Using a Microscope

Level: S1

Topic: Using a microscope to observe dry specimens (Section 3.1 of Unit 3)

Introduction:

This ELA is a laboratory activity which lasts for two periods. Students may find it easier to follow the teacher's explanation if the teacher describes the steps involved in using a microscope and at the same time demonstrates the procedure.

The ELA consists of four major parts: introducing a microscope, demonstrating how to use a microscope, practising how to use a microscope, and observing specimens with a microscope. Students first learn the names of different parts of a microscope when the teacher introduces a microscope. The Chinese names can be introduced before the English terms by asking students to complete the exercise in their textbook. Students then use the terms they learned to describe the steps in using a microscope after the teacher has demonstrated how to use it. After some practice of using a microscope to observe newspaper print, students examine other dry specimens. They have to draw what they observe on the worksheets and are encouraged to describe what the specimens look like under a microscope.

Lesson Plan – Using a microscope

Content Objectives:

After completing the activity, students should be able to:

- identify the major parts of a microscope
- follow the correct procedure to use a microscope to observe some dry specimens

Language Objectives:

After completing the activity, students should be able to:

- understand and use the English terms related to the major parts of a microscope (*e.g., microscope, clip, base, arm, mirror, stage, slide, objective, eyepiece, coarse adjustment knob, fine adjustment knob, observe, a sharper image, specimen, magnifications, low-power, position, look through, adjust, a bright circle of light, focus, magnified, inverted*);
- state the correct way of carrying a microscope from one place to another (e.g., *The student should hold the arm of the microscope with one hand and the base with another hand.*);
- state the steps for using a microscope to observe a specimen, e.g.,
  1. *Put a table lamp in front of the microscope.*
  2. *Put a low-power (e.g. x5) eyepiece into the microscope.*
  3. *Rotate a low-power (e.g. x4) objective into position.*
  4. *Look through the eyepiece. Adjust the mirror until you see a bright circle of light.*
  5. *Place a slide on the stage, and fix it with the clips. The specimen on the slide should be right above the hole of the stage.*
  6. *Look at the microscope from the side. Turn the coarse adjustment knob carefully to lower the objective until it is very close to the slide.*
  7. *Look through the eyepiece. Turn the coarse adjustment knob to raise the objective slowly until you can see an image of the specimen.*
  8. *Turn the fine adjustment knob to get a sharper image. The image is now in focus.*
- describe the features of an image formed in a microscope (e.g., *When compared with the specimen, the image formed in a microscope is magnified and inverted*).

Activities:

1. Introducing the microscope and its structure – whole-class & group work (18 min)
2. Demonstrating how to use a microscope – whole-class activity (20 min)

3. Practising how to use a microscope – group work (17 min)
4. Observing other specimens with a microscope – group work (15 min)
5. Round-up activity – pair work (10 min)

Materials: microscopes, newspaper, scissors, adhesive tape, slides, sugar, dried flowers, worksheets, textbook

Steps:

Introducing the microscope and its structure – whole-class & group work (18 min)

1. 老師利用提問方式跟學生溫習生物的基本單位。
2. 老師展示一顯微鏡，告訴學生這儀器可用來觀察細小的生物單位。
3. 學生在他們的中文教科書上填寫顯微鏡各部份的名稱 (雅集—「綜合科學」第 115 頁；朗文—「互動科學」第 110 頁；牛津—「生活與科學」第 99 頁)。

   老師可把顯微鏡各部份的講解留待英文教學部分進行，現在只著學生按照教科書所提供的各部份名稱的字面意思完成該作業。
4. 老師核對答案。
5. The teacher distributes the worksheets and tells students that they are going to study the structure of a microscope in detail and in English.
6. The teacher demonstrates the proper way of taking a microscope out from a box and carrying it to another place. He/she briefly introduces the names and the functions of the major parts of the microscope, and the magnifications of the lenses.

   During the explanation, the teacher should write the names on the blackboard or ask students to refer to part A of their worksheets in order to help them visualize the spellings of the technical terms.
7. Working in groups, students examine a microscope and complete part A of the worksheets.
8. The teacher checks the answers and has the class pronounce the names of the microscope parts.

