

Self – Study pack

- Subject - Science
- Grade - 7
- Term - Second Term
- Unit - Use of Microscopes
- Learning Outcomes –
 - Identify major parts of simple and compound microscopes.
 - Describe the functions of different parts of a compound microscope.
 - Explain the importance of using electron microscope.
 - Explain the terms magnification and resolution power.
 - Use the microscope correctly.
 - Accept that microscopes should be handled carefully.

Activity 1 – Let’s magnify minute things and observe them.

Materials Needed: –

- A water filled, closed cylindrical bottle
- A water filled, sealed, colourless polythene bag
- A sealed filament bulb filled with water (after removing its inner parts)
- A pen barrel without the inner ink tube

Method: -

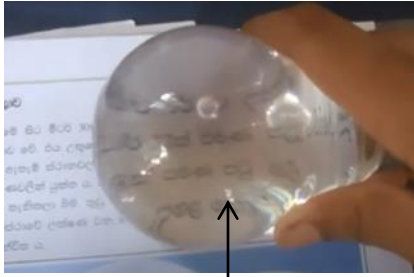
- Keep the above things on letters of your Science textbook and observe the letters through them.



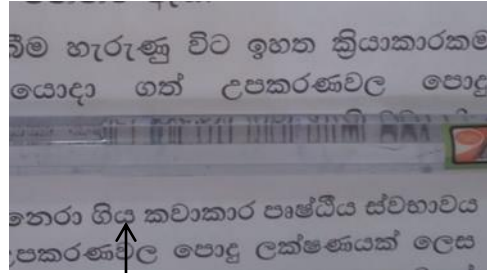
Water filled polythene bag



Water filled bottle



Filament bulb



Pen tube

- What is your observation?
- Does the magnification of letters increase or decrease when the curvature of the device you use increases?
- Which of the following pictures matches with the nature of the outer surface of the devices you used above?



A – Curved outward



B – Curved inward

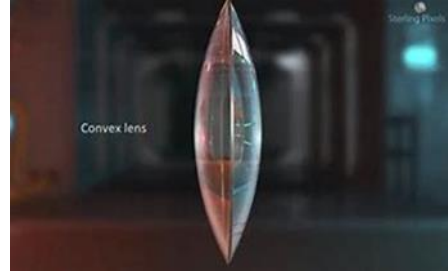


C – Plane

- ✓ Now, it is clear to you that **surfaces which are curved (protruded) outward** can be used for **magnifying minute things**.
- ✓ **Convex lens** is a device in the school laboratory with above features.



Front view of a convex lens



Side view of a convex lens

- Select the convex lens with the highest magnification power out of the convex lenses given below.



A



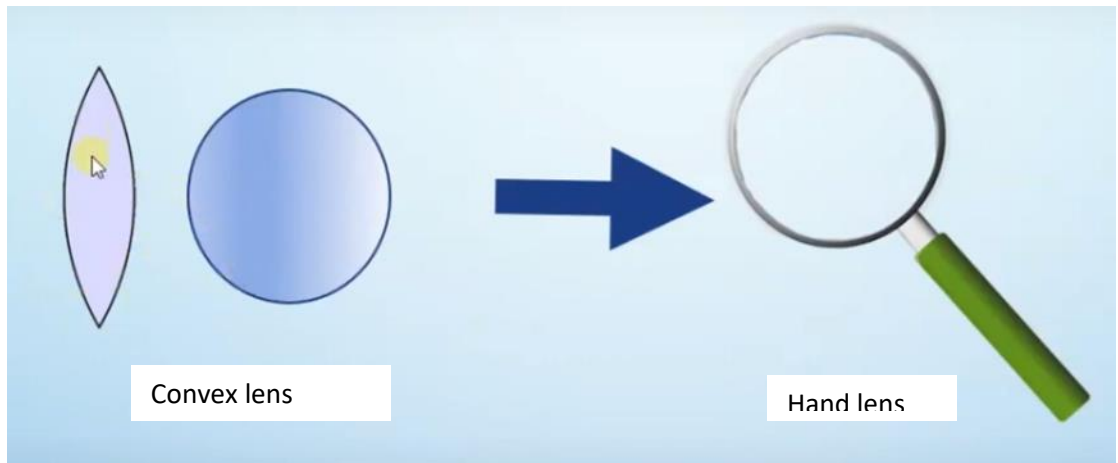
B



C

Activity 2 - Let's magnify minute things with a simple microscope and observe them.

