (j) Plate, 25 cm dia. approx.	3 3 2 1 1 2 24 24 12 12
126	<u>Container</u> Oil with lid	6
127	<u>Dinner Set</u> for 6 persons, Chinese style	1
128	<u>Dish</u> Pie, Heatproof Glass, 0.25 litre	6

Item No	Description	Quantity
129	<u>Dish</u> Pie, Heatproof Glass, 0.5 litre	6
130	<u>Dish</u> Pie, Oblong/Oval, 0.5 litre	12
131	<u>Dish</u> Souffle, 0.25 litre	24
132	<u>Glass Cookware</u> heatproof (a) saucepan, small 1.5 litres (b) saucepan, medium, 2.5 litres (c) saucepan, large, 3.5 litres	1 1 1
133	<u>Jug</u> Measuring, heatproof glass, 300 ml	26
134	<u>Jug</u> Measuring, heatproof glass, 600 ml	8
135	<u>Jug</u> Measuring, heatproof glass, 1 litre	4
136	<u>Jar</u> Storage, Glass, with black plastic lid, 2 - 3 kg	8
137	<u>Jar</u> Storage, Glass, small with black plastic lid	18
138	<u>Mould</u> heatproof glass	28
139	<u>Shaker</u> Pepper, Glass,	6
140	<u>Spoon</u> Chinese, White Porcelain, small	24
141	<u>Squeezer</u> Lemon, Glass	4
142	<u>Tea Set</u> for 6 persons, Western	1
143	<u>Tumbler</u> Glass <i>Cutlery and Bladed Tools</i>	24
144	<u>Chopper</u> Meat, 22 cm blade, 7 cm narrow end approx.	23
145	<u>Chopsticks</u> Plastic (table use)	23
146	<u>Fork</u>	26
147	<u>Knife</u> Bread	4
148	<u>Knife</u> Kitchen, Cook's, 18 cm blade approx.	23
149	<u>Knife</u> Kitchen, Paring, with or without serrated edge, 7.5 cm/10 cm blade approx.	23
150	<u>Knife</u> Kitchen, Utility, 13 cm/18 cm blade	13
151	<u>Knife</u> Palette, small	13
152	<u>Knife</u> Palette, large	13
153	<u>Knife</u> Round Ended, steel handle	26
154	<u>Knife</u> Sharpener	1
155	<u>One Set of Cutlery</u> for serving 6 persons as follows : (a) Fork, Table (this includes 2 extra for serving) (b) Fork, Dessert	8 6

Item No	Description	Quantity
	(c) Knife, Table	6
	(d) Knife, Dessert	6
	(e) Spoon, Table (For serving)	4
	(f) Spoon, Dessert	6
	(g) Spoon, Soup	6
	(h) Spoon, Tea	6
156	<u>Opener</u>	6
	Tin	
157	<u>Scissors</u>	13
	Kitchen	
158	<u>Spoon</u>	25
	Dessert	
159	<u>Spoon</u>	25
	Table	
160	<u>Spoon</u>	25
	Tea	
161	<u>Vegetable Peeler</u>	13
	<i>Miscellaneous - Cloths, etc.</i>	
162	<u>Cloth</u>	38
	Dish-net	
163	<u>Cloth</u>	8
	Glass, Linen, 50 cm x 75 cm approx.	
164	<u>Cloth/Gloves</u>	13
	Oven	
165	<u>Cloth</u>	32
	Kitchen	
166	<u>Cloth</u>	6
	Table, Plastic	
167	<u>Duster</u>	6
	Yellow	
168	<u>Furnishing Fabric</u>	1
	for curtain, laundry equipment, sewing machines, including making	
169	<u>Towel</u>	14
	Hand, 55 cm x 38 cm approx.	
	Total Cost for Hm Econ Rm 1	186,300

Note: Items 116,117,126,137 and 139 above are intended for use with Item 97 (Tray), making 6 sets. The tray contains two small soya sauce bottles, one large soya sauce bottle, one oil container, three storage jars and one pepper shaker.

**Reference List of Furniture and Equipment
for Secondary School**

Subject : Home Economics (Room II)

Item No	Description	Quantity
	FURNITURE	
1	<u>First-aid Cabinet</u>	1
2	<u>Student Chair</u>	37
3	<u>Teacher Chair</u>	1
4	<u>Stool</u>	8
5	<u>Teacher Desk</u>	2
6	<u>Needlework Table</u>	6
	EQUIPMENT	
	<i>Appliances - Electrical</i>	
7	<u>Microcomputer workstation</u>	1
8	<u>Printer or printer cum scanner (small)</u>	1
9	<u>Iron</u> steam with thermostat, loading of 1,200W or above.	4
10	<u>Machine, Sewing</u> Interlock, Domestic, portable, sews with 3 - 4 threads, power driven with a safety switch	1
11	<u>Machine, Sewing</u> power driven, portable with hard carrying case, finger guide/needle guard	10
12	<u>Machine, Sewing*</u> Computerised, power driven, portable with hard carrying case, finger guide/needle guard, built-in light and LCD display screen	1
	MISCELLANEOUS	
13	<u>Board</u> Ironing, metal :	
	(a) Sleeve	6
	(b) Standard	6
14	<u>Dress Form</u> ladies' version, small dress size, (small petite to size 8), full/round shoulders, foam back fabric/nylon cover, stainless steel support stand with adjustable height.	1
15	<u>Dress Form</u> ladies' version, medium dress size, (size 10 to size 14), full/round shoulders, foam back fabric/nylon cover, stainless steel support stand with adjustable height.	1
16	<u>Dress Form</u> men's version, small or medium dress size, full/round shoulders, foam back fabric/nylon cover, stainless steel support stand with adjustable height.	1
17	<u>Microscope, binocular</u> Eyepieces : pairs of 10x, 15x Objectives : 4x, 10x, 40x, 100x on quadruple revolving nosepiece with click stop. Focus control : Coarse and fine adjustments, with safety stop. Stage : Rectangular stage surface with built-in graduated mechanical stage. Condenser : Abbe condenser and iris diaphragm with filter tray. Illumination : Built-in low voltage illuminator with adjustable brightness Supplied with dust cover, eyepiece dust cap, cabinet with lock and key.	2
	SMALL EQUIPMENT	
18	<u>Awl</u>	7
19	<u>Broom</u> sweeping	1
20	<u>Counting Glass</u>	12
21	<u>Dressmaking Ruler</u> (a) French Curves (b) Metre Sticks (c) Set Squares	24 24 12
22	<u>Equipment for Experiments :</u> (a) Beaker, heatproof, 50 ml (b) Beaker, heatproof, 100 ml (c) Beaker, heatproof, 250 ml (d) Bench mat (e) Boiling tube, heatproof, 10 - 12 cm long, 150 ml (f) Bunsen burner with tubing (g) Cylinder, measuring, 10 ml (h) Cylinder, measuring, 25 ml (i) Cylinder, measuring, 50 ml (j) Flask, heatproof, 50 ml	13 13 13 2 26 2 13 13 26 7

Item No	Description	Quantity
	(k) Flask, heatproof, 100 ml	7
	(l) Forceps	13
	(m) Glass rod	50
	(n) Glass watch	50
	(o) Stand and Clamp	2 sets
	(p) Stop watch	2
	(q) Test tube, 10 - 12 cm long	50
	(r) Test tube brush	13
	(s) Test tube holder	13
	(t) Test tube rack (stainless steel)	13
	(u) Thermometer (-10°C to 10°C)	13
	(v) Tongs	13
	(w) Tray, stackable, polypropylene, chemical resistant	6
	(x) Tripod stand	2
	(y) Wire gauze	2
23	<u>Notcher</u>	2
24	<u>Pan</u>	1
	Dust, with handle	
25	<u>Scissors</u>	13
	overall length, 16 cm approx.	
26	<u>Scissors</u>	25
	overall length, 22 cm approx.	
27	<u>Sewing Box/Basket</u>	7
	Plastic	
28	<u>Shears</u>	6
	Pinking	
29	<u>Sprinkler</u>	6
	Laundry	
30	<u>Tape Measure</u>	25
	Linen/Plastic, Tailor, 1.5 m long	
31	<u>Tracing Wheel</u>	25
	Total Cost for Hm Econ Room II	78,300

**Reference List of Furniture and Equipment
for Secondary School**

Subject: Science (S1-3)

Item No	Description	Quantity
	<u>(A) Equipment (Items 1 - 167)</u>	
1	<u>Ammeter</u> 0 - 2.5 A for d.c. measurements only. Accuracy $\pm 2\%$ at f.s.d. Scale 50 mm long, is set at a convenient reading angle in plastic case 100 x 90 x 100 (height) mm. With a pair of colour-coded 4 mm socket terminals and zero adjustment.	24
2	<u>Balance, compression</u> Light-duty, with a clearly marked dial, protected by a strong plastic lens. Circular scale, 100 mm diameter or over. Capacity : 1,000 x 5 g Dimension : Overall (excluding pan) about 150 x 130 x 160 mm (length x width x height) Pan : About 300 x 200 x 25 mm (length x width x height)	1
3	<u>Balance, electronic</u> Readability 0.01 g. Electronic, capacity 200 g. Taring range 100 g or above. For use on 220-240 V, 50 Hz, single phase a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	10
4	<u>Balance, lever</u> Single pan, with two ranges reading 0 - 250 g x 1 g and 0 - 1,000 g x 10 g.	1
5	<u>Balance, spring</u> Measurement range: 0-10 N x 0.1 N. In flat form metal case with zero adjustment, suspension ring and load hook, calibrated in newton.	10
6	<u>Balance, triple beam</u> Single pan (stainless steel, diameter 150 mm), low form balance. Comprising 3 notched weighting beams with centre-indicating sliding masses. Beam graduated 0 - 500 g x 100 g, 0 - 100 g x 10 g, and 0 - 10 g x 0.1 g. Capacity about 2.5 kg. Sensitivity 0.1g with supplementary masses 2 x 1,000 g, 1 x 500 g.	1
7	<u>Balloon puck</u> To study layer of air reducing friction. A square piece of plastic sheet of side 100 mm, with a hole drilled through the centre of the sheet and a rubber bung. The rubber bung is fixed firmly on a plastic holder. Balloons are provided.	10
8	<u>Bar and gauge</u> For illustrating expansion by heating and contraction by cooling. Comprising a steel/iron bar approximately 110 x 12 mm (length x diameter), mounted at its point on a support rod fitted with a wooden handle; overall length approximately 200 mm. The gauge sliding fit over ends of bar and with a hole of bore diameter same as that of bar.	2 sets
9	<u>Barrier tape®</u> PVC tape, non-adhesive backing, for highlighting hazard/restricted areas, 50 mm x 3 m.	8 rolls
10	<u>Basin, evaporating®</u> Porcelain, round bottom, shallow form, with spout, glazed, capacity 75 ml, 80 mm x 30 mm (diameter x depth).	20
11	<u>Beaker</u> Squat form with spout, with two or more graduation marks showing approximate capacities. (a) Pyrex or equivalent, 50 ml® (b) Pyrex or equivalent, 100 ml® (c) Pyrex or equivalent, 250 ml® (d) Pyrex or equivalent, 500 ml® (e) Polypropylene, graduated, 100 ml (f) Polypropylene, graduated, 250 ml	40 40 40 20 20 20
12	<u>Bell jar</u> Socket top, without stopper or stopcock, approximately 300 x 200 mm (height x diameter).	4
# 13	<u>Bench mat</u> Make of glass reinforced cement, asbestos free, about 300 x 300 mm, 4.5 mm thick.	20
14	<u>Bicycle dynamo assembly</u> Bicycle dynamo mounted on wooden base and provided with two sets of gears driven by hand crank. Two 4 mm socket terminals are provided for the dynamo output, connected in parallel with an M.E.S. lamp holder and 2.5 V bulb.	5
15	<u>Bimetallic strip (with handle)</u> For demonstrating the differential expansion of two metals by curvature produced on heating. Fitted with wooden handle.	2
16	<u>Body Fat Meter</u> For measurement of body fat percentage and body fat mass. Measurement: Body fat in percentage and body fat mass in Kg. Power Source: DC battery Dimension: Compact design	1
17	<u>Borer, cork</u> Set of 6 from 4 to 10 mm. Plated metal. Cutting tube mounted with safety under-flange in shaped handle ensuring that operator cannot be injured by a dislodged tube. With rod for clearing borers.	1 set
18	<u>Borer sharpener, cork</u> Plated metal cone with hinged cutter blade set in slot and metal handle. Circular shape of borer maintained by cone. Edge cut to correct angle by depressing blade using thumb pressure button and rotating borer.	1
19	<u>Bottle, narrow mouth</u> With dust proof stopper, clear glass, 250 ml.	60
20	<u>Bourdon gauge and footpump</u> (a) <u>Bourdon gauge</u> For measurement of absolute gaseous pressure. This instrument comprises a circular gauge having an overall diameter of 106 mm and a depth of 40 mm. The dial reads 0 to 150 kPa actual pressure and the case has a clear perspex back so that the working parts may be seen. (b) <u>Footpump and adapter</u> For use with Bourdon gauge. This foot pump is a standard car pattern with an integral pressure gauge calibrated 0 to 0.4 MPa. With non-return valve and rubber hose to connect to Bourdon gauge.	1 1
21	<u>Brain, human (anatomical model)</u>	1

Item No	Description	Quantity
	Dissectible, showing the external and internal structure of the forebrain, midbrain, cerebellum and medulla.	
22	<u>Brownian movement smoke cell</u> A short cylindrical glass cell, closed by a cover glass, is held vertically in a transparent plastic box with sliding lid. Illumination is by integral line filament lamp and cylindrical glass lens. Fitted with 4 mm socket terminals for connection to 12 V supply.	2
23	<u>Bunsen burner</u> For either town gas or liquefied petroleum gas or natural gas depending on the type supplied. Nickel plated burner tube with rotatable air regulator and a tapering rifflled gas-pipe tube, mounted on an enamelled pressed-steel base. Burner tube 100 x 13 mm (height x diameter), base 80 mm diameter, connector 10 mm mean outer diameter.	24
24	<u>Calipers</u> For measuring length, internal / external diameter and depth up to 150 mm.	1
25	<u>Cart trolley</u> For studying action and reaction. Consisting of a pair of 350 x 600 mm plywood with 4 wheels.	1 pair
26	<u>Centralized low voltage power supply unit</u>	1 per laboratory
*	(For detailed specifications, please refer to footnote.)	
27	<u>Chart, Ishihara</u> For testing colour blindness.	2
28	<u>Colour filters set</u> Unmounted acetate sheets, comprising three primary colours and three secondary colours. Size 75 x 50 mm approximately.	10 sets
29	<u>Compass, plotting</u> With two clear glass faces, needle pivoted between top and bottom glass plates, without dial, diameter approximately 20 mm.	20
30	<u>Cork, tapered®</u> Assorted, pack of 144.	2 packs
31	<u>Cover glass®</u> Square glass cover slip for microscope slides, size 18 x 18 mm, thickness 0.16 - 0.19 mm in box of 100.	2 boxes
32	<u>Crucible®</u> Porcelain, squat form, glazed inside and outside, unglazed base, with lid, 23 x 43 mm (height x diameter).	20
33	<u>Cylinder, graduated</u> With spout, (a) glass, 10 ml (b) glass, 100 ml (c) glass, 500 ml (d) glass, 1000 ml	20 40 8 4
34	<u>Data logger interface</u> <u>Hardware</u> The interface can log data from appropriate sensors by connecting to a notebook computer through a common communication port (such as USB) and to a tablet device through a wireless connection (such as Bluetooth). <u>Software</u> Runs on operating system for notebook computers or tablets; displays and analyses data in the forms of digits, meter, graph and table.	5 5
35	<u>Data logger sensors</u> The sensors should be fully compatible with the data logger interface. (a) Voltage/Current sensor: For measuring a.c. and d.c. currents from 0 - 1.5A; a.c. and d.c. voltages from -10V to +10V. (b) Light sensor: For measuring light intensity level, suitable for indoor and outdoor experiments with spectral response: 400 - 1,000 nm. (c) Linear motion sensor: For measuring the position, velocity and acceleration of an object ranging from 0.3 to 8 m approximately. (d) Oxygen sensor: For measuring oxygen content in gases and liquids, with temperature compensation. (e) pH sensor: For measuring pH values ranging from 0-14, with an accuracy of $\pm 2\%$. (f) Pressure sensor: For measuring gas pressure ranging from 0 to 500 kPa. (g) Sound level sensor: For measuring sound level ranging from 50 to 100 dB, the overall frequency response within the range heard by human ear. (h) Temperature sensor: For measuring temperatures ranging from -10°C to +110°C, with an accuracy of $\pm 10^\circ\text{C}$. (i) Force sensor For measuring both pulling and pushing forces up to ± 50 N.	5 5 5 5 5 5 5 5 5 5
36	<u>Demonstration meter</u> Accepts large interchangeable plastic scales to enable it for use as a demonstration a.c./d.c. ammeter or voltmeter or ohmmeter. A magnetically damped, spring-controlling moving coil movement with a pointer, housed in case with transparent front and rear panels to enable all working parts to be clearly seen. With a pair of 4 mm socket terminals and a centre zero adjustment control. Comprises :	1

Item No	Description	Quantity
	(a) <u>Interscale demonstration meter</u> Sensitivity of 5 mA f.s.d. at d.c. 100 mV.	4
	(b) <u>Current and Voltage range scales</u> - d.c. current, range 2.5 - 0 - 2.5 mA - d.c. current, range 0 - 100 mA - d.c. current, range 0 - 1 A - d.c. current, range 0 - 5 A - d.c. current, range 0 - 5V - d.c. current, range 0 - 15V	2
37	<u>Desiccator</u> Borosilicate glass, with knob cover and perforated disc. 200 mm top internal diameter, 190 mm disc diameter, 85 mm depth of disc below flange.	1
38	<u>Digital blood pressure monitor</u> Automatic measurement. Digital display of systolic and diastolic blood pressure reading and heart rate Measurement range: - Pressure 20 - 280 mmHg ± 3 mmHg - Pulse 40 - 200 beats/min $\pm 5\%$	1
39	<u>Digital Camera for Microscope</u> Digital camera composed of colour CCD with eyepiece mount, USB connection, for use in colour photography and video, Windows / Mac / Linux compatible.	1
40	<u>Dissecting board</u> Wooden board of approximately 550 x 380 mm, (length x width) made of selected timber so that awls can be pressed in without hammering.	2
41	<u>Dissecting dish</u> White enamelled, steel, rounded corner supplied with white wax. Dimension about 300 x 250 x 45 mm (length x width x depth).	10
42	<u>Dissecting instrument set</u> In box/plastic wallet, comprising : - 1 pair of forceps, 130 mm straight, blunt ends - 1 pair of forceps, 130 mm straight, pointed ends - 2 needles, stainless steel in metal handle - 1 pair of scissors, stainless steel, straight, with one blunt and one pointed ends, overall length about 110 mm - 1 pair of scissors, stainless steel, straight, pointed, open shanks, overall length about 110 mm - 1 scalpel blade holder, stainless steel. No. 3 or No. 4 - 5 scalpel blades, length 38 mm - 5 scalpel blades, length 45 mm - 1 section lifter - 1 seeker, stainless steel in metal handle	2 sets
43	DNA double helix model <u>At least 12 base pairs</u>	1 set
44	<u>Drill, electrical band (pistol pattern)</u>	1
**	(For detailed specifications, please refer to footnote.)	
45	<u>Drill stand</u> Converts electric drill into a vertical drill press.	1
46	<u>Drills, twist</u> High speed steel, for use in electric drill, set of eight, 1.59 to 7.15 mm	1 set
47	<u>Ear, human (anatomical model)</u> Inner ear opens to show semicircular canals and cochlea with stapes attached, which is removable. Incus and malleus are attached to tympanum, which is removable. Enlarged approximately 5 times.	1
48	<u>Electric bell</u> With detachable 'snap-on' plastic cover and metal thread terminals. Dome gong diameter 70 mm approximately. For use on 3 to 8 V a.c./d.c. supplies.	2
49	<u>Electric bell in vacuum</u> For use on pump plate to show that sound is not transmitted in a vacuum with fine coiled wire connections to terminals mounted in rubber bung sealing the bell jar. Diameter of the electric bell is about 100 mm. Operating on 3 to 8 V a.c./d.c.	1
50	<u>Electromagnetic Radiation Meter</u> For measurement of electromagnetic radiation from low frequency electrical sources including TV sets, computers, photocopiers and outdoor power lines. The meter screen has 10 LED lights, each denoting a level of exposure from 1 to 24 milliGauss Detection frequency: 20 to 1200 Hz Display Range: 0 to 24 milliGauss Power source: DC battery Size: portable	1
51	<u>Energy conversion kit</u> The kit comprises : (a) <u>1 Motor / Generator unit</u> For use as a driving unit or dynamo in conjunction with other units, with a pulley approximately 15 mm diameter. Operates on 2 to 6 V d.c. (b) <u>1 Switch unit</u> A double-pole, double-throw change-over switch with 3 pairs of 4 mm sockets labelled battery, motor and lamp respectively. (c) <u>1 Lamp unit</u> Comprises three M.E.S. lamp-holders connected in parallel with two 4 mm sockets. Complete with three lamps 1.25 V, 0.25 A. (d) <u>1 Line shaft unit</u> For showing the conversion of electrical energy to potential energy and vice versa. Comprises an approximately 6 mm steel shaft with a pulley, 60 mm diameter approximately, the other end of the shaft overhangs the wooden base. (e) <u>1 Flywheel unit</u> Comprises an iron/steel flywheel, approximately 100 mm diameter and 1 kg mass, with pulley, 40 mm approximately. (f) <u>1 Steam engine unit</u> Superheated, double-action oscillating cylinder type operating on tablets of solid fuel. With safety valve, drain cock/overflow plug, whistle and flywheel with approximately 25 mm diameter pulley. Engine, with large capacity copper boiler, is of non-ferrous construction to avoid corrosion. Complete with fuel burner, supply of fuel tablets, spring driving belt and instructions. (g) <u>1 Turbine/Pump unit</u> With pump chamber fitted with inlet and outlet tubes and impeller linked with pulley, 20 mm diameter approximately the transparent front cover, with 'O' - ring seal, has integral inlet for use when pumping. A short length of tubing with tubing clip closes this inlet during turbine operation. (h) <u>1 Head of water unit</u>	1 kit

Item No	Description	Quantity
	Comprises upturned standard base acting as reservoir and fitted with stand for supporting outlet tube from pump above reservoir and bar for holding inlet tube to pump in reservoir.	
	(i) <u>1 Storage battery unit</u>	
	Glass jar, capacity approximately 250 ml with plastic screw cap, bearing externally two 4 mm socket terminals and supporting two lead plates.	
	(j) <u>1 Handwheel drive unit</u>	
	The unit has a pulley of 70 mm diameter approximately with a handle, driving a smaller pulley of 20 mm diameter approximately through a plastic belt. The small driven pulley has another large pulley of 70 mm diameter approximately on the outer end of its shaft, from which a belt drive may be taken to any other suitable unit.	
52	<u>Eye wash unit</u>	2
	Equipped with an eye wash bottle. With dust cap for eye bath and side tube for draining of contaminated water. The bottle is clipped into a moulded panel on which simple but complete instructions are printed. The panel has holes for wall hanging.	
53	<u>Eye, human (anatomical model)</u>	1
	Dissectible, showing the structure and position of the iris, pupil, lens, retina and optic nerve. Mounted on a pedestal or stand. Enlarged five times approximately.	
54	<u>Fibre optics kit</u>	1 kit
	The kit contains the following components for building a fibre optic transmitter and receiver to demonstrate the transmission of radio signals through a fibre-optic link.	
	- 1 fibre optic receiver	
	- 1 fibre optic transmitter	
	- 5m optic fibre	
	- 1 tuned circuit	
	- 1 radio receiver	
	- 1 power amplifier	
	- 2 battery connector	
	- 6 Alphalink, Central	
	- 1 Alphalink, Offset	
	- 1 4mm stackable lead black, 10 cm	
	- 1 4mm stackable lead red, 50 cm	
	- 1 4mm stackable lead black, 50 cm	
	- 1 loudspeaker	
55	<u>Filter paper®</u>	2 packs
	125 mm diameter, Whatman No. 1, pack of 100.	
56	<u>Flask</u>	
	Pyrex or equivalent	
	(a) Round bottom, 250 ml	20
	(b) Conical, 100 ml	20
	(c) Conical, 250 ml	20
57	<u>Fleming's apparatus set</u>	1 set
	To show that force can be produced by a magnet on a wire carrying an electric current. Metal roller, moving along two parallel non-magnetic rails carrying terminal sockets. Rails supported about 16 mm apart on transparent box channel. For supplies up to 6V, 3A dc. Supplied with steel magnet yoke and the associated magnets.	
58	<u>Forceps</u>	
	Stainless steel, straight, length 130 mm.	
	(a) Blunt end	20
	(b) Fine end	20
59	<u>Funnel, filter</u>	
	(a) Glass, 75 mm top diameter, 75 mm stem length.®	20
	(b) Polypropylene, 240 mm top diameter.	4
60	<u>Funnel stand</u>	20
	Hard wood, single type. Dimension of base approximately 200 x 100 mm. Funnel holders are slotted for ease of funnel entry.	
61	<u>Galvanometer</u>	4
	3.5 -0 -3.5 mA, moving-coil type. With scale, 50 mm long with anti-parallax mirror, set at a convenient reading angle in plastic case, and with a pair of colour coded 4 mm socket terminals and zero adjustment.	
62	<u>G-clamp</u>	8
	Malleable iron, with ball-end steel screw and socket swivel head, enamelled finish, approximately 100 mm opening.	
63	<u>Gas jar, with cover</u>	40
	With base and ground top flange, glass, 200 x 50 mm (height x diameter), with circular glass cover, ground one side, 75 mm diameter.	
64	<u>Glass block, rectangular</u>	20
	For refraction experiments, size 114 x 63 x19 mm approximately.	
65	<u>Glass rod®</u>	1 kg
	Soda lime glass, in length of about 1.5 m, 6 mm diameter.	
66	<u>Gloves</u>	
	(a) Animal handling, leather type with cuffs that reach to the upper arm.	1 pair
	(b) Chemical resistant, for handling acids, alkalis and common organic solvents, long cuff, with special finishing for excellent wet grip.®	2 pairs
	(c) Heat / Cold resistant, made of non-flammable non-asbestos material, with low thermal conductivity, high strength and high abrasion resistance gives no dermatological problems; for furnace and hotplate work in the laboratory; gauntlet length.	1 pair
	(d) Surgical, lightweight disposable latex rubber gloves. Close fitting and with high finger sensitivity.® Pack of 50 pairs.	4 packs
67	<u>Hand lens</u>	20
	Magnification x5 to x10 with metal / plastic frame and handle.	
68	<u>Hazard Warning Labels ®</u>	3 packs
	Self-adhesive yellow labels 25 x 25 mm printed with various black hazard symbols plus the appropriate hazard wording. Sheets of mixed symbols cover chemical hazards of toxic, harmful, corrosive, irritant, explosive, flammable and oxidizing. Pack of about 100 symbols each.	
69	<u>Hose clip</u>	100
	For use on Bunsen burner tubing.	
70	<u>Hot air drier</u>	1
	A low noise hair drier suitable for rapid drying of laboratory glassware, chromatograms, etc. A detachable nozzle is provided and there is an adjustable heat/speed setting. For use on 220-240V ac supply.	

Item No	Description	Quantity
71	<u>Infra-red detector</u> A phototransistor which responds to near infra-red light and to visible light. Enclosed in plastic case. Case has battery holder and 4 mm sockets for connection to 100mA or 1mA meter. The unit will supply a current of several mA when used with a 10 V d.c. supply.	2
72	<u>Jar, specimen</u> Clear glass, cylindrical, with foot and grip stopper. (a) 150 x 50 mm (height x diameter) (b) 250 x 100 mm (height x diameter)	20 20
73	<u>Kilowatt-hour meter</u> 'A 20A domestic 'consumer unit', which is a watt-hour meter, is mounted on a wood baseboard, provided with a 13A switched socket and 0.5 m of mains cable. The meter can be read to the nearest 0.1kW or 100 joules, and estimated to 50 joules. Alternatively, the number of revolutions of the rotating disc can be counted each minute, etc.	1
74	<u>Kinetic motion (theory) model</u> Comprises : - A plastic tube approximately 30 cm ² , height not less than 380 mm, terminated at upper end by loose-fitting cover and lower end by stretched rubber diaphragm. - Two expanded polystyrene pistons. - Metal spheres approximately 3 mm diameter. - Vibrator unit : 4 - 6 V d.c. electric motor mounted on wood/plastic base, external connector through two 4 mm terminals. Vibrator unit : 4 - 6 V d.c. electric motor	1
75	<u>Lamp, desk/table</u>	20
***	(For detailed specifications, please refer to footnote.)	
76	<u>Lens, cylindrical</u> Clear glass with ground ends and optically worked faces. 50 x 50 mm. (a) Plano-concave lens -17D (b) Plano-convex lens +17D	10 10
77	<u>Lens, spherical</u> 50 mm diameter (a) Focal length 10 cm (b) Focal length 20 cm	20 20
78	<u>Lens holder</u> For lens of diameter 50 mm.	40
80	<u>Magdeburg hemisphere</u> Plastic or casted iron, about 100mm diameter.	1
81	<u>Magnetic puck kit</u> For the investigation of linear and two-dimensional dynamics under conditions of negligible friction. Comprising two 25 mm circular magnetic pucks, 10 g polystyrene beads and a 300 x 300 x 40 mm (length x width x depth) transparent acrylic tank.	2 sets
82	<u>Mass hanger with slotted masses</u> (a) Hanger 100 g and 9 slotted weights of 100 g each. Slot designed to prevent masses sliding off hanger. (b) Hanger 500 g and 9 slotted weights of 500 g each. Slot designed to prevent masses sliding off hanger.	20 sets 2 sets
83	<u>Materials kit</u> A variety of materials in the form of rectangular blocks intended to familiarise the student with the appearance, "feel", texture, hardness and density of a range of common substances. The kit comprises two of each of seventeen blocks as below: - Blocks, 50 x 40 x 30 mm Softwood, hardwood, paraffin wax, aluminum, iron, foamed polystyrene. - Blocks, 20 x 20 x 100 mm Perspex, glass, slate, aluminum, softwood, marble. - Blocks, other sizes Lead 50 x 50 x 20 mm, aluminum 50 x 50 x 80 mm, hardwood 50 x 50 x 200 mm, brass 20 x 20 x 50 mm, iron 40 x 40 x 20 mm.	1
84	<u>Measuring tape</u> 2 m long.	1
85	<u>Mechanical vice</u> Jaw opening to 65 mm.	1
86	<u>Menstrual cycle model</u> Model depicts changes that take place in female reproductive system during the 28-day cycle. Cross-section of uterus in four stages shows growth of ovum and ejection into the uterus and through Fallopian tubes. A dial relates changes in uterus to day in cycle.	1
87	<u>Microscope, monocular</u> Vertical monocular body. Inclinal. Two eye-pieces : Huyghens x4 (or x5) and x10 (or x15). Four objectives : x5, x10 and x40 (or x45) on nosepiece. Coarse and fine adjustments, with limit stop. Abbe condenser NA 1.25 and iris diaphragm with filter tray. Built-in mechanical stage. Equipped with a halogen/tungsten or LED illuminator with intensity control fitted to base. Supplied with cabinet with lock and key.	10
88	<u>Microscope slide</u> [®] Standard, non-corrosive, hard-glass, 76 x 25 mm (length x width) and thickness not exceeding 1.2 mm. Pack of 100.	2 packs
89	<u>Microslides</u> (a) Cheek cell, human, W.M. (b) Ileum, mammal, T.S., showing villi. (c) Mammalian egg (Section of ovary with distinct mature eggs is acceptable as an alternative.) (d) Mammalian sperm, W.M.	2 2 2 2
90	Mirror, plane	20 sets

Item No	Description	Quantity
91	- Plane mirror strip For use in ray optics, may be conveniently held in holders. 150 x 50 mm approximately.	1 set
	- Wooden block Finished in matt black, with a slot in the side to accommodate plane mirror.	
92	<u>Model eye apparatus</u> (a) <u>Model eye kit</u> Round bottom flask about 4 to 5 L filled with fluorescein, together with the following 50 mm diameter meniscus lenses : + 11D, + 8D, + 5.5D, + 2.5D, - 3D.	2 sets
	(b) <u>Compact light source</u> A very efficient 12 V, 100 W quartz iodine lamp mounted in a well ventilated metal housing. Two shuttered holes are provided on two adjacent sides.	
93	<u>Molecular models</u> For making simple open type models. Spheres - 12 carbon (IV), 7 oxygen (II), 6 halogen (I), 2 nitrogen (III), 1 sulphur (II) and 20 Hydrogen (I). Links - 26 short, 26 medium and 10 long flexible. Connectors - the provision of flexible connectors of at least two lengths.	20
	<u>Mortar and Pestle</u> (a) Unglazed inside, glazed outside, with spout, porcelain. External diameter 110 mm.	
94	(b) Unglazed inside, glazed outside, with spout, porcelain. External diameter 150 mm.	1
	<u>Multimeter</u> Measurement ranges : 200 mV to 1000 V d.c. 2 V to 600 V a.c. 200 mA to 10 A d.c./a.c. 200W to 2 MW Accuracy : Better than $\pm 2\%$ for all ranges. Typically below $\pm 1\%$ when reading 2 digits. Automatic or manual range selection. Automatic zero point compensation. Overload protection in all ranges. Digital display.	
95	<u>Notebook computer / tablets</u> For interface to the data logger device. Specifications should conform to the latest standard of computers / tablets acquired by school via the bulk contract of information technology (IT) equipment.	5
	<u>Optic fibre®</u> Acrylic, 1 mm nominal diameter, 10 m long, unsheathed.	
97	<u>Optical illusion cards</u> A set of at least 12 cards with geometric patterns and drawings to demonstrate optical illusion. Each card is about 150 x 100 mm, and plastic laminated on both sides for long durability.	2 sets
	<u>Oven / Incubator</u> Temperature range 5°C above ambient to 250°C. Temperature fluctuation not more than 1°C. Minimum capacity 30 L. Provided with at least two shelves and three shelf positions. Thermometer required. For use on 220-240 V, 50 Hz, single phase a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	
99	<u>Periodic table, wall chart</u> Printed on one side only, listing elements with symbol, atomic number and electron shell arrangement in each case and showing the group classification.	2
	<u>Petri dish</u> (a) Pyrex or equivalent, can be resterilised. 90 x 15 mm (diameter x depth). Supplied with cover.	
101	(b) Plastic, 90 x 15 mm (diameter x depth). Supplied with cover.	60
	<u>Pipe-clay triangle</u> Length of sides 50 mm.	
102	<u>Plastic block, semicircular</u> Clear, polished acrylic plastic block, with white back to show the path of light rays through the block, approximately 98 mm (diameter) x 16 mm (thick).	20
	<u>Plug</u> Three-pin flat, moulded plastic body, with 13 A cartridge fused-linked, for use on 220 - 240 V a.c., 50 Hz, single phase supplies; complied with the latest British Standard Specifications (BS 1363) or fully equivalent.	
104	Prism (a) 45°, 90°, 45°; approximately 32 x 50 mm (hypotenuse length x height); acrylic plastic.	40
	(b) 60° x 60° x 60° polished perspex prism, approximately, 37.5 x 25 mm face.	
105	<u>Projection system with screen</u>	1
	<u>Pump, filter</u> Plated metal or plastic body with integral non-return valve, water inlet nozzle for flexible pressure tubing and vacuum nozzle for about 10 mm bore tubing.	
107	<u>Pump plate and bell jar</u> The plate comprises a heavy cast plate with integral feet and a fine ground surface to ensure a good seal with the bell jar flange. Supplied with screw in connection tubes to fit standard rubber pressure tubing. Diameter 175mm. Bell jar with knob at top. Borosilicate glass. Height 300 mm. For use with pump plate and rotary vacuum pump.	1
	<u>Pump, rotary vacuum</u> Displace 0.5 - 1.0 L/second, will evacuate to 1.36 Pa with 150 - 200 W motor, V-belt and drive guard, switch box, automatic air admittance valve, adjustable gas ballast single glass and nose-piece connector. Mounted on light alloy cast base. For use on 220 - 240 V a.c. 50 Hz, single phase supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	
109	<u>Quickfit</u> 34 BU and 34X, or equivalent.	1 set
	<u>Radiant heater</u> Radiant heat elements in brass lamp holder, mounted on heat resistant wood base and fitted with protective guard. Asbestos free. 300 W approximately, for use with 220 - 240 V a.c., 50 Hz, single phase supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	
111	<u>Radio Waves Monitor</u> Also called "Microwave radiation monitor". For measurement of radio waves emitted by mobile and cordless phones, antenna masts and microwave ovens. Detection frequency: In the range of microwave	1

Item No	Description	Quantity
112	Display range: approximately 0.7 to 6.5 V/m Power source: DC battery Size: portable <u>Ray box kit</u> (a) <u>Ray box</u> With triple slit aperture and 12 V 24 W line filament lamp and lamp holder. (b) <u>Cylindrical convex lens</u> Glass, focal length 75 mm, used in ray box.	20
113	<u>Refrigerator</u>	1
114	<u>Reproductive system, human, female (anatomical model)</u> Model shows the features of female reproductive organs as shown in cross-section view of pelvic area. Ovaries, oviduct, uterus and vagina demonstrate organ of ovum to be fertilised.	1
115	<u>Reproductive system, human, male (anatomical model)</u> Model shows the features of male reproductive organs as shown in models of pelvic area: postate gland, testicles and penis, demonstrating place of origin and discharge of sperm.	1
116	<u>Respirator with filter cartridge</u> (a) <u>Respirator</u> Moulded rubber body with anodised aluminum screw retainer. Fitted with two relief valves and an adjustable elastic band. (b) <u>Filter cartridge</u>[®] For use in presence of common organic vapours and acid gases.	1 3 pairs
117	<u>Retort stand with bosshead and clamp.</u> - Retort stand base : Iron with corrosion resistant finish, minimum size 160 x 100 mm. - Stand rod : Cadmium plated mild steel/bright aluminum alloy. Approximately 500 x 12 mm (length x diameter). - Clamp : Enables articles from 2 to 90 mm diameter to be clamped securely. Design for the jaw ensures a firm grip at all angles of opening. The cork liners for the jaws are well secured. With 8 mm diameter rod suitable for use in bosshead. - Bosshead : With offset jaws for rods up to 16 mm diameter.	40
118	<u>Rheostats</u> Variable up to 20Ω at 4.5A rating. Sliding contact, for use as series resistor or potentiometer. Open type with windings on an insulating, heat-resistance tube approximately 200 x 40 mm (length x diameter), three 4 mm socket terminals and slotted end plates for screw mounting. For use at voltage up to 50V.	10
119	<u>Rubber teat</u>[®] For teat pipettes.	6 dz.
120	<u>Ruler</u> Graduated at one edge, in cm and mm divisions, (a) hardwood, 0.5 m (b) hardwood, 1 m	20 2
121	<u>Safety goggles</u> Splash-proof. With single replaceable wide-angle clear polycarbonate lens, indirectly ventilated, flexible clear PVC frame for all-round vision. Fitted with adjustable headband with retained ends.	1
122	<u>Safety screen</u> Transparent polycarbonate, comprising central panel 610 x 300 x 3 mm (height x width x thickness) connected to outer panels 610 x 230 x 3 mm (height x width x thickness) on each side by full height hinges.	2
123	<u>Safety spectacles</u>[®] Constructed of polycarbonate, spectacle type with side shields giving all round protection. Top guard and lip prevents spillage into eyes. May be worn over prescription spectacles.	90
124	<u>Scalpel</u> - Blade: stainless steel, length 35-45mm. - Handle: nickel-plated, length 100-120mm.	20
125	<u>Scissors, dissecting</u> Nickel plated steel/stainless steel (a) Straight, fine points, open shanks. Overall length 110 - 120 mm. (b) Straight, blunt ends, close shanks. Overall length 120 - 130 mm.	20 20
126	<u>Screwdriver</u> Electrician's, with insulated handle, length of blades about 150 mm.	12
127	<u>Seeker</u> Stainless steel in metal handle. Overall length 120 - 140 mm.	20
128	<u>Shield, face</u> With curved hard plastic visor which can be raised from the face when not required, with adjustable headband.	1
129	<u>Signal generator with loudspeaker</u> (a) Signal generator, low impedance output <i>Frequency Range :</i> 10 Hz to 100 kHz in 5 decades and reads on linearly calibrated scale, with ±2% accuracy. The frequency control should have slow motion reduction gear drive. <i>Output waveform :</i> Sinewave with less than 0.5% T.H.D. Square wave with 1:1 mark/space ratio. Triangular wave if available. <i>Output coupling :</i> a.c. <i>Output power :</i> 2 W r.m.s. into 3W with volume control additional 600 W output adjustable from 0 V to 10 V will be an advantage. <i>Power :</i> a.c.220V - 240V, 50 ±1 Hz, single phase or a.c./d.c. with built-in a.c. adaptor. (b) Loudspeaker unit	1