Demonstrating how to use a microscope – whole-class activity (20 min)

9. The teacher tells the class that they are going to use their microscope to observe the print on newspaper. He/she shows the class a slide that has a letter ‘e’ stuck on it with adhesive tape. The letter was cut from a piece of newspaper.

10. The teacher demonstrates the steps in using a microscope to observe the newspaper print. He/she should say aloud the steps during the demonstration and check whether the students can name the microscope parts using questioning.

11. After the newspaper print is set in focus, some students are allowed to observe through the microscope the image.

12. Students are asked to complete the steps in part B of the worksheets.

13. The teacher checks the answers by asking some students to read aloud the steps, each responsible for one step.

Practising how to use a microscope – group work (17 min)

14. The group leaders prepare a slide with a letter ‘e’ at the teacher’s bench.

15. Each group follows the steps in the worksheets to observe the letter ‘e’ slide with their microscope. They are asked to complete Q1a and Q2 of part B of their worksheets.

16. The teacher checks the answers with the class. He/she should also point out that the direction of the movement of the image is opposite to that of the movement of the slide.

Observing other specimens with a microscope – group work (15 min)

17. The group leaders prepare slides with other dry specimens, such as sugar granules and dried flower petals, using adhesive tape.

18. Each group examines the specimens using their microscope and records what they see in Q1b and Q1c of part B of their worksheets.

19. The teacher checks the answers with the class. He/she may discuss with the class what these specimens look like under a microscope. For example, students may suggest sugar granules look like ice cubes or diamonds under a microscope and the petals look like bricks that are placed together.

Round-up activity – pair work (10 min)

20. If time allows, after students have cleaned up the laboratory, the teacher may ask students to pair up and take turns to read aloud the steps of using a microscope to each other.

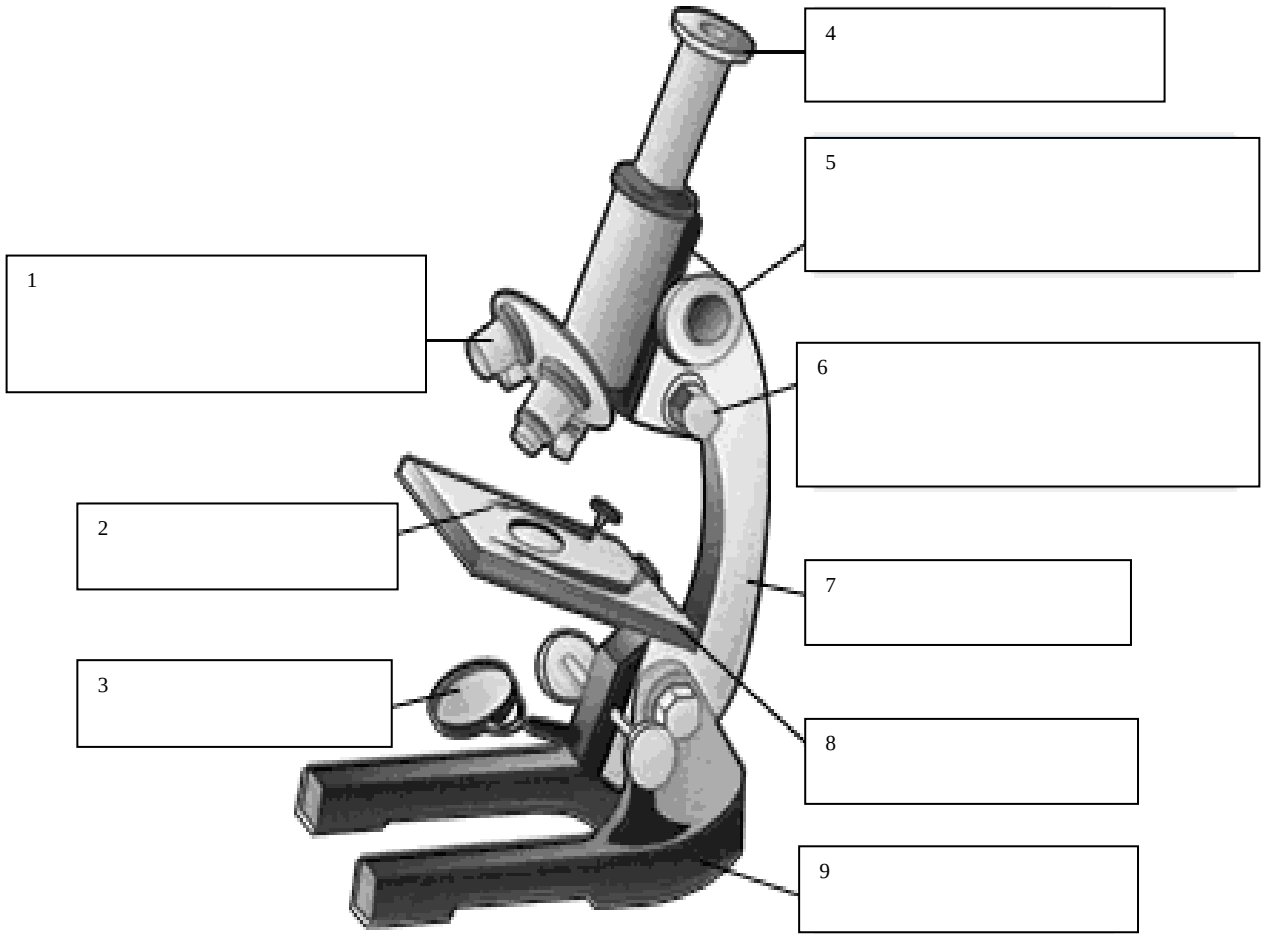
21. The teacher monitors the class while students work in pairs and provides guidance on the pronunciation where necessary.

