Presentation of Continuous Data

Level: Key Stage 3

Dimension: Data Handling
Module: Organization and Representation of Data
Unit: Construction and Interpretation of Simple Diagrams and Graphs

Student ability: Average

Content Objectives:

After completing the activity, students should understand how to construct histograms and have a clear understanding of the meaning of "class", " class interval", "class mark", "class limit" and "class boundary".

Language Objectives:

After completing the activity, students should be able to

- •understand and use the English key words used in discussing the construction of histograms (*e.g., class, range, class interval, lower class limit, upper class limit, class mark, class boundary, graphs, histograms, frequency distribution, axes, locate, rectangles, label, title*);

- understand the English expressions for explaining the key concepts, e.g.,

    - *The weights of the students in this school may fall into different classes. For example, 41-45 kg is a **class**. The range from 41 kg to 45 kg is the **class interval**. The two end values are called the **class limits**. The smaller one is called the **lower class limit** while the greater one is called the **upper class limit**. The **class mark** is the value used to represent the class. It is the mid-value of the class. For example, in the class 51-55 kg, the class mark is 53. The **class boundaries** are the positions between 2 classes.*

- understand the English expressions for explaining how to draw a histogram, e.g.,

    - *1. Draw the axes*

    - *2. Locate the class boundaries*

    - *3. Draw the rectangles*

    - *4. Label the axes*

    - *5. Give the graph a title*

- follow English instructions on solving problems concerning this topic and work on related problems written in English.

Prerequisite knowledge:

Students should have learned about the construction of frequency distribution tables through the medium of Chinese.

Time: 2 lessons (2 x 40 minutes)

Procedure:

Lesson 1

1. The teacher should first ask the students to group the weights of 40 students into a frequency distribution table.

2. The teacher should then introduce the terms "class", "class interval" and "class limits".

3. The teacher should then ask the students to choose a number to represent the class, i.e. the "class mark".

4. The teacher should then draw a number line on the board and ask the students to locate the "class" on it. Then, the teacher should also ask students to find the boundaries of the class, i.e. the class boundaries. As an example, the teacher should ask the students to which group 49.5 belongs.

5. The teacher should then ask the students to finish the exercise in order to familiarise themselves with the terms.

Lesson 2

1. In the second lesson, the teacher should first introduce John's and Mary's graphs, and then ask students which one is a better representation.

2. The teacher should then talk about the differences between the two graphs and introduce the kind of graph known as a "histogram".

3. The teacher should then ask students to practise drawing histograms using the frequency distribution table in the exercise.

4. The teacher should then give some time for the students to finish the drawing and go around the classroom in order to help the students if they have any questions.

5. The teacher should then check the answers with the students.

6. After that, the teacher should discuss with the students the procedures for drawing a histogram. The teacher should provide language support to the students when they do not know how to express the relevant ideas.

Explanatory Notes for Teachers:

1. The activity of putting data into a frequency distribution table is intended to serve as revision of previous knowledge.

2. Apart from introducing the Chinese and English terms and their pronunciation, the teacher should ensure that students understand the concepts behind the terms (e.g. class boundaries). This can allow students to remember the words more easily.

3. In exercise question 2 of Lesson 1, students can practise writing the terms while they are filling in the blanks. This can help them to remember the spelling of the terms. At the same time, students should be careful about which class is being referred to.

4. In lesson 2, students may not know how to express the procedures for drawing a histogram in words even though they know how to draw the histogram. The teacher can give them some time for reflection and then write some vocabulary on the board (e.g. draw, label, straight lines) to help them. The teacher should allow students to speak using incomplete sentences first. Then the teacher could guide the students in producing the complete sentences.