Item No	Description	Quantity
130	A moving coil loudspeaker, diameter 64 mm, impedance 3W Frequency range: 200Hz to 15kHz. <u>Solar energy kit</u> Demonstrates the conversion of solar energy to electric power. The kit includes a 400 mA solar cell, leads, motor, propeller and instructions.	2
131	<u>Sound level meter</u> Battery operated. Overall range of 40 to 110 dB, the overall frequency response within the range heard by the human ear. Digital display.	1
132	<u>Spatula</u> Heavy weight, with one spatulate and one spoon end, stainless steel, overall length about 150 mm	40
133	<u>Spill pack</u> [®] The spill pack is made up of six containers each with enough absorbent material to absorb a spillage of up to 500 mL. Two packets of soda ash are also provided for neutralization of acid spills. Supplied with instructions and ten stout polythene bags for collection of spillage.	1 pack
134	<u>Spoon, combustion</u> Steel with brass flange, length 350 mm, diameter of cover 88 mm, diameter of cap 18 mm.	24
135	<u>Spot plate</u> For observing colour changes. Porcelain: 150 x 150 mm with 12 cavities of 5 mm deep.	20
136	<u>Stethoscope</u> A simple pattern stethoscope for student use.	10
137	<u>Stopwatch</u> Read 0 - 60 second in 0.2 s, with start, stop and re-set buttons. Reads up to 30 minutes.	20
138	<u>Switch</u> (a) Knife switch, single-throw (b) Plug, one-way, brass (c) Push-button (d) S.P.D.T.	20 20 20 20
139	<u>Syringe</u> [®] Disposable, graduated, with plastic fitting, clear polystyrene barrel (a) 5 ml. (b) 20 ml.	20 20
140	<u>Teeth, human</u> (a) Teeth set Upper and lower teeth set. The upper jaw is sectioned to show root of left lateral incisor and the lower jaw is sectioned to show root of left first molar. Gums made of flexible plastic, with rigid plastic teeth faithfully reproduced so that dental hygiene and tooth care can be demonstrated. Enlarged 3 to 5 times. Dimensions about 140 x 140 x 120 mm. (b) Tooth, human (anatomical model) Dissectible, showing structures of tooth and occurrence of carie, mounted on a pedestal or stand. Enlarged about six to ten times.	1 1
141	<u>Test tube</u> [®] Medium wall, with rim, Pyrex or equivalent (a) 125 x 16 mm (b) 150 x 24 mm	200 200
142	<u>Test tube brush</u> Nylon and with fan shaped end, and galvanised wire handle. Diameter of head 30 mm, for tubes of diameter 16 to 25 mm.	20
143	<u>Test tube holder</u> Wood, with steel spring, to take tubes up to 19 mm diameter, length about 185 mm.	48
144	<u>Test tube rack</u> Hard wood, 10 holes of 22 mm diameter, 2 holes of 32 mm diameter.	40
145	<u>Thermometer</u> (a) Red spirit filled, glass tube, -10 °C to 110 °C x 1 °C . (b) <u>Thermometer (Digital)</u> Digital display, stainless steel probe, -50 °C to 150 °C x 0.1 °C, battery operated, probe sheath. (c) <u>Thermometer (Non-mercury)</u> Non-mercury filled. 0 °C to 260 °C x 2 °C, reinforced bulb type and permanent graduations.	20 12 12
146	<u>Tong, crucible</u> Stainless steel, straight with flattened hinge 200 mm length.	20
147	<u>Torch</u> Pocket size, providing a powerful beam using two UM3 1.5V batteries.	10
148	<u>Torso, human (anatomical model)</u> A sexless and headless model of life size, made of unbreakable plastic materials, dissectible into at least 11 parts. Neck features: Opened to show trachea. Thorax features: dissectible lungs and heart. Abdomen features: Removable liver with gall bladder, stomach, pancreas, small and large intestine, appendix flap and kidney.	1
149	<u>Tripod stand</u> Triangular top, cast iron, with splayed steel legs, 150 x 210 mm (length of side x height).	40
150	<u>Trolley, apparatus</u> Four wheels, tubular enamelled steel frame, two enamelled and plated trays of size 760 x 460 mm, height to top tray about 900 mm, height between trays about 350 mm.	2
151	<u>Trolley, dynamic</u>	2 pairs

Item No	Description	Quantity
152	Hardwood, 300 mm long, having 3 low-loss-bearing wheels and fitted spring-loaded impulse rod. Rod has three positions to provide different impulses and is triggered by a release pin. <u>Trough</u> Glass, 250 x 125 mm (diameter x depth).	4
153	<u>Tubing, Bunsen burner®</u> Rubber, with indication of Approval Mark & Expiry Date of Service Life on hose surface. About 9 mm internal bore, not more than 2m length, for either town gas or liquefied petroleum gas depending on the supplied.	30
154	<u>Tubing, glass®</u> (a) Soda lime glass, in length of about 1.5 m. External diameter 5 - 6 mm. (b) Soda lime glass, in length of about 750 mm, diameter of about 40 mm, for water filtration columns.	45 m 2
155	<u>Tubing, rubber®</u> (a) Normal wall, 5 x 1.5 mm (bore x wall thickness) (b) Normal wall, 8 x 1.5 mm (bore x wall thickness)	20 20
156	<u>Tuning fork</u> Boxed set of 13, blue steel, from C(256) to C(512) with frequencies marked.	4 sets
157	<u>Ultra-violet lamp with cover</u> To demonstrate characteristics of U-V radiation. The UV lamp should be enclosed in a cylindrical metal lamphouse with an aperture in its side and a simple ventilation system in its upper end. The UV lamp is 6W, E.S. cap. For operation on 220 - 240V a.c., 50Hz, single phase supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	1
158	<u>UV Index Meter</u> For measurement of UV index to provide information for accumulative UV exposure Response: 280 to 400 nm (UVA & B) Index range: 0 to 24 Display: LCD Power source: DC battery	1
159	<u>UV Transmission Tester</u> For comparison of UV blocking capability of various materials including sunglasses and sun-block lotions, and for measurement of UV transmission for various materials including window film. Response: 280 to 400 nm (UVA & B) Irradiance range: 0 to 100 W/m ² Display: LCD Power source: DC battery	1
160	<u>Vacuum flask</u> Domestic type with wide mouth for storing ice. Capacity about 1 litre.	2
161	<u>Voltmeter</u> 0 - 5 V d.c. moving coil type for d.c. measurement only, accuracy $\pm 2\%$ at f.s.d. Scale, 50 mm long with anti-parallax mirror, is set at a convenient reading angle in plastics case 100 x 90 x 100 mm. With pair of colour-coded 4 mm socket terminals and zero adjuster. Resistance 1,000W/V.	24
162	<u>Wash bottle</u> White translucent, flexible, with screw cap and bent tube, polyethylene, 250 ml capacity.	40
163	<u>Watch glass</u> Thin glass, with ground edge, (a) 50 mm diameter (b) 100 mm diameter	40 40
164	<u>White tiles</u>	10
165	<u>Wire gauze</u>	40
##	Ceramic centred, <u>asbestos free</u> , 150 x 150 mm.	
166	<u>Wire stripper</u> Adjustable for different wire or cable sizes, also serves as a wire cutter.	2
167	<u>Worcester circuit board</u> A base-board with terminals, a set of metal connection pillars and a number of clip-on flexible connection strips and accessory units. Each board comprises: 18 flash lamp bulbs 1.25 V, 0.25 A 12 plain connectors 1 connector with rheostat 1 resistor 2 flexible leads with 4 mm plug and crocodile clip 1 rectifier 2 flexible leads with crocodile clips 2 crocodile clips 2 mounted bell pushes 2 soft iron nails, 50 mm, square head 1 length bare copper wire 20 s.w.g. 1 length bare Eureka wire 34 s.w.g. 1 length plastic covered copper wire, 26 s.w.g. 1 hardboard disc, drilled 4 pencil leads 1 piece copper foil 1 piece steel wool 9 connectors with lamp holders	20 sets
168	<u>Y-piece</u> Glass, 6 mm bore. <u>(B) Chemicals®</u>	2
169	<u>Protein test paper (bottle of 50)</u>	6 bottles
170	<u>Aluminum foil</u>	250 g
171	<u>Ammonia solution, 0.88</u>	2.5 L
172	<u>Anti-bumping stones</u>	100g
173	<u>Calcium carbonate, marble chips</u>	2 kg
174	<u>Calcium carbonate, precipitated</u>	500 g

Item No	Description	Quantity
175	<u>Calcium chloride, anhydrous</u>	1 kg
176	<u>Calcium hydroxide</u>	500 g
177	<u>Calcium hypochlorite (bleaching powder)</u>	500 g
178	<u>Calcium oxide</u>	1 kg
179	<u>Calcium turnings</u>	250 g
180	<u>Casein powder</u>	100 g
181	<u>Charcoal, animal</u>	1 kg
182	<u>Charcoal, wood, powder</u>	500 g
183	<u>Charcoal block, 70 mm</u>	10
184	<u>Citric acid</u>	500 g
185	<u>Clinistix (bottle of 50)</u>	6 bottles
186	<u>Cobalt chloride paper</u>	10 books
187	<u>Copper foil</u>	500 g
188	<u>Copper wire, 22 s.w.g.</u>	250 g
189	<u>Copper(II) nitrate</u>	500 g
190	<u>Copper(II) oxide</u>	250 g
191	<u>Copper(II) sulphate-5-water</u>	2 kg
192	<u>Cresol red</u>	5 g
193	<u>Crude oil</u>	500ml
194	<u>Dettol</u>	1 L
195	<u>Ethanoic acid, glacial</u>	1 L
196	<u>Ethanol, 95%</u>	2.5 L
197	<u>Ethyl ethanoate (ethyl acetate)</u>	0.5 L
198	<u>Glucose</u>	100 g
199	<u>Glycerol (Glycerine)</u>	250ml
200	<u>Hydrochloric acid</u>	2.5 L
201	<u>Hydrogen peroxide, 20 volume</u>	500ml
202	<u>Iodine, resublimed</u>	250 g
203	<u>Iron filings, coarse</u>	1 kg
204	<u>Iron filings, fine clean</u>	1 kg
205	<u>Iron wire, 30 s.w.g., reel of 28 g</u>	1 reel
206	<u>Lead shot, 3 mm</u>	1 kg
207	<u>Lead(II) oxide</u>	250 g
208	<u>Litmus paper, blue</u>	10 books
209	<u>Litmus paper, red</u>	10 books
210	<u>Magnesium ribbon, reel of 25 g</u>	4 reels
211	<u>Manganese(IV) oxide</u>	250 g
212	<u>Methylene blue (alkaline)</u>	100 ml
213	<u>Nickel-chromium wire, 20 s.w.g., reel of 125 g</u>	2 reels
214	<u>Nickel-chromium wire, 32 s.w.g., reel of 125 g</u>	2 reels
215	<u>Nitric acid</u>	2.5 L
216	<u>pH paper</u>	4 rolls
217	<u>Potassium aluminum sulphate</u>	1 kg
218	<u>Potassium chromate(VI)</u>	500 g
219	<u>Potassium iodide</u>	500 g
220†	<u>Potassium manganate(VII)</u>	250 g
221	<u>Potassium nitrate</u>	1 kg
222	<u>Rocksil</u>	500 g
223	<u>Soda lime, granules, non-hygroscopic</u>	500 g
224	<u>Sodium carbonate, anhydrous, pure</u>	1 kg
225	<u>Sodium chloride, fine</u>	2 kg
226	<u>Sodium hydrogencarbonate</u>	500 g
227	<u>Sodium hydroxide, pellets</u>	1 kg
228	<u>Starch, soluble</u>	500 g
229	<u>Stearic acid</u>	250 g
230	<u>Sulphur, crushed</u>	1 kg
231	<u>Sulphuric acid, conc.</u>	2.5 L
232	<u>Thymol blue</u>	5 g
233	<u>Tin foil</u>	250 g

Item No	Description	Quantity
234	<u>Universal indicator (pH 3-11)</u>	250 ml
235	<u>Vaseline</u>	100 g
236	<u>Wood splint bundles</u>	6 bundles
237	<u>Zinc foil</u>	250 g
238	<u>Zinc, granulated</u>	500 g
	<u>(C) Furniture for Science (S1-3) Laboratories</u>	
239	<u>Box, first aid</u> Single door, 250 mm x 170 mm x 360 mm (width x depth x height).	2
240	<u>Stool</u> Wooden or plastic seat, approx. dimensions of 300 mm x 300 mm, 530 mm height	90
241	<u>Movable bench</u> 1,525 mm x 760 mm x 840 mm (length x width x height), with acid and heat resistant plastic laminate on top.	10
242	<u>Blackout curtains</u> - flameproof, preshrunk, thick and light proof material - 2 pieces for each window unit with rails - rufflette tape and hooks to fit windows	2 sets
	<u>(D) Storage cupboard and Trays for chemical wastes</u>	
243	<u>Chemical Waste Storage Cupboard</u> Overall dimension 910 mm (W) x 460 mm (D) x 1830 mm (H) Steel, double door, fitted with 3-point locking espagnolette bolt, controlled by 6-level lock with one adjustable shelf. With words "CHEMICAL WASTES 化學廢物" (not less than 60 mm in height) printed clearly and boldly in red on a white background on the left door. 4 ventilation holes on each side. Rust proof finish.	2
††		
244	<u>Stainless Steel Spill Catcher Tray</u> Overall dimension 380 mm (W) x 145 mm (D) x 380 mm (H).	6
††		
245	<u>Heavy-duty Plastic Spill Catcher Tray</u> Overall dimension 380 mm (W) x 362 (D) x 380 mm (H).	6
	Total Cost for Subject	395,800

Footnotes:

- @ Consumable item.
- # -The asbestos-free requirement should be clearly specified when purchasing the item. As a safeguarding measure, schools may consider requesting suppliers to provide evidence (e.g. laboratory testing report) authenticating their products are free of asbestos.
- School may also consider using other alternatives e.g. stainless steel bench mat if suppliers fail to authenticate their products are free of asbestos.
- ## -The asbestos-free requirement should be clearly specified when purchasing the item. As a safeguarding measure, schools may consider requesting suppliers to provide evidence (e.g. laboratory testing report) authenticating their products are free of asbestos.
- School may also consider using other alternatives e.g. wire gauze without the ceramic center if suppliers fail to authenticate their products are free of asbestos.
- ### -The asbestos-free requirement should be clearly specified when purchasing the item. As a safeguarding measure, schools may consider requesting suppliers to provide evidence (e.g. laboratory testing report) authenticating their products are free of asbestos.
- * **Specifications of Centralized low voltage power supply unit**
This equipment is designed to provide a source of low voltage a.c. or d.c. Power supplies simultaneously to distribution points with output controlled from the unit; for general use in school laboratories with provision for charging secondary batteries. A single phase a.c. supply is taken from an outlet with fused plug and is connected to the double pole isolator which disconnects the supply completely from all components immediately when the front panel is opened. From the isolator, power is taken through the input circuit breaker to the variable ratio auto-transformer. The input circuit is protected against both surge or steady overload by the input circuit breaker. Input current and voltage are indicated by the input ammeter and input voltmeter at the top of the front panel. The output from the variable ratio auto-transformer is taken to the primary of a fixed ratio, step down, double wound, main transformer. The secondary of this main transformer is taken to the rotary selector switch. To provide a.c. sources, the secondary output is fed via the output ammeter, output voltmeter and output circuit breaker to the output terminals. The output circuit breaker designed to withstand heavy current arcs safeguards the output circuit. To provide d.c. sources, the low voltage alternating current is fed into the selenium cell full wave bridge connected rectifier and then via the output meters and output circuit breaker to the output terminals. The d.c. output is unsmoothed and the polarity is indicated by terminal colour. All the measuring instruments are of the moving iron type. The input and output circuit breakers are both of the magnetic terminal release type and are adjusted to trip at 5 and 50 A respectively. For inspection purposes, the front panel is hinged at the bottom to allow it to be opened through 140°. The internal wiring is colour coded, with green for a.c. and red/black for d.c. When opening, the supply is automatically disconnected making the wiring "dead" and perfectly safe to touch.
- For laboratory use*
- The output from the unit is taken via a ring main circuit to at most 13 distribution points in the laboratory. The output voltage and/or current may be kept constant or varied by adjustment of the auto-transformer.
- Maximum outputs are:
0 - 14 V at 40 A a.c. or d.c.
14 - 18 V at 32 A a.c. or d.c.
- For battery charging, the cells should be connected in series with the positive and negative terminals connected to the output terminals of like polarity. The maximum number of 2 V cells that can be charged is 6 and the maximum charging current advised by the battery manufacturer should not be exceeded. The unit is rated at 580 VA. Overall dimensions approximately 540 x 310 x 740 mm (length x width x height). For use on 220 - 240 V, 50 Hz, single phase, a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.
- ** **Specifications of Drill, electrical band (pistol pattern)**
- (a) General:
The drill offered shall be of the medium duty type.
- (b) Capacity:
The drill shall have a capacity to drill holes in steel up to approximately 8 mm or in wood up to approximately 20 mm.
- (c) Dimensions & Requirements:
- (i) The drill shall be fitted with a drill chuck of suitable size complete with adjustment key.
- (ii) The drill shall be fitted with speed change by means of external gear box with speed change levers.
- (iii) The drive motor shall be designed for a 220 - 240 V, 50 Hz, single phase, a.c. supply, shall be complete with an ON/biased OFF switch so as to cause minimum operator fatigue during long period of use. The related power shall be approximately 400 W.
- (iv) The drill shall be designed for variable speeds from 0 to 3400 r.p.m. at no load. Nine constant speeds may be selected from the variable speed control (a

useful feature when drilling brittle surfaces such as tiles or glass).

(v) The drive unit should have overload protection to help prevent motor burn-out and the unit is double-insulated.

(d) Construction:

(i) The drill shall be robustly constructed for laboratory use, with cast iron/steel drill head, gear box if fitted and motor mount.

(ii) All drill head power transmission components shall be accurately manufactured from high grade steel to ensure durability and drilling accuracy. All shafts shall be heavy duty ball and/or roller bearing mounted.

(e) Electrics:

(i) The electrical equipment fitted conform to the applicable British Standard Specifications, or shall be of equivalent quality and capacity.

(ii) The equipment shall be either (1) bonded to earth through 3 core supply cable fitted with 3 pin B.S.S. appropriately fused plug; or (2) properly double insulated, and with 2 core supply cable fitted with 3 pin B.S.S. appropriately fused plug.

(f) Maintainability:

The drill shall be designed for durability easy maintenance.

Specifications of Lamp, desk/table

Single bulb type.

(a) General:

(i) The lamp shall be of modern design to give optimum illumination and good appearance.

(ii) It shall be suitable for use with lamp bulbs of up to 60 W.

(iii) A dimmer control is not required.

(b) Construction:

(i) The stem between the base and the bulb holder and shade shall be of the flexible type.

(ii) The lamp base, stem and shade should be of all metallic construction. The materials used shall be affected by atmospheric corrosion, or shall be suitably treated and/or painted for life protection against it and shall be of ample thickness to withstand heavy duty use and occasional accidents.

(iii) The lamp base shall be sufficiently heavy to ensure good stability.

(iv) The lamp shade shall be well ventilated.

(v) There shall be no external sharp edges, or any internally in way of the electric cable to the lamp holder.

(vi) The ON/OFF switch should be located in the lamp base. A rotary type ON/OFF switch located at the rear of the lamp shade may be accepted. Pendant operated switches will not be accepted. See also clause (c) (iii) below.

(c) Electrics:

(i) All electrical components and cabling shall be designed for heavy duty usage and their quality should be equal to that designed to British Standard Specifications.

(ii) All electrical components and metallic parts of the lamp shall be bonded to earth by a soldered, or bolted, connection to the earth wire of a 3 core supply cable and 3 rectangular pin fused plug. The cable shall be grommetted at the point of entry to the base.

(iii) The ON/OFF switch shall be of the heavy duty type and will preferably have a spring assisted toggle action. The "ON" and "OFF" positions should be marked.

(iv) The lamp bulb fitted shall be designed for 220 V a.c.

(d) Finish:

(i) Any chromium-plated parts shall be of good quality.

(ii) All painted parts shall be finished with an abrasion resistant, durable, materials. The lamp shade finish material shall also be heat resistant and high gloss internally.

(iii) The lamp shade interior shall be white, or silver.

(e) Warranty:

The lamp shall be guaranteed against faulty material and workmanship for a period of 1 year from the date of acceptance.

†

Potassium manganite (VII) is regarded as one of the controlled chemicals under the Control of Chemicals Ordinance. Schools wishing to acquire potassium manganite (VII) for experimental purpose must apply for a Storage Approval from Customs and Excise Department (Tel. 2541 4383). For more information about the controlled chemicals, please refer to the website http://www.customs.gov.hk/en/trade_facilitation/chemicals/index.html

††

The facilities for the storage of chemical wastes have already been included in the Chemistry Standard Equipment and Furniture List (Secondary 4-6).

Schools which do not offer Chemistry course, such as prevocational schools, special schools, etc., should acquire a set of these facilities for storing chemical wastes pending collection by the Chemical Wastes Treatment Centre for disposal.

It should be noted that each school should only acquire ONE set of these storage facilities.

**Reference List of Furniture and Equipment
for Secondary School**

Subject : Computer Subject Room

Item No	Description	Quantity
	<u>COMPUTER EQUIPMENT ITEMS</u>	
1	Microcomputer workstation	26
2	Projection system with screen	1
3	Printer or printer cum scanner (small)	2
4	Web camera	10
5	Digital video camera	10
6	Diagnostic toolkit	1
7	Web page development tool (for at least 21 concurrent users)	1
8	Graphics package (for at least 21 concurrent users)	1
9	PDF Editor	1
	<u>FURNITURE & EQUIPMENT ITEMS</u>	
10	Dehumidifier	2
11	Student chair	20
12	Teacher chair	1
	Total Cost for Subject	191,200

**Reference List of Furniture and Equipment
for Secondary School**

Subject : SS Biology

Item No	Item	Description	Quantity
1	ABO simulated blood typing kit	This kit simulates the classic agglutination reaction for blood typing. Each kit contains at least four blood samples (simulated or aseptic) and anti-sera A and B, and other accessories for performing at least 50 blood typing tests. Complete with notes and instructions. Preference will be given to kits which can be used to do the Rh typing as well.	2
2	Air pump, aquarium	Quiet running diaphragm type. Metal/tough plastic body with rubber/foam rubber base. Supplied with spare diaphragm.	1
3	Aquarium	Glass/Transparent plastics, 600 x 300 x 300 mm (length x width x depth).	1
4	Arm model (demonstration model)	Made of durable plastic to demonstrate muscular extension and flexion by moving the lower arm. The biceps and triceps are simulated with elastics attached to the base of the upper arm.	1
5	Awl	With wooden/plastic handle and stout steel spike, length about 50 mm.	50
6	Balance, electronic, capacity up to 110g	Readability 0.1mg, powered.	1
7	Balance, electronic, capacity up to 200g	Readability 0.1g, powered.	5
8	Barrier tape	PVC tape, strong adhesive, ideal for highlighting hazard/restricted areas, 50 mm x 3 m.	4 rolls
9	Beaker, 100 mL	Pyrex or equivalent, squat form with spout, with two or more graduation marks showing approximate capacities.	20
10	Beaker, 250 mL	Pyrex or equivalent, squat form with spout, with two or more graduation marks showing approximate capacities.	30
11	Beaker, 500 mL	Pyrex or equivalent, squat form with spout, with two or more graduation marks showing approximate capacities.	30
12	Beaker, 1000 mL	Pyrex or equivalent, squat form with spout, with two or more graduation marks showing approximate capacities.	2
13	Bell jar	Moulded glass, socket top, 300 x 200 mm (height x internal diameter).	2
14	Bell jar model (demonstration model)	An easy-to-use model to demonstrate the role of diaphragmatic contraction in causing the lung to inflate. Complete with a transparent heavy-duty plastic bell jar (about 200 mm x 200 mm), a metal Y-tube, 2 balloons and a rubber 'diaphragm' with hand grip.	1
15	Bench mat	Make of glass reinforced cement, asbestos free, 300 x 300 mm, 4.5 mm thick.	15
16	Blender	A domestic blender for blending biological materials into fine suspensions. Motor housed in a heavy metal/plastic case with rubber feet/pad. Supplied with grinding mill for dry grinding of peas and beans into fine particles.	1
17	Bone cutter forceps	Nickel-plated carbon steel/stainless steel with spring handles and closing clip, blade length 20 - 40 mm.	1
18	Bottle stand	Wooden with six holes for 60 mL dropping bottles.	12
19	Bottle, dropping	A three-piece pipette section comprising a stout glass dropper, high-density polythene stopper with dust-proof head and vinyl teat, fitted to a reagent bottle. Capacity 60 mL.	40
20	Bottle, narrow mouth (a) 100 mL	Clear glass, with dust-proof stopper.	20
21	Bottle, narrow mouth (b) 250 mL	Clear glass, with dust-proof stopper.	40
22	Bottle, narrow mouth (c) 500 mL	Clear glass, with dust-proof stopper.	20
23	Bottle, wide mouth	Clear glass, with dust-proof stopper. Capacity 250 mL.	20
24	Brain, human (anatomical model)	Life size or slightly larger than life size, detachable parts, made of durable plastics, mounted on stand/base. Complete with key card.	1
25	Brown alga, thalloid (demonstration mount)	Demonstration mount of Laminaria (or any other thalloid brown alga) showing small entire plant complete with holdfast, mounted on plastic slip in screw capped jar.	1
26	Burette	With teflon stopcock, 50 mL with 0.1 mL graduations.	10
27	Burette clamp	Fitting all retort stand rod up to 13 mm diameter. Comprises strong light weight metal frame with spring grips covered with replaceable rubber to give a safe and firm grip.	10
28	Burner, Bunsen	For *town gas/liquefied petroleum gas/natural gas supply. Nickel-plated burner tube with rotatable air regulator and tapering, rifled connector, mounted on an enamelled pressed-steel base. Burner tube 100 x 13 mm (height x diameter), base 80 mm diameter, connector 10 mm mean outer diameter. *Schools should specify the type of gas supply used in their laboratories and delete whichever is inapplicable.	14
29	Bunsen burner tubing	Rubber, with indication of Approval Mark & Expiry Date of Service Life on hose surface. About 9 mm internal bore, not more than 2m length, for either town gas or liquefied petroleum gas depending on the supplied.	20
30	Cell (model)	Three dimensional, made of durable plastics. Showing the following main cell organelles - nucleus, endoplasmic reticulum, mitochondria, ribosomes, Golgi apparatus and centriole. On a stand with base. Height of model not less than 200 mm.	1
31	Cell to embryo model	For the study of the menstrual cycle, fertilisation and formation of the embryo. Enlarged sections to show cross-section of ovary emitting ovum into uterus and into path of sperm, ovum being fertilised, initial cell division, and beginning shape of human embryo.	1
32	Centrifuge	Single speed bench centrifuge for general purpose. The centrifuge is driven by a quiet running single speed motor, speed 2,500 r.p.m. and is controlled by a biased off rotary switch. With four-place swing-out head for 100 x 16 mm test tubes. Lid with safety interlock to prevent the motor being started unless the lid is properly closed. Housed in a robust sheet metal case with rubber feet. Timer is not required. Supplied with 4 plastic adaptors for 75 x 10 mm test tubes.	1
33	Chart, Ishihara	For testing colour blindness.	5
34	Chromatography paper	Whatman Grade No. 1 (CHR), width 20 mm. In roll of 100 m.	1 roll
35	Clinostat	For demonstration of phototropism and geotropism. About 100 mm diameter, cork table rotated by an electric motor at 4 revolutions per hour, provided with plastic cover and adjustable to any angle from vertical to horizontal. Mounted on heavy base case. Supplied with or without plant pot holder.	2
36	Clip, Hoffman	Plated metal, with clamp screw and hinged bottom plate, width between bars 20 mm.	30
37	Clip, Hose	For use on Bunsen burner tubing.	30
38	Clip, Mohr	Plated metal, maximum diameter of tubing accepted 15 mm.	30
39	Cork	Tapered, assorted sizes, pack of 144.	1 pack
40	Cork borer	Set of 6 from 4 to 10 mm. Plated metal. Cutting tube mounted with safety underflange in shaped handle ensuring that operator cannot be injured by a dislodged tube. With rod for clearing borers.	5 sets
41	Cork borer sharpener	Plated metal cone with hinged cutter blade set in slot and metal handle. Circular shape of borer maintained by cone. Edge cut to correct angle by depressing blade using thumb pressure button and rotating borer.	1

Item No	Item	Description	Quantity
42	Counting cell	A transparent plastic slide with central cell 50 x 20 x 1 mm ruled in 1 mm squares, with cover glass to contain 1 mL of liquid. For use in water analysis and particle analysis.	20
43	Cover glass	Square glass cover slip for microscope slides. Size 18 mm square. Thickness 0.13 - 0.16 mm. In box of 100.	2 boxes
44	Cylinder, graduated, glass / plastics, with spout, (a) 10 mL		20
45	Cylinder, graduated, glass / plastics, with spout, (b) 25 mL		20
46	Cylinder, graduated, glass / plastics, with spout, (c) 100 mL		20
47	Cylinder, graduated, glass / plastics, with spout, (d) 250 mL		2
48	Data logger interface	<u>Hardware</u> The interface can log data from appropriate sensors by connecting to a microcomputer workstation / tablet through a common communication port (such as USB) and to a tablet device through a wireless connection (such as Bluetooth). <u>Software</u> Runs on operating system for microcomputer workstation / tablets; displays and analyses data in the forms of digits, meter, graph and table.	5
49	(a) Data logger sensor, carbon dioxide	For measuring carbon dioxide gas concentration in open or closed system. The sensor should be fully compatible with the interface above.	5
50	(b) Data logger sensor, colorimeter	For measuring transmittance (30% - 90%) of light (400 - 700 nm) through a solution, with cuvettes and caps. The sensor should be fully compatible with the interface above.	5
51	(c) Data logger sensor, conductivity	For measuring conductivity (0 - 20,000µS/cm) in aqueous solutions.	5
52	(d) Data logger sensor, heart rate	For measuring heart rate of human.	5
53	(e) Data logger sensor, dissolved oxygen	For measuring aqueous oxygen concentrations.	5
54	(f) Data logger sensor, flow rate	For measuring flow rate of streams.	5
55	(g) Data logger sensor, humidity	For measuring relative humidity, ranging 5 - 95%.	5
56	(h) Data logger sensor, low pressure sensor	For measuring gas pressure ranging from 0 to 10 kPa.	5
57	(i) Data logger sensor, pH	For measuring pH values ranging from 0-14 with an accuracy of $\pm 2\%$.	5
58	(j) Data logger sensor, respiration rate	For measuring respiration rate.	5
59	(k) Data logger sensor, sound	For measuring sound level ranging from 50 to 100 db, the overall frequency response within the range heard by human ear.	5
60	(l) Data logger sensor, temperature	For measuring temperature ranging from -10°C to +110°C, with an accuracy of $\pm 1^\circ\text{C}$.	5
61	Desiccator	Borosilicate glass with knob cover and perforated disc. 200 mm top internal diameter, 190 mm disc diameter, 85 mm depth of disc below flange.	2
62	Dialysis tubing	14 mm inflated diameter, 30m / pack.	1 pack
63	Digital blood pressure monitor	Automatic measurement. Digital display of systolic and diastolic blood pressure reading and heart rate. Measurement range: Pressure 20-280 mmHg ± 3 mmHg, pulse 40 - 200 beats/ min $\pm 5\%$.	10
64	Display tray	Plastic tray. Dimension: 400 x 300 x 100 mm (length x width x depth).	20
65	Dissecting board	Wooden board of approximately 560 x 380 mm (length x width), made of selected timber so that awls can be pressed in without hammering.	20
66	Dissecting instrument set	In box/plastic wallet, comprising -1 pair of forceps, blunt, stainless steel, straight, length about 130 mm -1 pair of forceps, pointed, stainless steel, straight, length about 130 mm -2 needles, stainless steel in metal handle -1 pair of scissors, stainless steel, straight with one blunt and one pointed ends, overall length about 110 mm -1 pair of scissors, stainless steel, straight, pointed, open shanks, overall length about 110 mm -1 scalpel blade holder, stainless steel, No. 3 or No. 4 -5 scalpel blades, length 38 mm -5 scalpel blades, length 45 mm -1 section lifter -1 seeker, stainless steel in metal handle	1 set
67	Dissecting needle	Stainless steel in metal handle. Overall length 120 -140 mm.	20
68	Dissecting pin	Plated steel with about 15 mm 'T' shaped head. Overall length about 50mm. In boxes of 400.	1 box
69	Drier, hot air and cool air output	A low noise hair drier suitable for rapid drying of laboratory glassware, chromatograms, etc. A detachable nozzle is provided and there is an adjustable heat/cool/speed setting.	10
70	Ear, human (anatomical model)	Enlarged at least 3 times, made of durable plastics. Inner ear can be opened to show semicircular canals and cochlea with stapes attached, which is removable. Incus and malleus are attached to tympanum which is removable.	1
71	Eye wash unit	Equipped with an eye wash bottle. For emergency treatment of the eye affected by liquids, dust or flying particles. By squeezing the bottle, a fountain of wash is directed into the eye via the eye bath. Contaminated wash drains through the side tube, so that a continual flow of clean wash reaches the eye. When not in use, eye bath is covered by a dust cap. The bottle is clipped into a moulded panel on which simple but complete instructions are printed. The panel has holes for wall hanging.	1
72	Eye, human (anatomical model)	Dissectible, enlarged 4 or 5 times, made of durable plastics, to show vitreous humour, blind spot, lens, ciliary processes, iris, pupil, optic nerve, retina and sclerotic coat. Mounted on a pedestal or stand.	1
73	Filter paper	Whatman No. 1, 125 mm diameter. In box of 200.	6 boxes
74	Flask, conical	Narrow mouth, Pyrex or equivalent.	40
75	Flask, flat bottom	Medium neck, Pyrex or equivalent.	20
76	Flask, round bottom	Pyrex or equivalent.	20
77	Flask, volumetric, 1000mL	Pyrex or equivalent.	5
78	Flask, volumetric, 250 mL	Pyrex or equivalent.	10
79	Flask, volumetric, 500 mL	Pyrex or equivalent.	10
80	Forceps, blunt	Stainless steel, straight, length about 130 mm.	20
81	Forceps, fine	Stainless steel, straight, length about 130 mm.	20
82	Funnel, dropping	Cylindrical, open top, with interchangeable glass/Teflon stopcock, borosilicate glass, 100 mL.	2
83	Funnel, filter, 150mm top diameter	150 mm top diameter, plain, soda-lime glass or plastic.	4

Item No	Item	Description	Quantity
84	Funnel, filter, 75 mm top diameter	75 mm top diameter, plain, soda-lime glass or plastic.	20
85	Funnel, thistle	With straight stem, soda-lime glass, overall length 300 mm.	4
86	Gene model kit	Comprising of pot-it beads, DNA support rods, hydrogen bonds, amino acids units and centromeres for demonstration of self-conservative replication of DNA, transcription, translation, mitosis, meiosis and genetic engineering. Complete with illustrated teaching notes.	5 sets
87	Genetic maize ear, dihybrid inheritance	One whole ear showing dihybrid inheritance of surface and aleurone colour in kernels.	5
88	Genetic maize ear, monohybrid inheritance	One whole ear showing monohybrid inheritance of aleurone colour in kernels.	5
89	Genetic maize mount, dihybrid cross	For demonstration of the dihybrid cross of surface and aleurone colour in kernels. Ears showing the parental and F1 phenotypes are mounted in clear box.	1
90	Genetic maize mount, monohybrid cross	For demonstration of the monohybrid cross of aleurone colour in kernels. Ears showing the parental and F1 phenotypes are mounted in clear box.	1
91	Genetics study kit, dihybrid inheritance	Each kit contains: Seeds of suitable plants (e.g. tomato) of the relevant parental types; the resulting F1 generation, at least 100 seeds of the F2 progeny, and at least 100 seeds of the back-cross progeny, for illustrating dihybrid inheritance of stem colour and leaf shape (or any other two discrete characters) Ratios of 9:3:3:1 and 1:1:1:1 should be illustrated.	2 sets
92	Genetics study kit, monohybrid inheritance	Each kit contains: Seeds of suitable plants (e.g. tomato) of the relevant parental types; the resulting F1 generation, at least 100 seeds of the F2 progeny, and at least 100 seeds of the back-cross progeny, for illustrating monohybrid inheritance of stem colour (or any other discrete character) Ratios of 3:1 in the F2 and 1:1 in the back-cross generation should be illustrated.	2 sets
93	Glass plate	Square for bell jar, ground one side, 250 - 300 mm.	2
94	Glass rod	Soda-lime glass, 6 mm diameter, in length of about 1.5 m.	10
95	Gloves, animal handling	Leather type with cuffs that reach to the upper arm.	1 pair
96	Gloves, chemical resistant	For handling acids, alkalis and common organic solvents, long cuff, with special finishing for excellent wet grip.	2 pairs
97	Gloves, heat/cold resistant	Made of non-flammable non-asbestos material, with low thermal conductivity, high strength and high abrasion resistance, gives no dermatological problems; for furnace and hotplate work in the laboratory; gauntlet length.	1 pair
98	Gloves, surgical	Lightweight disposable latex rubber gloves. Close fitting and with high finger sensitivity. 50/box.	1 box
99	Hand lens	Magnification x5 to x10 with metal/plastic frame and handle.	10
100	Heart, human (anatomical model)	Enlarged approximately 2 times, made of durable plastics. Dissectible into two parts showing atria, ventricles, bicuspid valve, tricuspid valve, semilunar valves and entry of blood vessels Mounted on a pedestal or stand	1
101	Heater, aquarium	Immersion type, thermostatically controlled. Comprising a heating element encased in a plastic-coated aluminium tube and a thermostat in an upper polycarbonate sheath. The thermostat can be adjusted using an external knob and incorporates a heater indicator lamp. The whole unit is enclosed in a glass tube which is sealed to the inner tube by the outer lip of the stopper. A suction clip is provided to enable attachment to the side of aquarium.	1
102	Ice bucket	For the transport and short-term storage of ice. Complete with lid. Capacity about 10 to 15 litres.	1
103	Jar, specimen, 150 x 50 mm	Clear glass, cylindrical, with foot and grip stopper.	6
104	Jar, specimen, 250 x 100 mm	Clear glass, cylindrical, with foot and grip stopper.	6
105	Joint model, elbow	Accurately moulded articulated models. Elasticated to allow movement.	1
106	Joint model, shoulder	Accurately moulded articulated models. Elasticated to allow movement.	1
107	Kidney, human (anatomical model)	Enlarged 3 or 4 times, made of durable plastics. Sectioned right/left kidney showing cortex, medulla, blood vessels and a nephron (enlarged) together with ducts leading into the pelvis and ureter renal artery and vein are also included	1
108	Lamps, bench/desk/table		10
109	Leaf, dicot (anatomical model)	Three dimensional model showing part of leaf with stomata on epidermis, face section of longitudinal and transverse planes. Made of durable plastics.	1
110	Magnetic stirrer-hotplate	1,300 r.p.m. and 450°C maximum, with energy regulator controlled 400 W hotplate. Mains and load indicator lamps, mains cable. With one each 20 & 40 mm PTFE coated magnetic followers & instructions but without support rod. The equipment must be designed to prevent any spillage from entering from base structure	1
111	Micrometer graticule	Harris-type, with scale 10 mm long, numbered at 1 mm intervals with 0.1 mm sub-divisions. Supplied with instructions for cutting and mounting the scales. In pack of 10."	2 packs
112	Microscope cavity slide	Single cavity, non-corrosive, hard-glass, 76 x 26 mm (length x width), thickness not exceeding 1.5 mm. In pack of 50.	1 pack
113	Microscope slide	Standard, non-corrosive, hard-glass, 76 x 26 mm (length x width), thickness not exceeding 1.2 mm. In pack of 100.	1 pack
114	Microscope slide box	Rack form, accommodate 76 x 26 mm microscope slides. Wooden/ High-impact polypropylene with hinged lid. Slides are held in numbered slots and there is an index inside the lid. Capacity 100 slides in 2 rows.	5
115	Microscope slide folder	Made of strong cardboard. Holds 9 to 10 microscope slides (76 x 26 mm) in one row.	10
116	Microscope, digital	Binocular head with built-in CCD/CMOS camera for still image ($\geq 5M$ pixels) and live video capture. USB connection to computer. Two pairs of eye-pieces : x4(x5) and x10 (or x15). Four objectives : x5, x10 , x40 (or x45) and x100 on quadruple nosepiece. Coarse and fine adjustments, with limit stop. Abbe condenser NA 1.25 and iris diaphragm with filter tray. Built-in mechanical stage, movement graduated with vernier reading to 0.1 mm with low level coaxial controls. Equipped with a halogen/tungsten or LED illuminator with intensity control fitted to base. Supplied with cabinet with lock and key. Software: can be run on at least one of the following operating systems: English/Chinese Microsoft Windows 7 and 10.	1
117	Microscope, monocular	Vertical monocular body. Inclinal. Two eye-pieces : Huyghens x4 (or x5) and x10 (or x15). Four objectives : x5, x10 , x40 (or x45) and x100 on quadruple nosepiece. Coarse and fine adjustments, with limit stop. Abbe condenser NA 1.25 and iris diaphragm with filter tray. Built-in-mechanical stage. Equipped with a halogen/tungsten or LED illuminator with intensity control fitted to base Supplied with cabinet with lock and key.	20
118	Microscope, stereoscopic	Robust stand with reversible white and black plate. Paired x10 wide field eyepiece, with interpupillary adjustment. Two objectives : x1 and x2 interchangeable by rolling motion. Supplied with cabinet with lock and key.	10
119	Mortar and pestle	Unglazed inside, glazed outside with spout. Porcelain. External diameter 110 mm.	12
120	Net, aquarium	Nylon, on rectangular galvanized wire frame. About 0.15 x 0.13 m with handle.	10
121	Net, pond	General purpose. Coarse mesh nylon net suitable for collecting macro-invertebrates, fish fry, etc. Dimensions about 0.25 x 0.7 m (depth x circumference). Supplied with tough fastener for attaching net to frame, complete with frame and wooden/aluminium handle Length of handle about 1.2m."	5