Using a microscope 使用顯微鏡

A. What are the parts of a microscope?

Label the diagram with the words provided below.

clip 夾	base 鏡座	mirror 反光鏡	objective 接物鏡	coarse adjustment knob 粗調節器
	arm 鏡臂	stage 載物台	eyepiece 接目鏡	fine adjustment knob 微調節器



<u>Questions</u>: (Please answer Q2 in complete sentences)

1. What are the magnifications (放大率) of
   a. the three eyepieces? _____
   b. the three objectives? _____
2. What is the correct way of carrying a microscope from one place to another?
   (Hint: Which two parts should you hold when you carry a microscope?)

_____

_____

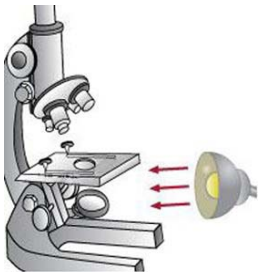
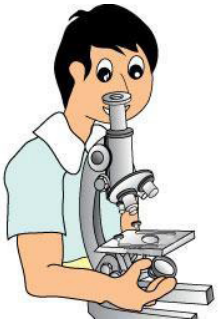
Using a microscope 使用顯微鏡

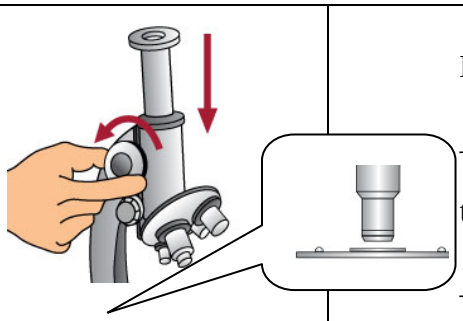
B. How do we use a microscope to observe a specimen?

Complete the following steps with the words provided.

microscope	eyepiece	objective	coarse adjustment knob	slide 玻片	specimen 標本
mirror	stage	clips	fine adjustment knob	image 影像	

Steps:

1		Put a table lamp in front of the _____.
2		Put a low-power (低倍, e.g. x5) _____ into the microscope.
3		Rotate (轉動) a low-power (e.g. x4) _____ into position.
4		Look through the eyepiece. Adjust (調較) the _____ until you see a bright circle of light.
5		Place a slide on the _____, and fix it with the _____. The _____ on the slide should be right above the hole of the stage.

