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Study of Compound Microscopes

Experiment 1 - Practical Notes

Aim

To identify the parts of a compound light microscope, explain their functions and use a prepared slide to compare low- and higher-power views.

Apparatus

- Compound brightfield microscope.
- Instructor-provided prepared slide.
- Manufacturer-approved optical-cleaning materials.
- Notebook and pencil.

Learning Outcomes

- Identify the main parts and state their functions.
- Focus a prepared slide at low and higher power.
- Calculate total magnification.
- Explain the difference between magnification and resolution.

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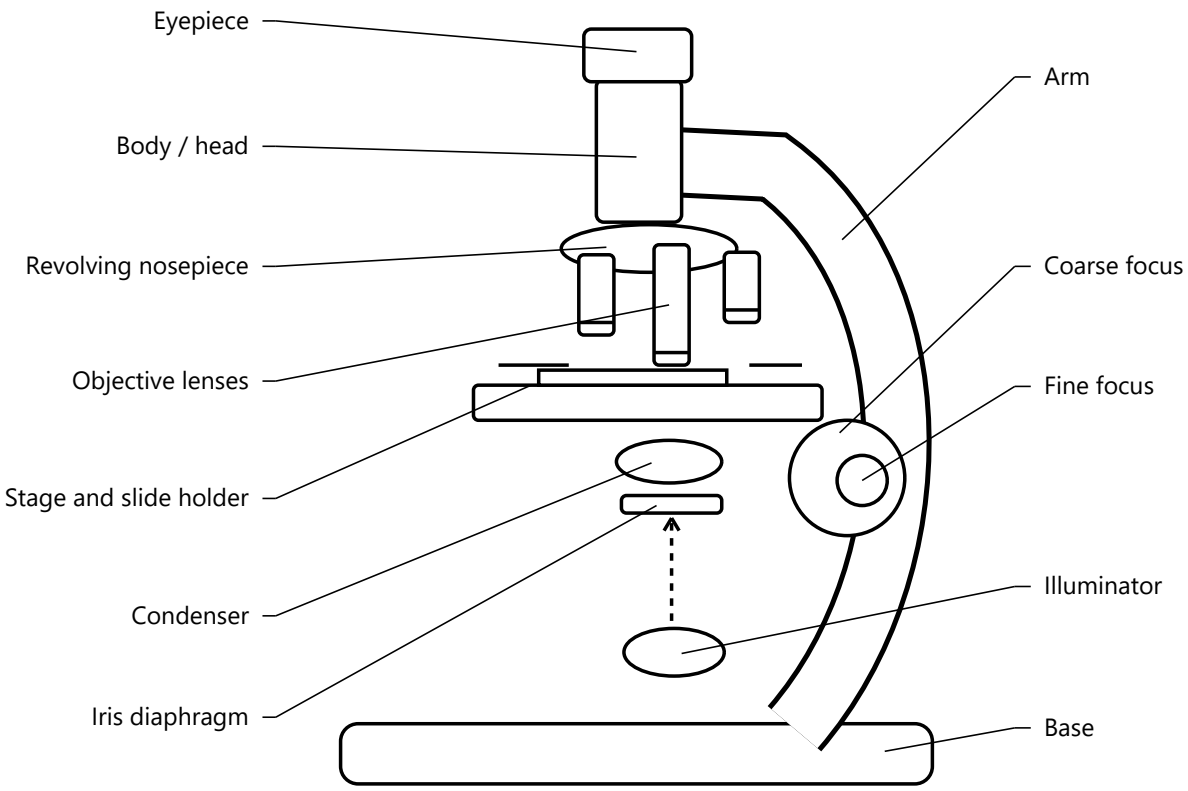
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Parts and Functions

Identify these parts on the microscope in your laboratory. Positions differ by model.



Simplified schematic; not to scale.

Part / group	Main function
Eyepiece and objective	Provide two stages of image magnification.
Revolving nosepiece	Selects an objective and holds it in the optical path.
Stage and slide holder	Support and position the prepared slide.
Condenser and iris diaphragm	Shape the illumination reaching the specimen.
Coarse and fine focus	Make large and small focusing adjustments.
Arm, base and illuminator	Support the instrument and supply transmitted light.