Item No	Item	Description	Quantity
122	Neurone, human (anatomical model)	Enlarged approximately 2,500 times, made of durable plastics. Showing fine structures of cell body, axon, myelin sheath and Schwann cell. In three parts, on stand with base.	1
123	Microcomputer workstation/ tablets	For interface to the data logger device.	5
124	Oven / Incubator	Temperature range 5°C above ambient to 250°C. Temperature fluctuation not more than 1°C. Minimum capacity 30 L. Provided with at least two shelves and three shelf positions. Thermometer required.	1
125	Petri dish	Pyrex or equivalent, 90 x 15 mm (diameter x depth). Supplied with cover.	24
126	Pipette filler	For use with bulb or graduated pipettes of capacity up to 10 mL. With finely adjustable thumb wheel that can avoid the sucking back of liquid into the filler. With flexible pipette holding socket to minimize possible damage to pipette and a rapid release valve.	20
127	Pipette, bulb form, 10 mL	Bulb form, single graduation on upper stem, capacity 10 mL.	2
128	Pipette, bulb form, 2 mL	Bulb form, single graduation on upper stem, capacity 2 mL.	2
129	Pipette, bulb form, 5 mL	Bulb form, single graduation on upper stem, capacity 5 mL.	2
130	Pipette, dropping	Narrow mouth, overall length about 110 mm. Supplied with rubber teats.	24
131	Pipette, graduated, 1 mL	Fast-flow, amber stain graduations and inscriptions, 1 mL, subdivision 0.01 mL.	20
132	Pipette, graduated, 10 mL	Fast-flow, amber stain graduations and inscriptions, 10 mL, subdivision 0.1 mL.	20
133	Pipette, graduated, 2 mL	Fast-flow, amber stain graduations and inscriptions, 2 mL, subdivision 0.02 mL.	20
134	Pipette, graduated, 5 mL	Fast-flow, amber stain graduations and inscriptions, 5 mL, subdivision 0.05 mL .	20
135	Pot, flower, 100 mm diameter		2
136	Pot, flower, 200 mm diameter		2
137	Pot, flower, 300 mm diameter		2
138	Potometer, Farmer	Consists of a central reservoir with a 3-holes stopper holding a capillary tube graduated in mm, a funnel with stopcock and a short length of glass tubing. Dimension : reservoir 80 - 120 mm (height) x 50 - 80 mm (diameter) capillary tube about 350 - 400 mm long and 1 mm bore	2
139	Potometer, Ganong	A stopper fits the end tube for holding a plant shoot. The capillary tube is graduated in millimetre. A central reservoir is provided with a stopcock to admit water for adjusting the position of the air bubble. Height to top of reservoir about 160 - 180 mm, overall length of capillary tube about 180 - 340 mm; mounted on wooden/plastic base by spring clips	10
140	Projection system with screen		1
141	Pump, filter	body, with integral non-return valve, water inlet for flexible pressure tubing, and vacuum nozzle for about 10mm bore tubing.	4
142	Quadrat, folding	Four plastic coated steel rods, each 0.5 m long, fitted together with bolts and wingnuts to form a quadrat frame.	5
143	Rat/rabbit (demonstration mount specimen), brain	Entire mounted on clear plastic slip so that dorsal and ventral sides are clearly visible.	1
144	Rat/rabbit (demonstration mount specimen), embryo	Embryo attached to placenta by umbilical cord.	1
145	Rat/rabbit (demonstration mount specimen), injected	Double injection of vascular system, including dissection of lung lobes and kidneys.	1
146	Refrigerator		1
147	Respirator	Moulded rubber body with anodized aluminium screw retainer. Fitted with two relief valves and an adjustable elastic	1
148	Respirator filter cartridge	Respirator filter cartridge for use in presence of common organic vapours and acid gases.	1 pair
149	Retort stand	For use in presence of common organic vapours and acid gases.	20
150	Root, dicot (anatomical model)	Three dimensional, with face section in transverse, longitudinal and tangential planes. Made of durable plastics.	1
151	Safety goggles	Splash-proof. With single replaceable wide-angle clear polycarbonate lens, indirectly ventilated, flexible clear PVC frame for all-round vision. Fitted with adjustable headband with retained ends.	1
152	Safety screen	Transparent polycarbonate, comprising central panel 610 x 300 x 3 mm (height x width x thickness) connected to outer panels 610 x 230 x 3 mm (height x width x thickness) on each side by full height hinges	1
153	Safety spectacles	Constructed of polycarbonate, spectacle type with side shields giving all round protection. Top guard and lip prevent spillage into eyes. May be worn over prescription	45
154	Sand bucket	Made of iron, with cover. Red in colour with label "FIRE BUCKET". Approximately 250 x 230 mm (Diameter x height). Half- filled with sand.	2
155	Scalpel	Blade : stainless steel, length 35 - 45 mm. Handle : nickel plated, length 100 - 120 mm.	10
156	Scissors, dissecting, blunt ends	Nickel-plated steel/Stainless steel, straight, blunt ends, close shanks, overall length about 120 - 130 mm.	20
157	Scissors, dissecting, fine points	Nickel-plated steel/Stainless steel, straight, fine points, open shanks, overall length about 110-120 mm.	20
158	Scissors, general purpose	Nickel plated steel/Stainless steel, with one pointed and one rounded blade. Overall length about 150 - 180 mm.	2
159	Sealing film	Parafilm-type, stretchable, self-adhesive and water-proof plastic sheet for sealing flasks, test tubes, etc. In roll of 38 m, interleaved with paper to prevent sticking. Width 10 cm.	1 roll
160	Seeker	Steel handle, blunt end stainless steel, overall length about 120 - 140 mm.	20
161	Shield, face	With curved hard plastic visor which can be raised from the face when not required, with adjustable headband.	1
162	Skeleton, human (anatomical model)	Life size, made of durable plastic material, showing anatomical details of bone structure, with dust proof case mounted upright on a roller stand. Detachable skull showing full set of permanent teeth on both jaws, removable cranium. Joints mounted, all movable joints should be demonstrated.	1
163	Skeleton, rabbit, adult, articulated	Articulated, mounted on base with perspex cover.	1
164	Skeleton, rabbit, adult, disarticulated		6 sets
165	Skin, human (anatomical model)	Enlarged approximately 70 times, made of durable plastics. Vertical section, large scale to show hair, sweat gland, sebaceous gland, blood vessel and sensory receptors.	1
166	Spatula	Heavyweight, with one spatula and one spoon end.	20
167	Spill pack	Stainless steel. Overall length about 150 mm. The spill pack is made up of six containers each with enough absorbent material to absorb a spillage of up to 500 cm ³ . In addition to the absorbent material, two packets of soda ash are provided so that acid spills, once absorbed and collected, can be neutralised and made safe for disposal. Ten stout polythene bags are also provide for disposal of spillage.	1 pack
168	Spinal cord, human (anatomical model)	Enlarged 7 times, made of durable plastics. Cross section of spinal cord in a vertebra showing the H-piece, dorsal and ventral roots, spinal ganglion, and spinal nerve.	1
169	Spirit level	For horizontal use.	5

Item No	Item	Description	Quantity
170	Spot plate	For observing colour changes. Porcelain : 150 x 150 mm with 12 cavities of 5 mm deep.	20
171	Stem, dicot (anatomical model)	Three dimensional, with face section in transverse, longitudinal and tangential planes. Made of durable plastics.	1
172	Stethoscope	Diaphragm type, Dual purpose chestpiece for monitoring heart beat and respiratory movements with the larger side (45- 50 mm diameter), and for listening to the pulse in the arm with the small one (about 30 mm diameter). Earpieces plastic/metal, fitted with replaceable ear plugs.	10
173	Stopper, rubber, one hole	Assorted sizes.	24
174	Stopper, rubber, one-hole, 24 mm diameter.	One-hole, for test-tube of 24 mm diameter.	24
175	Stopper, rubber, solid	Without hole, assorted sizes.	24
176	Stopper, rubber, solid, 24 mm diameter.	Without hole, for test-tube of 24 mm diameter.	24
177	Stopper, rubber, two-holes	Assorted sizes.	24
178	Stopper, rubber, two-holes, 24 mm diameter.	Two-hole, for test-tube of 24 mm diameter.	24
179	Stopwatch	Analog or digital display, reads up to 60 minutes, accuracy at least 0.2 s, with start, stop and reset buttons.	20
180	Syringe, 10mL	Disposable, clear polystyrene barrel, graduated, with plastic fitting.	20
181	Syringe, 5mL	Disposable, clear polystyrene barrel, graduated, with plastic fitting.	20
182	Test tube brush, diameter of head 15 mm	Nylon, with fan shaped end and galvanized wire handle.	12
183	Test tube brush, diameter of head 30 mm	Nylon, with fan shaped end and galvanized wire handle, for tubes of diameter 16 to 25 mm.	12
184	Test tube holder	Wood with steel spring, to take tubes up to 19 mm diameter, length about 185 mm.	20
185	Test tube rack, aluminium/stainless steel, stackable Z-pattern	With five 28 mm, six 19 mm and eight 13 mm diameter holes arranged in three rows.	12
186	Test tube rack, hard wood	Wood with 12 pegs, 10 holes of 22 mm diameter, 2 holes of 32 mm diameter.	12
187	Test tube rack, nylon coated steel wire	For use in water bath, with about 12 holes to take tubes up to 24 mm in diameter.	4
188	Test tube, 100 x 16 mm (length x diameter)	Soda-lime glass, with rim, for use in centrifuge.	20
189	Test tube, 125 x 16 mm (length x diameter)	Pyrex or equivalent, medium wall with rim.	20
190	Test tube, 150 x 24 mm (length x diameter)	Pyrex or equivalent, medium wall with rim.	20
191	Test tube, 75 x 10 mm (length x diameter)	Soda-lime glass, with rim, for use in centrifuge.	20
192	Thermometer	Red spirit filled, -10°C to 110°C x 1°C, with reinforced bulb and permanent graduations.	30
193	Tong, crucible	Stainless steel, straight with flattened hinge, length about 200 mm.	12
194	Tooth, human (anatomical model)	Enlarged about 8 times, made of durable plastics. Dissectible to show structures of tooth and occurrence of caries. Mounted on a pedestal or stand.	1
195	Torso, human (anatomical model)	Life size, head and trunk, mounted on a base with interchangeable male and female reproductive organs. Made of unbreakable plastic materials, dissectible into at least 20 parts. Head features: Detachable, one side of the head opened to reveal half brain, eye, teeth and jaw. Neck features: Opened to show trachea. Thorax features: With chest cover showing mammary gland, muscle and ribs, removable to show internal organs, dissectible lungs and heart. Abdomen features: Removable liver, stomach, pancreas, small and large intestine, kidney. Interchangeable male and female reproductive organs. Urinary system and all major blood vessels present. All anatomical features should have an accompanying key.	1
196	Tripod stand	Triangular top, cast iron, with splayed steel legs, 150 x 210 mm (length of side x height).	14
197	Trolley, apparatus	Apparatus, four wheels, tubular enameled steel frame, two enameled and plated trays of size 760 x 460 mm, height to top tray about 900 mm, height between trays about 350 mm.	1
198	Trough	Glass, 300 x 150 mm (diameter x depth).	2
199	Tubing connector, T-shaped	Polypropylene, autoclavable, of suitable O.D. to fit rubber tubing of bore diameter about 8 mm.	20
200	Tubing, capillary	Glass, external diameter x bore approximately 6 x 0.5 mm, in length of about 1.2 - 1.5 m.	5
201	Tubing, glass	Soda-lime glass, external diameter approximately 6 mm, in length of about 1.5 m.	10 (1 pack)
202	Tubing, rubber, normal wall, 5 x 1.5 mm (bore x wall thickness)		10 m(1 pack)
203	Tubing, rubber, normal wall, 8 x 1.5 mm (bore x wall thickness)		10 m(1 pack)
204	Tubing, rubber, transparent, with terylene mesh reinforced wall	Suitable for moderate pressure or vacuum applications. Made of PVC, bore 6.5 mm.	10 m(1 pack)
205	Vacuum flask	Capacity about 500 mL.	4
206	Vermiculite	A highly absorbent and non-flammable material suitable for plant culture without soil. Maximum particle size 3 mm. In pack of 14 kg (or 110 litres).	1 pack
207	Vertebra, human lumbar (anatomical model)	Life size, made of durable plastics, showing details of basic structures of a human vertebra.	1
208	Vial, plastic, 50 x 20 mm	Approximately 50 x 20 mm (height x diameter). Made of clear plastic and supplied with polyethylene snap-on caps, in pack of 144.	1 pack
209	Vial, plastic, 80 x 30 mm	Approximately 80 x 30 mm (height x diameter). Made of clear plastic and supplied with polyethylene snap-on caps, in pack of 144.	1 pack
210	Vial, plastic, 80 x 50 mm	Approximately 80 x 50 mm (height x diameter). Made of clear plastic and supplied with polyethylene snap-on caps, in pack of 144.	1 pack
211	Wash bottle	White translucent, flexible, with screw cap and bent tube, polyethene, 250 mL capacity.	12
212	Watch glass, 100 mm	Ground edge, diameter 100 mm.	12
213	Watch glass, 50 mm	Ground edge, diameter 50 mm.	12
214	Water bath	Capacity about 8-14 litres. Temperature ranges 5°C above ambient to about 100°C. Sensitivity 0.5°C. With thermostat and heater at the bottom of a polypropylene tank, under a perforated stainless steel tray. A clip is provided to hold a thermometer. Polypropylene tank in protected metal outer case. Protection against low water level or thermostat failure is provided by either a thermal fuse or a fixed-temperature cutout Heating rate is about 0.5°C per minute.	2
215	Windmeter	Portable and hand-held for measuring wind speed. The wind speed is indicated by a small sphere moving in narrow tube against a twin scale reading from 2 to 10 mph and from 4 to 66 mph. Supplied in waterproof plastic case with maintenance kit for cleaning tube and instructions for use	5

Item No	Item	Description	Quantity
216	Wire gauze	Ceramic centred, asbestos free, 150 x 150 mm.	14
	Microslides		
217	<i>Allium</i> , W.M. onion bulb scale		10
218	leaf epidermis		
218	<i>Allium/Vicia</i> , root tip L.S., showing stages of mitosis.		10
219	<i>Amoeba</i> , in binary fission.		10
220	Artery and vein, mammal, T.S.		10
221	Blood, human, smear, Giemsa		10
222	<i>Buxus</i> (or any dicot.), W.M. of leaf lower epidermis, showing stomata.		10
223	Cheek cell, human, W.M..		10
224	<i>Culex</i> (or <i>Anopheles</i>), W.M. female/male head and mouthparts.		2
225	<i>Cucurbita</i> , L.S. stem for sieve tubes.		2
226	<i>Cucurbita</i> , T.S. stem for sieve plates.		2
227	<i>Empetrum</i> , T.S. leaf, showing xerophytic structures.		2
228	<i>Erica</i> , T.S. leaf, showing xerophytic structures.		2
229	<i>Fagus</i> , sections of sun and shade leaves.		2
230	<i>Ficus</i> , T.S. leaf, showing xerophytic structures.		2
231	Giant chromosome, squash made from salivary glands of		10
232	<i>Hakea</i> , T.S. leaf, showing xerophytic structures.		2
233	<i>Helianthus</i> (or any dicot.), T.S.		20
234	<i>Helianthus</i> (or any dicot.), T.S. old stem		20
235	<i>Helianthus</i> (or any dicot.), T.S. young roots		20
236	<i>Helianthus</i> (or any dicot.), T.S. stem, showing interfascicular cambium.		20
237	<i>Helianthus</i> (or any dicot.), L.S. young stem.		10
238	<i>Helianthus</i> (or any Dicot.), T.S. young stem		10
239	<i>Hydrilla</i> (or any hydrophyte), T.S. stem		10
240	<i>Ileum</i> , mammal, T.S., injected to show capillaries in villi.		10
241	<i>Ileum</i> , mammal, T.S., showing villi, triple stain.		10
242	Leaf types, hydrophyte, mesophyte and xerophyte.		10
243	<i>Lilium</i> , T.S. bud, showing stages of meiosis.		20
244	Locust/Grasshopper testis squash, acetate orcein stain, showing stages of meiosis.		10
245	<i>Nerium</i> , T.S. leaf, showing xerophytic structure.		10
246	Nerve cell, mammal, isolated, smear from spinal cord.		10
247	<i>Nymphaea</i> , T.S. floating leaf.		10
248	Ovary, mammal, T.S., showing Graafian follicles, triple stain.		10
249	<i>Paramecium</i> , E., differentially stained to show detailed structures.		10
250	<i>Paramecium</i> , in binary fission.		20
251	<i>Pelargonium</i> , T.S. leaf, showing xerophytic structure.		2
252	Pollen, flowering plant,		10
253	<i>Potamogeton</i> , T.S. submerged		10
254	<i>Ribes</i> , T.S. stem, showing cork cambium.		10
255	<i>Sambucus</i> , T.S. bark with lenticel.		10
256	Skin, V.S., showing hair insertion and sebaceous gland, triple stain.		10
257	Skin, V.S., showing sweat glands.		10
258	Spermatozoa, human, smear.		10
259	Spinal cord, T.S.		10
260	<i>Spirogyra</i> , E. vegetative		10
261	Striated muscle, L.S., triple stain for striations and nuclei.		10
262	Striated muscle, T.S.		10
263	<i>Vicia</i> , root tip squash showing mitosis.		10
264	Yeast, budding.		10
Chemicals			
265	Acetic acid (Ethanoic acid), glacial		500 mL
266	Agar powder		500 g
268	Amylase, alpha, free from reducing sugars		25 g
269	Ascorbic acid tablets, in bottle of		1 bottle

Item No	Item	Description	Quantity
	100 tablets		
270	Benedict's solution		500 mL
271	Bile salt (sodium tauroglycocholate)		10g
272	Bromothymol blue		10 g
273	Calcium carbonate (marble chips)		500 g
274	Calcium hydroxide		500 g
275	Casein powder		100 g
276	Citric acid		100 g
277	Cobalt chloride paper (heat sensitive)		10 books
278	Copper (II) sulphate-5-water		500 g
279	Cresol Red		5 g
280	Dichlorophenol-indophenol (DCPIP)		5 g
281	Eosin B		25 g
282	Eosin Y, yellowish		25 g
283	Ethyl alcohol (Ethanol), absolute		500 mL
284	Ethyl alcohol (Ethanol), 95%		1 L
285	Glucose		100 g
286	Glycerine		250 mL
287	Hydrogen peroxide solution, 20 vols		250 mL
288	Invertase		50 mL
289	Iodine, resublimed		100 g
290	Methylene blue, alkaline (Loeffler), nuclear stain		10 g
291	Orcein acetic (Aceto-orcein)		10 g
292	Paraffin oil		500 ml
293	Pepsin		25 g
294	Peptone, bacteriological		50 g
295	pH paper, range 1-14, in book of 20		10 books
296	Phloroglucinol		25 g
297	Potassium dihydrogenphosphate		250 g
298	di-Potassium hydrogenphosphate		250 g
299	Potassium iodide		250 g
300	Pumice stone		200 g
301	Pyrogallol, resublimed		50 g
302	Safranine, water and alcohol		25 g
303	Soda-lime, granulated		250 g
304	Sodium acetate, anhydrous		500 g
305	Sodium chloride		250 g
306	Sodium citrate		100 g
307	Sodium hydrogencarbonate		500 g
308	Sodium hydroxide, pellets.		500 g
309	Sodium thiosulphate, ANALAR		500 g
310	Starch, soluble, free of reducing sugar		500 g
311	Sucrose		500 g
312	Thymol blue		5 g
313	Urea		500 g
314	Urease		25 g
315	Vaseline		500 g
Suggested equipment and consumable for conducting practical work related to microbiology			
316	Autoclave	Not less than 12L capacity, with temperature and pressure gauges.	1
317	Autoclave bags	300 x 610 mm, pack of 100	5 packs
318	Bottle for media	glass, autoclavable caps, 100 mL.	50
319	Culture bottles	sterile plastic, 30 mL.	50
320	Culture tubes	glass	40
321	Inoculating loops	nichrome	10
322	Inoculating loops, sterile, disposable	sterile, disposable with 10µl loop at one end with a needle for stab culture. 500 in a pack.	1 pack
323	L-shaped spreader	sterile, disposable, 500 in a pack.	1 pack
324	Petri dishes, diameter 55mm	depth 15 mm, sterile, disposable clear plastic.	500
325	Petri dishes, diameter 90mm	depth 15 mm, sterile, disposable clear plastic.	500

Item No	Item	Description	Quantity
326	Sterile indicator tape, roll, 25 mm wide, 55 m length	roll, 25 mm wide, 55 m length.	10 rolls
327	Swabs, sterile, rayon tipped, for spreading bacterial	sterile, rayon tipped, for spreading bacterial culture.	100
328	Disinfectant, concentrate		4 L
329	Gram stain kit	for studying the morphology of Gram-positive and Gram-negative bacteria.	1 set
330	Nutrient agar, powder	500g	500 g
331	Nutrient broth, powder	500g	500 g
332	Yeasts	100g	100 g
<u>Suggested equipment and consumable for conducting practical work related to biotechnology</u>			
333	Adjustable volume micropipettes, 2-20µl		10
334	Adjustable volume micropipettes, 20-200µl		10
335	Adjustable volume micropipettes, 100-1,000µl		5
336	DNA Gel electrophoresis tank	with casting tray and 8 wells comb.	10
337	Microcentrifuge	w/PCR tube adaptor, max. speed $\geq 14,000$ rpm (16,000 x g), capacity: 18-place rotor for 1.5 and 2.0 ml tubes.	1
338	Microwave oven, domestic	800W-1000W with digital timer.	1
339	Mini centrifuges	maximum speed: $\geq 6,000$ rpm (2,000 x g) , capacity: ≥ 6 x 2.0 ml tubes.	5
340	PCR thermal cycler	Capacity: 96 wells, holds 96 x 0.2 ml tubes, speed of ramping: $\geq 2.5^{\circ}\text{C}/\text{sec}$, temperature range: 4 - 100°C.	1
341	Power supply for gel electrophoresis tank	Output range: 10 - 300 V, fully adjustable in 1 V steps 4 - 400 mA, fully adjustable in 1 mA steps 75 W maximum, 3 - 4 pairs of output terminals.	3
342	Rocking platform	Speed range: 8-40 rpm, motion tilting: $\pm 7^{\circ}$, maximum load: ≥ 4.5 kg (10 lb).	2
343	Vortexer	Speed range: 0 - 3,000 rpm, operation modes: continuous operation or touch control.	2
344	Flip-top tubes, 1.5 ml	500 /pack	1
345	PCR tubes, 0.2 ml	1000/pack	1 pack
346	Pipettes tips (1- 200µl)	200 tips/rack	10 racks
347	Pipettes tips (100-1000µl)	100 tips/rack	5 racks
348	Pipettes tips (2-20µl and 20-200µl)	200 tips/rack	10 racks
349	Restriction analysis kit	containing DNA samples, restriction enzymes, and other related materials for performing DNA digestion and conducting agarose gel electrophoresis.	1 set
350	PCR Experiment Kit	containing required materials for conducting experiment using PCR to study polymorphism in genotype in Human.	1 set
351	Forensic DNA fingerprinting kit	containing DNA samples and other related materials for simulation of the Forensic DNA fingerprinting.	1 set
<u>Furniture for the Biology laboratory</u>			
352	Bench, movable	1,525 mm x 760 mm x 840 mm (length x width x height), with acid and heat resistant plastic laminate on top.	10
353	Box, First aid	Single door, approx. dimensions of 280 x 280 x 110 mm (width x depth x height)	1
354	Stool	Wooden or plastic seat, approx. dimensions of 300 mm x 300 mm, 530 mm height	45
<u>Furniture for the Biology preparation room</u>			
355	Blackout Curtains	- flameproof, preshrunk, thick and light proof material - 2 pieces for each window unit with rails - rufflette tape and hooks to fit windows	1 set
	Total cost for Subject		546,700

**Reference List of Furniture and Equipment
for Secondary School**

Subject : SS Chemistry

Item No	Item	Description	Quantity
	<u>EQUIPMENT</u>		
1	Absorption tube [®]	(a) Straight, 145 x 17 mm.	2
		(b) U-form with side tube.	2
2	Alcohol lamp	Glass, with plastic cap and wick, volume of approx. 150 mL	12
3	Aspirator bottle	With stopcock and plastic screw cap, polyethylene.	
		(a) 5 L	4
		(b) 10 L	2
		(c) 20 L	2
4	Atomic model	(a) Skeletal	1 set
		Comprises plastic spheres and flexible connectors representing atoms and bonds respectively. The spheres are in a variety of colours, and are number and/or letter coded for easy identification. There should be at least the following numbers and types of spheres (representing atoms of different elements, with oxidation states indicated in parentheses) for building a wide range of open type models: 14 metal(I, II, III, IV, V), 8 halogen(I), 22 oxygen(I, II, IV), 13 sulphur(II, IV, VI), 10 nitrogen(III, V), 6 carbon(IV), 7 phosphorus(III, IV, V) and 14 hydrogen(I, II). The connectors should be of two different lengths (at least 50 medium and 36 long) for building the open structures. The set contains a storage box and an instruction booklet for building simple organic and inorganic structures.	
		(b) Lattice Set	1 set
		Contains 380 atom centres. With 8 to 12 coordinate atom centres to allow construction of complex models. Instructions cover construction of 7 crystal systems, diamond, graphite, metals, sodium chloride, zinc blend and wurtzite, 8 coordinated ionic structures rutile ice and layer structures	
5	Balance	Electronic, capacity 200 g. Taring range 100 g or above. For use on 220-240V, 50 Hz, single phase a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	
		(a) Readability 0.01 g	2
		(b) Readability 1 mg	1
		(c) Readability 0.1 mg	1
6	Barrier tape [®]	PVC tape, non-adhesive backing, for highlighting hazard/ restricted areas, 50 mm x 3 m.	
7	Basin, evaporating [®]	Porcelain, shallow form with spout and glazed.	2 rolls
		(a) 75 mL capacity, 80 x 30 mm. (diameter x depth)	24
		(b) 225 mL capacity, 110 x 45 mm. (diameter x depth)	12
8	Beaker [®]	Squat form, with spout, with two or more graduation marks showing approximate capacities.	
		(a) Pyrex or equivalent, 50 mL	45
		(b) Pyrex or equivalent, 100 mL	90
		(c) Pyrex or equivalent, 250 mL	90
		(d) Pyrex or equivalent, 600 mL	12
		(e) Pyrex or equivalent, 1 L	3
		(f) Polypropene or equivalent, 250 mL	90
		(g) Polypropene, 2 L	4
9	Beehive shelf	Earthenware, glazed, 75mm diameter.	12
10	Bench mat [#]	Make of glass reinforced cement, <u>asbestos free</u> , about 300 x 300 mm, 4.5 mm thick.	12
11	Bottle, dropping	A three-piece pipette section comprising a stout glass dropper, high density polyethylene stopper with dust-proof head and vinyl teat fitted to a bottle of	
		(a) Clear glass, 100 mL	60
		(b) Amber glass, 100 mL	60
12	Bottle, narrow mouth	With dust-proof stopper.	
		(a) Clear glass, 250 mL	30
		(b) Amber glass, 250 mL	90
		(c) Clear glass, 500 mL	20
		(d) Amber glass, 500 mL	15
13	Bottle, wide mouth	With dust-proof stopper.	
		(a) Clear glass, 250 mL	60
		(b) Amber glass, 250 mL	20
14	Bottle top dispenser	Bottle top and digital, with alternative adaptors for different bottle sizes, accuracy within 1%.	3
15	Brush	(a) For test tubes of diameter 10 to 12 mm. Nylon, diameter of head 15 mm.	12
		(b) For test tubes of diameter 16 to 25 mm. Nylon, diameter of head 30 mm.	12
		(c) For burette of capacity 50 mL. Nylon, diameter of head 19 mm, overall length 750 mm.	12

Item No	Item	Description	Quantity
16	Burette	With teflon stopcock, 50 mL in 0.1 mL graduations.	45
17	Burette clamp	Fitting retort stand rod up to 13 mm diameter.	45
18	Burner	(a) Bunsen For either town gas or liquefied petroleum gas depending on the type supplied. Nickel plated burner tube with rotatable air regulator and tapering, rifflid connector, mounted on an enamelled pressed-steel base. Burner tube 100 x 13 mm (height x diameter), base 80 mm diameter, connector 10 mm mean outer diameter (b) Teclu For either town gas or liquefied petroleum gas depending on the type supplied. Nickel-plated burner tube with a threaded disc valve for adjustment of air/gas mixture. Burner tube 105 x 13 mm (height x diameter), base 80 mm diameter, connector 10 mm mean outer diameter	24
19	Chromatography column	Borosilicate glass for gravity elution, quickfit, 400 x 20 mm (length x diameter).	1
20	Clips	(a) Mohr, plated metal, accepts tubing of maximum diameter 15 mm. (b) Hoffman, plated metal, with clamp screw and hinged bottom plate, width between bars 20 mm. (c) Crocodile, small. ® (d) Joint clip, made of PTFE, for retaining glassware having Quickfit conical joints with joint size 14/23. For flame test, 25 x 50mm.	12 12 60 36
21	Cobalt glass	For flame test, 25 x 50mm.	12
22	Colorimeter	With seven or more colour filters for wavelength range 400- 700 nm, filter holder and tube cover. Absorbance range 0-2. Digital or analog display. Data output 0-1V. Accommodates 10 mm cuvettes or 16 mm test tubes. Battery operated or for use on 220-240V, 50 Hz, single phase a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B S S plug	6
23	Combustion tube ®	Borosilicate glass, open both ends, 300 x 20 mm (length x external diameter).	12
24	Cork ®	Tapered, assorted sizes, pack of 144.	1 pack
25	Cork borer set	Borer, set of 6 from 4 to 10 mm. Plated metal. Cutting tube mounted with safety under-flange in shaped handle ensuring that operator cannot be injured by a dislodged tube. With rod for clearing borers. Sharpener, plated metal cone with hinged cutter blade set in slot and metal handle. Circular shape of borer maintained by cone. Edge cut to correct angle by depressing blade using thumb pressure button and rotating borer.	1 set
26	Crucible ®	Porcelain, squat form, glazed inside and outside, unglazed base, with lid, 43 x 23 mm (diameter x depth).	24
27	Cylinder, graduated	With spout. (a) Glass or plastic, 10 mL (b) Glass or plastic, 25 mL (c) Glass or plastic, 50 mL (d) Glass or plastic, 100 mL (e) Glass or plastic, 500 mL (f) Glass or plastic, 1 L (g) Polypropylene, 3 L (graduated pitcher)	12 12 12 24 2 1 1
28	Data logger interface	Hardware: The interface can log data from appropriate sensors by connecting to a Windows-compatible computer through a common communication port, such as serial port, parallel port and USB. It has also remote data logging capability without a computer. Provided with a combination of at least 3 analog and digital I/O channels. Analog and digital inputs can be recorded simultaneously. Sampling rates: 16kHz or above. Power supply: both battery operated and for mains voltage of 220- 240V, 50Hz, single phase a.c. supplies; provided with Software: Runs on operating system for notebook computer / tablet PC; displays and analyses data in the forms of digits, meter, graph and table.	5
29	Data logger sensors	The sensors should be fully compatible with the data logger interface. (a) Colorimeter sensor: For measuring transmittance (30%- 90%) of light (400-700 nm) through a solution, with cuvettes and caps. (b) Conductivity sensor: For measuring conductivity (0-20,000mS/cm) in aqueous solutions. (c) Temperature sensor: For measuring temperatures ranging from -35°C to +135°C, with an accuracy of ±0.5°C. (d) Light sensor: For measuring light intensity level, suitable for indoor and outdoor experiments with spectral response: 400-1,000 nm. (e) pH sensor: For measuring pH values ranging from 0-14 with an accuracy of ±2%. (f) Pressure sensor: For measuring gas pressure ranging from 0 to 500 kPa. (g) Voltage/Current sensor: For measuring a.c. and d.c. currents/voltage. Voltage range: ±10 volts. Current range: ±1 amp.	5 5 5 5 5 5 5
30	Deioniser	(a) Wall mounting or bench standing. With battery operated water purity meter. For use with disposable mixed bed resin. Output: 100 to 1,000 L of tap water depending on hardness. Flow rate: up to 100 L/hr. Effluent quality: conductivity 2mS/cm residual solid <10 0 ppm pH 6-7. (b) Cartridge of mixed bed ion-exchange resin.	1 1
31	Desiccator	Glass, with knob cover and perforated metal/porcelain disc, 210 mm top internal diameter, 190 mm disc diameter, 85 mm depth of disc below flange.	2
32	Digital thermometer	Digital display, stainless steel probe, -50°C to 150°C x 0.1°C, battery operated, probe sheath.	12
33	Drier, with hot air and cold air output	A low noise hair drier suitable for rapid drying of laboratory glassware, chromatograms, etc. A detachable nozzle is provided and there is an adjustable heat/speed setting.	1
34	Electrode	(a) Carbon, 100 x 5 mm (length x diameter). ® (b) Platinum foil, mounted in glass tube with 4 mm socket.	48 12
35	Electrode holder	Plastic holder about 80 x 20 x12 mm (length x width x height) with two crocodile clips for holding rod/foil electrodes.	12

Item No	Item	Description	Quantity
36	Electrolysis cell	Comprises stout open ended glass tube, the lower end of which accommodates a tight-fitting rubber stopper fitted with two tapered carbon electrodes. Connection made by crocodile clips. Short-circuiting of electrodes is prevented by a strip of insulating material set into the rubber between the leads	12
37	Eye wash unit	Equipped with an eye wash bottle. With dust cap for eye bath and side tube for draining of contaminated water. The bottle is clipped into a moulded panel on which simple but complete instructions are printed. The panel has holes for wall hanging.	1
38	Filter Paper @	(a) Whatman No.1, 7 cm diameter.	2 packs
		(b) Whatman No.1, 12.5 cm diameter.	5 packs
39	Flask, Buchner	Conical form with heavy wall for vacuum filtration, capacity 250 mL.	12
40	Flask, conical @	Narrow mouth, pyrex or equivalent.	
		(a) 100 mL	12
		(b) 250 mL	90
41	Flask, flat bottom @	Medium neck, pyrex or equivalent.	
		(a) 250 mL	2
		(b) 500 mL	2
42	Flask, volumetric	Graduated one mark, with inter-changeable plastic stopper, pyrex or equivalent.	
		(a) 100 mL	45
		(b) 250 mL	45
		(c) 1 L	4
		(d) 2 L	1
		(e) 5 L	1
43	Forceps	Blunt ends, stainless steel, length 130 mm.	12
44	Funnel	(a) Buchner, porcelain, for filter paper of 70 mm diameter.	12
		(b) Dropping, cylindrical, open top, with interchangeable teflon stopcock, borosilicate glass, 100 mL.	3
		(c) Filter, plain, soda lime glass, 75 mm top diameter. @	45
		(d) Filter, plain, soda lime glass, 150 mm top diameter. @	3
		(e) Separating, conical shape, with interchangeable teflon stopcock and polypropylene stopper, borosilicate glass, capacity 250 mL.	12
		(f) Thistle, with straight stem, soda lime glass, overall length 300 mm.	3
45	Gas jar, with cover	With base and ground top flange, glass, 50 x 150 mm (diameter x height) with circular glass cover, ground one side, 75 mm diameter.	24
46	Glass rod	Soda lime glass, in length of about 1.5 m, 6 mm diameter.	1kg
47	Glass tubing	Soda lime glass, in length of about 1.5 m, 8 mm external diameter. Pack of 25.	1 pack
48	Gloves	(a) Chemical resistant, for handling acids, alkalis and organic solvents, long cuff. Special finish for an excellent wet grip. @	2 pairs
		(b) Heat/Cold resistant, made of non-flammable non-asbestos material, with low thermal conductivity, high strength and high abrasion resistance, gives no dermatological problems. For furnace and hotplate work in the laboratory. Gauntlet length.	1 pair
		(c) Disposable nitrile gloves. Gives good resistance to abrasion, nicks and cuts and offers superior splash protection against irritating chemicals. 100 pieces a pack.	1 pack
49	Hand protector	Silicon rubber, capable of withstanding temperatures up to 250°C.	12
50	Hazard warning labels	Self-adhesive labels printed with various hazard symbols plus the appropriate hazard wording. Sheets of mixed symbols cover chemical hazards of toxic, harmful, corrosive, irritant, explosive, flammable and oxidising. Pack of about 100 for each symbol.	1 pack
51	Heating mantle	For round bottomed flasks up to 250 ml, maximum temperature 450 °C, fitted with earthed energy regulator screen, for use on 220 - 240V.	2
52	Hoffman voltmeter with stand	Two graduated limbs, each of 50 mL capacity, integral with reservoir tube and funnel-shaped bulb, with a stopcock at top of each limb, overall length approximately 650 mm, with interchangeable platinum and carbon electrodes mounted in rubber stoppers for insertion into the voltmeter limbs. Supplied with stand.	1 set
53	Hydrogen fuel cell teaching kit	A solar cell module for conversion of radiant energy of light into electrical energy. A PEM electrolyser uses the electrical energy from the solar cell module to split water into hydrogen and oxygen gases, and stored in gas cylinders. A PEM fuel cell recombines the stored gases to produce water and electricity. Load measurement module for setting of various loads (resistances, lamp, motor) and display of voltage and current in the fuel cell circuit. User manual.	1
54	Labels	Plain, gummed, pack of 90.	1 pack
55*	Centralized low voltage power supply unit*	(For detailed specifications, please refer to footnote.)	1
56	Magnetic stirrer-hotplate	1,300 r.p.m. and 400 °C maximum, with energy regulator controlled 400 W hotplate. Mains and load indicator lamps, mains cable. With one each 20 & 40 mm PTFE coated followers and instructions. Designed to prevent spillage from entering the base structure. For use on 220-240V, 50Hz, single phase a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B S S plug.	12
57	Melting point apparatus	Electrically heated, with adjustable rate of temperature rise, built-in boost heater, accommodates three melting point tubes which can be observed simultaneously by means of full field lens. A cast aluminum case encloses the heating block and controls. Maximum temperature 360°C. For use on 220-240V, 50 Hz, single phase a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	1
58	Melting point tube, Thiele	Borosilicate glass apparatus with side tube to allow stirring by convection of heating liquid.	12
59	Microscale chemistry kit	Set comprises at least: 1 well-plate with about 2 mL and 0.3 mL wells 6 thin stemmed plastic pipets 1 syringe (2 mL, no needle) 1 gas lid set (2 pieces) 2 silicone tubes (4 cm x 4 mm) 1 microburner 1 plastic microstand	12 sets

Item No	Item	Description	Quantity
60	Mortar and pestle	8 plastic microspatulas 1 plastic gas collection tube with lid 1 small glass rod 1 zinc and copper electrode set 1 current indicator with crocodile clip 1 glass combustion tube (6 cm x 4 mm) 1 glass fusion tube 1 silicone delivery tube with U-bend Unglazed inside, glazed outside, with spout, porcelain, external diameter 160 mm.	12
61	Multimeter	Digital display. Automatic or manual range selection. Automatic zero point compensation. Overload protection in all ranges. Measurement ranges: 200 mV to 1,000V d.c. 2V to 600V a.c. 200 mA to 10 A d.c./a.c. 200 ohms to 2 megaohms	12
62	Nichrome wire	For flame test, wire length 33 mm, fused into 75 mm glass handle.	12
63	Microcomputer workstation		6
64	Organic chemistry glassware	(a) Quickfit, joint size 14/23. (i) Pear shaped flask, 50ml (ii) Still head (iii) Liebig condenser (iv) Screwcap adapter (v) Receiver adapter (vi) Dropping funnel, 50ml, with GP Rotaflo tap (vii) Stopper (viii) Round bottom flask, 25ml (ix) Air condenser/drying tube (b) Microscale, glass, joint size 14/10. (i) Jacket condenser, threaded joint, 80mm (ii) Round bottom flask, 5ml (x4) (iii) Adapter for inlet or thermometer (iv) Distillation adapter, threaded joint (v) Vacuum takeoff adapter, threaded joint (vi) Claisen adapter, threaded joint (vii) Tube for gas collection (viii) Flask, 25ml (ix) Filter funnel, 27mm diameter (x) Septum, teflon-lined silicon rubber (xi) cap, with hole (xii) O-ring, Viton	12 sets
65	Oven	Drying, volume of chamber about 115L. Temperature up to 300°C, with thermoregulator. For use on 220-240V, 50Hz, single phase a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	1
66	Petri dishes	Clear crystal glass, polished top and bottom, 90 x 15 mm (diameter x depth).	12
67	pH meter	Measuring range 0-14 pH, with combination electrode and temperature compensator. For use on 220-240V, 50Hz, single phase a.c. supplies or battery operated. Digital display.	6
68	Pipe-clay triangle	Length of sides 50 mm.	24
69	Pipette	Bulb type, single graduation on upper stem. (a) 10 mL (b) 25 mL	45 45
70	Pipette, graduated	Fast-flow, with permanent graduations. (a) 1 mL, subdivision 0.01 mL (b) 5 mL, subdivision 0.05 mL (c) 10 mL, subdivision 0.1 mL	12 12 24
71	Pipette filler	Ear syringe, rubber	45
72	Pipettor	(a) Digital micropipettes, with adjustable volume from 0.1 ml to 1ml. (b) Disposable pipette tips, capacity from 0.1 ml to 1 ml, pack of 500.	6 1 pack
73	Polymer kit	Comprising 8 containers of polythene, polystyrene, perspex, PVC, polypropene, nylon, bakelite and urea methanal of 80 g each. Each kind of plastic being contained in plastic vial.	1 kit
74	Porous pot	Cylindrical, 150 x 50 mm (height x diameter).	1
75	Projection system with screen		1
76	Pump, vacuum	Oil-free dry pump; pumping speed approx. 15 L/min.	12
77	Rack	(a) Burette, for holding 12 burettes. (b) Pipette, for holding 24 pipettes. (c) Test tube, for holding test tubes of 22 mm and 32 mm diameters.	4 2 24
78	Refrigerator	Please refer to the end of this list for the specifications.	1
79	Respirator with filter cartridge	(a) Respirator. Moulded rubber body with anodised aluminum screw retainer. Fitted with two relief valves and an adjustable elastic band. (b) Filter cartridge. For use in the presence of common organic vapours and acid gases. @	1 3 pairs
80	Retort stand with boss and clamp	Retort stand base, iron with corrosion resistant finish, minimum size 160 x 100 mm. Stand rod, cadmium plated mild steel/bright aluminum alloy, 500 x 12 mm (length x diameter). Clamp enables articles from 2 to 90 mm diameter to be clamped securely. Design of the jaw ensures a firm grip at all angles of opening. The cork liners for the jaws are well secured. With 8 mm diameter rod suitable for use in bosshead. Bossheads with offset jaws for rods up to 16 mm diameter.	45
81	Rubber bung @	Assorted sizes. (a) Single hole (b) Double hole	80 80