6		Look at the microscope from the side. Turn the _____ carefully to lower the objective until it is very close to the _____.
7		Look through the eyepiece. Turn the coarse adjustment knob to raise the objective slowly until you can see an _____ of the specimen.
8		Turn the _____ to get a sharper image. The image is now *in focus* (對焦).

<u>Questions</u>: (Please answer Q2 in complete sentences)

1. Draw what you see in the microscope.

a. Letter 'e'

Magnification: _____<u>X</u>

b. Sugar

Magnification: _____<u>X</u>

c. Dried flower

Magnification: _____<u>X</u>

(Hint: total magnification = magnification of the eyepiece x magnification of the objective)

2. How does the image look when it is compared with the specimen?
(Hints: magnified 放大; inverted 倒轉)

_____

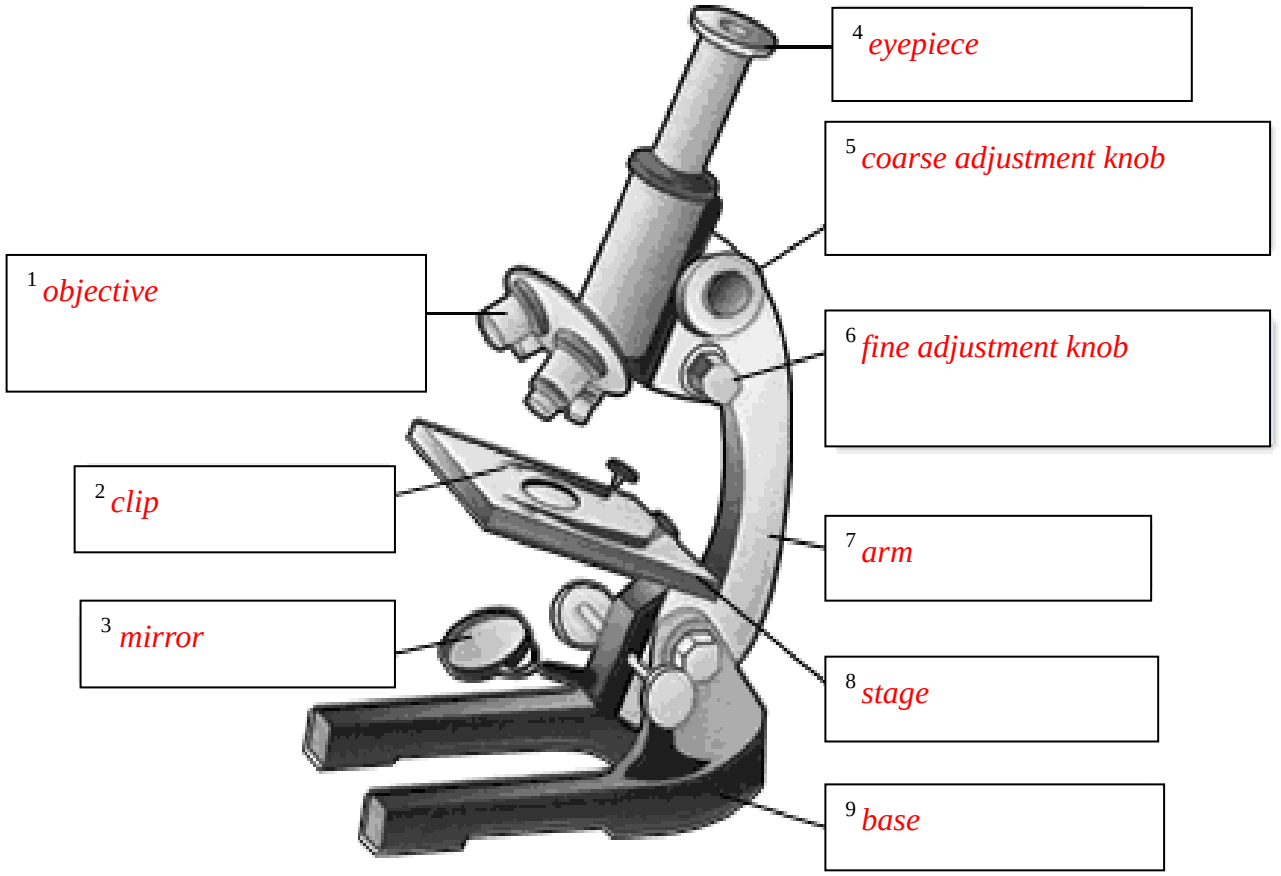
Using a microscope 使用顯微鏡

Answers

A. What are the parts of a microscope?

Label the diagram with the words provided below.

clip 夾	base 鏡座	mirror 反光鏡	objective 接物鏡	coarse adjustment knob 粗調節器
	arm 鏡臂	stage 載物台	eyepiece 接目鏡	fine adjustment knob 微調節器



Questions: *(Please answer Q2 in complete sentences)*

1. What are the magnifications (放大率) of
   a. the three eyepieces? *(the answer depends on the microscope used by the students)*
   b. the three objectives? *(the answer depends on the microscope used by the students)*
2. What is the correct way of carrying a microscope from one place to another?
   (Hint: Which two parts should you hold when you carry a microscope?)

The student should hold the arm of the microscope with one hand and the base with another hand.