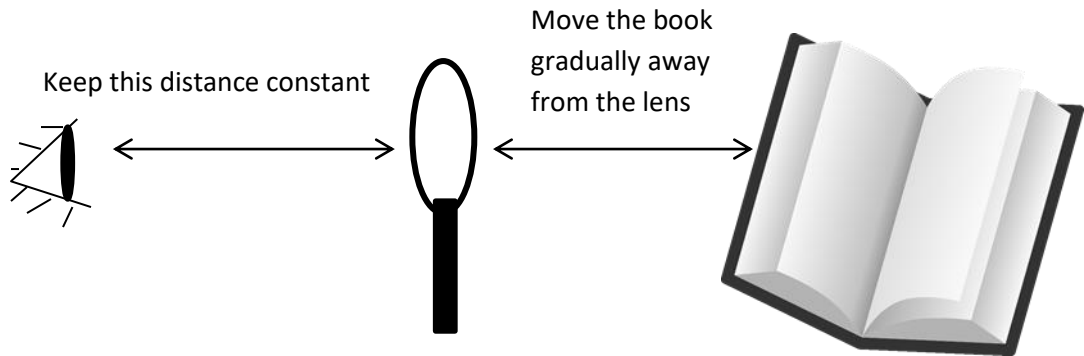
✓ **A hand lens or a simple microscope can be made by fixing a frame with a handle to a convex lens.**



Materials Needed – Hand lens (simple microscope)/ simple microscope made by you

Method -

- Keep the hand lens at a certain distance from the eye and hold a book with letters in small print close to the lens.
- Observe the letters through the lens while the book is being moved away from the lens gradually.



- What are your observations?

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✓ You may understand that letters get magnified up to a certain distance between lens and the book and then they get blurred when the distance is further increased.

Activity 3 – Let's find the magnification power of a microscope.

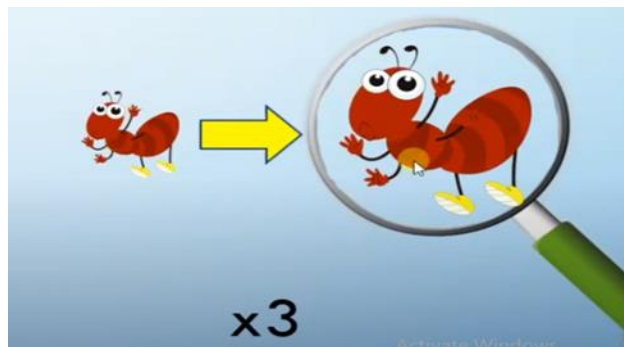
✓ Number of times that a specimen gets enlarged when observing through a microscope is known as magnification or magnification power.

Materials Needed – Simple Microscope

Method -

- Hold a microscope above the letters of a book or any other minute object.
- Approximately imagine how many times that the letters or the minute object has enlarged when observing them through the simple microscope.

Ex: -



Do you know?

The maximum magnification power of an improved compound microscope is (x 2000)

Activity 4 – Let's find the resolution.

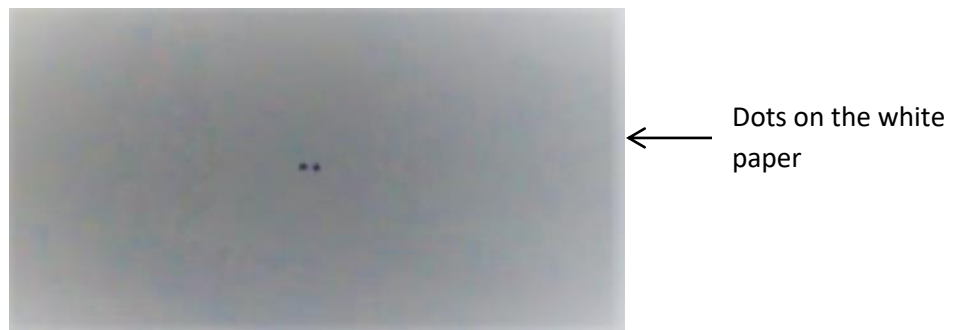
- ✓ Resolution is the minimum distance that should be there between two points next to each other to identify them separately.
- ✓ The resolution of the naked eye is 0.01mm.

4.1

Materials Needed – a white paper, black pen, two simple microscopes.

Method –

- Keep two dots with the black pen on the white paper in the way that they do not touch one another although they are close to each other as much as possible.
- Observe the gap between two dots and their magnification when they are viewed through a hand lens.
- Then observe the same dots with two hand lenses. Observe the gap between them and the magnification.



When observed through a single hand lens



When observed through two hand lenses

4.2

Things Needed – Hand lens, colour picture of a newspaper

Method

- Observe the colour picture with the naked eye.
- Then observe it with a hand lens.