Item No	Item	Description	Quantity
		(c) Solid (without holes)	200
82	Safety goggles	Splash-proof. With single replaceable wide-angle clear polycarbonate lens, indirectly ventilated, flexible clear PVC frame for all-round vision. Fitted with adjustable headband with retained ends.	2
83	Safety screen	Transparent polycarbonate, comprising central panel about 600 x 300 x 3 mm (height x width x thickness) connected to outer panels of 600 x 230 x 3 mm (height x width x thickness) on each side by full height hinges.	1
84	Safety spectacles [@]	Constructed of polycarbonate, spectacle type with side shields giving all round protection. Top guard and lip prevents spillage into eyes. May be worn over prescription spectacles.	45
85	Screw-neck tube	Glass, round bottomed, screw neck, with cap, 160 mm x 16 mm.	100
86	Separating funnel holder	Support separating funnels with a minimum diameter of 86 mm. Suitable for rods 9.5 - 13 mm diameter.	12
87	Shield, face	With curved hard plastic visor which can be raised from the face when not required, with adjustable headband.	2
88	Spatula	Stainless steel, overall length about 150 mm.	36
89	Spill pack [@]	The spill pack is made up of six containers each with enough absorbent material to absorb a spillage of up to 500 mL. Two packets of soda ash are also provided for neutralization of acid spills. Supplied with instructions and ten stout polythene bags for collection of spillage.	1 pack
90	Spoon, combustion	Steel with brass flange, length 350 mm, diameter of cover about 88 mm, of cap about 18 mm.	24
91	Stirrer bar	Made of PTFE, 20 mm length.	12
92	Stop watch	Digital display, reads up to 60 minutes, accuracy at least 0.2 s, with start/stop/reset buttons.	12
93	Syringe	(a) Precision ground, gas tight, heat resistant glass, free- running capacity 100 mL, graduated at 1 mL intervals, outlet tube 7 mm diameter.	12
		(b) Polypropene, synthetic rubber piston with tapered nozzle. Withstand temperature up to 125°C. Capacity 50 mL, graduated in 1 mL interval. [@]	12
		(c) Disposable, graduated, with plastic fitting, clear polystyrene barrel, 10 mL. [@]	45
		(d) Disposable, graduated, with plastic fitting, clear polystyrene barrel, 5 mL. [@]	45
94	Test tube [@]	Medium wall, with rim.	
		(a) Pyrex or equivalent, 150 x 24 mm.	100
		(b) Pyrex or equivalent, 150 x 18 mm.	900
		(c) Glass, 75 x 10 mm.	200
95	Test tube holder	With steel spring, to take tubes up to 19 mm diameter, length about 185 mm.	45
96	Thermometer	Non-mercury, with reinforced bulb and permanent graduations.	
		(a) -10°C to 110°C x 1°C, 305 mm length.	12
		(b) -10°C to 110°C x 1°C, 155 mm length.	12
		(c) -10°C to 300°C x 1°C, 305 mm length.	12
97	Thin layer chromatography plate	Flexible silica gel plates, layer 250 μ m, aluminium backing, without fluorescent indicator, 20 cm x 20 cm.	1 pack
98	Tile	White ceramic, 105 x 105 mm.	45
99	Tongs, crucible	Stainless steel, straight with flattened hinge, 200 mm.	24
100	T-piece [@]	Glass, 6 mm bore.	12
101	Tripod stand	Triangular top, cast iron, with splayed steel legs, 150 x 210 mm (length of side x height).	24
102	Trolley	For transport of apparatus, four wheels, stainless steel frame, stainless steel trays of size about 760 x 460 mm, height of top tray about 900 mm, height between trays about 350 mm.	4
103	Trough	Plastic, 350 x 150 mm (diameter x depth).	2
104	Tube, capillary [@]	For melting point determination, open at both ends, 100 x 1.8 to 2.0 mm (length x diameter). Pack of 100.	10 packs
105	Tubing, Bunsen / Teclu burner [@]	Rubber, with indication of Approval Mark & Expiry Date of Service Life on hose surface. About 9 mm internal bore, not more than 2m length, for either town gas or liquefied petroleum gas depending on the supplied.	25
106	Tubing, rubber [@]	(a) Normal wall, 3 x 1.5 mm (bore x wall thickness).	10m
		(b) Normal wall, 5 x 1.5 mm (bore x wall thickness).	10m
		(c) Normal wall, 8 x 1.5 mm (bore x wall thickness).	10m
107	U-tube [@]	Glass, 125 x 15 mm (height x external diameter).	12
108	Wash bottle	White translucent, flexible, with screw cap and bent tube, polyethene, 250 mL capacity.	45
109	Watch glass [@]	Ground edge, 100 - 120 mm diameter.	24
110	Water bath	(a) Bath Unit. Unstirred thermostatic bath. Made of stainless steel. Capacity 22 L. Has a sheathed immersion element incorporating a safety cut-out. Heater power 1,500 W. Temperature range ambient to 100°C, sensitivity $\pm 0.3^\circ\text{C}$, uniformity $\pm 0.1^\circ\text{C}$. The bath has an illuminated ON/OFF switch and a heater indicator lamp. With stainless steel lid bearing an insulated handle.	1
		(b) Stainless steel test tube racks for holding test tubes of 24 mm diameter.	2
111	Wire gauze [#]	Ceramic centred, <u>asbestos free</u> , 150 x 150 mm.	24
112	Y-piece [@]	Glass, 6 mm bore.	5
CHEMICALS (The following items are consumables)			
113	Agar		100g
114	Aluminum foil		250 g
115	Aluminum oxide		500 g
116	Aluminum sulphate		500 g
117	Ammonia solution, 0.880		2.5 L
118	Ammonium carbonate		500 g
119	Ammonium chloride		1 kg

Item No	Item	Description	Quantity
120	Ammonium iron(II) sulphate		500 g
121	Ammonium iron(III) sulphate		500 g
122	Ammonium sulphate		500 g
123	Ammonium vanadate(V)		100 g
124	Barium chloride		500 g
125	Barium nitrate		250g
126	Bromine, 1 mL ampoules		2 ampoules
127	Buffer solution, pH 4		1 L
128	Buffer solution, pH 7		1 L
129	Calcium carbonate, marble chips		500 g
130	Calcium carbonate, powder		500 g
131	Calcium chloride, anhydrous		1 kg
132	Calcium hydroxide		1 kg
133	Calcium nitrate		500 g
134	Calcium oxide		500 g
135	Calcium sulphate		500 g
136	Calcium turnings		50 g
137	Castor oil		250 mL
138	Charcoal block		24
139	Charcoal, wood powder		500 g
140	Chromium(III) chloride		100 g
141	Citric acid		100 g
142	Cobalt(II) chloride		250 g
143	Cobalt(II) nitrate		200 g
144	Copper(II) carbonate		500 g
145	Copper(II) chloride		250 g
146	Copper(II) oxide		250 g
147	Copper(II) sulphate-5- water		1kg
148	Copper, foil		500 g
149	Copper, turnings		500g
150	Cotton wool, absorbent		2 reels
151	Cyclohexanol		250 mL
152	2,4-Dinitrophenylhydrazine, moistened with 33% w/w water		25 g
153	Ethanamide		100 g
154	Ethanedioic acid		500g
155	Ethanoic acid, glacial		500 mL
156	Ethanol, 95%		2.5 L
157	Ethyl ethanoate		500 mL
158	Glucose		250 g
159	Hexane-1,6-diamine		25 g
160	Hexanedioyl dichloride		25 mL
161	Hydrochloric acid, conc.		2.5 L
162	Hydrogen peroxide, 6%		250 mL
163	Iodine		100 g
164	Iron(II) sulphate		100 g
165	Iron(II) sulphide		250 g
166	Iron(III) chloride		500 g
167	Iron(III) nitrate		250 g
168	Iron(III) oxide, powder		500 g
169	Iron(III) sulphate		500 g
170	Iron, fine clean filings		500 g
171	Iron, wire, 30 s.w.g.		1 reel of 28g
172	Lead, foil		500 g
173	Lead(II) bromide		250 g
174	Lead(II) chloride		100 g
175	Lead(II) nitrate		500 g
176	Lead(II) oxide		250 g
177	Lithium chloride		50 g
178	Litmus, granulated		50 g

Item No	Item	Description	Quantity
179	Magnesium, ribbon		2 reels of 25g
180	Magnesium carbonate		500 g
181	Magnesium sulphate, anhydrous		500 g
182	Magnesium sulphate-7-water		500 g
183	Manganese(II) chloride		250 g
184	Manganese(IV) oxide		500 g
185	Manganese(II) sulphate-4-water		500g
186	Methyl orange		25 g
187	Methyl red		25 g
188	Nickel, plate		500 g
189	Nickel(II) chloride		250 g
190	Nickel(II) sulphate		250 g
191	Nitric acid, conc.		2.5 L
192	Paraffin oil		500 mL
193	Phenol red		5 g
194	Phenolphthalein		25 g
195	Phosphoric(V) acid		500 mL
196	Phosphorus(V) oxide		100 g
197	Potassium bromate		250 g
198	Potassium bromide		250 g
199	Potassium carbonate		500 g
200	Potassium chloride		250 g
201	Potassium chromate(VI)		100 g
202	Potassium dichromate(VI)		500 g
203	Potassium hexacyanoferrate(III)		250 g
204	Potassium hydrogencarbonate		250 g
205	Potassium hydroxide, pellets		500 g
206	Potassium iodate(V)		250 g
207	Potassium iodide		250 g
208	Potassium manganate(VII)		250 g
209	Potassium nitrate		500 g
210	Potassium sulphate		500 g
211	Potassium thiocyanate		250 g
212	Propan-1,2,3-triol		500 mL
213	Propanone		1 L
214	Pumice stone		200 g
215	Rocksil		250 g
216	Silica gel, pore size 60		100g
217	Silicon(IV) oxide		500
218	Silver nitrate		50 g
219	Silver oxide		25 g
220	Soda lime		500 g
221	Sodium		25g
222	Sodium bromide		250 g
223	Sodium carbonate, anhydrous		500g
224	Sodium chloride, fine		2 kg
225	Sodium citrate		100 g
226	Sodium hydrogencarbonate		500 g
227	Sodium hydrogensulphite		500 g
228	Sodium hydroxide, pellets		1 kg
229	Sodium iodide		250 g
230	Sodium nitrate		250 g
231	Sodium nitrite		250 g
232	Sodium sulphate		500 g
233	Sodium sulphite		250 g
234	Sodium thiosulphate		500 g
235	Starch		250 g
236	Strontium chloride		100 g
237	Strontium nitrate		100 g

Item No	Item	Description	Quantity
238	Sucrose		250 g
239	Sulphur, crushed		250g
240	Sulphuric acid, conc.		2.5 L
241	Test paper, blue litmus (pkt/200)		3 packs
242	Test paper, cobalt chloride (pkt/200)		1 pack
243	Test paper, lead ethanoate (pkt/200)		1 pack
244	Test paper, neutral litmus (pkt/200)		3 packs
245	Test paper, pH, range 1-14 (pkt/200)		12 packs
246	Test paper, red litmus (pkt/200)		3 packs
247	Test paper, starch iodide (pkt/200)		1 pack
248	Tin, foil		100 g
249	Tin(II) chloride		100 g
250	Universal indicator		100 mL
251	Urea		500 g
252	Vaseline		100 g
253	Wooden splints (pkt/1000)		1 pack
254	Zinc carbonate		250 g
255	Zinc chloride		250 g
256	Zinc nitrate		100 g
257	Zinc sulphate-7-water		500 g
258	Zinc, foil		250 g
259	Zinc, granulated		500g
FURNITURE			
260	Box, first-aid	Single door, approx. dimensions of 280 x 280 x 110 mm (width x depth x height)	1
261	Stool	Wooden or plastic seat, approx. dimensions of 300 mm x 300 mm, 530 mm height	45
262	Chemical waste storage cupboard	Overall dimension 910 mm (W) x 460 mm (D) x 1830 mm (H) Steel, double door, fitted with 3-point locking espagnolette bolt, controlled by 6-level lock with one adjustable shelf. With words "CHEMICAL WASTES 化學廢物" (not less than 60 mm in height) printed clearly and boldly in red on a white background on the left door. 4 ventilation holes on each side. Rust proof finish.	2
263	Stainless steel spill catcher tray	Overall dimension 380 mm (W) x 145 mm (D) x 380 mm (H).	6
264	Heavy-duty plastic spill catcher tray	Overall dimension 380 mm (W) x 362 (D) x 380 mm (H).	6
Total cost for Subject			475,500

Remark:

This list is for reference only. The items and the quantities to be purchased are subject to the types of practical activities planned and the size of the classes.

Potassium manganate(VII) is regarded as one of the controlled chemicals under the Control of Chemicals Ordinance. Schools wishing to acquire potassium manganate(VII) for experimental purpose must apply for a Storage Approval from Customs and Excise Department (Tel. 2541 4383). For more information about the controlled chemicals, please refer to the website http://www.customs.gov.hk/en/trade_facilitation/chemicals/index.html 2,4-Dinitrophenylhydrazine solid should be kept damp or 'wetted' to minimise the risk of dust/air explosion. Stand the bottle of damp solid inside a larger container that also contains a little tap water in the bottom (~ 10mm depth). Label both the inner and outer containers. If solid may have become dry, do NOT attempt to open the bottle. Schools should defer the acquisition of this item until they are required for use in experiments.

@ Consumable items

The asbestos-free requirement should be clearly specified when purchasing the item. As a safeguarding measure, schools may consider requesting suppliers to provide evidence (e.g. laboratory testing report) authenticating their products are free of asbestos. School may also consider using other alternatives e.g. stainless steel bench mat if suppliers fail to authenticate their products are free of asbestos.

The asbestos-free requirement should be clearly specified when purchasing the item. As a safeguarding measure, schools may consider requesting suppliers to provide evidence (e.g. laboratory testing report) authenticating their products are free of asbestos. School may also consider using other alternatives e.g. wire gauze without the ceramic center if suppliers fail to authenticate their products are free of asbestos.

Refrigerator

- (1) Double door, with freezer and chiller compartments.
 - (2) Storage Capacity: net overall capacity of about 180 - 220 litres.
 - (3) Dimensions: not exceed 1,600 mm in height.
 - (4) Defrosting: frost-free.
 - (5) Energy rating: Two stars (2*) as a minimum.
 - (6) Freezer compartment: not higher than -12oC.
 - (7) Chiller compartment: not higher than 4oC.
 - (8) Ice tray of suitable design: should be provided.
 - (9) Refrigerant: non-toxic, non-explosive and odourless, preferably with low Global Warming Potential.
- Remarks: The refrigerator should not be used to store volatile flammable liquids and alkali metal (e.g. sodium).

***Specifications of Centralized low voltage power supply unit**

This equipment is designed to provide a source of low voltage a.c. or d.c. Power supplies simultaneously to distribution points with output controlled from the unit; for general use in school laboratories with provision for charging secondary batteries. A single phase a.c. supply is taken from an outlet with fused plug and is connected to the double pole isolator which disconnects the supply completely from all components immediately when the front panel is opened. From the isolator, power is taken through the input circuit breaker to the variable ratio auto-transformer. The input circuit is protected against both surge or steady overload by the input circuit breaker. Input current and voltage are indicated by the input ammeter and input voltmeter at the top of the front panel. The output from the variable ratio auto-transformer is taken to the primary of a fixed ratio, step down, double wound, main transformer. The secondary of this main transformer is taken to the rotary selector switch. To provide a.c. sources, the secondary output is fed via the output ammeter, output voltmeter and output circuit breaker to the output terminals. The output circuit breaker designed to withstand heavy current arcs safeguards the output circuit. To provide d.c. sources, the low voltage alternating current is fed into the selenium cell full wave bridge connected rectifier and then via the output meters and output circuit breaker to the output terminals. The d.c. output is unsmoothed and the polarity is indicated by terminal colour. All the measuring instruments are of the moving iron type. The input and output circuit breakers are both of the magnetic terminal release type and are adjusted to trip at 5 and 50 A respectively. For inspection

purposes, the front panel is hinged at the bottom to allow it to be opened through 140°. The internal wiring is colour coded, with green for a.c. and red/black for d.c. When opening, the supply is automatically disconnected making the wiring "dead" and perfectly safe to touch.

For laboratory use

The output from the unit is taken via a ring main circuit to at most 13 distribution points in the laboratory. The output voltage and/or current may be kept constant or varied by adjustment of the auto-transformer.

Maximum outputs are:

0 - 14 V at 40 A a.c. or d.c.

14 - 18 V at 32 A a.c. or d.c.

For battery charging, the cells should be connected in series with the positive and negative terminals connected to the output terminals of like polarity. The maximum number of 2 V cells that can be charged is 6 and the maximum charging current advised by the battery manufacturer should not be exceeded. The unit is rated at 580 VA. Overall dimensions approximately 540 x 310 x 740 mm (length x width x height). For use on 220 - 240 V, 50 Hz, single phase, a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.

**Reference List of Furniture and Equipment
for Secondary School**

Subject : SS Physics

Item No	Description	Quantity
1	<u>EQUIPMENT</u> <u>3 cm wave apparatus</u> Comprises: (a) 3 cm wave transmitter - Contains a Gunn diode oscillator operating at a frequency of about 10 GHz (thus, 3 cm wavelength). Radiated output is plane polarized vertically. - Should have some means for protection against accidental reversal of input polarity and overloads and is fitted with a high-gain horn radiator. - Output power is about 30 mW for an 8 to 12V a.c. / d.c. - Cylindrical case is 83 mm diameter x 70 mm long approx. Total length (including horn) is 225 mm approx. (b) 3 cm wave receiver - Construction similar to that of the transmitter. - Consists of a crystal diode to receive electromagnetic radiation of wavelength approximately 3 cm, output from 4 mm sockets can be monitored visibly on a meter or audibly using an amplifier. (c) Diode probe receiver - Consists of a crystal diode of the same type as that used in the receiver in (b) above. - The diode is mounted on a short, vertical, non-metallic rod to make detections in small positional locations. - Output from 4 mm sockets can be monitored visibly on a meter or audibly using an amplifier. - Dimensions 75 x 50 x 135 mm high approx. (d) Loudspeaker amplifier unit - A general purpose unit consisting of a transistorized 9 V amplifier housed in a plastic box. - Speaker approximately 64 mm diameter behind aluminum grill with volume control, input matching control, connection sockets and two-position switch for internal speaker / signal output. - Signal output sockets internally protected against overload. (e) Hollow plastic cylindrical plano-convex lens - For EM wave's refraction experiments. - Dimensions: 180 mm x 210 mm approx. (diameter x height) - To be filled with paraffin oil. (f) Hollow plastic prism (45° 90° 45°) - For EM wave's refraction experiments. - Dimensions: 210 mm x 210 mm x 300 mm approx. - To be filled with paraffin oil. (g) Set of plates Comprising : - 2 aluminum plates 60 x 300 mm approx. - 1 aluminum plate 200 x 300 mm approx. - 1 plastic plate 200 x 300 mm approx. - Each of the plates mounted on supporting feet. - 1 polarisation grille 200 x 200 mm approx. mounted on supporting rod. (h) Paraffin oil @ Mainly used for the filling up of the plastic lens and prism in refraction experiments.	1
2	<u>Alpha particle scattering analogue</u> Comprises: - a moulded plastic ramp rising to approximately 100 mm in height. - a moulded plastic model nucleus about 280 mm diameter with an accurately calculated curved surface rising to a height of 60 mm approximately. - two steel balls approximately 12.5 mm diameter.	1
3	<u>Atomic model</u> A lattice model constructed from spheres interconnected by weak open wound spiral springs providing a very flexible arrangement.	1
4	<u>Balance, spring (dial type)</u> - A strong and tension balance with large scale, which can be used to demonstrate weightlessness during free fall. - With a large dial surface at least 150 mm diameter. - Range: 0 - 100 N x 0.5 N	1
5	<u>Balance, spring (flat form)</u> - In flat form with metal case. - With suspension ring and load hook. - With zero adjustment. (a) Range: 0 - 10 N x 0.1 N (b) Range: 0 - 20 N x 0.5 N	10 10
6	<u>Bicycle dynamo assembly</u> - Bicycle dynamo mounted on wooden base and provided with two sets of gears driven by hand crank. - Two 4 mm socket terminals are provided for the dynamo output, connected in parallel with a lamp holder with a 1.25V, 0.25 A (MES) bulb.	1
7	<u>Binoculars</u> - Used to view celestial objects in the night sky. - Magnification should be 10x or above. - Diameter of the objective lens should be 50 mm or above.	10
8	<u>Bourdon gauge</u> - Metal cased pressure gauge mounted on a base. - With a circular dial of 100 mm diameter approx. - With connector for 6.5 mm bore heavy wall flexible tubing. - Range: 0 to 130 kPa absolute pressure approx.	10
9	<u>Boyle's Law apparatus and footpump</u> Boyle's Law digital apparatus without pump is an alternative. (a) Boyle's Law apparatus - With a vertical wide bore glass tube mounted vertically in front of a scale from 0 to 60 mL approximately. Air is confined in the tube by a coloured oil contained in a cylindrical metal oil reservoir, which is fitted with a Bourdon gauge calibrated 0 to 350 kPa approximately. - A valve tap is fitted to the air inlet tube from the foot-pump. - Mounted on wood base 270 x 150 mm approximately. - Supplied complete with a bottle of oil (250 mL) and a plastic safety screen fixed in front of the glass tube mount. (b) Footpump and adapter - Used with the Bourdon gauge or the Boyle's Law apparatus. - This foot pump is a standard car tyre's pump with an integral pressure gauge calibrated from 0 to 400 kPa. - With non-return valve and rubber hose to connect to the Bourdon gauge or the Boyle's Law apparatus.	1 1
10	<u>Brownian movement smoke cell</u> - A short cylindrical glasscell, closed by a cover glass, is held vertically in a transparent plastic box with sliding lid. - Illumination is by a line filament lamp with a cylindrical glass	1

Item No	Description	Quantity
11	- Fitted with battery holder and 4 mm socket terminals and connection to 3V supply. <u>Carbon model kit</u> A model kit which can be used to assemble different appearances of carbon: Diamond, Graphite and Fullerene (C60). - Consists of at least 78 spheres & 128 rods for a diamond model. - Consists of at least 67 spheres & 105 rods for a graphite model. - Consists of at least 60 spheres & 90 rods for a Fullerene (C60) model.	5 kits
12	<u>Celestial globe</u> Approx. 400 mm in diameter. Demonstrate the relationships of the earth, stars, planets and galaxies. With an outer sphere to indicate the constellations and stars, an earth globe mounted within the outer sphere and a movable sun. Complete with the meridian ring and horizontal mounting. Manuals included.	1
13	<u>Cell Holder</u> A plastic box with cover to accommodate four 1.5V D-size dry cells in series. Fitted with terminals to accept 4 mm plug leads or screw down onto bare wire. Can provide 1.5V, 3V, 4.5V or 6V e.m.f. values.	10
14	<u>Centralized low voltage power supply unit</u>	1
15	<u>Coils, Transformer</u> (a) Coil (120 + 120 turns) Of copper wire on plastic former, approx. 100 x 55 x 35 mm overall. With hole approx. 24 x 14 mm to accommodate C-core in (b) and three 4 mm sockets for 0-, 120- and 240- turn connections. Rated at 1 A. (b) Double C-core with clips Each core is laminated from low loss iron strip and is cut across the middle to produce two equal C's. A strong spring clip is provided to hold the two halves together.	4
16	<u>Colour filter set</u> A set of eight sheets of acetate filter 540 x 300 mm approx. One each of blue, cyan, green, yellow, magenta, red, ruby.	10 sets
17	<u>Compass, plotting</u> With two clear glass faces, needle pivoted between top and bottom glass plates, without dial, 20 mm diameter approximately.	1 set
18	<u>Convection in air apparatus</u> It comprises a metal box sized 230 x 75 x 75 mm approximately with a sliding glass front and two detachable glass chimneys 150 x 50 mm diameter approx. A candle holder is mounted in the box under each chimney. A short length of candle is inserted into one of the holders and ignited. Once the sliding front of the box is closed, a convection flow is produced which travels down the unheated chimney, across the box, up the heated chimney, and may be shown by use of smoke from a smoldering taper or string held close to the top of the unheated chimney.	40
19	<u>Current balance kit</u> Comprises: - one wide and one narrow 1.6 mm diameter copper wire current balance. Dimensions approximately 320 x 250 mm and 320 x 35 mm respectively. The ends are joined by a plastic sleeve through which a brass pointer is fitted and each balance carries a coiled wire rider. - a mounted index. - two magnets with pole face approximately 50 x 19 x 4.5 mm thick - one mild steel yoke - one stand comprises two plastic supports approximately 60 x 45 x 5 mm mounted 210 mm apart at ends of aluminum rod 5 mm diameter and together carrying three 8 mm square section brass fulcras at appropriate separations for wide and narrow current balances.	1
20	<u>Data logger interface</u> (a) Hardware - The interface can log data from appropriate sensors to a suitable device (such as notebook computer/tablet) (b) Software - Can be run on a suitable operating system - Can display and analyze data from appropriate sensors	2 kits
21	<u>Data logger sensors</u> The sensors should be fully compatible with the interface above (not necessary to purchase extra sensor(s) if the above interface has the corresponding built-in sensor(s)). (a) Current sensor Can be used to measure current from -1.0 to +1.0 A in an electric circuit. The inputs should be protected against overloads by some practical ways. Current range: -1.0 A to +1.0 A Current resolution: better than 1 mA Sample rate: not less than 1,000Hz (b) Force sensor Can be used to measure force from -50 N to +50 N with a resolution of ± 0.05 N (or better). (c) Infrared sensor Can be used to measure infrared radiation ranging from 600 nm to 40,000 nm and the intensity is displayed in Watt /meter². (d) Light sensor Can be used to measure light intensity and data is displayed in lux (unit of illuminance) which is a measure of luminous flux per unit area. (e) Motion sensor Can be used to measure position, velocity and acceleration of objects within a range from 0.2 m to 8.0 m approx. (f) Photogate sensor Consists of a light source and a light detecting device. Can be used to monitor motion of moving objects of tiny size (e.g. a thin cardboard paper). Photogate width: approx. 7 cm Spatial resolution: 1 mm or better Timing resolution: 0.1 ms or better (g) Pressure sensor, Absolute Can be used to measure the absolute pressure of a gas in a container up to 700 kPa with a resolution of ± 0.1 kPa. Should include a syringe and a quick connect tubing for investigating the Gas Laws. (h) Rotary motion sensor Can be used to measure rotary motion with a resolution of 0.09° or better. (i) Sound sensor Can be used to measure both sound level (in dB) and sound intensity (in W/m²). Max sample rate: 20 Hz or higher. Accuracy: ± 3 dB at 100 dB and 1000 Hz Resolution: 0.1 dB or better (j) Temperature sensor Stainless steel temperature sensor which offers fast response and large range of temperature measurement. Range: -35 °C to +135 °C or better Accuracy: ± 0.5 °C or better Resolution: 0.1 °C or better (k) Ultraviolet sensor Can be used to detect and measure UVA (i.e. from 320 nm to 400 nm). (l) Voltage sensor Can be used to measure voltage from -10 V to +10 V in an electric circuit. The inputs should be protected by some practical ways. Voltage range: -10V to +10V or better	5

Item No	Description	Quantity
22	Voltage resolution: 10 mV or better Sample rate: not less than 1000 Hz (m) Acceleration sensor (3-axis) and Altimeter Can be used to measure and present acceleration in x, y and z axes, resultant acceleration as well as altitude (in metres). Range of acceleration: ± 10 g or better Resolution of acceleration: ± 0.01 g or better Range of altitude: up to 7 km above sea level Resolution of altitude: ± 50 cm or better <u>Demonstration meter</u> Accepts large interchangeable plastic scales to enable the use as a demonstration a.c./d.c. ammeter or voltmeter. A magnetically damped, spring-controlled moving coil movement with a pointer, housed in case with transparent front and rear panels to enable all working parts to be clearly seen. With a pair of 4 mm socket terminals and a centre zero adjustment control. Comprises: (a) Interscale demonstration meter Sensitivity of 300 A f.s.d. at d.c. 100 mV (b) Current and Voltage range scales - d.c. current, range 2.5-0-2.5 mA - d.c. current, range 0-10 mA - d.c. current, range 0-100 mA - d.c. current, range 0-1 A - d.c. current, range 0-10 A - d.c. voltage, range 0-1 V - d.c. voltage, range 0-15 V - d.c. voltage, range 5-0-5 V - a.c. current, range 0-10 mA - a.c. current, range 0-1 A - a.c. current, range 0-10 A - a.c. voltage, range 0-15 V - a.c. voltage, range 0-300 V	5 2 2 1 each
23	<u>Dice</u> Used to study the radioactive decay law by performing an analogue dice throwing simulation. With 6 faces, approx. 14 mm x 14 mm x 14 mm	100
24	<u>Diffraction grating</u> Embedded in 50 x 50 mm slide or film mounts. (a) 300 lines per mm. (b) 600 lines per mm.	10 10
25	<u>Ear model</u> - An enlarged model of the ear showing pinna, auditory canal, tympanic membrane, incus, malleus, stapes, cochlea and semicircular canals isolated from surrounding tissues. - Mounted on a stand so that effect of sound wave vibrations can be demonstrated. - Approximate dimension: 280 mm x 210 mm x 140 mm	1 set
26	<u>Eddy current kit</u> For providing a qualitative practical demonstration of Lenz's law. Comprises: - a copper tube (about 320 mm x 15 mm) together with a pair of cylindrical 'plugs' (the plugs are identical in appearance and mass but one is plain steel and one is a powerful neodymium plug). - a pair of plastic caps to provide self contained storage.	1 set
27	<u>Electric field Kit</u> To give visual demonstration of electric fields Comprises: (a) Electric field apparatus Comprises: - 1 transparent plastic base supports a dish 90 mm diameter approx. - two 4 mm socket terminals, mounted on insulating pillars 30 mm high approx. - 2 wire point electrodes - 1 ring electrode - 2 line electrodes (b) Castor oil[™] (c) Semolina powder	1 set
28	<u>Extra high tension (EHT) power supply unit</u> Outputs : 0 to 5 kV d.c. short circuit current of 3 mA 0 to 5 kV d.c. short circuit current of 60 μA through 50 MΩ resistor. 6 V a.c at approx. 2 A (for filament) - The 50 MΩ safety resistance is built in and can be brought into use as required, and for additional safety measure there is 1 MΩ resistance between the voltage doubler capacitors and the metered + ve and -ve sockets. - Enclosed in robust metal case with pilot light and mains switch. - For use on 220 - 240 V a.c. 50 Hz, single phase supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	2 litres 40 grams 1
29	<u>Fibre optics communication kit</u> The system comprises a transmitter, a receiver and a length of optical fibre to demonstrate long distance communication. Specifications are given as below: (a) Transmitter: 1. Light source - High intensity red LED; 2. Modulation - internal or external; 3. Ext Modulation - input 0 to 5V approximately; 4. Ext Modulation frequency range - d.c. to greater than 300Hz approximately; (b) Receiver: 1. Input - solid state photo-detector; 2. Output - high speed digital output, 0 to 5V from below 20 Hz to above 300 kHz approximately; Other requirements; 1. Optical termination - by simple push in connection for 1 mm diameter optical fibre; 2. Electrical termination - 4 mm sockets; 3. Power requirements - 5 to 6V dc; 4. Optical fibre - double layer polymer fibre of 1 mm nominal diameter.	1 kit
30	<u>Flat solenoid</u> - Consists of approximately 250 turns of enamelled copper wire, wound on wood and plastic former. To be used with the current balance kit. - Overall dimensions approximately 300 x 260 x 30 mm. - Connections are made via 4 mm sockets.	2
31	<u>Fleming apparatus</u> For demonstration of force acting on a current-carrying conductor in a magnetic field. Comprising a pair of metal rails with 4 mm socket terminals. A non-magnetic metal axle is free to rotate along the rails and completes the electrical contact between them. When the axle is	1

Item No	Description	Quantity
32	placed on the rails and a power supply is connected, the axle will rolls along the rails under the effect of magnetic field. <u>Galvanometer, centre zero moving-coil</u> For investigating EM induction, or as an indicator in low frequency a.c. experiments. Coil resistance: 1000 Ω Current range: 50-0-50 μ A Voltage range: 50-0-50 mV Scale: approximately 50 mm long	2
33	<u>Galvanometer, internal light beam</u> A sensitive meter and null detector with an integral taut suspension movement, lamp-unit and scale, the indication being presented as a hairline in a brilliant light spot on a translucent screen. Power supply: 200-240V, 50Hz Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug. Scale: approx. 180mm divided in mm and cm with left-hand and centre-zero scales. Range: attenuation sensitivities of "x1", "x0.1", "x0.01", "x0.001" and "direct". Sensitivity: 25 mm/ μ A, 70 mm/ μ V and 70 mm/ μ C. Dimension: Enclosed in robust metal case. 295 x 215 x 130 mm high approx.	1
34	<u>Geiger Counter, Portable</u> A portable nuclear radiation counter/detector operated by a 9 V alkaline battery. Should be easy to start up and use. Equipped with a GM tube with thin mica window so that radiations such as alpha, beta & gamma can all be detected and measured. Max. rate of counting should be up to 50,000 counts/min. With built-in beeper.	1
35	<u>Geiger-Muller tube assembly</u> ² GM tube and holder with lead.	1 set
36	<u>Glass block, rectangular</u> For refraction experiments, size 115 x 65 x 20 mm approximately.	10
37	<u>Hand Spectrometer, Plastic</u> A portable diffraction grating spectrometer for viewing visible spectra (including emission and absorption spectra) with a resolution of ± 50 nm. A built-in scale indicates wavelength to the nearest 100nm. Simple instrumental manual should be included.	5
38	<u>Hot-cathode discharge tubes</u> (a) Cathode ray deflection tube A longitudinal phosphorescent screen displays the path of the cathode rays. Using the grid marked on the screen, the deflection of the cathode ray can be measured. EHT supply 2 to 5 kV required, the higher voltages give a bright track. (b) Helmholtz coils A pair of coils in series, for use with cathode ray deflection tube. Operating current and voltage are 0 to 1 A and 0 to 12 V respectively. (c) Universal stand For the above tubes, providing a firm, three-point, insulated support.	1 1 pair 1
39	<u>Immersion heater kit, low voltage</u> (a) Immersion heater, low voltage Totally enclosed heating element 12 V 60 W in cartridge-type housing approx. 80 mm (length) x 13 mm (diameter) with leads terminating in 4 mm twin socket connector. (b) Metal blocks 1 kg metal blocks with holes to accommodate the immersion heater in (a) for specific heat capacity determinations. Materials: - Aluminum - Brass - Copper - Steel	10 1 each
40	<u>Immersion heater, mains</u> - A plated copper sheathed helical element approx. 50 mm external diameter, with thermal cut-out set to operate at 120 oC, mounted on a water-tight, thermally and electrically insulated handle. - The handle includes a manual reset for the thermal cut-out and a clip for mounting the heater on the side of a container. - For 220 - 240V 50Hz. a.c. single phase supplies. The body of the heater must be bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug. - Rating: 1,000 W.	1
41	<u>Joulemeter, digital</u> For AC and DC measurement of either cumulative electrical energy in joule delivered to a load, or instantaneous power in watt. Result is shown on a LED/LCD digital display. Electrical connection to the meter by means of four 4 mm socket terminals, one pair for the power supply and one pair for the load. Maximum input voltage: 20 V d.c. or 14 V rms a.c. (or higher) Maximum energy indication: 9,999 J (or higher) Maximum power indication: 2,000 W (or higher) Accuracy: typical 2 % Other features: selectable range of measurement Power supply: mains unit with approx. 1.8 m of 3-core cable and BSS plug, 220V, 50Hz AC.	1
42	<u>Kilowatt-hour meter</u> A domestic 'consumer unit' at a max. load of 20 A, which provides and measures electrical energy supplied to appliances in kilowatt-hour. Mounted on a wood baseboard, provided with a 13 A switched socket and approx. 0.5 m of mains cable. The energy consumed can be read by counting the number of revolutions of the rotating disc. Alternatively, power can be measured by counting the no. of revolutions of the rotating disc in each minute,	1
43	<u>Kinetic motion (theory) model</u> Comprises: - A plastic tube approximately 30 cm2 cross section, height not less than 380 mm, terminated at upper end by loose-fitting cover and lower end by stretched rubber diaphragm. - Two expanded polystyrene pistons. - Metal spheres approximately 3 mm diameter. - Vibrator unit : 0-6 V d.c. electric motor mounted on wood/plastic base. - External connection through two 4 mm terminals. - With instruction manual.	1
44	<u>Laser and safety goggles</u> (a) He-Ne or solid-state laser - A "Class 2" laser of power output less than 1 mW. - The laser emits an intense monochromatic red beam of wavelength 632.8 nm. - Beam diameter approximately 1.8 mm and divergence about 1 mrad. - The unit, including integral power pack is housed in a robust metal case. - With illuminated ON/OFF switch, key operated mains switch and laser warning label. - Can be powered by batteries, a smoothed and regulated power supply, or a 220 - 240V a.c., 50Hz, single phase supply. (b) Laser safety goggles Special filters protect the eyes from exposure to emission from He-Ne lasers. A soft plastic moulding to cover the eyes completely. Can be worn over prescription spectacles.	1 1
45	<u>Lens, cylindrical</u> (a) Plano-concave lens Clear glass with ground ends and optically worked faces. Size: 50 x 50 mm Power : -17 D (b) Plano-convex lens	10 10 each

Item No	Description	Quantity
46	Clear glass with ground ends and optically worked faces. Size: 50 x 50 mm Power : +7D +10D +17D <u>Lens, spherical</u> (a) Biconvex lens 50 mm diameter Focal length : 10 cm 15 cm 20 cm (b) Biconcave lens 50 mm diameter Focal length : 15 cm. 20 cm (c) Lens holder with stand For lens of diameter 50 mm	10 each 10 each 10
47	<u>Lens, thin convex</u> Biconvex, diameter approximately 50 mm, focal length 1,000 mm.	1
48	<u>Leslie's Cube</u> - Tinplate box with approx. 130 mm sides. The vertical faces of the box are blackened, roughened, varnished and polished respectively. The top opening is approx. 75 mm diameter and is fitted with a lid. The apparatus is filled with water maintained at boiling point by a Bunsen flame. - Infrared sensor may be used to compare the relative radiant heat output from each of the four faces.	1
49	<u>Lever apparatus</u> Comprises: - 5 wood beams, approximately 610 x 44 mm graduated at 38 mm intervals. - 4 U-shaped supports, grooved to locate fulcrum pins. - 40 brass 'penny-weights', approximately 25 x 25 x 2 mm - 20 fulcrum pins, for insertion into edge of beam.	2 sets
50	<u>Light meter, digital</u> For measurement of illuminance in terms of lux (lx). Portable, compact sized digital light meter for simple one hand operation. Range: 0 to 50,000 lux (or better) Resolution: 1 lux Accuracy: 5 % (or better) Lighting type: selectable between Tungsten, Daylight, Fluorescent, Sodium, Mercury Sample rate: 2.5 s-1 Spectral response: close to CIE photopic curve Other features: PEAK HOLD, DATA HOLD, display	5
51	<u>Linear air track assembly</u>³ (a) Linear air track (b) Air blower	1 1
52	<u>Long spring</u> Steel wire closed-wound helix, about 19 mm diameter, closed length approximately 3 m, extending to approximately 9 m.	10
54	<u>Low voltage smoothing unit</u> Provides smoothed d.c. from low-voltage power supplies. Will accept inputs up to 25 V and supplies outputs not less than 3 A with ripple less than 1% . Inputs and outputs made via 4 mm sockets.	1
55	<u>Magnet, large (with keeper)</u> - Eclipse major magnet. - Suitable for demonstrating the deflection of fundamental charged particles. Materials: Alcomax 111 and mild steel. Strength: 0.2 T approximately. Dimensions: 110 x 105 x 50 mm approximately Pole face area: 50 x 20 mm approximately Distance between poles: 25 mm approximately	1
56	<u>Magnetic field of current, demonstrator</u> For demonstration of magnetic field formed by a current carrying conductor. To be used on an overhead projector. (a) Solenoid - A copper solenoid mounted on a transparent plastic plate with 4 mm connectors. - 250 mm x 250 mm x 45 mm approx. (b) Straight wire - Straight wire mounted on a transparent plastic frame with 4 mm connectors. - 170 x 170 x 200 mm approx.	1 1
57	<u>Magnets</u> (a) Horseshoe magnets Magnets in horseshoe shape with poles on open ends; each of lengths 75 mm, 100 mm and 125 mm approximately in lateral dimensions. (b) Rectangular bar magnets Rectangular bar shaped magnets of 100 mm approximately in length and poles on two ends. (c) Ceramic block magnets Magnets measure 50 x 20 x 5 mm approximately with poles on the large faces.	1 each 2 8
58	<u>Meters, moving coil</u> 100 μA movement, with approx. 75 mm scale, 1,000 Ω resistance, used with the following multipliers and shunts to give the required ammeter and voltmeter ranges. Comprises: (a) Basic meter Range: 20-0-100 μA (i.e. 20-0-100 mV) (b) Plug in accessories - Dual 1 V + 5 V d.c. Multiplier - Dual 5 V + 10 V d.c. Multiplier - Dual 10 V + 50 V d.c. Multiplier - Dual 1 mA + 10 mA d.c. Shunt - Dual 50 mA + 100 mA d.c. Shunt - Dual 1 A + 5 A d.c. Shunt - Triple 1 A + 5 A + 10 A (r.m.s.) a.c. Shunt	20 10 sets