Mathematics
Presentation of Continuous Data (Lesson 1)

Name: _____ Class: _____ (   )

Weight of 40 students (in kg)

40.5	48	48.3	59.6	59.5	55.2	54.8	50.9
41	47.5	48.9	60.1	58	55.9	54.2	51.5
43	46	49.1	60.7	57.8	56	53.7	51.7
44.5	45.7	49.5	61.3	57.4	56.5	53.5	52.1
45.4	45.5	50.6	64	57	56.8	53	52.4

Put the data into a frequency distribution table:

Weight (in kg)	Tally	Frequency
41 - 45		
46 - 50		
51 - 55		
56 - 60		
61 - 65		
Total=		

The weights of the students fall into different classes. For example, 41-45 kg is a *class* (組).
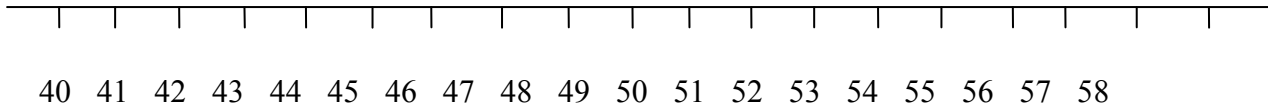
The range from 41 kg to 45 kg is the *class interval* (組區間).

The two end values are called the *class limits* (組限). The smaller one is called the *lower class limit* (下組限) while the greater one is called the *upper class limit* (上組限).

If you have to choose a number to represent the class 46-50 kg, which number will you choose? Why?

_____

The *class mark* (組中點) is the value used to represent the class. It is the _____ of the class. For example, in the class 51-55 kg, the class mark = _____.

In the following number line, mark the position of the lower and upper class limits of classes 41-45, 46-50 and 51-55 kg with blue lines. Then, mark the boundaries (邊界) of the classes with a long red dotted line.

```
|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
40  41  42  43  44  45  46  47  48  49  50  51  52  53  54  55  56  57  58
```

The ***class boundaries*** are the positions between 2 classes. We call 50.5 kg the ***lower class boundary*** (下組界) of class 51-55 kg and at the same time, it is also the ***upper class boundary*** (上組界) of class 46-50 kg.

If the data fall on the class boundaries (e.g. 50.5 kg), which classes do they belong to? Class 46-50 or 51-55 kg?

_____

Remark:

If x kg is in the class 41-45 kg, then $40.5 \leq x < 45.5$

Exercise:

1. Complete the following table:

Class	Class mark	Lower class limit	Upper class limit	Lower class boundary	Upper class boundary
41 - 45					
46 -50					
51 - 55					
56 - 60					
61 - 65					

2. Fill in the blanks:

a) 40.5 is the _____ of the class 41-45.

b) 46 is the _____ of the class 46-50.

c) 50 is the _____ of the class 46-50.

d) 53 is the _____ of the class 51-55.

e) 60.5 is the _____ of the class 56-60.

f) 60.5 is also the _____ of the class 61-65.

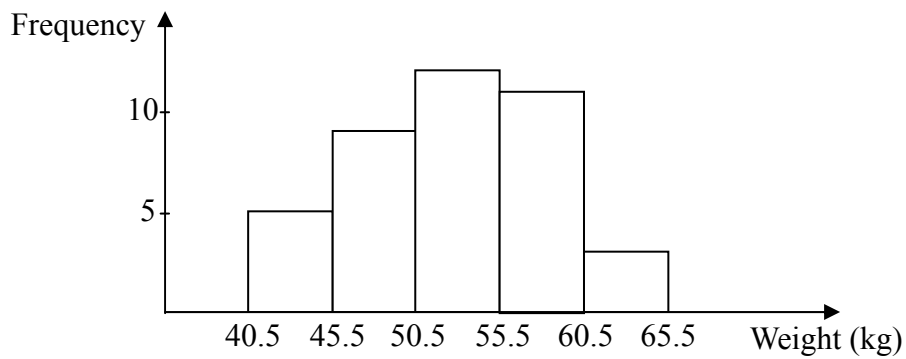g) The range from 61 to 65 is the _____ of the class 61-65.