Observation – Write down your observation.

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- When you observe the colour picture with the hand lens, you may realize that it consists of large number of fine dots.
- The reason for this is that the resolution of the hand lens is greater than that of the naked eye.



Picture of a newspaper when observed with the naked eye



Picture of a newspaper when observed with the hand lens

Activity 5 – Let’s investigate on parts of compound light microscope and its usage

Why is this called compound light microscope?

Compound Microscope



As it consists of at least two convex lenses

Light Microscope



As it needs light energy while it is being used

- When an object is observed with two convex lenses it gets magnified than when it is observed with a single lens.
- By considering this fact, a compound light microscope with two convex lenses is used in school laboratories to observe minute things.
- Its maximum magnification is about (x 2000).
- Its maximum resolution is about 0.2 μm .

- **Do you know?**
 - The microscope was first invented by Anton Van Liven Hook
 - Compound microscope was first invented by Jansen brothers



Anton Van Liven Hook

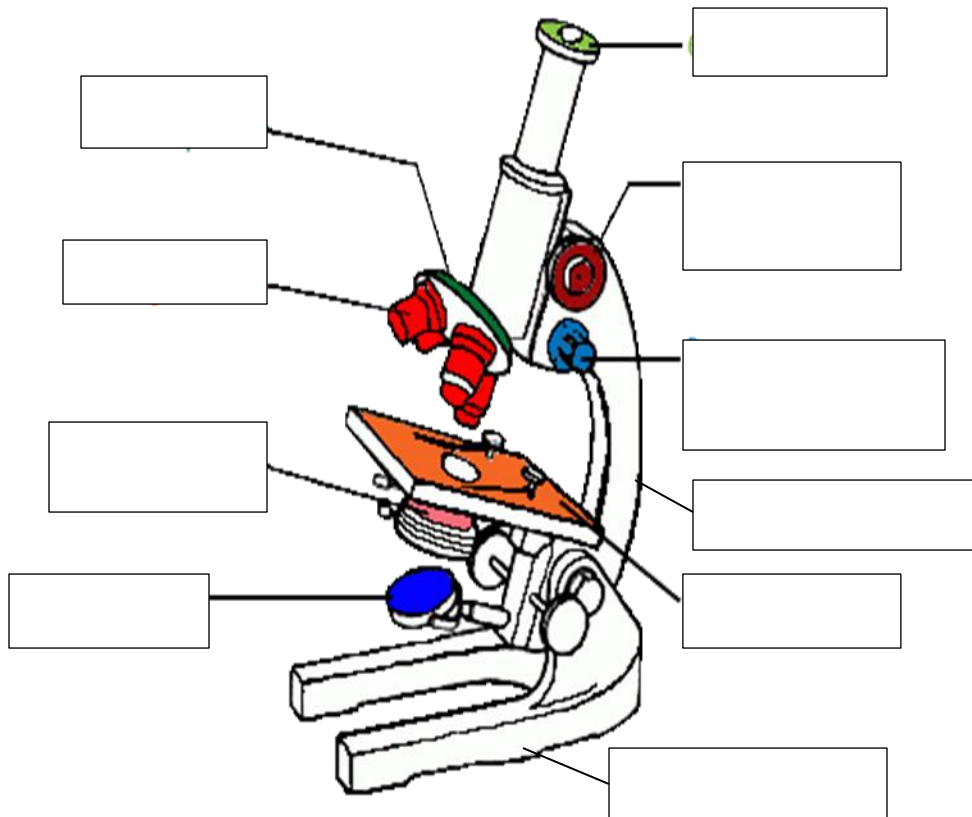


Zacharias Jansen

5.1

Let's name the parts of the compound light microscope.

Label the parts of the diagram given below with the help of page No. 145 of your textbook.



5.2

Let's write the functions of each part of the compound light microscope.

Use your textbook and mention the function of each part of the compound light microscope in the table given below.

Part of the Microscope	Function
Eye piece	The specimen is magnified (by x 5, x10 or x15)
Objectives	The specimen is magnified. (Low power- x4/x5/x8 –Mid power –x10- High power x 40)
Coarse Adjustment Knob	
Fine Adjustment Knob	
Stage	
Stage Clips	
Diaphragm	
Mirror	
Base	

Activity 6 – The correct order of using a compound light microscope

- Arrange the jumbled sentences given below in the correct order.
- Your textbook will guide you.
- Give the correct order in the cages given below.