Item No	Description	Quantity
59	<u>Microphone, crystal</u> Crystal microphone mounted in a box with 4 mm connections. Can be used to demonstrate voice waveform on CRO. Frequency response range: 50 Hz to 6 kHz (or better) Impedance: approx. 1 M Ω Supplied complete with not less than 1.4 m coaxial cable and coaxial plug.	1
60	<u>Microwave radiation monitor</u> The meter is used to detect and measure microwave signal from mobile and cordless phones, antenna masts and microwave The meter shows signal levels approximately 0.7 to 6.5 V/m. Digital meter which can measure microwave signal and other EM waves is an alternative.	1
61	<u>Mirror, plane</u> (a) Plane mirror strip For use in ray optics, may be conveniently held in holders. 150 x 50 mm approximately. (b) Wooden block Wooden block, finished in matt black, with a slot in the side to accommodate plane mirror.	10
62	<u>Model eye apparatus</u> (a) Model eye kit - A 4 litre round bottom flask with cork support ring filled with fluorescein. - Designed to demonstrate normal, long and short sight and the function of spectacles. - With the following 50 mm diameter meniscus lenses: +5.5 D, +8 D, +11 D, +2.5 D, -3 D (b) Compact light source A very efficient 12V 100W quartz iodine lamp mounted in a well ventilated metal housing. Two shuttered holes are provided on two adjacent sides.	1 set
63	<u>Motor accessory set</u> For demonstrating the effects of eddy currents. Comprises: - A pair of quadrant shaped eddy current plates, one plain, one slotted. - An aluminum motor disc with a pole shading piece. - A vertical support rod carries two transverse holes with clamping screws to accommodate the spindles of the quadrants and motor	1 set
64	<u>Motor construction kit</u> Enable the students to build their own motors from scratch. Each kit should include: - 2 Magnadur magnets and a mild steel yoke - armature - supporting base - shaft and 2 split pins - 4 rivets - 0.6 mm PVC tinned copper wire - Sellotape - 50 mm tubing, 2.5 mm bore	10 motors
65	<u>Multimeter, student</u> - Analogue or digital. - Accuracy: 2% d.c. and a.c. - Input impedance 10 M Ω /V d.c. and a.c. - With audible continuity check, overload protection to 400 V r.m.s. Specifications : V d.c. : 200 mV to 600 V in 5 ranges V a.c. : 200 mV to 600 V in 5 ranges I d.c. : 200 μ A to 10 A in 5 ranges I a.c. : 200 μ A to 10 A in 5 ranges Ω : 20 k Ω - 200 k Ω - 2 M Ω in 3 ranges	10
66	<u>Oscilloscope, dual trace⁴</u>	2
67	<u>Parallel beam projector (with bulb)</u> Comprises: (a) Parallel Beam Projector - Designed primarily for work on spectra. Has an integral table for prisms, gratings, etc. Can produce a light beam which is continuously adjustable to be parallel, divergent or convergent by a plano-convex lens about 50 mm (diameter) x 150 mm (focal length). - A SBC/SCC lamp-holder for the filament bulb on a sliding - Overall dimensions approximately 320 mm (L) x 80 mm (W) x 100 mm (H) - For use on 12 V a.c. or d.c. supply. (b) Filament bulb A 12V 24W axial filament bulb for the projector.	1 set
68	<u>Photo-electric unit</u> For evaluation of the Planck's Constant h. The apparatus comprises a photo-emissive tube with a caesium-antimony cathode, a transistorized a.c. amplifier, a calibrated linear potentiometer and a press switch. The unit is powered by an external 9V battery and should be used with the 3.5 mm jack plug removed. Output through two 4 mm sockets. A set of six mounted colour filters is provided. The filters are fitted over the cell aperture in the panel of the unit between the locating pillars.	1 set
69	<u>Photo-timing gate</u> For use as a light operating timing gate. Comprises: - a fast response photo-detector and a light source each housed in a plastic case spaced 40 mm apart on a metal rod 120 mm long approx. - light source houses 2.5 V 0.2 A MES bulb with 2 pairs of labelled 4 mm sockets for connection to electronic timer and 2 V a.c./d.c. power supply.	2
70	<u>Plastic block (or glass block), semicircular</u> Clear, polished semicircular block (plastic or glass), with white back to show the path of light rays through the block, approximately 98 mm (diameter) x 16 mm (thick).	10
71	<u>Power line transmission demonstration kit</u> This kit demonstrates how losses in transmission over long distances can be reduced by transmitting at high voltage. Comprises: - a step-up transformer and a bulb holder on a plastic base. - a step-down transformer and bulb holders on a plastic base. - thin insulated wire substitution box. For safety reason the maximum a.c. voltage involved does not exceed 24 V.	1
72	<u>Prism</u> - 45°, 90°, 45° - Approximately 35 mm (hypotenuse length) x 25 mm (height). - Made of acrylic plastic.	10
73	<u>Prism, high dispersion</u> - 60°, 60°, 60° - Extra dense flint, refractive index = 1.65. - Equilateral sides approximately 32 mm.	1

Item No	Description	Quantity
74	- Height approximately 32 mm. <u>Protractor, full-circle</u> 160 x 160 cm approx., white plastic protractor printed with a circular scale of 0o to 360o x 1o reading and four quadrant scales 0° to 90° x 1° reading.	10
75	<u>Pulleys</u> (a) Single pulley Suitable for bench or retort stand mountings. 51 mm diameter approximately. For clamping to benches up to 25 mm thick. (b) Fine strings[@] For use on pulleys, diameter 1 mm approximately.	10
76	<u>Ray box kit</u> (a) Ray box With triple slit aperture and 12V 24 W line filament lamp and lamp holder. (b) Cylindrical convex lens Glass, used with ray box in (a) to produce parallel and convergent rays of light.	1 10 10
77	<u>Resistance substitution box</u> Range 100 Ω to 10 MΩ given by 12 to 16 resistors. - preferred value carbon resistors are: 100, 220, 470 Ω, 1, 2.2, 4.7, 10, 22, 47, 100, 220, 470 kΩ, 1, 2.2, 4.7, and 10 MΩ. - Rating 0.5 W continuous, 1 W maximum. - Selection is done by means of a rotary switch and external connection is via a pair of 4 mm sockets.	5
78	<u>Rheostat</u> - Variable up to 10 Ω at 5 A rating. - Sliding contact, for use as series resistor or potentiometer. - Open type with windings on an insulating, heat-resistance tube approximately 200 mm (L) x 40 mm (diameter), three 4 mm socket terminals and slotted end plates for screw mounting. - For use at voltages up to 50 V.	10
79	<u>Ripple tank assembly</u> (a) Ripple tank & accessories Plastic ripple tank, overall size of tank approximately 580 x 500 x 80 mm. <u>Rippler assembly</u> : Comprises a beam approximately 300 mm long drilled to receive rods of point sources and provided with two support hooks for elastic bands. Ripple motor d.c. 4-6 V complete with approximately 0.9 m of flex. Rippler support rod of light alloy with clips to fit upright rods. Lamp support rod of light alloy, approximately 380 mm long. <u>Accessories of the tank</u>: 2 straight obstacles approximately 130 mm long, 1 straight obstacle approximately 40 mm. Curved reflector approx. 200 mm radius all in light alloy, plastics refraction plate, wood hand wave roller, water dropper, pack of rubber bands and sponge. (b) Lamp (to be used with the ripple tank) - Lamp, 12 V 24 W - Able to be mounted vertically above the ripple tank and illuminates the ripple patterns onto the floor for students to make observations and recordings.	1 set
80	<u>Scaler/Timer²</u>	1
81	<u>Screen, translucent</u> For optics experiments. 80 x 130 mm approx. translucent plastic screen on an aluminum or wooden base.	10
82	<u>Search coils</u> (a) Axial search coil Consists of 5,000 turns of 48 swg copper wire mounted axially in a plastic handle approximately 300 mm (L) x 22 mm (diameter) x 3 mm (thick) with 4 mm (b) Lateral search coil Specification as the above, but with the coil mounted laterally in the plastic handle	10 10
83	<u>Set of solenoids</u> Comprises of 4 square-sectioned single layer solenoids, each having a wound length of approx. 280 mm and mounted on a thin former fitted with small feet and 4 mm sockets. - 2 solenoids are of approximately 2,000 mm² cross-sectional area and have about 180 and 360 turns respectively. - The other 2 solenoids are similar but of approximately 4,000 mm² cross-sectional area.	3 sets
84	<u>Signal generator with loudspeaker and vibration generator</u> (a) <u>Signal generator, low impedance output</u>⁶ (b) <u>Loudspeaker unit</u> A moving coil loudspeaker, diameter 64 mm approx., impedance 3 Ω (c) <u>Vibration generator & accessories</u> (i) Vibration generator For use with the above signal generator. A 3Ω impedance moving coil in a powerful magnetic field to produce controlled vibrations down to 1 Hz. The vibrator will accept sine or square wave inputs and can be used in any position including when clamped to a retort stand. (ii) Accessories - Two rolls of rubber cord, one approx. 3 mm x 3 mm, the other approx. 1.5 mm x 1.5 mm for demonstrating standing waves - Three spring steel blades each approx. 210 mm x 10 mm with securing holes punched at different points	10 2 2 2 sets
85	<u>Single and Double Slits</u> Comprises: - 10 single slits, 0.3 mm slit width, 10 mm approximately long, framed in 50 x 50 mm slide mounts. - 10 double slits, 0.3 mm slit width, 0.6 mm separation, 10 mm approximately long, framed in 50 x 50 mm slide mounts.	1 set
86	<u>Single Slit, Adjustable</u> An adjustable slit, of length 10 mm approximately, the width can be continuously adjusted by a spring-loaded knurled knob up to a maximum width of 2.5 mm approximately. The slit assembly is mounted centrally on a black metal plate, with a central aperture 13 mm diameter approximately.	1
87	<u>Slinky spring</u> For illustrating wave motion. Flat section, steel line in helical coil, diameter approximately 75 mm, closed length approximately 110 mm.	10
88	<u>Slits and gratings set</u> Can be used to demonstrate the inter-relationship between diffraction gratings and slits interference. All items are mounted between glass plates in a 35 mm plastic slide frame. Comprises: - Six slides with a progression of 1 to 6 slits embedded separately, each slit having the same width of 0.06 mm approximately and are equally separated by approximately 4 times the slit width (i.e. 0.24 mm). - Three coarse grating slides with the following parameters.	1 set

Item No	Description	Quantity
89	(i) Grating 1 150 slits having the slit width of 0.06 mm approximately and the slit separations are approximately 4 times the slit width (i.e. 0.24 mm). (ii) Grating 2 150 slits having the slit width of 0.03 mm approximately and the slit separations are the same with Grating 1 above (i.e. 0.24 mm). (iii) Grating 3 300 slits having the slit width of 0.03 mm approximately and the slit separations are one half of Grating 1 above (i.e. 0.12 mm). <u>Slotted weight hangers and weights</u> A hanger of 100 g and nine slotted weights of 100 g each.	10 sets
90	<u>Sodium lamp</u> - Comprises a 34 W approx. sodium discharge tube, housed in a metal shield with a 28 mm approx. diameter aperture and mounted by means of a boss head on an alloy rod at the rear of the control box. - Mains switch and indicator lamp are mounted on the front panel. - For use on 220 - 240 V a.c. 50 Hz, single phase supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	1
91	<u>Solar cell kit</u> Comprises: (a) Solar panel - Output: 2V, 200 mA (or higher) - 70 x 100 mm approx. - Housed in a plastic case, with connectors for easy connection in laboratory. (b) Solar motor To be used with the solar panel in (a). Operate around the maximum power point of the solar panel under direct	5
92	<u>Sound level meter</u> Shows instant response to change in noise level. Operating range is approximately 40 dB to 110 dB. The overall frequency response within the range heard by human ear.	1
93	<u>Sound wave kit</u> The kit comprises: - 1 control box For easy connection and phase reversal of sound sources and inputs. Having approximately 1 m of screened input lead with 4 mm plugs and 2 pairs of 4 mm output sockets. - 3 transducers Functioning as microphones or loudspeakers, each with at least 1 m screened lead and 4 mm plugs.	1 set
94	<u>Spectrometer, intermediate</u> - Graduated disc approximately 150 mm diameter fixed to table, double ended vernier, to read to 1' of arc, attached to telescope. - Telescope and collimator are fitted with approximately 178 mm focal length 25 mm clear aperture achromatic objectives and have rack and pinion focusing; telescope fitted with x 8 Ramsden eyepiece and crossline graticule; collimator with adjustable slit, length 6 mm - The spectrometer table, marked with lines to assist positioning of prism in relation to leveling screws, has interchangeable clamping units for prism and diffraction grating.	1
95	<u>Spectrum tube unit</u> (a) <u>Spectrum tubes</u> - Hydrogen, neon, and mercury vapour tubes. - Straight pattern, capillary length approx. 50 mm. - Fitted with a 4 mm plug at each end. (b) <u>Power supply unit</u> - For operating the above spectrum tubes. - Power output is 3 kV a.c. at 3 mA r.m.s. - Metal top carries an ON-OFF switch, indicator lamp, fuse, rod assembly, 4 mm socket protected by plastic shield and socket for mains cable. The metal end cap of the tube is completely hidden to avoid electrical shocks from touch. The rod assembly comprises a screw-in support rod, approximately 264 mm long, carrying a horizontal rod at its upper end secured and adjusted using a lock-screw and having a 4 mm aperture for tube connection. - For use on 220 - 240 V a.c. 50 Hz, single phase supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.	1 each
96	<u>Speed of Sound Kit</u> (a) 1 Fast timer Ranges : 1 to 999 ms 1 to 999 μ s Input controlled by light gates, microphones or mechanical switches. A change of level of at least 50 mV is needed to start or stop timing. Connected via 4 mm sockets. Two sockets provide 0 and 5 V for connection to sensors if required. Power : internal 9 V battery (b) 2 Ceramic microphone High impedance and high sensitivity. Fitted with about 90 cm screened flex, and two 4 mm plugs. (c) A small hammer and a metal plate For making a sharp sound.	1 kit
97	<u>Stopwatch</u> Reads 0-60 second in 0.2 s. With start, stop and reset buttons.	10
98	<u>Stroboscope, xenon</u> - Flashing rate : Range 1: 1-10 flashes per second Range 2: 10-100 flashes per second Range 3: 100-250 flashes per second - Frequency accuracy : Typically $\pm 2\%$ of each full scale - Triggering : (a) by internal oscillator (b) by external closing contacts (c) by externally applied waveforms - Maximum energy per flash : Range 1 : 0.8 J approx. Range 2 : 0.2 J approx. Range 3 : 0.1 J approx. - Flash duration : Approx. 12 μ s on all ranges - Mains supply : 220 - 240V a.c. 50Hz, single phase	1
99	<u>Sunspotter</u> A wooden, folded-path, Keplerian telescope which provides a much safer and convenient way to view the brilliant light of the Sun than other normal methods. Can project a bright solar image onto a white viewing screen through an objective lens of 60 mm diameter approx. Overall dimensions: 40 cm x 37 cm x 15 cm (HxLxW) approx.	1
100	<u>Syringe</u> Precision-ground, gas-tight, heat-resisting glass, free-running capacity 100 mL, graduated at 1 mL intervals, outlet tube 7 mm internal diameter approximately.	1
101	<u>Syringe, plastic @</u> Disposable plastic syringe for Boyle's law experiment, capacity 60 mL, 2 mL graduations.	10

Item No	Description	Quantity
102	<u>Tank, rectangular plastic</u> Dimension approximately 180 x 120 x 50 mm with matt white	2
103	<u>Tank, rectangular transparent</u> For use in wave motion and ray optics demonstrations, 600 x 200 x 75 mm approximately, complete with plunger on rod to act as wave generator when tank is filled with water.	1
104	<u>Telescope (Refractor, Reflector or Catadioptrics)</u> - Used to view celestial objects in the night sky. - Aperture size should be 6-inches (i.e. 15 cm) or above. - Must be accommodated with a tripod stand. - With equatorial mount and automatic go-to function	1
105	<u>Thermometer</u> - Filled with low toxic environmentally friendly liquid, with reinforced bulb and permanent graduations. - With non-roll top and suspension ring. (a) -10 oC to 110 oC x 1 oC	30
106	<u>Thermometer, digital</u> Hand held, battery operated digital thermometer with LCD display. With one Type K thermocouple input socket. Come with a general purpose probe and a flexible-wire thermocouple probe. Range of measurement: -50 to 700°C (or better) Resolution: 0.1°C Sampling rate: 2 times per second (or better) Accuracy: ±0.5 % (or better)	10
107	<u>Thermometer, infrared</u> Gun type, takes instant temperature readings of any surface. Requires no contact with surface – safely measure temperature in inaccessible or hazardous areas. - Laser-sighting beam permits aiming precisely at target surface. - Includes backlighting and data hold options (freezes display reading) and low-battery indicator. - Display update time: ± 1 s - Temperature range: -20 oC to 500 oC (or better) - Resolution: 0.5 oC (or better) - D/S ratio: 12:1 (or higher) - Accuracy: ±2% (or better)	5
108	<u>Thermometer, wall</u> Bimetallic type, scale – 30 °C to 60 °C	1
109	<u>Toroidal rheostats</u> - Rotary action type, for use as series resistors or potentiometers with loads up to 50 W. - With control knob moving over circular scale marked 0 to 100. - For use on circuits below 50 V. - Resistance values: 1, 5, 10, 25, 50, 100, 200 & 500 Ω	1 set
110	<u>Trolley apparatus</u> (a) Trolley, dynamic Hard wood, approximately 300 mm long, having 3 low-loss-bearing wheels and fitted with spring-loaded impulse rod. Rod has three positions to provide different impulses and is triggered by a release pin. (b) Runway For use with trolleys, warp-resistant wood board, 2,450 mm (L) x 300 mm (W) x 20 mm (thick) approx., reinforced with metal angle side rails. (c) Elastic cords Used to accelerate dynamic trolleys. Rubber nature, 180 mm long with ends eyelet terminated.	10 pairs
111	<u>Tuning fork</u> Boxed set of 13, blue steel, from C1 (256 Hz) to C2 (512 Hz) with frequencies marked.	1 set
112	<u>Ultrasonics kit</u> Comprises: - An ultrasound transmitter Generates 40 kHz signal which can also feed to other transducer cell. Dimensions: case 150 x 95 x 60 mm approx. horn 75 x 100 mm (mouth diameter x length) - An ultrasonic receiver Identical dimensions to the transmitter. A pair of 4 mm output sockets allow connection to a 1mA meter for quantitative work. A gain control is also provided so that the output from the receiver provides full-scale deflection of the meter under max. signal conditions. If speech or other audio modulation is used, the output from the receiver should be connected to an audio amplifier/loudspeaker combination.	1 set
113	<u>Ultra-violet lamp with cover</u> To demonstrate characteristics of UV radiation or photo-electric expt. The UV lamp should be enclosed in cylindrical metal lamphouse with an aperture in its side and a simple ventilation system in its upper end. The UV lamp is 6 W approx., for operation on 220 - 240V a.c. 50Hz, single phase supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug	1
114	<u>Van de Graaff generator</u> (a) <u>The generator</u> - Driven by a constant-speed motor housed in an earthed metal case with front panel, which is incorporated with earth terminal. - The charge collecting rubber belt and metal charging comb could be easily adjusted for performance. - A built-in heating source (optional) can help the generator to discharge spark when the relative humidity is - Charge collecting sphere about 250 mm diameter. - Discharging sphere about 150 mm diameter. - 4 mm connection sockets in dome and base. - For use with 220 - 240 V a.c. 50 Hz, single phase supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug. (b) <u>Accessories for Van de Graaff generator</u> Comprises: - head of hair with a 4 mm connection plug. - insulating plastic rod with right-angle bend approximately 240 mm high, lower end of reduced diameter to fit generator dome, upper end drilled to accommodate nylon monofilament for supporting an expanded polystyrene sphere about 25 mm diameter with conducting surface. - approximately one meter of monofilament. - Faraday ice pail, 100 x 60 mm, height x diameter approximately, with 4 mm plug in centre of base. - neon lamp, MES Insulating holder, mounted on approximately 60 mm steel pin with sharp point. - vibrating column to simulate ions in motion, transparent plastic container, approximately 100 mm (H) x 90 mm (maximum diameter), mounted on 4 mm plug with aluminum disc top and bottom, with 12 electrically conducting expanded polystyrene spheres of about 13 mm diameter.	1
115	<u>Watt meter, digital</u> Measures the electric power consumption of an electric appliance connected to mains supply. - Equipped with a B.S.S. 3-pin plug for connection to the wall socket. The appliance to be measured is plugged on a B.S.S. 3-pin socket on the wattage meter directly. - LCD display, shows a.c. power, voltage, current and total energy consumption (in kWh). - Operating voltage: 220 V, 50 Hz - Maximum measured current: 13 A (or better) - Maximum measured power: 2000 W (or better)	1 set

Item No	Description	Quantity
116	- Accuracy: $\pm 5\%$ of measured value (or better) <u>Wind meter</u> For wind speed measurements. Measures outside wind speed, air velocity in hoods and gas movement in ducts. With a lightweight propeller rotates freely under air motion. Enclosed in a chemical and shock resistant hard cover and has handy flip-open bench stand for easy monitoring. Reading is displayed on a LCD panel. Operation modes: current, average, maximum values of wind speeds Display update time: ≤ 1 s Speed range: 0.3 ms⁻¹ to 40 ms⁻¹ Other features: HOLD switch, display backlighting BASIC EQUIPMENT	5
117	<u>Adjustable spanner</u> Approximately 150 mm long with 19 mm opening span.	1
118	<u>Balance</u> (a) <u>Electronic balance</u> - Top pan, electronic, weighing range about 200 g, readability 0.01 g. - For use on 220 - 240 V, 50 Hz, single phase, a.c. supplies. (b) <u>Triple beam balance</u> - Single pan (stainless steel, diameter 150 mm approx.), low form balance. - Comprising 3 notched weighting beams with centre-indicating sliding masses. - Beam graduated in (i) 0 - 500 g x 100 g, (ii) 0 - 100 g x 10 g, (iii) 0 - 10 g x 0.1 g. - Capacity about 2.5 kg. - Sensitivity 0.1 g with supplementary masses 2 x 1,000 g, 1 x 500 g.	1
119	<u>Barrier tape @</u> PVC type, strong adhesive, ideal for highlighting hazard/restricted areas, 50 x 3 mm approx.	4 rolls
120	<u>Beaker @</u> Squat form, with spout, with two or more graduation marks showing approximate capacities. (a) Pyrex or equivalent, 250 mL (b) Pyrex or equivalent, 500 mL (c) Polypropylene, 0 - 250 mL	40 20 20
#121	<u>Bench protection mat</u> Heat-resistant mat, made of glass reinforced cement, about 300 mm x 300 mm, 4.5 mm thick. (Asbestos free)	10
122	<u>Bottle, narrow mouth</u> With dust proof stopper. (a) Clear glass, 250 mL (b) Clear glass, 500 mL	20 10
123	<u>Brush, test tube</u> Nylon made. (a) Diameter 15 mm (b) Diameter 30 mm	12 12
124	<u>Burette stand</u> Hardwood, single clamp, approximately 45 cm high.	2
125	<u>Burner</u> (a) Bunsen Burner For either town gas or liquefied petroleum gas or natural gas, depending on the type supplied. Nickel plated burner tube with rotatable air regulator and tapering, rifflled connector, mounted on an enamelled pressed-steel base. Burner tube 100 mm (H) x 13 mm (diameter), base 80 mm diameter, connector 10 mm mean outer diameter. (b) Teclu Burner For either town gas or liquefied petroleum gas or natural gas depending on the type supplied. Nickel plated burner tube with a threaded disc valve for adjustment of the air/gas mixture. Burner tube 105 mm (H) x 13 mm (diameter), base 80 mm diameter, connector 10 mm mean outer diameter.	12 1
126	<u>Calipers, vernier</u> For measuring length, internal/external diameter and depth up to 150 mm.	1
127	<u>Clip component holder</u> Comprising a pair of crocodile clips with integral 4 mm sockets mounted on plastic base at about 55 mm spacing.	20
128	<u>Clips with lead @</u> Crocodile-to-crocodile lead	50
129	<u>Cold chisel</u> 150 mm approximately.	1
130	<u>Contact key</u> 1 way, with spring brass contact arms.	2
131	<u>Cotton thread @</u>	1 reel
132	<u>Craft tool</u> Consisting of slotting handle and blades.	1
133	<u>Cylinder</u> Graduated with spout. (a) Glass, 100 mL (b) Glass, 250 mL	10 10
134	<u>Eye wash unit</u> Equipped with an eye wash bottle for emergency treatment of the eye affected by liquids, dust or flying particles. By squeezing the bottle a fountain of wash is directed into the eye via the eye bath. Contaminated wash drains through the side tubes, so that a continual flow of clean wash reaches the eye. When not in use, eye bath is covered by a dust cap. The bottle is clipped into a moulded panel on which simple but complete instructions are The panel has holes for wall hanging.	1
135	<u>Filter Funnel</u> Plain, soda lime glass, 150 mm approx. top diameter.	2
136	<u>Flask @</u> Flat bottom, medium neck, Pyrex/equivalent, 500 mL.	10
137	<u>Flat file</u> Second cut, length 200 mm approximately.	1

Item No	Description	Quantity
138	<u>Foam cup @</u> 275 mL capacity approximately.	200
139	<u>G-clamp</u> Malleable iron, with ball-end steel screw and socket swivel head, enamelled finish, approximately 100 mm opening.	5
140	<u>Glass-cutting diamond</u>	1
141	<u>Glove, chemical resistant</u> For handling acids, alkalis and common organic solvents, long cuff, with special finishing for excellent wet grip.	2 pairs
142	<u>Glove, heat/cold resistant</u> Made of non-flammable non-asbestos material, with low thermal conductivity, high strength and high abrasion resistance, gives no dermatological problems; for furnace and hotplate work in the laboratory; gauntlet length.	1 pair
143	<u>Hacksaw</u> Pistol grip, fixed length 300 mm approximately. Supplied with 4 blades.	1 set
144	<u>Hose clip</u> For use on Bunsen burner tubing.	50
145	<u>Iron filings</u>	500 g
146	<u>LCR Meter, Hand Held</u> Used to measure inductance, capacitance and resistance, with LCD display panel. - Accuracy: Better than $\pm 1\%$ for all measurements - Measured Range: Capacitance: 200 pF (min.), 20000 μ F (max.) or better Inductance: 200 μ H (min.), 20 H (max.) or better Resistance: 20 Ω (min.), 20 M Ω (max.) or better - Other features: With zero adjustment.	1
147	<u>Measuring tape</u> 2 m long.	1
148	<u>Mechanical vice</u> Jaw opening to about 65 mm.	1
149	<u>Micrometer Screw gauge</u> 0 to 25 mm graduated to 0.01 mm.	2
150	<u>Microscope slide</u> 1.2 to 1.5 mm thick.	1 Pack of 50
151	<u>Multimeter, Digital</u> - Display: - LCD digital display with max. reading of 1,999 plus decimal point, unit symbol indication. - Automatic polarity, "-" display for -ve input. - Full range overload protection indication. - Low battery indication. - Measurement ranges: DCV: 200 mV to 1000 V (or better) ACV: 2 V to 600 V (or better) DVA/ACA: 2 mA to 10 A (or better) Resistance: 200 Ω to 20 M Ω (or better) Capacitance: 10 nF to 100 μ F (or better) Frequency: 5 Hz to 50 kHz (or better) - Accuracy: Better than $\pm 2\%$ for all ranges. - Other features: Automatic zero adjustment. With diode and transistor testing function. 2-3 second measurement rate update.	10
152	<u>Microcomputer workstation</u>	5
153	<u>Nylon thread @</u>	1 reel
154	<u>Pack of Aradite cement @</u>	1
155	<u>Planerfile</u> A dual purpose tool which can be used as a plane or a file.	1
156	<u>Plastic beads @</u> Small spheres of polystyrene about 0.5 mm diameter.	250 g
157	<u>Plasticine @</u>	2 kg
158	<u>Pliers, electricians</u> With PVC insulated handles, length 150 mm approximately.	1
159	<u>Pliers, taper nose</u> With wire cutters, approximately 140 mm long.	1
160	<u>Plugs with lead, stackable @</u> Plug-to-plug lead, 4 mm plugs with longitudinal and transverse holes of 4 mm diameter so that additional connections may be made to each point. (a) Black (b) Red	25 25
161	<u>Projection system with screen</u>	1
162	<u>Reel of resin-cored solder @</u>	1
163	<u>Retort stand with bosshead and clamp</u> (a) <u>Retort stand base</u> : Iron with corrosion resistant finish, minimum size 160 x 100 (b) <u>Stand rod</u> : Cadmium plated mild steel/bright aluminum alloy. Approximately 500 mm (L) x 12 mm (diameter). (c) <u>Clamp</u> : Enables articles from about 2 to 90 mm diameter to be clamped securely. Design of the jaw ensures a firm grip at all angles of opening. The corkliners of the jaws are well secured. With 8 mm diameter rod suitable for use in bosshead. (d) <u>Bosshead</u> : With offset jaws for great strength. Give a firm grip in either jaw on rods up to 16 mm diameter.	20 sets
164	<u>Round file</u> Second cut, length 150 mm approximately.	1

Item No	Description	Quantity
165	<u>Ruler</u> Graduated at one edge, in cm and mm divisions: (a) Hardwood, 1/2 metre (b) Hardwood, 1 metre (c) Steel, 300 mm	20 10 1
166	<u>Safety screen</u> Transparent polycarbonate, comprising central panel 610 mm (H) x 300 mm (W) x 3 mm (thick) approx. connected to outer panels 610 mm (H) x 230 mm (W) x 3 mm (thick) approx. on each side by full height hinges.	1
167	<u>Safety spectacles</u> Constructed of polycarbonate, spectacle type with side shields giving all round protection. Top guard and lip prevents spillage into eyes. May be worn over prescription spectacles.	45
168	<u>Sand paper @</u> Various grit sizes.	1 set
169	<u>Saw</u> General purpose, 410 mm length approximately, suitable for cutting all woods, plastics as well as mild steel, copper, brass, lead and aluminum.	1
170	<u>Scissors</u> 175 mm approximately.	10
171	<u>Screwdriver, electricians</u> Plastic handle, length of blade approximately (a) 65 mm (b) 100 mm	1 1
172	<u>Screwdriver, Philips type</u> Length of blade 100 mm approximately.	1
173	<u>Screwdriver, watchman's</u> Width of blade approximately 2.5 mm.	1
174	<u>Shield, face</u> With curved hard plastic visor which can be raised from the face when not required, with adjustable headband.	1
175	<u>Silk thread @</u>	1 reel
176	<u>Slotted base</u> To hold flat objects up to 35 mm thick approx. in a vertical position. Cast metal, finished in paint, with jaw 40 mm high approx., end fitted with thumb screw. Dimension of base: 100 mm x 80 mm approx.	2
177	<u>Soldering iron, electrical</u> ⁷	1
178	<u>Spirit Level</u> 200 mm long approximately.	1
179	<u>Steel claw hammer</u> Complete with handle, mass of head approximately 450 g.	1
180	<u>Switch, plug</u> One-way, brass.	20
181	<u>Switch, reversing</u> Rotary brush type switch with brass contacts on rotatable spring loaded ebonite beam. 4 mm socket terminals. Mounted on an insulating base. The brushes and contact strips are arranged on the pivoted bar and base separately so that when the bar is turned from one extreme to the other, the polarity of the connections is Maximum current 10 A. For use on circuits below 50 V.	2
182	<u>Test-tube @</u> Medium wall, with rim, Pyrex or equivalent. (a) 150 x 24 mm (b) 100 x 12 mm	50 100
183	<u>Triangular file</u> Second cut, length 150 mm approximately.	1
184	<u>Tripod stand</u> Triangular top, cast iron, with splayed steel legs, approximately 150 mm (L) x 210 mm (H).	10
185	<u>Tubing, glass</u> Soda lime glass, standard wall, can be worked in a Bunsen flame, in length of 1.5 m approximately. External diameter: 4 mm, 5 mm, 6 mm 7 mm, 8 mm 30 mm, 40 mm	22 m each 15 m each 3 m each
186	<u>Tubing, Bunsen burner</u> Rubber, of an approved type with internal bore about 9 mm, for either town gas or liquefied petroleum gas or natural gas, depending on the type supplied.	30 m
187	<u>Tubing, rubber @</u> (a) Normal wall, 5 mm (bore) x 1.5 mm (wall thickness) (b) Normal wall, 8 mm (bore) x 1.5 mm (wall thickness)	20 m 20 m
188	<u>Tubing, rubber @</u> Red, heavy wall, for use under pressure and at relatively low pressure.	10 m
189	<u>Vaseline @</u>	1 tin
## 190	<u>Wire gauze</u> With ceramic centre, 150 mm x 150 mm. For use on tripod stands. (Asbestos free)	10
191	<u>Wire stripper</u> Adjustable for different wire or cable sizes, also serves as a wire	5
192	<u>Y-piece</u> Polypropylene, length of stem and limb 35 mm, external diameter 7 mm approximately.	20
FURNITURE FOR PHYSICS LABORATORY		
193	<u>First-aid cabinet</u>	1
194	<u>Stool</u> approx. dimensions of 300 x 300 mm, 530 mm (H)	45
195	<u>Movable benches</u> 1,525 mm (L) x 760 mm (W) x 840 mm (H), with acid and heat resistant plastic laminate on top.	10
FURNITURE FOR PHYSICS/CHEMISTRY PREPARATION ROOM		

Item No	Description	Quantity
196	Blackout Curtains	1 set
	Total Cost	571,200

Notes:

@ Consumable items

- # - The asbestos-free requirement should be clearly specified when purchasing the item. As a safeguarding measure, schools may consider requesting suppliers to provide evidence (e.g. laboratory testing report) authenticating their products are free of asbestos.
 - School may also consider using other alternatives e.g. stainless steel bench protection mat if suppliers fail to authenticate their products are free of asbestos.
- ## - The asbestos-free requirement should be clearly specified when purchasing the item. As a safeguarding measure, schools may consider requesting suppliers to provide evidence (e.g. laboratory testing report) authenticating their products are free of asbestos.
 - School may also consider using other alternatives e.g. wire gauze without the ceramic center if suppliers fail to authenticate their products are free of asbestos.

1 Specification of item "14": Centralized low voltage power supply unit

(A) General description

This equipment is designed to provide a source of low voltage a.c. or d.c. power supplies simultaneously to distribution points with output controlled from the unit; for general use in school laboratories with provision for charging secondary batteries.

A single phase a.c. supply is taken from an outlet with fused plug and is connected to the double pole isolator which disconnects the supply completely from all components immediately when the front panel is opened. From the isolator, power is taken through the input circuit breaker to the variable ratio auto-transformer. The input circuit is protected against both surge or steady overload by the input circuit breaker. Input current and voltage are indicated by the input ammeter and input voltmeter at the top of the front panel. The output from the variable ratio auto-transformer is taken to the primary of a fixed ratio, step down, double wound, main transformer. The secondary of this main transformer is taken to the rotary selector switch. To provide a.c. sources, the secondary output is fed via the output ammeter, output voltmeter and output circuit breaker to the output terminals. The output circuit breaker designed to withstand heavy current safeguards the output circuit. To provide d.c. sources, the low voltage alternating current is fed into the selenium cell full wave bridge connected rectifier and then via the output terminals. The d.c. output is unsmoothed and the polarity is indicated by terminal colour.

All the measuring instruments are of the moving iron type. The input and output circuit breakers are both of the magnetic terminal release type and are adjusted to trip at 5 and 50 amperes respectively.

For inspection purposes, the front panel is hinged at the bottom to allow it to be opened through 140 degrees. The internal wiring is colour coded, with green for a.c. and red/black for d.c. When opening, the supply is automatically disconnected making the wiring "dead" and perfectly safe to touch.

(B) For laboratory use

The output from the unit is taken via a ring main circuit to at most 13 distribution points in the laboratory. The output voltage and/or current may be kept constant or varied by adjustment of the auto-transformer. Maximum outputs are :
 0-14 V at 40 A a.c. or d.c.
 14-18 V at 32 A a.c. or d.c.

- (C) For battery charging, the cells should be connected in series with the positive and negative terminals connected to the output terminals of like polarity. The maximum number of 2 volt cells that can be charged is 6 and the maximum charging current advised by the battery manufacturer should not be exceeded. The unit is rated at 580 VA.

- (D) Overall dimensions approx. 310 mm x 540 mm x 740 mm high approximately. For use on 220 – 240 V, 50 Hz, single phase, a.c. supplies. Bonded to earth through 3 core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.

2 Specification of item "35": Geiger-Muller tube assembly

(A) GM tube

Centronic ZP1481(MX168), sensitive to beta, gamma and high energy alpha radiations, to be used with scaler/timer. Specification:
 Threshold voltage (max.): 370 V Plateau length (min.): 100 V Plateau slope (max.): 0.5 % per V
 Operating temp. range: -50 to +60 oC Dead time (max.): 150 µs Anode/cathode capacity: 3.5 pF
 Background, shielded with 50 mm lead + 3 mm aluminum (max): 30
 Sensitivity for 1 mR/h radium: 1200 counts/min Window thickness: 2.5-3.0 mg/cm²
 Electrical connections: B2A base

(B) GM tube holder and lead

Circular base, 50 mm diameter, with GM tube socket, stabilising resistor and detachable 1.5 m coaxial cable fitted with PET 100 series plug.

3 Specification of item "51": Linear air track assembly

(A) Linear air track

Track overall length 2 m, made from a square plastic section, 60 x 60 mm approx., supported along one corner of the section (i.e. diagonally) on five adjustable feet. Two rows of fine holes run along the top of the track. Hole diameter and spacing, 1.05 mm; 25 mm approximately. The track is supplied complete with the following accessories:

- Two heavy and one light vehicle, their masses in the ratio 2 :1.
- Two metal location plates, sprayed black and drilled to take the inner feet of the track so that it can be firmly positioned on the bench using 'G' clamps, screws or self-adhesive pads. The plates are fitted with pegs to support the shutter accessory pillars.
- Three moulded, black 'buffers' and three 'horns' (fitted with rubber bands for work on elastic collisions).
- One set of pin and absorber (plasticine) attachments for work on inelastic collisions.
- A supply of self-adhesive buffers for an alternative method with inelastic collisions.
- A set of Magnadur magnets (2) and counter balances (2) for work on collisions at a distance.
- Three black cards to fit the vehicles for use in timing.

(B) Air blower

This is of general purpose laboratory type for secondary school to be used with the linear air track. The blower is supplied with the standard hose approximately 2 m long and the integral 3-core mains cable, approx. 5 m long.
 Motor rating : 650 W approximately Maximum pressure : 14 kPa approximately.
 For use on 220 - 240 V a.c., 50 Hz, single phase supplies. Bonded to earth through 3-core supply cable and 3 rectangular pin appropriately fused B.S.S. plug.

4 Specification of item "66": Oscilloscope, dual trace

(A) Display:

Display area: Not less than 10 x 8 cm with graticule and illumination. Beam Control: Focus, brightness control and front panel.
 Trace rotation: Astigmatism adjustment by screw driver.

(B) Vertical Amplifier:

Sensitivity: 5 mV/div. to 20 V/div. $\pm 3\%$, (1 Div = 1 cm) calibrated in 1-2-5 step sequence with magnification "x5" switch. Freq. response: DC to 10 MHz (-3 dB)
 Rise time: 35 ns max.
 Input impedance: 1 M Ω shunted by 35 pF $\pm 3\%$ pF. Max input voltage: not less than 400 V peak
 Input terminal: BNC, complete with 4 mm BNC adaptor binding post Input coupling: DC/AC/GND
 Calibration Inverting: calibrated signal provided either CH 1 or CH 2 be fitted with "inverting" switch.

- (C) Time Base:
Sweep speed: 0.5 μ s/div. to 1 s/div. $\pm 3\%$, calibrated in 1-2-5 sequence. Magnification "x5" switch. Sweep mode: CH 1, CH 2, CHOP, ALT, CH 1 + CH 2
Trigger mode: CH 1 +, CH 1 -, CH 2 +, CH 2 -, auto, external Trigger sensitivity: (INT) 2 Hz to 10 MHz at 1 div. (EXT) 2 Hz to 10 MHz at 200 mV p.p. (min.)
Auto: (INT) 50 Hz - 10 MHz at 1 div. (EXT) 50 Hz - 10 MHz at 200 mV p.p.
Max. external input not to exceed 200 V p.p.
- (D) X-Y operation:
The oscilloscope can be switched to X-Y operation with CH 1 = Y, CH 2 = X or vice versa.
- (E) Z Modulation :
Trace could be blanked by TTL level signal input.
- (F) Power Supply:
220 V - 240 V a.c. 50 Hz, single phase.
- (G) Weight :
Equipment should not weigh more than 10 kg for portability.
- (H) Durability :
The equipment should be able to withstand rugged treatment in operation. All control knobs shall lock to the control spindles despite excessive turning and twisting effort.
- (I) Safety :
The equipment shall satisfy safety standard to BS4743.
- (J) Material and Component :
Semiconductor components are to be used, except for the cathode ray tube. Fibre glass PCB to be used. Resistors to be either carbon film type or metal oxide type. Casing should be constructed of metal, with vinyl cladding on the external surface. For oscilloscopes with a plastic moulded casing, there shall be adequate provisions of electromagnetic screening for the electronic circuits.

5 Specification of item "80": Scaler/Timer

- (A) General description:
Power Supply :
Single phase 220 - 240 V a.c. 50 Hz ± 1 Hz via 3 core mains
lead with I.E.C. connector. Display :
6 digits LED/LCD at least 12 mm high featuring most significant blanking (i.e. zeros to the left of the most significant digit are not displayed.)
- (B) Timer:
Maximum recording capacity : 1 x 10⁵ s.
Range :
0 to 99,999.9 s in units of 0.1 s
0 to 9,999.99 s in units of 0.01 s
0 to 999.999 s in units of 1 ms
0 to 99.9999 s in units of 0.1 ms Accuracy :
Better than 0.02 % $\pm$ count Controls :
By manual on/off
By make or break input socket
By triggering timing stop/start inputs (such as by momentary interruption of the light beam) Power Output : 2 V a.c. 0.5 A for Lamp (4 mm socket)
- (C) Scaler:
Maximum count capacity : 100 M Overall counting speed : $\geq 2,000$ /s Counting method:
Selection of continuous count or automatic rate measurement with sampling period selectable at 1 second, 10 second or 100 second. Input : PET coaxial connector
EHT supply : 300 to 500 V adjustable using calibrated control Preamplifier power supply (4 mm socket): 6 V a.c. 0.5 A.

6 Specification of item "84(a)": Signal Generator, Low Impedance Output

- (A) Frequency Range :
10 Hz to 100 kHz in 5 decades and reads on linearly calibrated scale, with $\pm 2\%$ accuracy. The frequency control should have slow motion reduction gear drive. Output waveform :
Sinewave with less than 0.5% T.H.D. Square wave with 1 : 1 mark/space ratio. Triangular wave - if available.
- (B) Output coupling : a.c.
- (C) Output power :
Not less than 2 W r.m.s. into 3 Ω with volume control, additional 600 W output adjustable from 0 V to 10 V will be an advantage.
- (D) Power :
a.c. 220 V - 240 V, (50 ± 1) Hz, single phase or a.c. / d.c. with built-in a.c. adaptor.