Mathematics

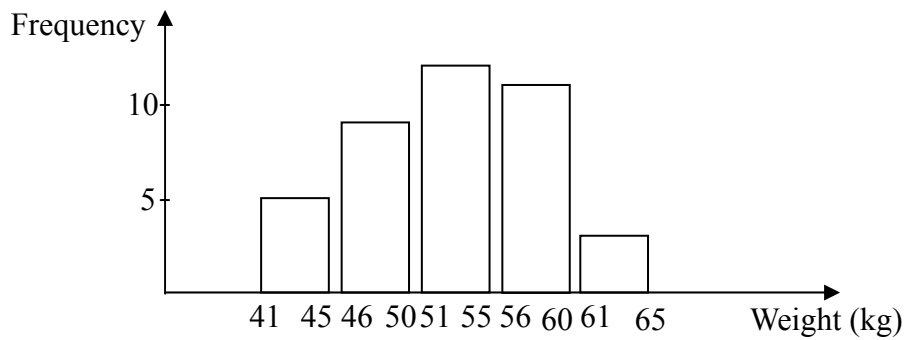## Presentation of Continuous Data (Lesson 2)

Name: _____   Class: _____ (   )

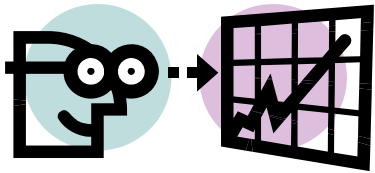John and Mary drew two graphs for the weight of 40 students as follows:

John's graph:

Mary's graph:

Which graph is better? John's or Mary's? Why?

_____

_____

John's graph uses _____ as the base of the rectangles.

Mary's graph uses _____ as the base of the rectangles.

For continuous data, we use _____'s graph to represent the data graphically

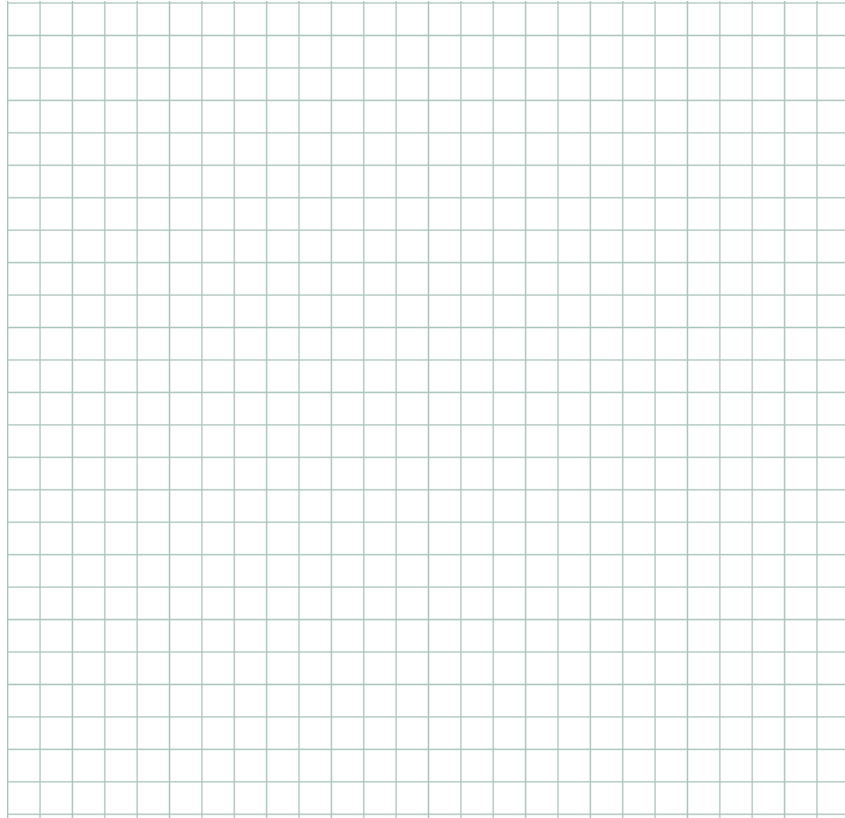This kind of graph is called _____ (   ).

Exercise:

Draw a histogram on the graph paper to represent the information provided in the table.