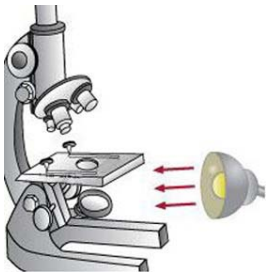
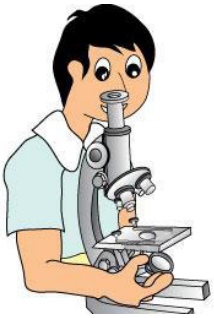
Using a microscope 使用顯微鏡

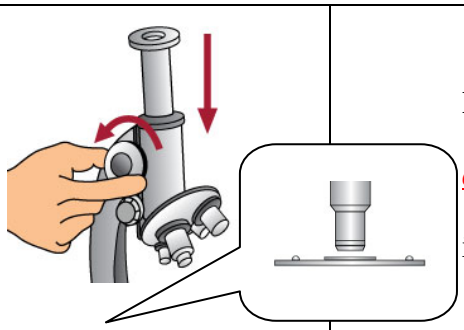
B. How do we use a microscope to observe a specimen?

Complete the following steps with the words provided.

microscope	eyepiece	objective	coarse adjustment knob	slide 玻片	specimen 標本
mirror	stage	clips	fine adjustment knob	image 影像	

Steps:

1		Put a table lamp in front of the *microscope*.
2		Put a low-power (低倍, e.g. x5) *eyepiece* into the microscope.
3		Rotate (轉動) a low-power (e.g. x4) *objective* into position.
4		Look through the eyepiece. Adjust (調較) the *mirror* until you see a bright circle of light.
5		Place a slide on the *stage*, and fix it with the *clips*. The *specimen* on the slide should be right above the hole of the stage.

6		Look at the microscope from the side. Turn the *coarse adjustment knob* carefully to lower the objective until it is very close to the *slide*.
7		Look through the eyepiece. Turn the coarse adjustment knob to raise the objective slowly until you can see an *image* of the specimen.
8		Turn the *fine adjustment knob* to get a sharper image. The image is now *in focus* (對焦).

Questions: (Please answer Q2 in complete sentences)

1. Draw what you see in the microscope.

a. Letter 'e'

b. Sugar

c. Dried flower

Magnification: _____X Magnification: _____X Magnification: _____X

(Hint: total magnification = magnification of the eyepiece x magnification of the objective)

2. How does the image look when it is compared with the specimen?
   (Hints: magnified 放大; inverted 倒轉)

   The image is magnified and inverted