7 Specification of item "177": Soldering iron, electrical

- (A) General :
The soldering iron shall be of an electrically safe design and shall be suitable for heavy duty usage.
- (B) Type :
Pistol grip / Straight handle, instant heat, general purpose, interchangeable tip, small power, light weight.
- (C) Heating Power :
A heating power of below 100 W is required.
- (D) Construction :
(i) The soldering iron body shall be of steel, securely attached to a high strength plastic, or wood handle which shall be easily removable for maintenance and repair.
(ii) The interior design shall ensure maximum heat transfer to the electrically insulated tip and minimum heat transfer to the wiring, switch and supply cable.
(iii) If fitted, the ON/OFF switch shall be biased to the OFF position so as to cause minimum operator fatigue during long periods of use.
(iv) The supply cable shall enter the handle through a rubber grommet and shall be secured inside with a screw-down type clamp, or equal.
(v) The heating element shall be designed and constructed so as to minimize the possibility of electric shock to the user in the event of a burn-out, or electrical circuit failure.
(vi) The Pistol grip type should preferably have a work piece light activated from main ON/OFF switch.
(vii) Tip : The tip shall be manufactured from steel or copper, shall present a smooth soldering surface and shall be factory pre-coated for maximum performance and durability.
(E) Electrics :
(i) The soldering iron offered shall be designed and fitted so as to prevent an electric shock to the user, in the event of any internal electrical failure.
(ii) The iron shall be designed for operation on a 220-240 V a.c. 50 Hz supply.
(iii) Any irons NOT fitted with an integral, ON/biased OFF switch shall have the element rated for, at least, a full 1 hour duty without overheating, or burn-out.
(iv) The iron shall be fitted with high temperature insulated wires between the element and the flexible supply cable.
(v) The iron shall be fitted with a suitable flexible supply cable and plug, to a standard, type and capacity full equivalent to the expressed by the latest British standard specifications.

**Reference List of Furniture and Equipment
for Secondary School**

Subject : SS Music

Item No	Description	Quantity
	FURNITURE	
1	<u>Student Chair</u>	40
2	<u>Teacher Desk</u>	2
3	<u>Teacher Chair</u>	2
4	<u>Blackout Curtains*</u>	1 set
	MUSICAL INSTRUMENTS / EQUIPMENT	
	<i>Pianos</i>	
5	<u>Upright School Model Piano</u> ¹	1
6	<u>Upright Piano Cover</u>	1
7	<u>Grand Piano</u> ²	1
8	<u>Grand Piano Cover</u>	1
	<i>Unpitched Percussion Instruments</i>	
9	<u>Triangle</u> 15 cm, with beater and holder	2
10	<u>Solo Triangle</u> 24 cm, with beater and holder	2
11	<u>Pair of Wooden Castanets</u> Mounted on a wooden handle	2
12	<u>Pair of Finger Castanets</u>	2
13	<u>Two-tone Tubular Woodblock</u> With beater and holder	2
14	<u>Tambour</u> 25 cm vellum	2
15	<u>Tambourine</u> 25 cm vellum, with jingles and wooden frame	2
16	<u>Sleigh Bells</u> With 10 bells and handle	2
17	<u>Pair of Cymbals</u> 26 cm	1
18	<u>Cymbal</u> 40 cm, with stand and soft beater	1
19	<u>Pair of Wooden Maracas</u> Mexican style or fish style	1
20	<u>Cabasa</u> Standard size	1
21	<u>Guiro</u>	1
22	<u>Pair of Claves</u> Rosewood, large size	1
23	<u>Pair of Bongo Drums with Stand</u>	1
24	<u>Snare Drum</u> With stand and beaters	1
25	<u>Bass Drum</u> With stand and beater	1
	<i>Pitched Percussion Instruments</i>	
26	<u>Soprano Glockenspiel</u> - single row - C major scale c" - c#" with additional F# and B ^b - 19 individual removable bars (20 X 4 mm) complete with case and one pair of double-headed beaters	1
27	<u>Chromatic Glockenspiel</u> - tenor-alto range c" - c#" with additional F# and B ^b - 26 individual removable bars (20 X 4 mm) double row with chromatic scale together with case and one pair of double-headed rubber beaters	1
28	<u>Soprano Xylophone (Rosewood)</u> - single row - C major scale c" - f#" with additional F# and B ^b - 14 individual bars (40 X 15 mm) complete with one pair of single-headed beaters	1
29	<u>Tenor-alto Xylophone (Rosewood)</u> - diatonic c' - c#" with additional F# and B ^b - 19 individual bars (40 X 15 mm) complete with one pair of single-headed beaters	1

Item No	Description	Quantity
30	<u>Bass Xylophone (Rosewood)</u> - diatonic c' - a" with additional F# and Bb - 16 individual bars (40 X 18 mm) complete with one pair of single-headed beaters	1
31	<u>Set of Chime Bars</u> - single notes c" - c#"" accurately - tuned and mounted on a tuned wood or metal resonator - 26 individual notes forming a chromatic scale as specified above - with a pair of medium-hard rubber single-headed beaters <i>Other Instruments</i>	1
32	<u>Descant Recorder / Soprano Recorder</u> Baroque fingering	4
33	<u>Treble Recorder / Alto Recorder</u> Baroque fingering	4
34	<u>Guitar</u>	1
35	<u>Melodica</u> 36 notes	1
36	<u>Portable Electronic Keyboard</u> With transformer and stand - 61 full-size keys - 32-note polyphonic sounds or more - MIDI in/out <i>Music Stand</i>	1
37	<u>Music Stand</u> - desk adjustable (Pipe : 30 mm diameter) - with wide, folding legs <i>Chinese Percussion Instruments</i>	20
38	<u>Pair of Dajingbo (大京鈸一對)</u>	1
39	<u>Pair of Xiaojingbo (小京鈸一對)</u>	1
40	<u>Pair of Dabo, 40cm (大鈸一對, 40厘米)</u>	1
41	<u>Wuyinmuyu with Stand and Beaters (五音木魚連架及棒子)</u>	1
42	<u>Zhonghuyinluo with Beater (中虎音鐃連棒子)</u>	1
43	<u>Jingluo with Beater (京鐃連棒子)</u>	1
44	<u>Xiaoluo with Luo Pian (小鐃連鐃片)</u>	1
45	<u>Stand for Luo and Bo (鐃查架一套)</u>	1
46	<u>Pair of Pengling (碰鈴一對)</u>	1
47	<u>Dabukyu with Beaters, Rosewood (花梨木大卜魚連棒子)</u>	1
48	<u>Shadi with Stand and Beaters (沙的連架及棒子)</u>	1
49	<u>Wuyingu with Stand and Beaters (五音鼓連架及棒子)</u>	1
50	<u>Zhangu with Stand and Beaters (戰鼓連架及棒子)</u>	1
51	<u>Shuangpigu with Stand and Beaters (雙皮鼓連架及棒子)</u> <i>Audio-visual Equipment</i>	1
52	<u>Projection system with screen</u>	1
53	<u>Media player (DVD/VCD/CD/Bluetooth/USB)</u>	1
54	<u>Microcomputer workstation</u> - DVD-RW Drive - MIDI-compatible - installation of music notation/sequencing software - connection to the stereo speakers below	1 set
55	<u>Pair of Stereo Speakers</u> - with amplification (Amplifier Power Output: 50W+50W RMS) - woofer ≥f 200mm - connection to the multimedia computer system and DVD player	1
56	<u>Mixer</u> - 8-12 Channels including Balance / Unbalance Microphone and Line Inputs with: Aux Channels with Send and Return EQ (Equalisation) <i>Other Electronic Equipment</i>	1
57	<u>Dehumidifier</u>	
58	<u>Digital Video Camera</u> - full HD - with external mic input - portable tripod for digital video camera	1
59	<u>Microphone</u> - with cable	2
60	<u>Stand for microphone</u> <i>A Collection of Self-chosen Teaching Materials</i>	2
61	<u>Audio-visual materials (such as CDs, DVDs)</u>	1 set
62	<u>Music Software (such as notation and/or sequencing software)</u>	
63	<u>Wall Charts</u>	
64	<u>Music Scores / Music Books</u>	
65	<u>Teachers' Reference Books</u>	

Item No	Description	Quantity
	Total cost (only Items 58 to 65)	23,300

- Notes:-
- @ Items 1 to 56 are shared with Music and therefore, excluded in calculating the total cost.
 - 1 School may consider using an 88-key digital piano with acoustics and touch similar to an upright piano.
 - 2 School may consider using an 88-key digital piano with acoustics and touch similar to an upright piano.

**Reference List of Furniture and Equipment
for Secondary School**

Subject : SS Geography

Item No	Description	Quantity
(I)	FURNITURE	
A	<i>Geography Room</i>	
A1	<u>Student desk</u>	24
A2	<u>Student chair</u>	40
A3	<u>Teacher chair</u>	1
A4	<u>Bookcase / storage cabinet</u>	1
A5	<u>Blackout Curtains</u>	1 set
B	<i>Geography Resource Room</i>	
B1	<u>Bookcase / storage cabinet</u>	1
B2	<u>Teacher desk</u>	1
B3	<u>Teacher chair</u>	1
C	<i>Geography IT Room</i>	
C1	<u>Tables for computer and printer</u> Table for computer & printer, overall dimensions 1,000 mm wide x 690 mm high x 760mm deep. Materials (a) Legs and rails teakwood, seasoned and straight-grained and free from shakes; (b) Top 20 mm thick plywood top faced with acid and heat resistant plastic laminate lipped with 12 mm thick teakwood edge all round. All surfaces should be sanded, filed and polished in natural lacquer. All arris-edges should be chamfered.	3
C2	<u>Student chair</u>	8
C3	<u>Bookcase / storage cabinet</u>	1
(II)	EQUIPMENT	
A	<i>Chalkboard Equipment</i>	
A1	<u>Magnets</u> Colour magnets for the magnet board, with a minimum diameter of 3 cm.	15
A2	<u>Compasses</u> Wooden varnished/plastic made up, overall length about 45 cm, rubber non-slip tip on one leg and chalk holder on the other.	2
A3	<u>Set Squares</u> (a) 45° Length of hypotenuse about 45 cm. Provided with/without handle and with centimetre graduations on one edge. Corners are slightly rounded for safety, made of plastic/varnished wood. (b) 60° Similar to A3(a) but having angles of 90o, 60o, 30o. Length of hypotenuse about 50 cm. Longest non-hypotenuse side graduated from 0 to 44 cm.	1
A4	<u>Long Ruler</u> Plastic or wooden varnished, 1 metre graduated in 1cm, with/without handle.	1
A5	<u>Protractor</u> Half circle, plastic or wooden varnished, graduated in degree '0o to 180o in both directions, figured every 10o. The base is provided with a handle. Length of base 50 cm.	1
A6	<u>Wooden Pointer</u> About 80 cm.	1
B	<i>Globes</i>	
B1	<u>Globe -Political</u> Showing clear locations of political divisions of the in colour, with a minimum diameter of 30 cm, unted on wood/moplastic/metal base with tilted axis.	1 (*2)
B2	<u>Globe-Physical</u> Showing mountains, rivers and other features of the earth's surface in colour, minimum 30cm diameter, mounted on wood/plastic/metal base with tilted axis.	1
B3	<u>Physiographic Relief Globe</u> All of the major geologic landforms of the earth are depicted in raised relief. The two-piece globe construction provides students with a view of the cross-section of the earth, exposing the internal physical characteristics of the planet. The colourful cutaway shows the earth's crust, mantle and inner and outer cores, and provides useful data such as temperatures, air densities, distances and atmospheric layers. The globe is markable.	1
C	<i>Meteorological Instruments</i>	
C1	<u>Digital Weather Station</u> (1) a field unit consisting of sensors for measuring temperature, ultra-violet radiation, humidity, wind speed/direction, pressure and rainfall, and a display console for showing the weather data in real-time (2) a software programme for transmitting the data to a PC and for running a user-friendly graphic display of the weather data in real-time on the same PC (3) a software programme for transmitting the weather back to a local meteorological organisation for further data analysis	1
C2	<u>Six's Thermometer</u> To indicate present temperature as well as the highest and lowest temperatures since last resetting of indices. Ranges: about -30oC to 50oC, measures about 30cm in length. Thermometer mounted as a single unit, e.g. a glass U-tube on a separate printed scale, with magnet for resetting the maximum and minimum temperatures. To be mounted on metal/plastic/wooden case.	1
C3	<u>Hygrometer with Celsius Tables</u> Wet and dry bulb thermometers mounted on plastic base-plate with printed scales from -30oC to 50oC (approx.). A plastic reservoir for the wet bulb is secured to the plate by a metal clip or strip, supplied with muslin thread. The comparison table in Celsius is either printed on the base plate or on a separate sheet.	2

Item No	Description	Quantity
C4	<u>Wind Vane</u> Pointer rotates on a vertical steel shaft to be fixed on a mast. Indication of directions North, East, South and West are fixed to the shaft.	1
C5	<u>Thermometer, Maximum and Minimum</u> 2 thermometers about 20 cm in length mounted on a single unit. Mercury filled, dual scales, each calibrated degrees Celsius and Fahrenheit. Weatherproof, all plastic casing and a push-button resetting system which does not require the use of a separate magnet. Range -35o to 50 oC (-31o to 122 oF).	1
D	<u>Field Study Instruments</u>	
D1	<u>Measuring Tapes</u> Total length not less than 30 metres.	10
D2	<u>Prismatic Compasses (liquid- filled)</u> With prismatic reading, the pivoted dial and magnet assembly are liquid-filled and housed in a metal case about 60 mm diameter.	1
D3	<u>Pocket Compasses</u> About 40 mm diameter, with circle graduated in degrees and with compass points marked.	10
D4	<u>Orienteering Compasses</u> For rapid transfer of map bearings to field sightings and vice versa. The compass needle is enclosed in a clear liquid-filled housing, with a clockwise 0o - 360o scale and North/South index lines which can rotate on a rectangular clear plastic base plate. Convenient measuring scale on bevelled end and on one of the base plates.	20
D5	<u>5 in 1 Pocket Digital Weather Meter</u> Functions of the weather meter (about 15 cm x 6 cm x 2 cm) include the measurement of wind speed, temperature, relative humidity, air pressure and altitude.	10
D6	<u>Rock Specimen Set</u> Packing in wooden/metal box. Including typical specimens of igneous, sedimentary and metamorphic rocks. Each specimen, more than 40 mm x 40 mm in size, comprising a total of at least 40 pieces per set.	1
D7	<u>Abney level</u> A precision-made clinometer for measuring angles of elevation and depression. Scale divided 90o - 0o- 90o vernier scale reading to 10 min. of arc. Includes sighting tube with reflector and spirit level in case.	5
D8	<u>Ranging Rods</u> Ranging rod about 2 metres long (either in one piece or 2 pieces each of 1 metre long)	5
D9	<u>Soil Thermometer</u> Slotted aluminum/brass case with pointed end for easy insertion into soil. Encloses mercury/spirit in glass thermometer which may be read through a window in the tube; engraved stem to enable measurement at various depths, with range -10oC to 60oC x 1oC.	5
D10	<u>Whirling Psychrometer</u> Wet and dry bulb thermometers with lens front stems, range -5oC to 50oC x 0.5oC, mounted in wooden/plastic frames to be rotated. With simple plastics conversion slide/plastic coated table in Celsius to compute relative humidity from the thermometer readings.	2
D11	<u>Laser / Infrared distance meter (up to 100 m)</u> The meter (about 14 cm x 3 cm x 2 cm) can be used to measure distance up to 100 m as well as calculating area and volume.	5
D12	<u>Soil Testing Kit @</u> The test kit provides reagents and test tubes for measuring the level of lime, pH, nitrogen, phosphorus and potassium salts. Contained in a carrying case, for use in the field. Each reagent is sufficient for at least 50 individual tests. Complete with colour charts, for each test, and full instructions.	5
D13	<u>Environmental Test Kit (for water and / or air pollution) @</u> Designed to provide students with practical experience in environmental monitoring, this field kit supplies all of the required materials for investigations of the major types of air and/or water pollution. Water tests include dissolved oxygen (D.O.), hardness, chloride, phosphate, nitrate and pH. Air tests are for windblown particles, smoke density, nylon deterioration and carbon dioxide. Included in the kit are clear instructions, background information and sufficient reagents for at least 50 individual tests.	5
D14	<u>Simple Stereoscope</u>	5 pairs
D15	<u>Stop Watch</u> With a 0 - 60 seconds main dial graduated to 0.2 The subsidiary dial reads up to 60 minutes and is graduated to 1 minute. Size: about 5.5 cm diameter x 1.5 cm deep.	5
D16	<u>pH meter</u> The meter (about 15 cm x 3 cm x 1 cm) can be used for measuring the pH value of liquid from 0-14 (±0.05).	5
D17	<u>Level angle finder</u> Each 8 cm x 8 cm x 2 cm It can be used to measure the angle of a flat surface / slope angles.	10
D18	<u>10xField Lens</u> About 18 mm in diameter each. The lens are used for the close inspection on rock composition.	10
D19	<u>Light meter</u> Digital meter for outdoor use and can measure up to 200,000 lux	2
D20	<u>Noise meter</u> Digital meter with sound measuring range from 30 to 130 dB	2
D21	<u>Air quality / PM2.5 monitor</u> Digital meter with sensors to measure fine particulate dust matter <2.5 microns in size (PM2.5)	5
D22	<u>Vernier caliper, metal / digital</u> Metal / digital caliper which can measure outside and inside dimension with a range of 0-150 mm	5
D23	<u>Soil sieves</u> A set of at least 2 sieves for different grain size: (1) 2.0 mm and (2) 0.063 mm	5 sets
D24	<u>Mohs hardness testing kit</u> A box of 9-10 minerals, each with a distinct hardness, and a specimen key. It can be used in the field or the geography room to determine the hardness of different minerals, rocks or any unidentified sample	5
D25	<u>Stream flow meter</u> Digital handheld meter via an at least 1m cable with LCD display which shows the velocity of meters per second (m/s)	2
D26	<u>Digital data logger</u>	

Item No	Description	Quantity
	(with large, high resolution touch screen, built-in graphing and analysis application(s), and wireless data sharing function for collecting sensor data and for collaborative learning in geography fieldwork) and the following external data collection sensors: (a) A weather sensor with functions to measure temperature, humidity, wind speed, dew point and barometric pressure / individual sensors for measuring different weather elements (e.g. anemometer, temperature sensor, relative humidity sensor, wind speed sensor); (b) Salinity sensor; (c) Sound level sensor; (d) Light sensor; (e) Flow rate sensor; (f) Soil moisture sensor; (g) pH sensor; (h) CO2 sensor; (i) Optical dissolved oxygen sensor	5 sets
E	<i>Atlas</i>	
E1	<u>Comprehensive Reference Atlas</u>	1
	Includes maps showing world and regional relief, climate, natural vegetation, political divisions and density of population, with some basic information, statistical tables and comprehensive index.	
F	<i>Hong Kong Maps and Photographs</i>	
F1	<u>Maps Index @</u> (Published by Lands Department, H.K.) (a) 1:1 000 Large Scale Plan Index (Index A)	1
F2	<u>Geological Maps @</u> HGM 20 series (Sheets 2-16)	1 set
F3	<u>End-maps for Hong Kong Annual Report @</u> 20 copies of any 5 sheets to be selected by the school	100
F4	<u>Topographic Maps @</u> (a) Series HM20C (1:20 000) (Sheets 2-16) (b) 20 copies of any 3 sheets in Series HM20C (1:20 000) to be selected by the school (c) Series HM50CP (1:50 000) (2 sheets) (d) Series HM100CL (1:100 000) (e) Series HM200C (1:200 000)	2 sets 60 copies 2 sets 5 copies 50 copies
F5	<u>Large Scale and Medium Scale Plans@</u> To be selected by the school from the following scales: (a) Series HP1C (1:1 000) (b) Series HP5C (1:5 000) (c) Series SM10D (1:10 000) (d) Series SM15D (1:15 000) (Kowloon & Hong Kong- 2 sheets)	50 copies (10 copies per selected sheet)
F6	<u>Countryside Series Sheets @</u> Hong Kong Island Central N.T. North-West N.T. Lantau Island Outlying Islands Sai Kung and Clear Water Bay North-East N.T.	1 1 1 1 1 1 1
F7	<u>Hong Kong Guide - Streets & Places@</u>	1
F8	<u>Vertical Aerial Photos (Black & White) @</u> To be selected by the school.	10
F9	<u>Ground and Oblique Aerial Photos (Black & White) @</u> To be selected by the school.	15 copies
F10	<u>Vertical Aerial Photos (Colour) @</u> To be selected by the school	5 pairs
F11	<u>Ground and Oblique Aerial Photos (Colour) @</u> To be selected by the school	15 copies
G	<i>Aerial Photos and Maps of China, and other Countries</i>	
G1	<u>Aerial Photos @</u> To be selected by the school	
G2	<u>Ordinance Survey Maps @</u> (a) Landranger Sheets (1:50 000) (b) Student Map Packs (c) Examination Map Extracts	
G3	<u>Aerial Photos and Maps of China and Other Countries @</u> e.g. To be selected by the school	
H	<u>AR Sandbox</u> Hardware components: (a) A computer with a high-end graphics card (b) A 3D camera / depth sensor (c) A digital video projector with a digital video interface, such as HDMI, DVI, or display DisplayPort	1 set

Item No	Description	Quantity
1	(d) A sandbox with a way to mount the 3D camera / depth sensor and the projector above the sandbox (e) Sand (white in colour) Software components: (a) AR sandbox and related software packages IT Equipment	No specified quantity but controlled by ceiling of the estimated cost
11	<u>Computer Softwares, GIS Software and data files</u> Softwares to be selected by the school: (a) Softwares programmes providing either updated facts and data for themes covered by the geography curriculum or simulation exercises. For example, , World Atlas Encyclopedia, Simcity, Simfarm. (b) GIS software and data files (c) Geography and fieldwork-related applications for mobile devices	
12	<u>Microcomputer workstation</u> Three sets of desktop computers equipped with essential software. Specifications should conform to the latest standard of desktop computers acquired by school via the bulk contract of information technology (IT) equipment	3
13	<u>Projection system with screen</u>	1
	Total Cost for Subject	274,400

Note:

@ Consumable items

**Reference List of Furniture and Equipment
for Secondary School**

Subject : SS Visual Arts

Item No	Description	Quantity
	<u>FURNITURE</u>	
1	<u>Working Table</u>	10
2	<u>Wooden Panel</u> for Working Table Tops	10
3	<u>Stool</u>	40
4	<u>Teacher Desk</u>	1
5	<u>Teacher chair</u>	1
6	<u>Cupboard with lock for media storage</u>	1
7	<u>Plan Chest</u>	2
	Steel, approx. 1,200 mm (W) x 915 mm (D) x 625 mm overall, fitted with 5 equal drawers	
8	<u>First-aid Cabinet</u>	1
9	<u>Blackout Curtains</u>	1 set
	<u>EQUIPMENT</u>	
10	<u>Trolley</u>	1
	Stainless steel, with 3 tiers	
11	<u>Hair Dryer (blower with handle)</u>	2
	For drying prints including hot and cold air, approx. 1,000W / 220V / 50Hz AC (or use standard specifications "spec. 60/07/02 C(6)" issued by the and Mechanical Services Department)	
12	<u>Domestic Iron</u>	2
	Operating on approx. 1,000W / 220V / 50Hz AC. With adjustable thermostat control and indicating self-resetting (e.g. General Electric, National)	
13	<u>Paper Trimmer</u>	1
	Rotary trimming blade, cut length 610 mm. The maximum thickness of cut is about 3 mm	
14	<u>Drawing Board</u>	40
	Plywood, 8 mm thick, size A2 (420 mm x 594 mm)	
15	<u>Palette</u>	40
16	<u>Light Box for Screen Printing</u>	1
17	<u>Squeegee for Screen Printing</u>	1 set
	Assorted sizes: (20 nos.)	
18	<u>Etching Press</u>	2
	Steel bed plate size at least 330 mm x 660 mm x 6 mm, approx. With upper and lower rollers. Four-arm spoked drive wheel. Fitted with one sheet of felt blanket and one oiler	
19	<u>Scissors</u>	40
	150 mm, stainless steel	
20	<u>Staple Gun</u>	5
	(e.g. Rapid 13 or equivalent)	
21	<u>Stapler</u>	40
	(e.g. Max. HD-10 or equivalent)	
22	<u>Staple Remover</u>	5
	(e.g. Max. R2 or equivalent)	
23	<u>Knife</u>	40
	130 mm blade	
24	<u>Woodblock Cutters</u>	40 boxes
	Heavy duty, 6 shapes in box, with grind stone and baren	
25	<u>Lino Dabber</u>	40
26	<u>Bench Hook</u>	40
27	<u>Plastic Mug</u>	40
	100 mm diameter	
28	<u>Palette Knife</u>	10
	100 mm blade	
29	<u>Paper Cutter</u>	40
	With chippable, retractable blade and safety lock (e.g. N.T. Cutter, S200 or equivalent)	
30	<u>Mat Cutter with Guide Rail</u>	1
	For picture frames cutting. (e.g. Logan Model 440 or equivalent)	
31	<u>Oval and Circle Cutter</u>	1
	(e.g. Logan Model 201 3-step oval and circle cutter or equivalent)	
32	<u>Ruler</u>	40
	Plastic, 450 mm	

Item No	Description	Quantity
33	<u>Ruler</u> Wooden or plastic, 1 meter long	1
34	<u>T-square, A1</u> Hardwood, length of blade 920 mm	2
35	<u>T-square, A2</u> Hardwood, length of blade 650 mm approx.	5
36	<u>Set Square</u> Plastic, 45°, 60°, 30°, 200 mm in set	5 sets
37	<u>Cutting Mat</u> Plastic, 3 layers structure (soft P.V.C. sandwiches hard P.V.C. board), double sided usage, 300 mm x 450 mm 3 mm thickness	40
38	<u>Lino Roller</u> 100 mm - 5 nos. 150 mm - 5 nos. 270 mm - 2 nos. (rubber)	1 set
39	<u>Claw Hammer</u> 450 g head	2
40	<u>Screw Driver</u> 100 mm blade length, 6 mm tip	2
41	<u>Screw Driver</u> 150 mm blade length, 8 mm tip	2
42	<u>Hand Drill</u> 6 mm capacity, overall length about 330 mm	2
43	<u>Hand Saw</u> Length 400 mm, 10 points per 25 mm	1
44	<u>Pliers</u> Round nose, overall length 150 mm	10
45	<u>Pliers</u> Combination, overall length 150-250 mm	10
46	<u>Pincers</u> Carpenter, overall length 150-250 mm	2
47	<u>Tenon Saw</u> Length 250 mm, 11 to 20 points per 25 mm	1
48	<u>Hacksaw</u> Adjustable, to take blades up to 310 mm	2
49	<u>File</u> Needle, second cut, 12 assorted shapes	1 set
50	<u>File</u> Flat, rough with handles, overall length about 250 mm	1
51	<u>File</u> Flat, smooth, with handles, overall length about 250 mm	1
52	<u>Rasp</u> (Chinese style - small size)	1
53	<u>Chisels</u> Firmer, square edge, with handles, 6 mm/10 mm/12 mm/20 mm (2 of each size)	1 set
54	<u>Gouges</u> Firmer outcannelled, with handles, 6 mm/10 mm/12 mm (4 of each size)	1 set
55	<u>Centre Punch</u>	2
56	<u>Nail Punch</u> Point diameter 2 mm and 3 mm (one of each)	2
57	<u>"G" Clamp</u> 100 mm	1
58	<u>"G" Clamp</u> 150 mm	1
59	<u>Stainless Steel Ruler</u> 300 mm	2
60	<u>Stainless Steel Ruler</u> 600 mm	1
61	<u>Drying Rack</u> Steel, spray painted, 50 tiers with spring action for Size of wire mesh shelves : 700 x 920 mm, approx., mesh opening not larger than 200 x 200 mm. Overall dimension: 740 x 940 x 1,350 mm, approx. with four rollers (80 mm diam. approx.)	1
62	<u>Teacher Reference Books</u>	1 set
63	<u>Electric Ceramic Kiln***</u>	1

Item No	Description	Quantity
	(a) Framework : The kiln shall be robustly constructed and the kiln door shall be mounted on strong hinges allowing easy but firm closing. There shall be a spy- hole situated in the door for cone sighting. If the kiln is a side-loading type, it shall be provided with an integral metal stand. (b) Firing Chamber : Firing chamber capacity shall be about 80 litres and shall be lined with low conductivity materials and faced with special high temperature refractory insulation bricks. (c) Heating element : The heating elements shall be made of long lasting high temperature wire and shall not be more than 6KW and at 200V. The elements shall be securely carried. (d) Control : For the control and regulation of firing, the ceramic kiln shall be fitted with the following items : (i) an energy regulator; (ii) a temperature indicator/control device incorporated with thermocouple; (iii) an automatic time controller for predetermined firing control. (e) Firing temperature : The maximum firing temperature shall be 1,260°C or above. The heat-up time required to reach 1000°C shall not be more than 8 hours. (f) Safety : The ceramic kiln shall be suitable and safe to use in schools. It shall be equipped with at least three electrical safety precautions : (i) a warning light which glows whenever the elements are live; (ii) a door-operated switch to disconnect the electrical supply automatically as the door is opened; (iii) a key-operated switch/door lock, or has provision for fitting a padlock for the kiln door to prevent unauthorized opening of the kiln. (g) Accessories : (i) Bat, refractory, about 15 mm thickness, size to match the kiln; (12 pcs) (ii) Prop, tubular, about 100 mm long. (20 pcs)	
64	<u>Potters' Kick Wheel</u> All moving parts fitted with bearings (wheel-head 250 mm)	4
65	<u>Turntable</u> 250 mm diam. for pottery	10
66	<u>Clay Storage Bin with Lid</u> Water proof, plastic, min., capacity, 35 litres	4
67	<u>Turning Tools</u> Assorted shapes, 4 in a set	4 sets
68	<u>Modelling Tools</u> Wood, assorted shape, 10 in a set	10 sets
69	<u>Rolling Pin</u> Wooden, 510 mm long approximately, for rolling clay slabs	10
70	<u>LED Spotlights</u> 3 pieces of LED spotlight (continuous, daylight) with tripod stand for photography	1
71	<u>IT Equipment for Visual Arts</u> (A) <u>Microcomputer workstation for graphic use, teacher</u> Specifications: with software items for: word processing graphic picture and photo processing video editing presentation animation (B) <u>Microcomputer workstation for graphic use, student</u> Specifications: with software items for: word processing graphic picture and photo processing video editing presentation animation- Windows system (C) <u>Pressure Sensitive Drawing Tablet</u> - Pressure levels: 1,024 - Active area: 15 x 20 cm (D) <u>Digital Camera with Accessories</u> Specifications: - for High Definition photo and video shooting with AVI and HDMI - tripod - moisture proof plastic box for storage (F) <u>Printer or printer cum scanner (small)</u>	1 set
		5
		1
		4
		1
72	<u>Projection system with screen</u>	1

Note:-

@ All items are shared with Visual Arts. No additional items are needed to be purchased for the SS Visual Arts.

**Reference List of Furniture and Equipment
for Secondary School**

Subject : SS Design & Applied Technology

Item No.	Description	Quantity
	<u>(A) FURNITURE</u>	
1	<u>Square woodwork bench</u> 1,070 mm (L) x 1,070 mm (W) x 760 mm (H)	2
2	<u>Square woodwork bench</u> 1,070 mm (L) x 1,070 mm (W) x 800 mm (H)	3
3	<u>Design table</u> 1,800 mm (L) x 1,000 mm (W) x 760 mm (H), heavy-duty tabletop covered with light-covered plastic laminated sheet, sturdy metal underframe.	3
4	<u>Demo Bench</u> 1,800 mm (L) x 800 mm (W) x 700 mm (H), heavy-duty tabletop covered with light-covered plastic laminated sheet, sturdy metal underframe.	1
5	<u>Stool</u> Stackable, 460 mm height, made from plastics or hardwood.	20
6	<u>Trolley</u> Stainless steel, 4 shelves, rubber casters	2
7	<u>Bin for inflammable fluids</u> 760 mm (L) x 450 mm (W) x 380 mm (H) (20 SWG G.I.)	2
8	<u>Cabinet, first aid</u>	1
	<u>(B) COMPUTER-AIDED DESIGN</u>	
	<u>WORKSTATION & TECHNOLOGY KITS</u>	
9	<u>Computer workstation</u> General purpose desktop PC with 20" LCD monitor	21
10	<u>Integrated software package</u> MS Chinese/English Office (standard suite) (Education Version)	21
11	<u>3-D CAD software</u> Inventor/SolidWorks /ProENGINEER or equivalent (Education Version)	21
12	<u>Animation software</u> 3D Studio VIZ or equivalent (Education Version)	21
13	<u>Computer graphics software</u> - CorelDRAW or equivalent (Education Version)	21
14	<u>CAL on Electronics</u> Interactive, simulate electronic circuits (Education Version)	1
15	<u>Printer or printer cum scanner (small)</u>	1
16	<u>Digital video camera</u> for photo / HD video shooting	4
17	<u>Mechanisms kit</u> for introduction of mechanical components, structures and forces, completed with building instruction sheets and storage unit. Class pack is preferable.	2
18	<u>Pneumatics kit</u> for constructing simple pneumatic systems, completed with teacher's manual and instruction sheets. An air pump unit (without cylinder) should be included.	1
19	<u>Robotics kit</u> Robotics kit, completed with interface, capable of simulating a variety of manufacturing processes such as pick and place, sorting, assembling. (Site license preferable)	3
20	<u>Learning kit for electronics</u> DC operated electronics system with decisions module containing AND, OR, NOT gates and other accessories such as micro-switch, sensors, battery, connecting leads. Completed with teacher's manual & worksheets. Class pack is preferable.	1
21	<u>Learning kit for computer / microcontroller control</u> completed with the following essential elements:- - flowchart-based control software - text-based control software - interface with i/o ports/adapters - set of digital i/o devices and sensor devices - motorised model e.g. 'Buggy' or manufacturing unit - building guide and publication resource Site license of software is preferable, if applicable.	3
22	<u>Laser Cutter and Engraver</u> Completed with odour reduction and exhaust system	1

Item No.	Description	Quantity
23	<u>CNC Lathe (for DAT)</u> PC controlled, bench type, with driven motor 700W (approx.), operated at 220V, 50 Hz, single phase, a.c. Basic requirements include:- - Full 2-axis simultaneous movement - Swing over bed: 150 mm approx. - Programmable speed range: 0-3,000 r.p.m. approx. - Position repeatability 0.01mm (or better) - Programmable tool turret - X-axis travel 100 mm (min.), Z-axis travel 200 mm (min.) - Safety features including safety guard, emergency stop, overload protection, low-volt release unit, travel limit switches etc. - All electrical wiring of the equipments shall comply with the latest edition of BS7671 Completed with: - full set of tool holders - CNC control software - CAD/CAM software - Teaching and learning resources Training should be provided for teachers or school's assigned personnel. (To comply with latest Factories and Industrial Undertakings Ordinance and Regulation.)	1
24	<u>Video editing software (for DAT)</u> - VideoStudio or equivalent (education version)	5
25	<u>Web Authoring software (for DAT)</u> - Adobe Web Tools or equivalent (education version)	5
	<u>(C) PLASTICS & ELECTRICAL EQUIPMENT</u>	
26	<u>Strip heater</u> for heating acrylic sheets, 500 mm length, 220 V 50 Hz single phase A.C., 1 kW approx. , electrical components and cabling conform to the latest B.S.S. earthing through 3-core supply cable.	1
27	<u>Oven</u> (curing), 220V, approx. 1,000 W, single phase, up to 300oC, electrical components and cabling conformed to the latest B.S.S. earthing through 3-core supply cable, exterior temperature 50oC at max. optimum temperature, safety door interlock, firing chamber approx. 250 x 300 x 450 mm.	1
28	<u>Vacuum former</u> (manual), capable of blank size 300 mm x 300 mm end up to 2 mm thick sheet. Heating element is 1.5 kW. Vacuum pump is self-contained unit, 200W. Electrical components and cabling conform to the latest B.S.S. Operated on 220V, 50Hz single phase A.C. and earthing through 3 core supply cable.	1
29	<u>Multimeter</u> battery operated.	4
30	<u>Glue gun</u> for 11mm dia. glue-sticks, double insulated, 220V 50Hz A.C.	10
31	<u>Electric soldering iron with stand</u> 220V 50 Hz, single phase A.C., 25 W.	4
32	<u>Electric soldering iron with stand</u> 220V 50 Hz, single phase A.C., 125 W.	1
33	<u>Electric soldering iron with stand</u> 220 V 50 Hz, single phase A.C., 240 W.	1
34	<u>Hand engraver</u> 220 V 50 Hz single phase A.C., variable stroke control, electrical components and cabling conformed to the latest B.S.S., earthing through 3 core supply cable.	1
35	<u>Power hand drill with accessories</u> single phase, 220V 50Hz 2 speed - 1,150 r.p.m. and 2,300 r.p.m., double insulation, heavy duty motor with ball bearings, capacity 10 mm, earthing through 3 core supply cable.	1
36	<u>Solid state D.C. power supply</u> mains input 220V A.C. 50 Hz, Output 0-20V D.C., 0-2A approx. on-off switch with indicator lamp, earthing through 3 core supply cable.	2
	<u>(D) MACHINERY</u>	
37	<u>Drilling machine</u> bench model, 13 mm drilling capacity, 100mm spindle travel, chuck and adequate chuck guard, push button starter with overload protection and no-volt release unit with operating coil designed for 220 V, 370 W, 3 phase, 380 V 50 cycles AC motor, safety belt guard. (To comply with E. & M. standard specification and F. & I. U. Ord. & Regulations)	2
38	<u>Circular saw</u> bench, 250 mm, tilt-arbor depth of cut at 45o, 50 mm, depth of cut at 90o, 70 mm max., quick release safety guard fitted to riving knife, precision machined rip-fence locks back and front of table with single lever, fine adjustment through rack and pinion, extra heavy close grained cast iron table unit size 700 x 700 mm. 1.5 Kw, 3 phase, 380V, 50 cycle motor A.C. supply. Push button starter with no-volt release unit with coil designed to operate at 220V with over-load protection; accessible door for saw dust removal.	1
39	<u>Chip extractor for woodworking machine</u> mobile extractor, 220V, 50Hz single phase A.C., motor driven at 560W with airflow rate 0.2m³/s approximately. Supplied with 2.5m ong flexible hose of 100 mm dia. Electrical components and cabling conform to the latest B.S.S., earthing through 3-core supply cable.	1
40	<u>Power disc sander</u> bench type, 260±50 mm dia. Disc, with 550W motor, single phase, 220V, 50 cycles A.C. supply, mounted on solid cast iron bases. Fitted with fixed disc guard covering the major part of disc, leaving only the portion of the disc in use, and supplied with dust extraction port. Push button overload and no-volt release starter for 220V supply. (To comply with latest F. & I.U. Ord. & Regulations.)	1
41	<u>Jigsaw</u> bench model, stroke of blade 25 mm, 400 mm throat, size of table approx. 200 x 225 mm, 720 strokes per min. 200 W motor, single phase, 220 V, 50 cycles A.C. supply, earthing through 3 core supply cable. Safety guard must be included.	2
42	<u>Metalworking lathe</u> metric model, 250 mm, on cabinet base to admit 560 mm between centres, with 560 W 3-phase motor and lever controlled gear change mounted inside the cabinet base, push button starter with overload protection and no-volt release unit with operating coil designed for 220V. Electrical equipment to be fully tropicallised and suitable for 380 V, 50 Hz, 3 phase A.C., emergency stop button at convenient position, chuck guard with safety interlocking device, suds pump and fitting, single phase low voltage lighting unit preferably 24 V but not exceeding 50 V and saddle limit switch (electrical/mechanical).	1

Item No.	Description	Quantity
	Accessories include:- (i) 125 mm 3-jaw self centring chuck and backplate (ii) 150 mm 4-jaw independent chuck and backplate (iii) Rear splash guard for cabinet base (iv) Drill chuck 12.5 mm capacity (v) Set of toolholders for 4-way toolpost	
43	<u>Double-ended grinder</u> bench type, spindle speed at 2,100 rpm approx.; 200 dia. grinding wheels ; wheel guards made from heavy steel plate, adjustable tool rests, safety eye shields; 560 W motor, push button overload and no-volt release starter, suitable for 380 V, 3 phase, 50 Hz A.C. supply. (To comply with E&M standard specifications and F & I U Ord. & Reg.)	1
44	<u>Double-ended polisher (for DAT)</u> floor-type; spindle mounted on ball bearings, 2100 r.p.m. approximately from 380 V, 3 phase, 50 Hz A.C. at 560 W; the polishing spindle should be protected with guards when the machine is not being used; guards mounted behind polishing mops to provide maximum protection; push button starter with overload protection and no-volt release unit with operating coil designed for 220V, single phase, A.C. supply. (To comply with latest E&M standard specifications)	1
	<u>(E) HAND TOOLS</u>	
45	<u>Bench hook</u> Beech, size 150 x 250 mm	20
46	'Carborundum' stone silicon carbide, rectangular type, one side coarse and one side fine	1
47	<u>Abrasive wheel dresser</u> suitable for dressing up to 510 mm dia. Dia of cutters 33 mm	1
48	<u>Adjustable tap wrench</u> bar type 6-12 mm	2
49	<u>Adjustable tap wrench</u> bar type 1.5-6 mm	2
50	<u>Bevel</u> Sliding blade 188 mm, hardwood stock with brass protected ends and brass lever locking nut	2
51	<u>Bit</u> countersink rosehead, 13 mm dia. straight shank dia. 5 mm	2
52	<u>Bit</u> forstner, straight shank 19 mm dia	1
53	<u>Bit</u> forstner, straight shank 13 mm dia	1
54	<u>Bit</u> countersink rosehead, 10 mm dia. straight shank dia. 5 mm	2
55	<u>Bit</u> forstner, straight shank 25 mm dia	1
56	<u>Brace</u> ratchet 200 mm sweep, alligator jaws, ball-bearing head.	2
57	<u>Brace bit</u> Centre, fast cutting 25 mm dia., square shank	1
58	<u>Brace bit</u> Centre, fast cutting 19 mm dia., square shank	1
59	<u>Brace bit</u> Centre, fast cutting 16 mm dia., square shank	1
60	<u>Brace bit</u> centre, fast cutting 13 mm dia., square shank	1
61	<u>Brace bit</u> centre, fast cutting 10 mm dia., square shank	1
62	<u>Brace bit</u> solid centre auger (Jenning Pat.) 16 mm dia	1
63	<u>Brace bit</u> solid centre auger (Jenning Pat.) 13 mm dia	1
64	<u>Brace bit</u> solid centre auger (Jenning Pat.) 10 mm dia	1
65	<u>Brace bit</u> solid centre auger (Jenning Pat.) 6 mm dia	1
66	<u>Brace bit</u> solid centre auger (Jenning Pat.) 19 mm dia	1
67	<u>Bract bit</u> Centre, fast cutting 22 mm dia., square shank	1
68	<u>Bradawl</u> 38 mm blade, with pinned end size, hardwood handle	4