Height of 40 students

Group (in cm)	Frequency
131 - 135	3
136 - 140	9
141 - 145	12
146 - 150	9
151 - 155	7
Total =	40

Can you write down the procedures for drawing a histogram?

Steps for drawing a histogram:

1. _____

2. _____

3. _____

4. _____

5. _____

(Lesson 1)

Frequency distribution table:

Group (in kg)	Tally	Frequency
41 - 45	////	5
46 - 50	///// ////	9
51 - 55	///// ///// //	12
56 - 60	///// ///// /	11
61 - 65	///	3
	Total=	40

The *class mark* (組中點) is the value used to represent the class. It is the <u>mid-value</u> of the class. For example, in the class 51-55 kg, the class mark = __53__.

If the data fall on the class boundaries (e.g. 50.5 kg), which classes do they belong to? Class 46-50 or 51-55 kg?

<u>Class 51-55 kg.</u>

Exercise:

1.

Class	Class mark	Lower class limit	Upper class limit	Lower class boundary	Upper class boundary
41 - 45	43	41	45	40.5	45.5
46 -50	48	46	50	45.5	50.5
51 - 55	53	51	55	50.5	55.5
56 - 60	58	56	60	55.5	60.5
61 - 65	63	61	65	60.5	65.5

2a) lower class boundary

b) lower class limit

c) upper class limit

d) class mark

e) upper class boundary

f) lower class boundary

g) class interval

(Lesson 2)

Which graph is better?

John's graph is a better representation of the data. The weights of students are continuous data.

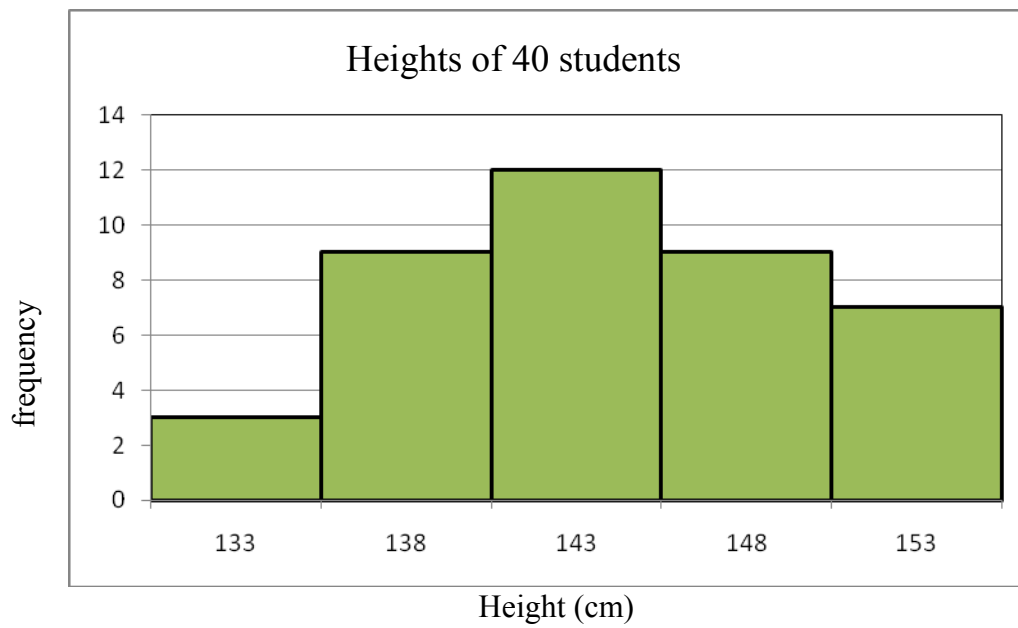There should be no gap between the rectangles.

John's graph uses class boundaries as the bases of the rectangles.

Mary's graph uses class limits as the bases of the rectangles.

For continuous data, we use John's graph to represent the data graphically

This kind of graph is called a Histogram (組織圖).

Exercise:

Heights of 40 students

Steps for drawing a histogram:

1. Draw the axes

2. Locate the class boundaries

3. Draw the rectangles

4. Label the axes

5. Give the graph a title