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- Make the image clearer with the fine adjustment knob.
- Bring the low power objective down with the coarse adjustment knob.
- Keep the prepared slide on the stage and fix it with the clips.
- Keep the microscope stable on a horizontal table.

- E. Keep both eyes open. Keep your familiar eye close to the eye piece and move the low power objective up with the coarse adjustment knob till you get a clear image.
- F. Obtain a sharp patch of light on the slide by adjusting the mirror and the diaphragm while keeping the familiar eye close to the eye piece.
- G. If it is necessary, use mid power or high power objective.

Activity 7 – Facts to be considered while using the compound light microscope



- A. Store the microscope vertically in a dust free place.
- B. When the microscope is carried from one place to another place, hold the arm of it with your familiar hand and keep its base on the palm of the other hand and slightly bend the microscope towards your body.
- C. Use clean cover slips and slides.
- D. Keep the lenses in a desiccator when the microscope is not in use for long time.
- E. Clean the lenses and the stage after use.

Activity 8 – Let’s calculate the magnification power of a microscope

Magnification of a microscope = Magnification of eye piece x Magnification of objective lens



Eye piece



Objectives



Eyepiece at 10x

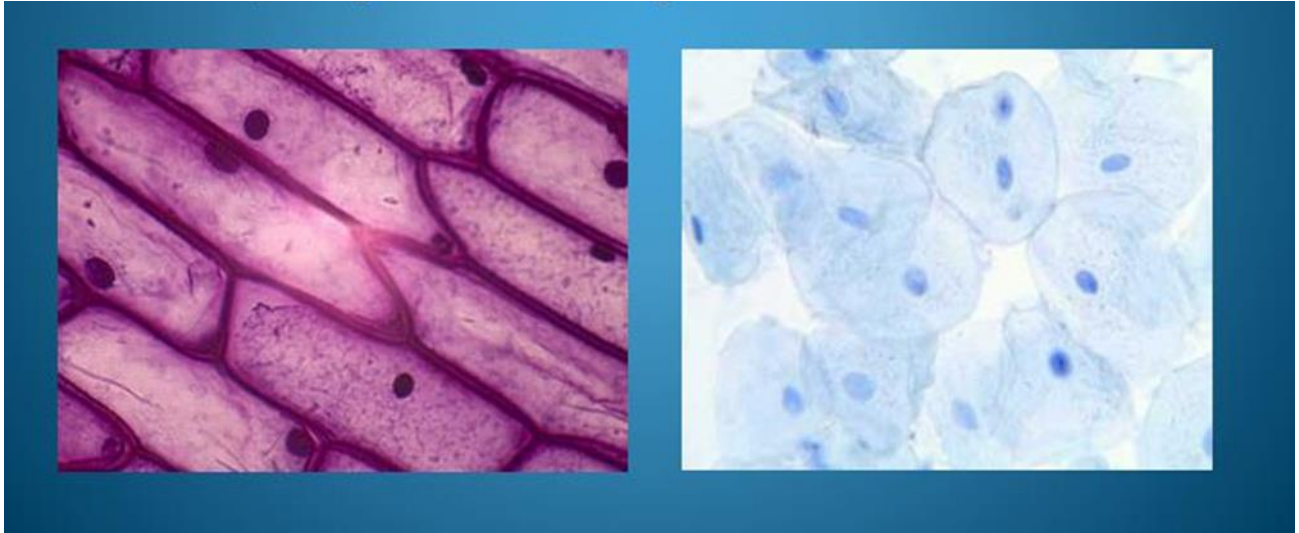
Objective lens at 4x

eyepiece x objective lens = Magnification

$$(10x) \times (4x) = 40x$$

Biological / Compound Microscope

Activity 9 – Observing tissues with the compound light microscope



Cells of an onion peel

(Purple colour outer peel of an onion)

Human cheek cells

(Scratch the inner wall of the cheek with a yoghurt spoon to obtain cheek cells)

- Draw the cells in above diagrams with a pencil in the space provided to you in the table given below.

Cells of the onion peel	Human cheek cells

Activity 10 – Let's find out information regarding electron microscope.

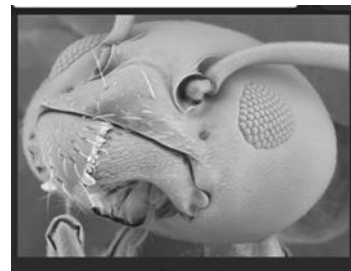
- Uses a beam of electron instead of light.
- Live specimens cannot be observed.
- Maximum magnification is (x 500 000).
- Maximum resolution is 0.0005 μm .