Item No.	Description	Quantity
69	<u>Calipers</u> outside firm joint, 200 mm	1
70	<u>Calipers</u> inside 150 mm, firm joint	1
71	<u>Calipers</u> outside 150 mm, firm joint	3
72	<u>Centre punch</u> 5 mm point dia x 100 mm long, round head	10
73	<u>Chisel</u> bevel edge 25 mm, plastic handle	10
74	<u>Chisel</u> bevel edge, 19 mm blade, plastic handle	10
75	<u>Chisel</u> bevel edge 16 mm, plastic handle	10
76	<u>Chisel</u> bevel edge 13 mm, plastic handle	10
77	<u>Chisel</u> bevel edge 10 mm, plastic handle	10
78	<u>Chisel</u> bevel edge 6 mm, plastic handle	10
79	<u>Chisel</u> square edge, firmer, 19 mm ash handle	20
80	<u>Chisel</u> square edge, firmer, 13 mm ash handle	20
81	<u>Chisel</u> square edge, firmer, 6 mm ash handle	20
82	<u>Chisel</u> sash mortice, 13 mm blade, beech handle	5
83	<u>Chisel</u> sash mortice, 8 mm blade, beech handle	10
84	<u>Chisel</u> sash mortice, 6 mm blade, beech handle	20
85	<u>Cold chisel</u> flat, octagon steel, 12 mm blade width x 150 mm long	2
86	<u>Cold chisel</u> cross cut, octagon steel, 6 mm blade width x 150 mm long	1
87	<u>Compasses</u> wing 200 mm	2
88	<u>Cork</u> rubbing block	4
89	<u>Cramp</u> 'G' ribbed, 150 mm	12
90	<u>Cramp</u> 'G' ribbed, 100 mm	12
91	<u>Cramp</u> 'G' ribbed, 50 mm	12
92	<u>Cramp</u> 'G' ribbed, 200 mm	4
93	<u>Cramp</u> sash, 900 mm length out of steel bar	4
94	<u>Cramp</u> sash, 600 mm length out of steel bar	4
95	<u>Die stocks for circular die</u> 21 mm O.D.	2
96	<u>Die stocks for circular die</u> 25 mm, O.D.	2
97	<u>Dividers</u> 150 mm quick solid nut, spring type	2
98	<u>Set of drill morse</u>	2

Item No.	Description	Quantity
99	twist, straight shank, H.S.S <u>Drill</u>	2
100	hand, 8 mm capacity, machine cut gears and pinion, double pinion with all bright parts plated <u>Enamel trough</u>	1
101	152 x 250 x 50 mm <u>Engineer steel square</u>	10
102	150 mm <u>Engineers' combination pliers</u>	2
103	150 mm <u>Engineers' H.S.S. hand taps</u>	2
104	metric M3 x 0.5 (set of 3) <u>Engineers' H.S.S. hand taps</u>	2
105	metric M5 x 0.8 (set of 3) <u>Engineers' H.S.S. hand taps</u>	2
106	metric M6 x 1 (set of 3) <u>Engineers' H.S.S. hand taps</u>	2
107	metric M8 x 1.25 (set of 3) <u>Engineers' H.S.S. hand taps</u>	2
108	metric M10 x 1.5 (set of 3) <u>Face shield</u>	2
109	for general eye and face protection, with 200 mm adjustable clear vizor and adjustable crown strap <u>File card</u>	6
110	50 mm wide, 100 mm long. <u>File</u>	6
111	taper, saw, slim, 150 mm <u>File</u>	6
112	taper, saw, extra slim 100 mm <u>File</u>	5
113	half round, 2 nd cut, 200 mm <u>File</u>	5
114	round, 2 nd cut, 200 mm <u>File</u>	5
115	square, 2 nd cut, 200 mm <u>File</u>	2
116	surform, 250 mm blade, plastic handle <u>File</u>	20
117	hand, safe edge, bastard, 250 mm <u>File</u>	10
118	hand, safe edge, 2 nd cut, 200 mm <u>Gauge</u>	1
119	cutting, beechwood head and half round stock, brass facing strips and plastic thumbscrew <u>Gauge</u>	20
120	marking, beechwood head plastic thumbscrew and stock <u>Gauge</u>	2
121	mortice, rosewood head and stock, brass facing strips on stock, thumbscrew operated slide, knurled screw for fixing stock <u>Gloves</u>	1
122	leather <u>Hacksaw</u>	20
123	adjustable, 230 mm telescopic pattern, depth of bow 90 mm , hard wood handle <u>Hammer engineers' ball pein</u>	1
124	ash handle, 900g <u>Hammer</u>	1
125	claw, 450 g Adze eye <u>Hammer</u>	5
126	Warrington, 226 g, ash handle <u>Hand lever operated shear</u>	1
127	length of blade 180 mm for cutting plate and round steel. <u>Hand riveter</u>	2
	capable of riveting 2.4, 3.2, 4 and 4.8 mm diameter rivets by means of inter-changeable nose-pieces	

Item No.	Description	Quantity
128	<u>Hand vice</u> 50 mm width x 125 mm drop forged steel, bright jaws, spring type	2
129	<u>Knife</u> marking, plastic handle, steel blade 150 mm overall length	10
130	<u>Letter stamps</u> 5 mm (27 in case)	1
131	<u>Level</u> spirit, multi-view, plastic body, 230 mm long	2
132	<u>Machine vice</u> 100 mm jaw width, 32 mm depth of jaw, jaw opening 75 mm. Suitable for holding round and square sections, with knurled handle.	2
133	<u>Mechanic vice</u> 100 mm jaws, with plastic vice grips	20
134	<u>Machinist scriber</u> 115 mm long	10
135	<u>Machinists screwdriver</u> 267 mm overall, chrome vanadium blade, 8 mm square x 150 mm long securely pinned in handle	1
136	<u>Mallet</u> carpenter, beechwood head and handle 125 mm	20
137	<u>Mitre block</u> beechwood, 300 mm x 100 mm x 50 mm	1
138	<u>Mitre square</u> 250 mm fixed blade, rosewood handle	2
139	<u>Needle file</u> round handle 140 mm warding, 3 square	3
140	<u>Needle file</u> round handle 140 mm warding	6
141	<u>Nippers, end cutting, 125 mm</u>	2
142	<u>Nippers, side cutting, 125 mm</u>	5
143	<u>Number stamps, 5 mm (9 or 10 in case)</u>	1
144	<u>Odd leg calipers</u> firm joint, 125 mm	2
145	<u>Oil can</u> valve spout, 85 c.c. conical tin spring valve	1
146	<u>Philips driver set</u>	2
147	<u>Piercing saw frames</u> adjustable, blade length up to 150 mm, depth of bow 70 mm	2
148	<u>Pincers</u> carpenter, 150 mm	4
149	<u>Plane</u> smoothing, adjustable iron	20
150	<u>Pliers</u> combination, 150 mm insulated	1
151	<u>Pliers</u> end cutter, 150 mm	1
152	<u>Pliers</u> flat nose, smooth jaw, 125 mm	5
153	<u>Pliers</u> round nose, 125 mm	5
154	<u>Punch</u> centre, 10 mm dia. knurled	2
155	<u>Rasp</u> wood, 200 mm, half round, hardwood handle, smooth	6
156	<u>Rasp</u> wood, 200 mm, flat, hardwood handle, smooth	6
157	<u>Rasp</u> wood, 200 mm, half round, hardwood handle, bastard	6
158	<u>Rasp</u> wood, 200 mm, flat, hardwood handle, bastard.	6

Item No.	Description	Quantity
159	<u>Respirator</u> soft PVC face mask, micro foam filter, adjustable plastic headband	4
160	<u>Round split dies, H.S.S.</u> metric M3 x 0.5, 21 mm O.D.	2
161	<u>Round split dies, H.S.S.</u> metric M5 x 0.8, 21 mm O.D.	2
162	<u>Round split dies, H.S.S.</u> metric M6 x 1, 21 mm O.D.	2
163	<u>Round split dies, H.S.S.</u> metric M8 x 1.25, 25 mm O.D.	2
164	<u>Round split dies, H.S.S.</u> metric M10 x 1.5, 25 mm O.D.	2
165	<u>Rule</u> stainless steel, 300 mm, graduated in inches and mm	20
166	<u>Rule</u> stainless steel, 600 mm, graduated in inches and mm	4
167	<u>Safety goggle/spectacle</u> comply with B.S.S. or equivalent	20
168	<u>Saw set</u>	1
169	<u>Saw</u> coping, 163 mm coping saw blade, pinned ends, depth of bow 120 mm.	20
170	<u>Saw</u> cross cut, 600 mm skewback, 8 T.P.I. beech handle	1
171	<u>Saw</u> keyhole, hardwood handle	1
172	<u>Saw</u> keyhole, blades, 250 mm, fine	2
173	<u>Saw</u> panel, 500 mm 10 T.P.I. beech handle	1
174	<u>Saw</u> rip, 650 mm, 6 T.P.I. beech handle	1
175	<u>Saw</u> tenon, brass back 250 mm, beech handle.	20
176	<u>Saw</u> piercing	10
177	<u>Screwdriver</u> cabinet pattern, 150 mm blade.	6
178	<u>Screwdriver</u> cabinet pattern, 200 mm blade	2
179	<u>Screwdriver</u> engineer fluted, plastic handle 100 mm	6
180	<u>Screwdriver</u> engineer fluted, plastic handle 75 mm	6
181	<u>Sheetmetal bender</u> bench type hand-operated, capable of bending steel sheets 0.6 mm thick and aluminum sheets 1.5 thick	1
182	<u>Spanner set</u> double end type, 6 mm - 24 mm	2
183	<u>Spokeshave</u> metal, flat bottom, adjustable iron, 250 mm long 50 mm cutter	5
184	<u>Spokeshave</u> metal, round bottom, adjustable iron, 250 mm long 50 mm cutter	5
185	<u>Square</u> mitre combination, 300 mm	2
186	<u>Tape measuring</u> 3 m long, high impact electroplated chrome finish case, automatic rewind with locking switch	5
187	<u>Tinmen's boxwood mallets</u> 75 mm, ash handle	4
188	<u>Tinmen's groove punches</u> 3 mm	1

Item No.	Description	Quantity
189	<u>Tinmen's groove punches</u> 5 mm	1
190	<u>Tinmen's groove punches</u> 6 mm	1
191	<u>Tinmen's rivet sets</u> 3 mm	1
192	<u>Tinmen's rivet sets</u> 5 mm	1
193	<u>Tinmen's rivet sets</u> 6 mm	1
194	<u>Tinmen's snips</u> straight blade 250 mm	4
195	<u>Tinmen's snips</u> curved blade 250 mm	4
196	<u>Trysquare</u> 300 mm rosewood stock faced with brass, blade secured with brass diamonds	1
197	<u>Trysquare</u> 150 mm rosewood stock faced with brass, blade secured with brass diamonds.	20
198	<u>Tweezers</u> pointed, stainless steel, 200 mm	8
199	<u>Universal surface gauge</u> one pillar, height 300 mm base length 75 mm, base width 75 mm	1
200	<u>Vee-blocks and clamp</u> cast iron, 50 mm x 40 mm sq., 40 mm dia. Capacity, two 90° vees having different capacities, vees truly centre	1
201	<u>3D Printer</u> Using FDM / SLA printing technology or equivalent Minimum print volume 150x150x150mm	5
202	<u>3D scanner</u> Depth Precision ± 0.05 mm Minimum scan volume 100x100x100mm	1
203	<u>Vinyl cutter</u> Minimum cutting width 290mm	1
Total cost for Items*		89,500

* F&E Items Nos. 1-22, 26-43 and 45- 203 are shared with Design and Technology.

**Reference List of Furniture and Equipment
for Secondary School**

Subject : SS Information and Communication Technology

Item No	Description	Quantity
	<u>COMPUTER EQUIPMENT ITEMS</u>	
1	Microcomputer workstation	26
2	Projection system with screen	1
3	Printer or printer cum scanner (small)	2
4	LAN kit including hub/switch, router, printer server, wireless access point, cabling tools	1
5	Web camera	10
6	Digital video camera	10
7	Diagnostic toolkit	1
8	Web page development tool (for at least 21 concurrent users)	1
9	Graphics package (for at least 21 concurrent users)	1
10	PDF Editor	1
	<u>FURNITURE & EQUIPMENT ITEMS</u>	
11	Dehumidifier	2
12	Student chair	
13	Teacher chair	21

Note: Furniture and equipment items listed above are already provided in the Computer Subject Rm in Part IIa.

**Reference List of Furniture and Equipment
for Secondary School**

Subject : Technology and Living - Food Science and Technology Strand

Item No	Description	Quantity	Remarks
	<u>FURNITURE</u>		
1	<u>Cabinet</u> First-aid, single door type	1	**
2	<u>Chair</u> Student, large to extra large	1	**
3	<u>Stool</u> 480 mm high	24	**
4	<u>Table</u> Housecraft, Pupils'	8	**
5	<u>Table</u> Work, with cupboards <i>Home Living Area Furniture</i>	3	**
6	<u>Trolley</u> Tea	2	**
	<u>EQUIPMENT</u>		
	<i>Appliances - Gas</i>		
7	<u>Cooker</u> Domestic, Asian style, free standing, consists of 4 burners (2 middle burners and 2 big burners with inner and outer rings), automatic ignition, height 200 mm approx., with flame failure devices.	7	**
8	<u>Cooker</u> Domestic, full size, completed with automatic ignition, consists of a separate grill compartment, 4 - burner hotplate of 2 sizes, with flame failure devices for the burners and the oven.	5	**
	<i>Appliances - Electrical</i>		
9	<u>Cooker*</u> Domestic, consists of 4 radiant rings with 2 economy mini/maxi rings, with control panel for different functions, i.e. grill and oven, oven temperature in degree Celsius ranged from 150°C - 250°C, the should be suitable for use on 200-220 Volts, 50 Hz, 60 Ampere power supply.	1	**
10	<u>Dish Washer*</u> with a capacity of washing 12 culinary sets, 2 washing temperatures and 4-6 washing programmes, stainless steel tub, adjustable basket.	1	**
11	<u>Dryer, Tumble*</u> capable of drying 3-5 kg dry weight of wash with 2 temperature settings, loading of heaters shall be of 2,000W approx.	1	**
12	<u>Hot Water Pot*</u> Electric, with a capacity of 3 litres, water level indicator, boil and reboil function, detachable lid with power of 600-700W.	1	**
13	<u>Induction Cooker*</u> On/Off switch with different power level control, ceramic top plate, overheat sensor, protection fuse with power of 1,300-1,600W.	1	**
14	<u>Iron*</u> electric, steam with thermostat, loading of 1,200W or above.	2	**
15	<u>Mixer</u> electric : (a) Egg beater * 3-5 speed control with 2 beaters and 2 dough hooks, with/without stand and bowl with power of 15 -180W.	6	**
	(b) Liquidizer* 2-4 speed control switch, glass container with 1-1.5 litre capacity, detachable blades with power of 400-750W.	6	**
16	<u>Multi-purpose Food Preparation Machine*</u> stainless steel bowl (approximately 4.3-litre capacity), with special attachments : e.g. Dough hook, Whisk, K-beater, Pasta Extruder, Multi-Mill and Mincer with power of 600-700W.	1	**
17	<u>Oven, Microwave*</u> electric, oven capacity of approximately 23 litre, loading of 900W, fully automatic with timer, safety door lock and at least 3 microwave settings.	2	**
18	<u>Processor, Food*</u> stainless steel blade with different functions, e.g. slicing, shredding, grating, chopping with safety lock device, bowl volume of at least 1-litre capacity, with blender and juice extractor attachments with power of 500-700W	2	**
19	<u>Refrigerator*</u> Net capacity of 300-450 litres, frost-free type	2	**
20	<u>Rice Cooker*</u> electric, medium (capacity for 6-8 persons), automatic release button, hinge spring for auto lid opening, with power of 600-650W.	3	**
21	<u>Rice Cooker*</u> electric, small, (capacity for 2 - 4 persons) automatic release button, hinge spring for auto lid opening, with power of 300 - 450W.	3	**

Item No	Description	Quantity	Remarks
22	<u>Washing Machine*</u> fully automatic with selectable programmes for washing and spin drying, capable of washing 5 kg dry weight of wash, front provided with a cold and hot water washing facility	1	**
	<u>MISCELLANEOUS</u>		
23	<u>Blanket</u> Fire Fighting	1	**
24	<u>Board</u> Ironing, metal :		
	(a) Sleeve	2	**
	(b) Standard	2	**
25	<u>Drying Equipment</u> portable, indoor, durable steel frame with rust proof and rounded drying line fittings, adjustable multi-position, additional rubber fittings on the feet for improved stability.	2	**
26	<u>Water Purifier</u> free standing or built in type with replaceable filter, contain filter cartridge life checker and safety valve to prevent damage to purifier.	7	**
	<u>SMALL EQUIPMENT</u>		
	<i>Bamboo-Wooden-Cane Utensils</i>		
27	<u>Board</u> Chopping, 30 cm to 33 cm dia. x 4 cm approx.	13	**
28	<u>Board</u> Chopping, Oblong, 35 cm x 22 cm x 2.5 cm approx.	13	**
29	<u>Cake Mould</u> small	6	**
30	<u>Cake Mould</u> medium	6	**
31	<u>Chopsticks</u> Bamboo	23	**
32	<u>Chopsticks</u> Bamboo, extra long	23	**
33	<u>Panstand</u>	24	**
34	<u>Pin</u> Rolling, Wooden, Chinese	13	**
35	<u>Pin</u> Rolling, Wooden, Western	13	**
36	<u>Spoon</u> Wooden, small	24	**
37	<u>Steamer</u> Bamboo with cover, 14 cm dia.	13	**
38	<u>Steamer</u> Bamboo with cover, 28- 30 cm dia.	6	**
39	<u>Tray</u> Service <i>Metal (aluminum, stainless steel etc.)/Plastic Utensils</i>	3	**
40	<u>Board</u> Chopping, Plastic, 18 cm x 25 cm approx.	13	**
41	<u>Board</u> Chopping, Plastic, 35 cm x 20 cm approx.	13	**
42	<u>Bowl</u> Washing-up, Plastic, 35 cm dia. approx.	24	**
43	<u>Bucket</u> Plastic with lid, 10-13 litres	7	**
44	<u>Colander</u> Plastic, Chinese	13	**
45	<u>Colander</u> Stainless Steel	13	**
46	<u>Container</u> Storage, Plastic, (set of 3)	2	**
47	<u>Container</u> Stainless Steel for oil, 1-1.5 litres	3	**
48	<u>Container</u> Cutlery, Plastic	13	**

Item No	Description	Quantity	Remarks
49	<u>Cutters</u> Pastry (set) - assorted sizes/shapes	12	**
50	<u>Cutters</u> Pastry(set) - fluted/plain	12	**
51	<u>Dish</u> Soap, Plastic	7	**
52	<u>Dredger</u> Flour	13	**
53	<u>Dust pan</u> with handle	1	**
54	<u>Grater</u> combining 3 sizes of teeth	13	**
55	<u>Jug</u> Water, Plastic, with cover	2	**
56	<u>Kettle</u> Stainless steel, 2 litres to 4.5 litres	7	**
57	<u>Ladle</u> Draining, Stainless Steel, 12.5 cm dia. approx.	13	**
58	<u>Ladle</u> Soup, Stainless Steel, horizontal handle	2	**
59	<u>Ladle</u> Soup, Stainless Steel, vertical handle	6	**
60	<u>Ladle</u> Rice, Stainless Steel	6	**
61	<u>Mould</u> Jelly, Plastic, small	46	**
62	<u>Mould</u> Jelly, 0.5 litre	6	**
63	<u>Pan</u> Stainless Steel, 1 litre, 12.5 cm dia. approx.	13	**
64	<u>Pan</u> Stainless Steel, 1.7 litre, 15 cm dia. approx.	12	**
65	<u>Pan</u> Stainless Steel, 2.5 litre, 18 cm dia. approx	12	**
66	<u>Pan</u> Stainless Steel, 3 litre, 20 cm dia	12	**
67	<u>Pan</u> Milk, Non- stick/Stainless Steel, 12.5 cm dia. approx.	7	**
68	<u>Pan</u> Stainless Steel, Heavy Quality Machine Base, 1 litre, 12.5 cm dia. approx.	1	**
69	<u>Pan</u> Stainless Steel, Heavy Quality Machine Base, 2 litres, 15 cm dia. approx.	1	**
70	<u>Pan</u> Stainless Steel, Heavy Quality Machine Base, 3 litres, 18 cm dia. approx.	1	**
71	<u>Pan</u> Stainless Steel, Heavy Quality Machine Base, with basket for deep frying, 5.7 litres, 22 cm dia. approx.	2	**
72	<u>Pan</u> Frying, Flat, good quality, 17 cm/20 cm dia. approx	13	**
73	<u>Plate</u> Stainless Steel, 17 cm dia. approx.	34	**
74	<u>Plate</u> Stainless Steel, 22 cm dia. approx.	34	**
75	<u>Scale</u> Weighing, Electronic, for kitchen use, with maximum capacity of 2 kg,readability of 1g, Battery or D.C. supply.	5	**
76	<u>Scale</u> Weighing, Kitchen, 2kg approx.	3	**
77	<u>Scraper</u> Plastic	13	**

Item No	Description	Quantity	Remarks
78	<u>Sieve</u> with handle, 18cm dia. approx.	13	**
79	<u>Sink Tidy</u> Plastic	7	**
80	<u>Slicer</u> Egg	6	**
81	<u>Slice</u> Fish, Small	13	**
82	<u>Spoon</u> Measuring (set of 3-4)	13	**
83	<u>Sprinkler</u> for laundry	2	**
84	<u>Steamer</u> Stainless Steel (set of 3 & cover), 30 cm dia. approx.	6	**
85	<u>Strainer</u> Tea, with stand	2	**
86	<u>Tin</u> Baking, Loaf	6	**
87	<u>Tin</u> Baking, Oblong	12	**
88	<u>Tin</u> Baking, Oblong, shallow, 28 cm x 18 cm approx.	12	**
89	<u>Tin</u> Baking, Round, 17 cm approx.	24	**
90	<u>Tin</u> Baking, Round, deep, 15 cm dia. approx.	6	**
91	<u>Tin</u> Baking, Round, deep, 20 cm dia. approx.	6	**
92	<u>Tin</u> Baking, Sheet	12	**
93	<u>Tin</u> Baking, 6/9 holes, medium	24	**
94	<u>Tin</u> Baking, 12 holes, small	12	**
95	<u>Tin</u> Baking, 12 holes, medium	24	**
96	<u>Tin</u> Baking, Square, shallow, 20 cm x 20 cm approx	6	**
97	<u>Tray</u> aluminum, oblong, 28 cm x 21 cm approx.	12	**
98	<u>Tray</u> aluminum, small, 35 cm x 25 cm approx.	18	**
99	<u>Tray</u> aluminum, medium, 45 cm x 33 cm approx.	13	**
100	<u>Tray</u> aluminum, large, 48 cm x 38 cm approx.	13	**
101	<u>Tray</u> Cooling , Wire	25	**
102	<u>Tripod</u> for steaming	13	**
103	<u>Turntable</u> cake	2	**
104	<u>Whisk</u> Egg, Spiral	13	**
105	<u>Whisk</u> Egg, Rotary	4	**
106	<u>Wok</u> Stainless Steel, 33cm/35cm dia.	13	**
107	<u>Wok Chaan</u>	13	**

Item No	Description	Quantity	Remarks
108	Stainless Steel, with wooden handle <u>Wok Cover</u> aluminum/ Stainless Steel, 30 cm/32.5 cm dia. approx. (N.B. All pans, kettles etc. should have non-conductive handles) <u>Brushes</u>	13	**
109	<u>Broom</u> Sweeping	1	**
110	<u>Brush</u> Clothes	2	**
111	<u>Brush</u> Nail, Plastic, single- sided	13	**
112	<u>Brush</u> Pastry	26	**
113	<u>Brush</u> Scrubbing, 15 cm length	13	**
114	<u>Brush</u> Vegetable	25	**
115	<u>Mop</u> Floor, complete with handle <i>China and Glassware1</i>	1	**
116	<u>Basin</u> Pudding, 0.5 litre	13	**
117	<u>Bottle</u> Soya Sauce, small	12	**
118	<u>Bottle</u> Soya Sauce, large	6	**
119	<u>Bowl</u> Mixing, 23 cm dia. approx.	13	**
120	<u>Bowl</u> Mixing, 26 cm dia. approx.	13	**
121	<u>Bowl</u> Utility, 11 cm dia. approx.	38	**
122	<u>Bowl</u> Utility, 15 cm dia. approx.	38	**
123	<u>Casserole</u> with Lid, Heatproof Glass, round, 0.5 litre	13	**
124	<u>Casserole</u> with Lid, Heatproof Glass, round, 1 litre	13	**
125	<u>Chinese Pattern. Chinaware (Plain/Rice):</u> (a) Bowl, Tea (b) Bowl, small, 9 cm dia. approx. (c) Bowl, large, 11 cm dia. approx. (d) Dish, 7 cm dia. approx. (e) Dish, Bone, 9 cm dia. approx. (f) Dish, 9 cm dia. approx. (for soya sauce) (g) Dish, 13 cm dia. approx. (h) Plate, 18 cm dia. approx. (i) Plate, 23 cm dia. approx. (j) Plate, Oval, 20 cm long approx. (k) Serving Bowl, deep, 15 cm dia. approx. (l) Serving Bowl, shallow, 16 cm dia. approx. (m) Spoon, Serving (n) Spoon, Soup, small	24 24 24 24 24 6 24 12 12 6 6 12 6 24	** ** ** ** ** ** ** ** ** ** ** ** ** **
126	<u>Coloured Glazed Earthenware/Chinaware</u> (a) Basin, Sugar (b) Jug, Milk (c) Pot, Coffee, 0.8 litre approx. (d) Pot, Tea, 0.4 litre approx. (e) Pot, Tea, 0.7 litre approx. (f) Pot, Hot water	3 3 2 1 1 2	** ** ** ** ** **

Item No	Description	Quantity	Remarks
	(g) Cup, Tea, with Saucer	24	**
	(h) Plate, 18 cm dia. approx.	24	**
	(i) Plate, 23 cm dia. approx.	12	**
	(j) Plate, 25 cm dia. approx.	12	**
127	<u>Container</u>	6	**
	Oil with lid		
128	<u>Dinner Set</u>	1	**
	for 6 persons, Chinese style		
129	<u>Dish</u>	6	**
	Pie, Heatproof Glass, 0.25 litre		
130	<u>Dish</u>	6	**
	Pie, Heatproof Glass, 0.5 litre		
131	<u>Dish</u>	12	**
	Pie, Oblong/Oval, 0.5 litre		
132	<u>Dish</u>	24	**
	Souffle, 0.25 litre		
133	<u>Glass Cookware</u>		
	heatproof		
	(a) saucepan, small 1.5 litres	1	**
	(b) saucepan, medium, 2.5 litres	1	**
	(c) saucepan, large, 3.5 litres	1	**
134	<u>Jug</u>	26	**
	Measuring, heatproof glass, 300 ml		
135	<u>Jug</u>	8	**
	Measuring, heatproof glass, 600 ml		
136	<u>Jug</u>	4	**
	Measuring, heatproof glass, 1 litre		
137	<u>Jar</u>	8	**
	Storage, Glass, with black plastic lid, 2-3 kg		
138	<u>Jar</u>	18	**
	Storage, Glass, small with black plastic lid		
139	<u>Mould</u>	28	**
	heatproof glass		
140	<u>Shaker</u>	6	**
	Pepper, Glass,		
141	<u>Spoon</u>	24	**
	Chinese, White Porcelain, small		
142	<u>Squeezer</u>	4	**
	Lemon, Glass		
143	<u>Tea Set</u>	1	**
	for 6 persons, Western		
144	<u>Tumbler</u>	24	**
	Glass		
	<i>Cutlery and Bladed Tools</i>		
145	<u>Chopper</u>	23	**
	Meat, 22 cm blade, 7 cm narrow end approx.		
146	<u>Chopsticks</u>	23	**
	Plastic (table use)		
147	<u>Fork</u>	26	**
148	<u>Knife</u>	4	**
	Bread		
149	<u>Knife</u>	23	**
	Kitchen, Cook's, 18 cm blade approx.		
150	<u>Knife</u>	23	**
	Kitchen, Paring, with or without serrated edge, 7.5 cm/10 cm blade approx.		
151	<u>Knife</u>	13	**
	Kitchen, Utility, 13 cm/18 cm blade		
152	<u>Knife</u>	13	**
	Palette, small		

Item No	Description	Quantity	Remarks
153	<u>Knife</u> Palette, large	13	**
154	<u>Knife</u> Round Ended, steel handle	26	**
155	<u>Knife</u> Sharpener	1	**
156	<u>One Set of Cutlery</u> for serving 6 persons as follows : (a) Fork, Table (this includes 2 extra for serving) (b) Fork, Dessert (c) Knife, Table (d) Knife, Dessert (e) Spoon, Table (For serving) (f) Spoon, Dessert (g) Spoon, Soup (h) Spoon, Tea	8 6 6 6 4 6 6 6	** ** ** ** ** ** ** **
157	<u>Opener</u> Tin	6	**
158	<u>Scissors</u> Kitchen	13	**
159	<u>Spoon</u> Dessert	25	**
160	<u>Spoon</u> Table	25	**
161	<u>Spoon</u> Tea	25	**
162	<u>Vegetable Peeler</u> <i>Miscellaneous - Cloths, etc.</i>	13	**
163	<u>Cloth</u> Dish-net	38	**
164	<u>Cloth</u> Glass, Linen, 50 cm x 75 cm approx.	8	**
165	<u>Cloth/Gloves</u> Oven	13	**
166	<u>Cloth</u> Kitchen	32	**
167	<u>Cloth</u> Table, Plastic	6	**
168	<u>Duster</u> Yellow	6	**
169	<u>Furnishing Fabric</u> for curtain, laundry equipment, sewing machines	1	**
170	<u>Towel</u> Hand, 55 cm x 38 cm approx.	14	**
171	<u>Bread Maker*</u> Electric, domestic use, 220 - 230V, 3-pin plug, a selection of programme for different types of bread (including plain bread and bread with fillings)	1	
172	<u>Deep Fryer*</u> Electric, domestic use, 220 - 230V, 3-pin plug, capacity of 1.5 - 2.5 litres	1	
173	<u>Ice Cream Maker*</u> Electric, domestic use, 220 - 230V, 3-pin plug, capacity of 1 - 2 litres	5	
	Sub-total Cost		8,100

Notes:

** These items share the F&E of Home Ecom Rm 1.

* Electrical appliances should be suitable for use on 200-220 volts, 50 HZ., single phase A.C. power supply.

1 Items 117, 118, 127, 138 and 140 above are intended for use with Item 98 (Tray), making 6 sets. The tray contains two small soya sauce bottles, one large soya sauce bottle, one oil container, three storage jars and one pepper shaker.

2 For further details of the electrical appliances and small equipment, please refer to the Section on References and Resources of the webpage of the Technology Education Section of the Curriculum Development Institute at <http://www.edb.gov.hk/index.aspx?nodeID=3104&langno=1>

Item No	Description	Quantity	Remarks
174	<u>Balance, dial-o-gram</u> (a) Balance, electronic, capacity up to 200 g. (b) Balance, electronic, capacity up to 110 g.	5 1	@ @
175	<u>Beaker</u> Squat form with spout, with two or more graduation marks showing approximate capacities, (a) Pyrex or equivalent, 100 mL. (b) Pyrex or equivalent, 250 mL. (c) Pyrex or equivalent, 500 mL. (d) Pyrex or equivalent, 1,000 mL.	20 30 2 2	@ @ @ @
176	<u>Bench mat</u> Make of glass reinforced cement, asbestos free, about 300 x 300 mm, 4.5 mm thick.	15	@
177	<u>Bone cutter forceps</u> Nickel-plated carbon steel/stainless steel with spring handles and closing clip, blade length 20 - 40 mm.	1	@
178	<u>Bottle, dropping</u> A three-piece pipette section comprising a stout glass dropper, high-density polythene stopper with dust-proof head and vinyl teat, fitted to a reagent bottle. Capacity 60 mL.	40	@
179	<u>Bottle, narrow mouth</u> Clear glass, with dust-proof stopper (a) 100 mL. (b) 250 mL. (c) 500 mL	20 40 20	@ @ @
180	<u>Bottle, wide mouth</u> Clear glass, with dust-proof stopper. Capacity 250 mL.	20	@
181	<u>Bottle stand</u> Wooden with six holes for 60 mL dropping bottles.	12	@
182	<u>Burner, Bunsen</u> For *town gas/liquefied petroleum gas/natural gas supply. Nickel-plated burner tube with rotatable air regulator and riffled connector, mounted on an enamelled pressed-steel base. Burner tube 100 x 13 mm (height x diameter), base 80 mm diameter, connector 10 mm mean outer diameter. *Schools should specify the type of gas supply used in their laboratories and delete whichever is inapplicable.	14	@
183	<u>Clip, Hoffman</u> Plated metal, with clamp screw and hinged bottom plate, width between bars 20 mm.	30	@
184	<u>Clip, Hose</u> For use on Bunsen burner tubing.	30	@
185	<u>Clip, Mohr</u> Plated metal, maximum diameter of tubing accepted 15 mm.	12	@
186	<u>Cork</u> Tapered, assorted sizes, pack of 144.	1 pack	@
187	<u>Cork borer</u> Set of 6 from 4 to 10 mm. Plated metal. Cutting tube mounted with safety underflange in shaped handle ensuring that operator cannot be injured by a dislodged tube. With rod for clearing borers.	5 sets	@
188	<u>Cork borer sharpener</u> Plated metal cone with hinged cutter blade set in slot and metal handle. Circular shape of borer maintained by cone. Edge cut to correct angle by depressing blade using thumb pressure button and rotating borer.	1	@
189	<u>Cover glass</u> Square glass cover slip for microscope slides. Size 18 mm square. Thickness 0.13 - 0.16 mm. In box of 100.	2 boxes	@
190	<u>Cylinder, graduated</u> Glass, with spout, (a) 10 mL. (b) 25 mL. (c) 100 mL. (d) 250 mL.	20 20 20 2 10	@ @ @ @ @
191	<u>Drier, hot air</u> A low noise hair drier suitable for rapid drying of laboratory glassware, chromatograms, etc. A detachable nozzle is provided and there is an adjustable heat/speed setting.		
192	<u>Filter paper</u> Whatman No. 1, 125 mm diameter. In box of 200.	6 boxes	@
193	<u>Flask, conical</u> Narrow mouth, Pyrex or equivalent, 250 mL.	40	@
194	<u>Flask, flat bottom</u> Medium neck, Pyrex or equivalent, 250 mL.	20	@
195	<u>Flask, round bottom</u>	20	@

Item No	Description	Quantity	Remarks
196	Pyrex or equivalent, 250 mL. <u>Flask, volumetric</u> (a) 250 mL. (b) 500 mL. (c) 1,000 mL.	10 10 5	@ @ @
197	<u>Forceps, blunt</u> Stainless steel, straight, length about 130 mm.	20	@
198	<u>Forceps, fine</u> Stainless steel, straight, length about 130 mm.	20	@
199	<u>Funnel, dropping</u> Cylindrical, open top, with interchangeable glass/teflon stopcock, borosilicate glass, 100 mL.	2	@
200	<u>Funnel, filter</u> Plain, soda-lime glass, (a) 75 mm top diameter. (b) 150 mm top diameter.	20 4	@ @
201	<u>Funnel, thistle</u> With straight stem, soda-lime glass, overall length 300 mm.	4	@
202	<u>Glass plate</u> Square for bell jar, ground one side, 400 - 500 mm.	2	@
203	<u>Glass rod</u> Soda-lime glass, 6 mm diameter, in length of about 1.5 m.	10	@
204	<u>Ice bucket</u> For the transport and short-term storage of ice. Complete with lid. Capacity about 10 to 15 litres.	1	@
205	<u>Jar, specimen</u> Clear glass, cylindrical, with foot and grip stopper, (a) 150 x 50 mm (height x diameter). (b) 250 x 100 mm (height x diameter).	6 6	@ @
206	<u>Microscope, monocular</u> Vertical monocular body. Inclinal. Two eye-pieces : Huyghens x4 (or x5) and x10 (or x15). Three objectives : x5, x10 and x40 (or x45) on triple (or quadruple) nosepiece. Coarse and fine adjustments, with limit stop. Abbe condenser NA 1.25 and iris diaphragm with filter tray. Built-in mechanical stage. Equipped with a halogen/tungsten or LED illuminator with intensity control fitted to base. Supplied with cabinet with lock and key	20	@
207	<u>Microscope, stereoscopic</u> Robust stand with reversible white and black plate. Paired x10 wide field eyepiece, with interpupillary adjustment. Two objectives : x1 and x2 interchangeable by rolling motion. Supplied with cabinet with lock and key OR supplied with dust cover.	10	@
208	<u>Microscope cavity slide</u> Single cavity, non-corrosive, hard-glass, 76 x 26 mm (length x width), thickness not exceeding 1.5 mm. In pack of 50.	1 pack	@
209	<u>Microscope slide</u> Standard, non-corrosive, hard-glass, 76 x 26 mm (length x width), thickness not exceeding 1.2 mm. In pack of 100.	1 pack	@
210	<u>Microscope slide box</u> Rack form, accommodate 76 x 26 mm microscope slides. Wooden/ High-impact polypropylene with hinged lid. Slides are held in numbered slots and there is an index inside the lid. Capacity 100 slides in 2 rows.	5	@
211	<u>Microscope slide folder</u> Made of strong cardboard. Holds 9 to 10 microscope slides (76 x 26 mm) in one row.	10	@
212	<u>Mortar and pestle</u> Unglazed inside, glazed outside with spout. Porcelain. External diameter 110 mm.	12	@
213	<u>Notebook computer</u> For interface to the data logger device. Equipped with appropriate communication port(s) compatible with those available from the data logger interface. Please refer to the Specification of computer hardware and projection system provided by EDB under IT in Education Initiative.	1	@
214	<u>Oven/Incubator</u> Temperature range 5°C above ambient to 120°C. Temperature fluctuation not more than 1°C. Minimum capacity about 30 L. Provided with at least two shelves with at least three shelf positions. Thermometer required.	1	@
215	<u>Petri dish</u> Pyrex or equivalent, 90 x 15 mm (diameter x depth). Supplied with cover.	24	@
216	<u>Pipette, bulb form</u> Bulb form, single graduation on upper stem, capacity (a) 2 mL. (b) 5 mL. (c) 10 mL.	2 2 2	@ @ @
217	<u>Pipette, dropping</u> Narrow mouth, overall length about 110mm. Supplied with rubber teats.	24	@
218	<u>Pipette, graduated</u>		

Item No	Description	Quantity	Remarks
	Fast-flow, amber stain graduations and inscriptions,		
	(a) 1 mL, subdivision 0.01 mL.	20	@
	(b) 2 mL, subdivision 0.02 mL.	20	@
	(c) 5 mL, subdivision 0.05 mL .	20	@
	(d) 10 mL, subdivision 0.1 mL.	20	@
219	<u>Pipette filler</u> For use with bulb or graduated pipettes of capacity up to 10 mL. With finely adjustable thumb wheel that can avoid the sucking back of liquid into the filler. With flexible pipette holding socket to minimize possible damage to pipette and a rapid release valve.	20	@
220	<u>Printer or printer cum scanner (small)</u>	1	@
221	<u>Pump, filter</u> Plated metal or moulded polypropylene body, with integral non-return valve, water inlet for flexible pressure tubing, and vacuum nozzle for about 10 mm bore tubing.	4	@
222	<u>Refrigerator</u>	1	@
223	<u>Retort stand</u> Supplied with boss and clamp. Retort stand base : iron with corrosion resistant finish, minimum size 160 x 100 mm. Stand rod : cadmium plated mild steel/bright aluminum alloy, 500 x 12 mm (length x diameter). Clamp enables articles from 2 to 90 mm diameter to be clamped securely; design of the jaw ensures a firm grip at all angles of opening; cork liners for the jaws well secured with 8 mm diameter rod suitable for use in bossheads. Bosshead with offset jaws for great strength; gives a firm grip in either jaw on rods up to 16 mm diameter.	20	@
224	<u>Safety goggles</u> Splash-proof. With single replaceable wide-angle clear polycarbonate lens, indirectly ventilated, flexible clear PVC frame for all-round vision. Fitted with adjustable handband with retained ends.	1	@
225	<u>Safety screen</u> Transparent polycarbonate, comprising central panel 610 x 300 x 3 mm (height x width x thickness) connected to outer panels 610 x 230 x 3 mm (height x width x thickness) on each side by full height hinges.	1	@
226	<u>Safety spectacles</u> Constructed of polycarbonate, spectacle type with side shields giving all round protection. Top guard and lip prevent spillage into eyes. May be worn over prescription spectacles.	45	@
227	<u>Sand bucket</u> Made of iron, with cover. Red in colour with label "FIRE BUCKET". Approximately 250 x 230 mm (Diameter x height). Half-filled with sand.	2	@
228	<u>Spatula</u> Heavyweight, with one spatulate and one spoon end. Stainless steel. Overall length about 150 mm.	20	@
229	<u>Spot plate</u> For observing colour changes. Porcelain : 150 x 150 mm with 12 cavities of 5 mm deep.	20	@
230	<u>Stopper, rubber</u> (a) Solid (without holes), assorted sizes.	24	@
	(b) One-hole, assorted sizes.	24	@
	(c) Two-hole, assorted sizes.	24	@
	(d) Solid, for test-tube of 24 mm diameter.	24	@
	(e) One-hole, for test-tube of 24 mm diameter.	24	@
	(f) Two-hole, for test-tube of 24 mm diameter.	24	@
231	<u>Stopwatch</u> Analog or digital display, reads up to 60 minutes, accuracy at least 0.2 s, with start, stop and reset buttons.	20	@
232	<u>Syringe</u> Disposable, clear polystyrene barrel, (a) 5 mL.	20	@
	(b) 10 mL.	20	@
233	<u>Test tube</u> (a) Soda-lime glass, with rim, for use in centrifuge, 75 x 10 mm (length x diameter).	20	@
	(b) Soda-lime glass, with rim, for use in centrifuge, 100 x 16 mm (length x diameter).	20	@
	(c) Pyrex or equivalent, medium wall with rim, 125 x 16 mm (length x diameter).	150	@
	(d) Pyrex or equivalent, medium wall with rim, 150 x 24 mm (length x diameter).	60	@
234	<u>Test tube brush</u> Nylon, with fan shaped end and galvanized wire handle. (a) Diameter of head 15 mm, for tubes of diameter 10 to 12 mm.	12	@
	(b) Diameter of head 30 mm, for tubes of diameter 16 to 25 mm.	12	@
235	<u>Test tube holder</u> Wood with steel spring, to take tubes up to 19 mm diameter, length about 185 mm.	20	@
236	<u>Thermometer</u> Red spirit filled, -10°C to 110°C x 1°C, with reinforced bulb and permanent graduations.	30	@

Item No	Description	Quantity	Remarks
237	<u>Tong, crucible</u> Stainless steel, straight with flattened hinge, length about 200 mm	12	@
238	<u>Torso, human (anatomical model)</u> Life size, head and trunk, mounted on a base with interchangeable male and female reproductive organs. Made of unbreakable plastic materials. Head features: Detachable, one side of the head opened to reveal half brain, eye, teeth and jaw. Neck features: Opened to show trachea. Thorax features: With chest cover showing mammary gland, muscle and ribs, removable to show internal organs, dissectible lungs and heart. Abdomen features: Removable liver, stomach, pancreas, small and large intestine, kidney. Interchangeable male and female reproductive organs. Urinary system and all major blood vessels present. All anatomical features should have an accompanying key.	1	@
239	<u>Tripod stand</u> Triangular top, cast iron, with splayed steel legs, 150 x 210 mm (length of side x height).	14	@
240	<u>Trolley, apparatus</u> Apparatus, four wheels, tubular enamelled steel frame, two enamelled and plated trays of size 760 x 460 mm, height to top tray about 900 mm, height between trays about 350 mm.	1	@
241	<u>Tubing, capillary</u> approximately 6 x 0.5 mm, in length of about 1.2 - 1.5 m. Soda-lime glass, external diameter approximately 6 mm, in length of about 1.5 m.	5	@
242	<u>Tubing, rubber</u> (a) Normal wall, 5 x 1.5 mm (bore x wall thickness). (b) Normal wall, 8 x 1.5 mm (bore x wall thickness). (c) Transparent, with terylene mesh reinforced wall. Suitable for moderate pressure or vacuum applications. Made of PVC, bore 6.5 mm.	10 m 10 m 3 m	@ @ @
243	<u>Tubing connector, T-shaped</u> Polypropylene, autoclavable, of suitable O.D. to fit rubber tubing of bore diameter about 8 mm.	20	@
244	<u>Wash bottle</u> White translucent, flexible, with screw cap and bent tube, polyethylene, 250 mL capacity.	12	@
245	<u>Watch glass</u> Ground edge, diameter (a) 50 mm (b) 100 mm	12 12	@ @
246	<u>Water bath</u> Capacity about 14 litres. Temperature ranges 5°C above ambient to about 80°C. Sensitivity 0.5°C. With thermostat and heater at the bottom of a polypropylene tank, under a perforated stainless steel tray. A clip is provided to hold a thermometer. Polypropylene tank in protected metal outer case. Protection against low water level or thermostat failure is provided by either a thermal fuse or a fixed-temperature cutout. Heating rate is about 0.5°C per minute.	1	@
247	<u>Wire gauze</u> Ceramic centred, asbestos free, 150 x 150 mm	14	@
248	<u>Atomic Model</u> (a) Skeletal Comprises plastic spheres and flexible connectors representing atoms and bonds respectively. The spheres are in a variety of colours, and are number and/or letter coded for easy identification. There should be at least the following numbers and types of spheres (representing atoms of different elements, with oxidation states indicated in parentheses) for building a wide range of open type models: 14 metal(I, II, III, IV, V, VI), 8 halogen(I), 22 oxygen(I, II, IV), 13 sulphur(II, IV, VI), 10 nitrogen(III, V), 6 carbon(IV), 7 phosphorus(III, IV, V) and 14 hydrogen(I, II). The connectors should be of two different lengths (at least 50 medium and 36 long) for building the open structures. The set contains a storage box and an instruction booklet for building simple organic and inorganic structures. (b) Lattice Set Contains 380 atom centres. With 8 to 12 coordinate atom centres to allow construction of complex models. Instructions cover construction of 7 crystal systems; diamond; graphite; metals; sodium chloride; zinc blende and wurtzite; 8 coordinated ionic structures; rutile; ice and layer structures.	1 set 1 set	## ##
Sub-total Cost			91,200
249	<u>Weighing scale</u> With height indicators and in metric units. (Spring type not recommended)	1	!!
250	<u>Computer equipment for teacher</u>	1 set	^^
251	<u>Computer equipment for student</u>	20 sets	^^
252	<u>Headphones</u>	21	^^
253	<u>Media player (DVD/VCD/CD/Bluetooth/USB)</u>	1	^^
254	<u>Digital video camera</u>	1	^^
255	<u>Projection system with screen</u>	1	^^
Grand-total Cost (if a school does not offer SS Biology and Chemistry at the same time)			99,300

Notes:

Furniture and equipment items listed above are to be used in respective special room / laboratories for conducting Technology and Living lessons. Except for computer equipment, all other items should NOT be placed and used in one special room for safety reason.