Quick check: Point to each part and state one function.

Principle and Magnification

Principle

- A compound microscope uses an objective and an eyepiece together.
- The objective collects light from the specimen and contributes to a magnified, inverted intermediate image.
- The eyepiece enlarges the intermediate image for visual observation.

Simplified Light Path

Illuminator → Condenser → Specimen → Objective → Eyepiece

Total Magnification

Total magnification = Objective magnification × Eyepiece magnification

Example: 40x objective × 10x eyepiece = **400x** total magnification.

Common Teaching Configuration

Objective	Eyepiece	Total magnification
4x	10x	40x
10x	10x	100x
40x (dry)	10x	400x

Confirm the markings on your own lenses. This table assumes visual observation with no extra magnification factor.

Magnification and Resolution

- **Magnification:** How large the image appears. A larger image alone does not guarantee more visible detail.
- **Resolution:** The ability to separate nearby details. It depends on the optics and illumination, not magnification alone.

Procedure and Precautions

Use the instructor-provided prepared slide and the operating manual for your microscope model.

Procedure

1. Set up

Place the microscope on a stable bench. Identify the controls and inspect the supplied slide before switching on the illuminator.

2. Select low power

Engage the lowest-power objective, commonly 4x. Check clearance between the objective and slide from the side.

3. Position the slide

Secure the prepared slide on the stage. Bring the region of interest over the stage opening.

4. Focus at low power

Use coarse focus cautiously at low power, then fine focus. Keep the objective clear of the slide and avoid forcing any control.

5. Increase magnification

Centre the feature first. Move through 10x to 40x dry objectives when available; refine with fine focus and adjust illumination as instructed.

6. Observe and record

Record lens markings and calculate total magnification. Describe image appearance and sketch what you actually observe.

7. Finish and store

Return to low power and remove the slide with adequate clearance. Switch off, clean accessible optics as instructed and cover after the lamp has cooled.

Precautions

- Use fine focus at 40x; coarse movement can strike the slide.
- Keep fingerprints off lenses. Use manufacturer-approved optical-cleaning materials.
- Use the correct dry objective. Use immersion oil only with a specified immersion objective.
- Carry and store the instrument as directed by its manufacturer.

Observations, Calculations and Result

Fill in your own observations. Numerical examples below are not laboratory results.

Name: _____ Date: _____ Roll no.: _____

Microscope model: _____ Prepared slide: _____

Observation Table

View	Objective	Eyepiece	Total	Appearance / feature
1	____ x	____ x	____ x	_____
2	____ x	____ x	____ x	_____
3	____ x	____ x	____ x	_____

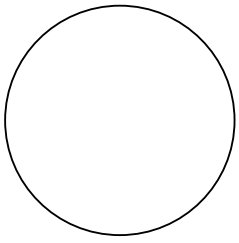
Worked Example: Field of View

Field diameter = Eyepiece field number (FN) ÷ Objective magnification.

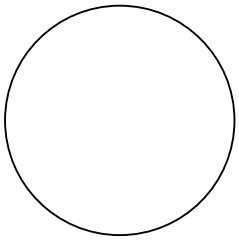
- Example only: assume FN = 18 mm.
- With a 10x objective: 18 ÷ 10 = **1.8 mm**.
- With a 40x objective: 18 ÷ 40 = **0.45 mm**.

Assumes no additional lens factor. Use your own instrument specifications.

Your Labelled Sketches



Low-power view



Higher-power view

Result - Complete After Observation

I identified _____ and observed the prepared slide at _____ x total magnification. On increasing objective power, I noted _____.

Viva Questions

Questions and Answers

1. Why is it called a compound microscope?

The objective and eyepiece provide two successive stages of magnification.

2. What is the total magnification for 10x × 40x?

400x, assuming no other lens factor.

3. Does a larger image always show more detail?

No. Magnification enlarges the image; resolution separates close details.

4. Why start at low power?

It helps you find and centre a feature before observing a smaller field at higher power.

5. Which focusing control should you use at 40x?

Fine focus. Large coarse movements risk contact between the objective and slide.

6. Why does the field of view become smaller?

For a fixed field number, increasing objective magnification reduces specimen field diameter.

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