Electron Microscope



An electron microscopic view of an ant



An electron microscopic view of head of an ant

Find and write down the instances where the electron microscope is used.

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- Write down the differences between compound light microscope and electron microscope.

Compound Light Microscope	Electron Microscope

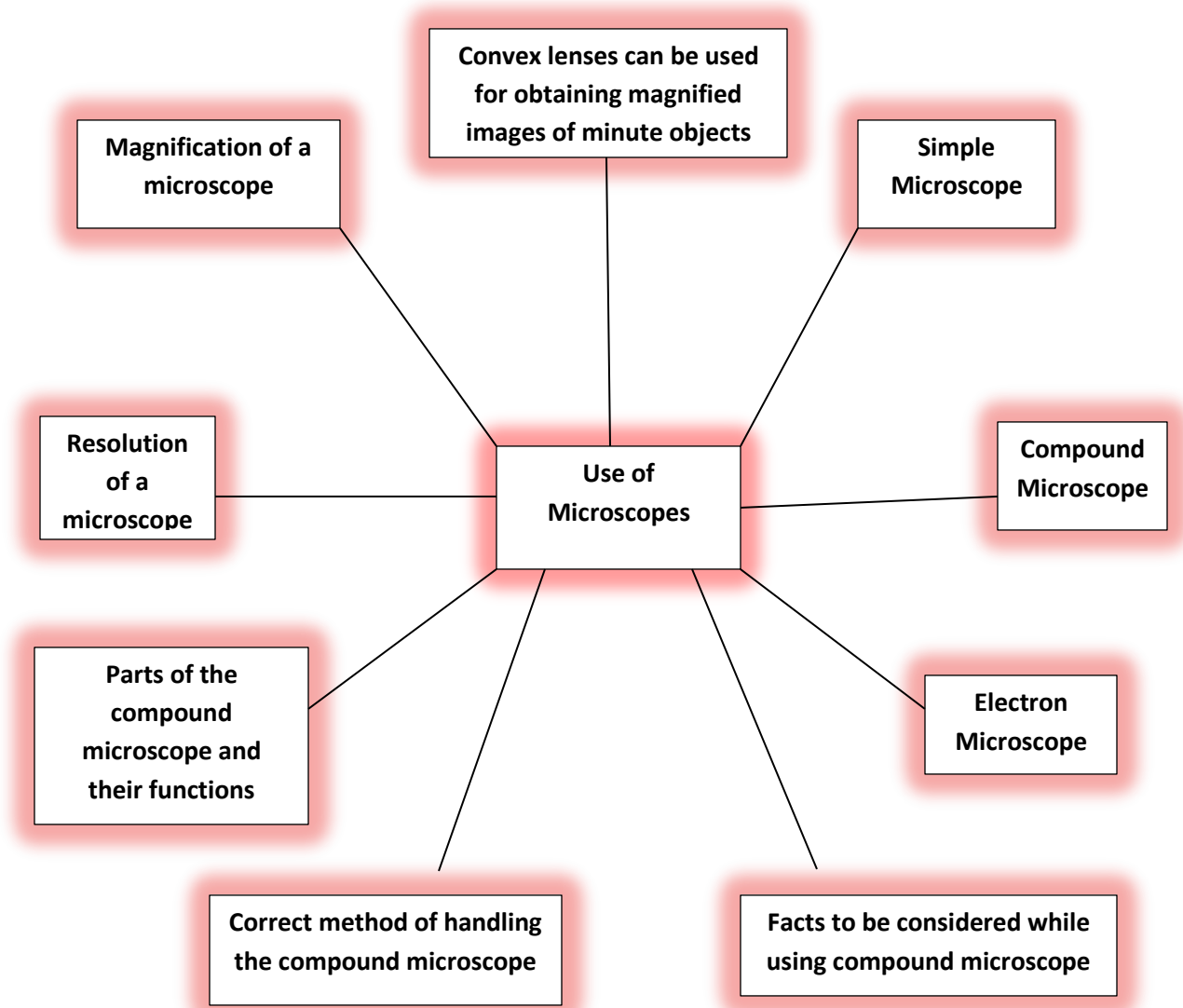
Assessment

- 1) What type of lens is used as a simple microscope?
- 2) Write down an expression for the magnification of a compound light microscope.
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- 3) Which part of the compound microscope controls the amount of light received by the slide?
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- 4) What type of microscopes is used in the researches associated with genetics?
- 5) Write down the resolution of following instances.

Eye	Light Microscope	Electron Microscope

- 6) Under a microscopic illustration of a specimen, it is mentioned as (x40). What is meant by this?
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Summary



Translated By :

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