@ F&E shared with SS Biology. Purchase of these items is not required if a school also offers SS Biology at the same time.

F&E shared with SS Chemistry. Purchase of these items is not required if a school also offers SS Chemistry at the same time.

!! F&E shared with PE.

^^ F&E shared with Computer Assisted Learning Room.

**Reference List of Furniture and Equipment
for Secondary School**

Subject : SS Technology and Living - Fashion, Clothing and Textiles Strand

Item No	Description	Quantity	Remarks
	<u>FURNITURE</u>		
1	<u>First-aid Cabinet</u>	1	&&
2	a. Student Chair	37	&&
3	b. Teacher Chair	1	&&
4	<u>Stool</u>	8	&&
5	<u>Teacher Desk</u>	2	&&
6	<u>Needlework Table</u>	6	&&
	<u>EQUIPMENT</u>		
	<i>Appliances - Electrical</i>		
	<u>Computer Equipment Items</u>		
7	Microcomputer workstation	1	&&
8	Printer or printer cum scanner (small)	1	
9	<u>Iron</u> steam with thermostat, loading of 1,200W or above.	4	&&
10	<u>Machine, Sewing</u> Interlock, Domestic, portable, sews with 3 - 4 threads, power driven with a safety switch	1	&&
11	<u>Machine, Sewing</u> power driven, portable with hard carrying case, finger guide/ needle guard	10	&&
12	<u>Machine, Sewing</u> computerized, power driven, portable with hard carrying case, finger guide/needle guard, built-in light and LCD display screen	1	&&
	<u>MISCELLANEOUS</u>		
13	<u>Board</u> Ironing, metal :		
	(a) Sleeve	6	&&
	(b) Standard	6	&&
14	<u>Dress Form</u> ladies' version, small dress size, (small petite to size 8), full/round shoulders, foam back fabric/nylon cover, stainless steel support stand with adjustable height.	1	&&
15	<u>Dress Form</u> ladies' version, medium dress size, (size 10 to size 14), full/round shoulders, foam back fabric/nylon cover, stainless steel support stand with adjustable height.	1	&&
16	<u>Dress Form</u> men's version, small or medium dress size, full/round shoulders, foam back fabric/nylon cover, stainless steel support stand with adjustable height.	1	&&
17	<u>Microscope, binocular</u> Eyepieces : pairs of 10x, 15x Objectives : 4x, 10x, 40x, 100x on quadruple revolving nosepiece with click stop. Focus control : Coarse and fine adjustments, with safety stop. Stage : Rectangular stage surface with built-in graduated mechanical stage. Condenser : Abbe condenser and Iris diaphragm with filter tray. Illumination* : Built-in low voltage illuminator with adjustable brightness Supplied with dust cover, eyepiece dust cap, cabinet with lock and key.	2	&&
	<u>SMALL EQUIPMENT</u>		
18	<u>Awl</u>	7	&&
19	<u>Broom</u> sweeping	1	&&
20	<u>Counting Glass</u>	12	&&
21	<u>Dressmaking Ruler</u> (a) French Curves	24	&&
	(b) Metre Sticks	24	&&
	(c) Set Squares	12	&&
22	<u>Equipment</u> for Experiments :		
	(a) Beaker, heatproof, 50 ml	13	&&
	(b) Beaker, heatproof, 100 ml	13	&&
	(c) Beaker, heatproof, 250 ml	13	&&
	(d) Bench mat	2	&&
	(e) Boiling tube, heatproof, 10-12 cm long, 150 ml	26	&&
	(f) Bunsen burner with tubing	2	&&
	(g) Cylinder, measuring, 10 ml	13	&&
	(h) Cylinder, measuring, 25 ml	13	&&

Item No	Description	Quantity	Remarks
	(i) Cylinder, measuring, 50 ml	26	&&
	(j) Flask, heatproof, 50 ml	7	&&
	(k) Flask, heatproof, 100 ml	7	&&
	(l) Forceps	13	&&
	(m) Glass rod	50	&&
	(n) Glass watch	50	&&
	(o) Stand and Clamp	2 sets	&&
	(p) Stop watch	2	&&
	(q) Test tube, 10-12cm long	50	&&
	(r) Test tube brush	13	&&
	(s) Test tube holder	13	&&
	(t) Test tube rack (stainless steel)	13	&&
	(u) Thermometer (-10°C to 10°C)	13	&&
	(v) Tongs	13	&&
	(w) Tray, stackable, polypropylene, chemical resistant	6	&&
	(x) Tripod stand	2	&&
	(y) Wire gauze	2	&&
23	<u>Notcher</u>	2	&&
24	<u>Pan</u> Dust, with handle	1	&&
25	<u>Scissors</u> overall length, 16 cm approx.	13	&&
26	<u>Scissors</u> overall length, 22 cm approx.	25	&&
27	<u>Sewing Box/Basket</u> Plastic	7	&&
28	<u>Shears</u> Pinking	6	&&
29	<u>Sprinkler</u> Laundry	6	&&
30	<u>Tape Measure</u> Linen/Plastic, Tailor, 1.5 m long	25	&&
31	<u>Tracing Wheel</u>	25	&&
32	<u>Dress Form</u> Child's version, small or medium dress size, full/round shoulders, foam back fabric/nylon cover, stainless steel support with adjustable height	1	&&
	Sub-total Cost:		1,600

Note: &&

These items are included in the F&E list for Home Economics Room II .

Item No	Description	Quantity	Remarks
33	<u>Balance, dial-o-gram</u> (a) Balance, electronic, capacity up to 200 g. (b) Balance, electronic, capacity up to 110 g.	5 1	@ @
34	<u>Beaker</u> Squat form with spout, with two or more graduation marks showing approximate capacities, (a) Pyrex or equivalent, 100 mL. (b) Pyrex or equivalent, 250 mL. (c) Pyrex or equivalent, 500 mL. (d) Pyrex or equivalent, 1,000 mL.	20 30 2 2	@ @ @ @
35	<u>Bench mat</u> Make of glass reinforced cement, asbestos free, about 300 x 300 mm, 4.5 mm thick.	15	@
36	<u>Bone cutter forceps</u> Nickel-plated carbon steel/stainless steel with spring handles and closing clip, blade length 20 - 40 mm.	1	@
37	<u>Bottle, dropping</u> A three-piece pipette section comprising a stout glass dropper, high-density polythene stopper with dust-proof head and vinyl teat, fitted to a reagent bottle. Capacity 60 mL.	40	@
38	<u>Bottle, narrow mouth</u> Clear glass, with dust-proof stopper (a) 100 mL.	20	@

Item No	Description	Quantity	Remarks
	(b) 250 mL.	40	@
	(c) 500 mL	20	@
39	<u>Bottle, wide mouth</u> Clear glass, with dust-proof stopper. Capacity 250 mL.	20	@
40	<u>Bottle stand</u> Wooden with six holes for 60 mL dropping bottles.	12	@
41	<u>Burner, Bunsen</u> For *town gas/liquetified petroleum gas/natural gas Nickel-plated burner tube with rotatable air regulator and tapering, rifled connector, mounted on an enamelled pressed-steel base. Burner tube 100 x 13 mm (height x diameter), base 80 mm diameter, connector 10 mm mean outer diameter. *Schools should specify the type of gas supply used in their laboratories and delete whichever is inapplicable.	14	@
42	<u>Clip, Hoffman</u> Plated metal, with clamp screw and hinged bottom plate, width between bars 20 mm.	30	@
43	<u>Clip, Hose</u> For use on Bunsen burner tubing.	30	@
44	<u>Clip, Mohr</u> Plated metal, maximum diameter of tubing accepted 15 mm.	12	@
45	<u>Cork</u> Tapered, assorted sizes, pack of 144.	1 pack	@
46	<u>Cork borer</u> Set of 6 from 4 to 10 mm. Plated metal. Cutting tube mounted with safety underflange in shaped handle ensuring that operator cannot be injured by a dislodged tube. With rod for clearing borers.	5 sets	@
47	<u>Cork borer sharpener</u> Plated metal cone with hinged cutter blade set in slot and metal handle. Circular shape of borer maintained by cone. Edge cut to correct angle by depressing blade using thumb pressure button and rotating borer.	1	@
48	<u>Cover glass</u> Square glass cover slip for microscope slides. Size 18 mm square. Thickness 0.13 - 0.16 mm. In box of 100.	2 boxes	@
49	<u>Cylinder, graduated</u> Glass, with spout, (a) 10 mL. (b) 25 mL. (c) 100 mL. (d) 250 mL.	20 20 20 2	@ @ @ @
50	<u>Drier, hot air</u> A low noise hair drier suitable for rapid drying of laboratory glassware, chromatograms, etc. A detachable nozzle is provided and there is an adjustable heat/speed setting.	10	@
51	<u>Filter paper</u> Whatman No. 1, 125 mm diameter. In box of 200.	6 boxes	@
52	<u>Flask, conical</u> Narrow mouth, Pyrex or equivalent, 250 mL.	40	@
53	<u>Flask, flat bottom</u> Medium neck, Pyrex or equivalent, 250 mL.	20	@
54	<u>Flask, round bottom</u> Pyrex or equivalent, 250 mL.	20	@
55	<u>Flask, volumetric</u> (a) 250 mL. (b) 500 mL. (c) 1,000 mL.	10 10 5	@ @ @
56	<u>Forceps, blunt</u> Stainless steel, straight, length about 130 mm.	20	@
57	<u>Forceps, fine</u> Stainless steel, straight, length about 130 mm.	20	@
58	<u>Funnel, dropping</u> Cylindrical, open top, with interchangeable glass teflon/stopcock, borosilicate glass, 100 mL.	2	@
59	<u>Funnel, filter</u> Plain, soda-lime glass, (a) 75 mm top diameter. (b) 150 mm top diameter.	20 4	@ @
60	<u>Funnel, thistle</u> With straight stem, soda-lime glass, overall length 300 mm.	4	@
61	<u>Glass plate</u> Square for bell jar, ground one side, 400 - 500 mm.	2	@

Item No	Description	Quantity	Remarks
62	<u>Glass rod</u> Soda-lime glass, 6 mm diameter, in length of about 1.5 m.	10	@
63	<u>Ice bucket</u> For the transport and short-term storage of ice. Complete with lid. Capacity about 10 to 15 litres.	1	@
64	<u>Jar, specimen</u> Clear glass, cylindrical, with foot and grip stopper, (a) 150 x 50 mm (height x diameter). (b) 250 x 100 mm (height x diameter).	6 6	@ @
65	<u>Microscope, monocular</u> Vertical monocular body. Inclinalable. Two eye-pieces : Huyghens x4 (or x5) and x10 (or x15). Three objectives : x5, x10 and x40 (or x45) on triple (or quadruple) nosepiece. Coarse and fine adjustments, with limit stop. Abbe condenser NA 1.25 and iris diaphragm with filter tray. Built-in mechanical stage. Equipped with a halogen/tungsten or LED illuminator with intensity control fitted to base. Supplied with cabinet with lock and key	20	@
66	<u>Microscope, stereoscopic</u> Robust stand with reversible white and black plate. Paired x10 wide field eyepiece, with interpupillary Two objectives : x1 and x2 interchangeable by rolling motion. Supplied with cabinet with lock and key OR supplied with dust cover.	10	@
67	<u>Microscope cavity slide</u> Single cavity, non-corrosive, hard-glass, 76 x 26 mm (length x width), thickness not exceeding 1.5 mm. In pack of 50.	1 pack	@
68	<u>Microscope slide</u> Standard, non-corrosive, hard-glass, 76 x 26 mm (length x width), thickness not exceeding 1.2 mm. In pack of 100.	1 pack	@
69	<u>Microscope slide box</u> Rack form, accommodate 76 x 26 mm microscope slides. Wooden/ High-impact polypropylene with hinged lid. Slides are held in numbered slots and there is an index inside the lid. Capacity 100 slides in 2 rows.	5	@
70	<u>Microscope slide folder</u> Made of strong cardboard. Holds 9 to 10 microscope slides (76 x 26 mm) in one row.	10	@
71	<u>Mortar and pestle</u> Unglazed inside, glazed outside with spout. Porcelain. External diameter 110 mm.	12	@
72	<u>Notebook computer</u> For interface to the data logger device. Equipped with appropriate communication port(s) compatible with those available from the data logger interface. Please refer to the Specification of computer hardware and projection system provided by EDB under IT in Education Initiative.	1	@
73	<u>Petri dish</u> Pyrex or equivalent, 90 x 15 mm (diameter x depth). Supplied with cover.	24	@
74	<u>Pipette, bulb form</u> Bulb form, single graduation on upper stem, capacity (a) 2 mL. (b) 5 mL. (c) 10 mL.	2 2 2	@ @ @
75	<u>Pipette, dropping</u> Narrow mouth, overall length about 110 mm. Supplied with rubber teats.	24	@
76	<u>Pipette, graduated</u> Fast-flow, amber stain graduations and inscriptions, (a) 1 mL, subdivision 0.01 mL. (b) 2 mL, subdivision 0.02 mL. (c) 5 mL, subdivision 0.05 mL . (d) 10 mL, subdivision 0.1 mL.	20 20 20 20	@ @ @ @
77	<u>Pipette filler</u> For use with bulb or graduated pipettes of capacity up to 10 mL. With finely adjustable thumb wheel that can avoid the back of liquid into the filler. With flexible pipette holding socket to minimize possible damage to pipette and a rapid release valve.	20	@
78	<u>Printer or printer cum scanner (small)</u>	1	@
79	<u>Pump, filter</u> Plated metal or moulded polypropylene body, with integral non-return valve, water inlet for flexible pressure tubing, and vacuum nozzle for about 10 mm bore tubing.	4	@
80	<u>Retort stand</u> Supplied with boss and clamp. Retort stand base : iron with corrosion resistant finish, minimum size 160 x 100 mm. Stand rod : cadmium plated mild steel/bright aluminum alloy, 500 x 12 mm (length x diameter). Clamp enables articles from 2 to 90 mm diameter to be clamped securely; design of the jaw ensures a firm grip at all angles of opening; cork liners for the jaws well secured with 8 mm diameter rod suitable for use in bossheads. Bosshead with offset jaws for great strength; gives a firm grip in either jaw on rods up to 16 mm diameter.	20	@

Item No	Description	Quantity	Remarks
81	<u>Safety goggles</u> Splash-proof. With single replaceable wide-angle clear polycarbonate lens, indirectly ventilated, flexible clear PVC frame for all-round vision. Fitted with adjustable handband with retained ends.	1	@
82	<u>Safety screen</u> Transparent polycarbonate, comprising central panel 610 x 300 x 3 mm (height x width x thickness) connected to outer panels 610 x 230 x 3 mm (height x width x thickness) on each side by full height hinges.	1	@
83	<u>Safety spectacles</u> Constructed of polycarbonate, spectacle type with side shields giving all round protection. Top guard and lip prevent spillage into eyes. May be worn over prescription spectacles.	45	@
84	<u>Sand bucket</u> Made of iron, with cover. Red in colour with label "FIRE BUCKET". Approximately 250 x 230 mm (Diameter x height). Half-filled with sand.	2	@
85	<u>Spatula</u> Heavyweight, with one spatulate and one spoon end. Stainless steel. Overall length about 150 mm.	20	@
86	<u>Spot plate</u> For observing colour changes. Porcelain : 150 x 150 mm with 12 cavities of 5 mm deep.	20	@
87	<u>Stopper, rubber</u> (a) Solid (without holes), assorted sizes. (b) One-hole, assorted sizes. (c) Two-hole, assorted sizes. (d) Solid, for test-tube of 24 mm diameter. (e) One-hole, for test-tube of 24 mm diameter. (f) Two-hole, for test-tube of 24 mm diameter.	24 24 24 24 24 24	@ @ @ @ @ @
88	<u>Stopwatch</u> Analog or digital display, reads up to 60 minutes, accuracy at least 0.2 s, with start, stop and reset buttons.	20	@
89	<u>Syringe</u> Disposable, clear polystyrene barrel, (a) 5 mL. (b) 10 mL.	20 20	@ @
90	<u>Test tube</u> (a) Soda-lime glass, with rim, for use in centrifuge, 75 x 10 mm (length x diameter). (b) Soda-lime glass, with rim, for use in centrifuge, 100 x 16 mm (length x diameter). (c) Pyrex or equivalent, medium wall with rim, 125 x 16 mm (length x diameter). (d) Pyrex or equivalent, medium wall with rim, 150 x 24 mm (length x diameter).	20 20 150 60	@ @ @ @
91	<u>Test tube brush</u> Nylon, with fan shaped end and galvanized wire handle. (a) Diameter of head 15 mm, for tubes of diameter 10 to 12 mm. (b) Diameter of head 30 mm, for tubes of diameter 16 to 25 mm.	12 12	@ @
92	<u>Test tube holder</u> Wood with steel spring, to take tube up to 19 mm diameter, length about 185 mm.	20	@
93	<u>Thermometer</u> Red spirit filled, -10°C to 110°C x 1°C, with reinforced bulb and permanent graduations.	30	@
94	<u>Tong, crucible</u> Stainless steel, straight with flattened hinge, length about 200 mm	12	@
95	<u>Tripod stand</u> Triangular top, cast iron, with splayed steel legs, 150 x 210 mm (length of side x height).	14	@
96	<u>Trolley, apparatus</u> Apparatus, four wheels, tubular enameled steel frame, two enamelled and plated trays of size 760 x 460 mm, height to top tray about 900 mm, height between trays about 350 mm.	1	@
97	<u>Tubing, capillary</u> approximately 6 x 0.5 mm, in length of about 1.2 - 1.5 m. Soda-lime glass, external diameter approximately 6 mm, in length of about 1.5 m.	5	@
98	<u>Tubing, rubber</u> (a) Normal wall, 5 x 1.5 mm (bore x wall thickness). (b) Normal wall, 8 x 1.5 mm (bore x wall thickness). (c) Transparent, with terylene mesh reinforced wall. Suitable for moderate pressure or vacuum applications. Made of PVC, bore 6.5 mm.	10 m 10 m 3 m	@ @ @

Item No	Description	Quantity	Remarks
99	<u>Tubing connector, T-shaped</u> Polypropylene, autoclavable, of suitable O.D. to fit rubber tubing of bore diameter about 8 mm.	20	@
100	<u>Wash bottle</u> White translucent, flexible, with screw cap and bent tube, polyethylene, 250 mL capacity.	12	@
101	<u>Watch glass</u> Ground edge, diameter (a) 50 mm (b) 100 mm	12 12	@ @
102	<u>Water bath</u> Capacity about 14 litres. Temperature ranges 5°C above ambient to about 80°C. Sensitivity 0.5°C. With thermostat and heater at the bottom of a polypropylene tank, under a perforated stainless steel tray. A clip is provided to hold a thermometer. Polypropylene tank in protected metal outer case. Protection against low water level or thermostat failure is provided by either a thermal fuse or a fixed-temperature cutout. Heating rate is about 0.5°C per minute.	1	@
103	<u>Wire gauze</u> Ceramic centred, asbestos free, 150 x 150 mm	14	@
	Sub-total Cost		79,400
104	<u>Microcomputer workstation</u>	41 set	^^
105	<u>Printer or printer cum scanner (small)</u>	4	^^
106	<u>Headphones</u>	41	^^
107	<u>Media player (DVD/VCD/CD/Bluetooth/USB)</u>	1	^^
108	<u>Digital video camera</u>	1	^^
109	<u>Projection system with screen</u>	1	^^
	Grand-total Cost (if a school does not offer SS Biology at the same time)		81,000

Notes:

Furniture and equipment items listed above are to be used in respective special rooms / laboratory for conducting Technology and Living lessons.

@ F&E shared with SS Biology. Purchase of these items is not required if a school also offers SS Biology at the same time.

^^ F&E shared with Computer Assisted Learning Room.

**Reference List of Furniture and Equipment
for Secondary School**

Subject : SS Physical Education

Item No	Description	Quantity
I	GENERAL EQUIPMENT	
	Athletics	
1	<u>Discus (rubber)</u> Weight : 1 kg Diameter :180 - 182 mm Thickness at centre : 37-39 mm Thickness of rim : 12 mm	2
2	<u>Discus (rubber)</u> Weight : 1.5 kg Diameter : 200-205 mm Thickness at centre : 37-42 mm Thickness of rim : 12 mm	2
3	<u>High jump cross bar (C)</u> Fibreglass, circular, with square ends. (AAA specifications)	1
4	<u>High jump stands</u> Two cross pieces at bottom of the stand to make a firm base with stays fixed diagonally to post. Sliding metal buckles for adjustment of height should be provided. Height : 1,830 mm	1 pair
5	<u>Hurdle</u> Adjustable plastic or foam training hurdle. Height can be adjusted to 762 mm, 840 mm, 914 mm, 990 mm and 1,067 mm.	12
6	<u>Relay baton (C)</u> Made of light aluminum.	20
7	<u>Javelin</u> For practice use, aluminum with cord grip and blunt plastic tips Weight: 600 gm	1
8	<u>Javelin</u> For practice use, aluminum with cord grip and blunt plastic tips Weight: 700 gm	1
9	<u>Shot (indoor)</u> Plastic case with vacuum moulded cap, lead shot filled. Weight : 3 kg	3
10	<u>Shot (indoor)</u> Plastic case with vacuum moulded cap, lead shot filled. Weight : 4 kg	3
11	<u>Shot (indoor)</u> Plastic case with vacuum moulded cap, lead shot filled. Weight : 5 kg	1
	<u>Dance</u>	
12	<u>Tambour or hand drum</u> With beater Dia : 250 - 300 mm	1
13	<u>Drum</u> With sticks Dia. : 250 - 800 mm	1
14	<u>Tambourine</u> With head & jingles Dia. : 250 - 300 mm	1
15	<u>Media player (DVD/VCD/VC/Bluetooth/USB)</u>	1
16	<u>Amplifier with portable microphone</u>	
	<u>Gymnastics</u>	
17	<u>Gymnastic mat</u> With Velcro corners, 1500 mm x 1000 mm x 60 mm	
18	<u>Balance beam</u> Wooden beam with steel base. Layer is elastic and covered with non-slippery material. Local-made beam not recommended. Height : 700-1,200 mm, adjustable in 50 mm intervals Length : 5,000 ± 10 mm Width of beam : 100 mm	1
19	<u>Low balance beam</u> Wooden beam with steel base. Layer is elastic and covered with non-slippery material. Height : 600-900 mm, adjustable in 100 mm interval Length : 3,500 mm Width of beam : 100 mm	1
20	<u>Gymnastic mat</u> a) Airex (Swiss), sponge rubber Size : 1,523 mm x 1,219 mm x 32 mm OR	12

Item No	Description	Quantity
	b) Sameige (French) Size : 1,523 mm x 1,219 mm x 40 mm <i>[School should choose either (a) or (b)]</i>	
21	<u>Horizontal bar</u> Made of polished steel with cable & hooks, may be fixed on floor for stability. Local-made bar not recommended. Bar : 2,400 ± 2 mm (length), 28 mm ± 0.1 mm (dia.) Height of the bar : 1,200 - 2,500 mm, adjustable in 200 mm interval	1
22	<u>Parallel bars</u> (with or without trolley) With foot board. Remaining part made of steel or cast iron. Local-made bars not recommended. Bars : 3,500 ± 10 mm (long) Dist. between bars : 420 - 480 mm Dist. of pivot points : 2,300 ± 3 mm Height of bars : 1,550 - 1,800 mm	1
23	<u>Spring board</u> Surface must be covered with non-slippery layer of strong elastic material. The elasticity must be most effective at the highest point. Local-made board not recommended Length : 1,200 ± 5 mm Width : 600 ± 3 mm Thickness : 120 - 140 mm (front brim)	2
24	<u>Uneven parallel bars</u> (with or without trolley) With foot board. The bars should be made of wood with braces to prevent total breaking. Local-made bars not recommended. Bar : 3,500 mm (length); Cross section of bar : 41 - 48 mm Distance between 2 bars (vertical plane) : 420-480 mm (easily adjustable) Height of upper bar : 2,300 ± 10 mm Height of lower bar : 1,500 ± 10 mm	1
25	<u>Vaulting box</u> In 5 sections, with casters, made of pinewood. Top cover made of best quality cow hide leather. Stuffing at top panel should be outstanding, firm and evenly distributed. Bottom : 1,300 mm x 900 mm Top : 1,300 mm x 350 mm Height : 1,000 mm	2
	<i>Racket Games</i>	
	<i>(Badminton)</i>	
26	<u>Badminton racket (C)</u>	40
27	<u>Shuttlecock (practice) (C)</u>	6 doz.
28	<u>Shuttlecock (competition) (C)</u> The feather should be 16 pieces with the length of 64-78 mm	6 doz.
29	<u>Badminton net (C)</u>	2
30	<u>Badminton stand</u> Portable with solid base. Height : 1,550 mm	2 pairs
	<i>(Table tennis)</i>	
31	<u>Table tennis ball (C)</u>	72
32	<u>Table tennis bat (C)</u> Wooden bladed, could be covered with plain pimped rubber or sponge and pimped rubber. The two faces should be in 2 different contrast dark colour.	40
33	<u>Table tennis net & clamp (C)</u>	4 sets
34	<u>Table tennis table</u> Hardwood or plywood or particle board in dark green or dark blue, could be folded and moved on rollers. Dimension : 2,740 mm x 1,525 mm Thickness : 16-30 mm Height : 762 mm (regular)	4
	<i>Swimming</i>	
35	<u>Kick board (C)</u>	40
36	<u>Swimming cap or rubber wrist band (C)</u>	45
	<i>Team Games</i>	
37	<u>Match timer</u> With start, stop & reset buttons. Two sweep hands recording minutes and seconds.	1
38	<u>Number bib</u> No. 1-15 /set, of light weight and made of nylon or cloth.	4
39	<u>Score board</u> Heavy duty plastic, 6-digit scorer with display on both sides for competitions, foldable.	1
40	<u>Pump or compressor unit with metre</u> 200-220V, 50 Hz, single phase A.C., earthed B.S.S. fused plug. 200W approx. 500g/sq. cm max. working pressure, without air receiver. Electric component & cabling conform to the latest B.S.S., earthing through 3 core supply cable.	1
	<i>(Basketball)</i>	
41	<u>Basketball (size 6) (C)</u> For girls. Synthetic.	20
42	<u>Basketball (size 7) (C)</u>	20

Item No	Description	Quantity
43	For boys. Synthetic. <u>Basketball (size 6) (C)</u>	5
44	For girls. Leather. <u>Basketball (size 7) (C)</u>	5
45	For boys. Leather. <u>a. Basketball stand with protective pad, fibreglass backboard and ring</u>	2 pairs
46	For open playground, specification must conform to the latest International Basketball Rules. Basketball stands should be adequately secured or anchored to the ground (Price includes installation.) <u>Basketball ring net (C)</u> (Football)	2 pairs
47	<u>Football (size 4) (C)</u> Leather	20
48	<u>Football (size 5) (C)</u> Leather (Handball)	20
49	<u>Handball (size 2) (C)</u> Synthetic.	20
50	<u>Handball (size 3) (C)</u> Synthetic.	20
51	<u>Handball (size 2) (C)</u> Leather.	5
52	<u>Handball (size 3) (C)</u> Leather.	5
53	<u>Handball goal with net</u> (with or without trolley, and with or without anchors) Post made of wood, metal or light metal painted in 2 contrasting colours. (Specifications must conform to the latest rules of the International Handball Federation) (<i>School should choose either type; i.e. with or without trolley/with or without anchors</i>)	1 pair
54	<u>Handball net (C)</u> Made of hemp or nylon. (Volleyball)	1 pair
55	<u>Volleyball (practice) (C)</u> Leather. Regular size.	24
56	<u>Volleyball (competition) (C)</u> Leather, better quality. Regular size.	10
57	<u>Volleyball (soft) (C)</u> Made of foam material with PU coverRegular size.	20
58	<u>Volleyball net (C)</u> With 6.35 mm (dia.) flexible wire cable through the top edge canvas cover. Net : 9,500 mm x 1,000 mm Mesh : 100 mm Vertical tape : 1,000 mm x 50 mm Length of wire cable : 16,000 mm	1
59	<u>Volleyball post (with or without sockets)</u> Made of iron. Adjustable height. Dia. of post : 76 mm (Price includes installation.) (<i>School should specify either "with sockets" or "without socket".</i>)	1 pair
60	<u>Volleyball umpire stand</u>	1
61	<u>Rugby (Size 5) (C)</u> PU Cover or Leather.	10
62	<u>Rugby Tag</u> <u>Team set: 10 pcs</u> Fitness	2 sets
63	<u>Bar bell</u> 1 stand and 1 bar. Weights : 7.5 kg (2pcs) 5 kg (2pcs) 2.5 kg (2pcs) 2 kg (2pcs) 1.25 kg (6pcs) 1 kg (2pcs) 0.5 kg (2pcs) 0.25 kg (2pcs)	1 set
64	<u>Dumb bell</u> Weight : 1.5 - 1.8 kg	4 pairs
65	<u>Dumb bell</u> Weight : 2.5 - 2.7 kg	4 pairs
66	<u>Dumb bell</u> Weight : 3.5-3.7 kg	4 pairs

Item No	Description	Quantity
67	<u>Medicine ball</u> Rubber. Weight : 1.5 - 1.8 kg	2
68	<u>Medicine ball</u> Rubber. Weight : 2.2 - 2.7 kg	2
69	<u>Medicine ball</u> Rubber. Weight : 3.6 - 3.7 kg	2
70	<u>Skinfold calipers</u> Made of plastic, alloy or steel. Measuring scale : 0 - 50 mm, 1 mm interval	2
71	<u>Sit and reach box</u> Made of sturdy wood or comparable construction material. Measuring scale: should extend from about 9-50 cm with the 23 cm mark exactly in line with the vertical plane against which the feet will be placed.	2
72	<u>Inclined pull-up stand</u> Poles and bars made of steel Platform made of plywood Elastic rubber band 160 cm long Height: adjustable chinning bar between 25 cm and 155 cm. Foldable and lockable stand	2
73	<u>Handgrip dynamometer</u>	2
74	<u>Sphygmomanometer (digital)</u>	1
75	<u>Metronome</u> <i>Miscellaneous</i>	1
76	<u>Balance bench</u> With/ without two hooks at one end, made of hardwood or pinewood or fibre glass. Flank : 3,000 - 3,350 mm x 250 mm Height : 350 mm Rib : 100 mm (width) 60 mm (thickness)	6
77	<u>Bean bag (C)</u> Made of good quality twill in bright colours, containing plastic beads or beans.	40
78	<u>Plastic bar</u> Smoothly finished. Length : 900 - 1,000 mm Dia. : 20 mm	20
79	<u>Plastic bar</u> Smoothly finished. Length : 1,200 - 1,500 mm Dia. : 20 mm	20
80	<u>Coloured band (C)</u> Made of braided cotton or nylon in bright colours. Length : 1,060 mm Width : 30 mm	40
81	<u>Hoop (large) (C)</u> Made of plastic or smoothly finished cane. Joint to be bonded, riveted and covered with resin glue. Dia. of hoop : 800 mm Dia. of cane : 20 mm	10
82	<u>Hoop (medium) (C)</u> Made of plastic or smoothly finished cane. Joint to be bonded, riveted and covered with resin glue. Dia. of hoop : 600 mm Dia. of cane : 20 mm	20
83	<u>Jump rope (C)</u> Length : 3,000 mm	40
84	<u>Jump rope (C)</u> Length : 7,000 mm	6
85	<u>Measuring tape</u> Made of steel, fibreglass or fabric. Length : 50 m	2
86	<u>Polypad</u> Made of strong urethane foam rubber. Cover made of strong canvas or nylon reinforced vinyl. Size : 2,440 mm x 1,830 mm x 200 mm (Schools must specify the material of the cover)	12
87	<u>Playground marker cone</u> Made of hard-wearing plastic. a) Height: 350 - 400 mm Base: 250 mm x 250 mm b) Height: 160 - 300 mm Base: 130 -230 mm x 130 - 230 mm c) Height: 50mm - 150mm Base: square or round	24 20 20
88	Multi-purpose marker cone set Made of Plastic, with holes Height: 425 - 500 mm Base : 240 x 240 mm Pole: Length 1,600 mm with diameter : 250 mm	12

Item No	Description	Quantity
89	<u>Stop watch</u> 1/100 second. Measures accumulated split times.	8
90	<u>Quoit (C)</u> Rubber, in various colours. Dia. : 165 mm Weight : 280 g Dia. of rubber ring : 25 mm	40
91	<u>Weighing scale (digital)</u> With weight and body fat indicator	2
92	<u>Triangular body height measuring tape</u> Pull down when measuring height	2
Part II - FURNITURE FOR STORAGE OF EQUIPMENT		
93	<u>Plastic storage box</u> Size :680 - 740 mm x 470 - 500 mm x 455 - 470mm (H)	4
94	<u>Storage cabinet</u> Made of wood or metal Size : 760 mm x 1,370 mm x 1,980 mm (H)	1
95	<u>Rack</u> Made of wood or metal with shelves. size : 1,830 mm x 610 mm x 1,675 mm (H)	1
96	<u>Basket drawer</u> Made of mesh / fibre with handle. Size: 840mm(L) x 610mm(W) x430m (H)	4
97	<u>Ball cage with casters (with or without lid)</u>	4
98	<u>Storage Trolley (with side door or sliding door)</u> made of wire-mesh, with adjustable shelves and non-marking multi-direction swivel casters. 1,500 x 1,500 x 650 mm Dia. of caster : 100 mm (School should choose either type; i.e. with side door or sliding door)	1
99	<u>Mat trolley (horizontal, with or without handle)</u> for gymnastic mats, made of painted G.I. tube, with swivel non-marking rubber multi-direction swivel casters. Length : 1,800 mm Width : 1,200 mm Diameter of tube : 25 mm Diameter of caster : 220 mm (Schools should choose either type; i.e. with or without handle)	1
100	<u>Polypad Trolley (vertical)</u> Made of painted G.I. tube with non-marking rubber multi-direction swivel casters. Length : 2,450 mm Width : 850 mm Height : 2,200 mm Dia. of tube : 25 mm Dia. of caster : 220 mm	2
Part III - FOR SCHOOLS OFFERING THE PHYSICAL EDUCATION ELECTIVE AT SENIOR SECONDARY		
101	<u>Exercise Test Bike</u> Weight : 40-60 kg Length : 100-130 cm Width : 40-60 cm Height: 80-120 cm Adjustable saddle post Showing pedal-turns per minute (rpm) Heart rate in beats per minute (HR) Cycling time in minutes and seconds (TIME) Intended cycling speed in km/miles per hour (SPEED) Distance covered in km/miles (DISTANCE)	1
102	<u>Strapless Heart Rate Monitor</u> Current, average, and maximum heart rate Heart rate (displayed as % of maximum heart rate) Log memory Stopwatch with first 30 laps stored User-replaceable battery Water resistant to 30 m (100 ft) Computer connectivity with software	5
103	<u>Hand-held Bioimpedance Body Fat Analyser</u> Hand-held and Battery operated Provides percentage and total weight of body fat	1
104	<u>Electronic Goniometer</u> Measures range of motion as well as angular motion, velocity and acceleration Support data storage and analysis through built-in functions or connecting to a data logger	1
105	<u>Movement Analysis Software/Apps</u> Watch and review video with a frame rate of 25 images per second Measures key events using time, angle, distance and speed	1
106	<u>Human Anatomy Software/Apps</u> Introduces different parts of the human body Introduces the human body by graphics, text, animations	1
107	<u>Biofeedback Equipment</u> Measures skin temperature, sweat gland activity, muscle tension, etc.; and conveys the information to the user in real-time Equipped with computer software and interface for relaxation training	1
FIRST AID TRAINING EQUIPMENT		
108	<u>Resuscitation Training Torso</u> Weight: 15-20 kg Height: 70-80 cm	1

Item No	Description	Quantity
	Width : 25-30 cm Diameter: 35-50 Natural obstruction of the airway for applying head tilt/chin lift Realistic resistance for chest compression Anatomically correct landmarks and sternal notch Disposable non-rebreathing airways	
	Total cost for subject	51,400

Note: *Items under Parts I and II are already included in the F&E list for PE.