

Microscopy

I can use a light microscope model and explain the difference between magnification and resolution.

Notice. Recall. Be ready to explain.

- 1** What tool could help us see cells that are too small for the eye?
- 2** What might make an image look bigger?



Retrieval answers

Make a prediction

A cell image becomes larger but stays blurred. Has its resolution improved? Commit a view before the model opens.

A Yes — bigger always means clearer

B No — size and detail are different

C Not sure yet — I need evidence

Commit, then check

Watch the model

- 1 Begin on the lowest-power objective so the specimen is easier to find.
- 2 Use coarse focus only at low power, then fine focus. Use fine focus only at high power.
- 3 Total magnification equals eyepiece magnification multiplied by objective magnification.

Two lenses magnify

EYEPIECE

OBJECTIVE

×10

×

×4

Total magnification

×40[View labelled diagram](#)[Optional video](#)

Choose and justify

A microscope uses a $\times 10$ eyepiece and a $\times 40$ objective. What is the total magnification?

A $\times 50$

B $\times 400$

C $\times 4$

D $\times 4000$

Give the deciding clue before checking.

Check the reasoning

Connect the science

- 1 Magnification describes how many times larger the image appears.
- 2 Resolution describes whether two close points can be seen as separate detail.
- 3 A larger image is not automatically a more detailed image.

Match units before dividing

$$1 \text{ mm} = 1000 \text{ } \mu\text{m} = 1,000,000 \text{ nm}$$

$$M = I \div A ; I = M \times A ; A = I \div M$$

M is a ratio. I and A are lengths.

Lens detective

Choose the first safe step. Then predict what changes at higher power.

- 1 Start at $\times 4$ objective.
- 2 Find and centre the specimen.
- 3 Focus, then increase power.

Reveal shared reasoning

Your independent evidence

A pupil changes from a $\times 4$ objective to a $\times 40$ objective while keeping a $\times 10$ eyepiece. Explain the change in total magnification, field of view and visible detail. Include one limitation of the digital model.

Optional support

Total magnification = eyepiece $\times$ objective. A bigger image is not always a clearer image. Describe what you can see before you explain it.

Make one precise correction to the same work after feedback.

[Open worksheet pages](#)[Model after first attempt](#)

What changed in your thinking?

In one sentence, explain why a bigger image is not always a better-resolved image.

- 1** Point to one improvement in your work.
- 2** Choose what you want to revisit.
- 3** Tell your teacher; agree the next step together.

Retrieval and prediction check

- 1 A microscope.
- 2 Greater magnification, e.g. a higher-power lens or enlarging a print.

No — size and detail are different

[Return to Starter](#)

Check the deciding clue

×400

Correct relationship. Now state which two lens values were multiplied.

Compare your reason. Correct one step if needed.

[Return to We Do](#)

Our shared reasoning

With a $\times 10$ eyepiece: $\times 4$ gives $\times 40$; $\times 40$ gives $\times 400$. The field of view shrinks. A larger image is not automatically clearer.

[Return to shared task](#)

Compare after your first attempt

The total magnification changes from $\times 40$ to $\times 400$ because $10 \times 40 = 400$. The field of view becomes smaller, so less of the specimen is visible. The image appears larger, but improved resolution depends on the optics and focus, not magnification alone. The digital model does not reproduce real specimen preparation or optical limits.

Use the model to improve your explanation in your own words.

[Return to independent task](#)

Your lesson resources

Worksheet pages are stored inside this PowerPoint.

[Worksheet · page 1](#)[Worksheet · page 2](#)[Standard PDF](#)[Supported PDF](#)[Depth PDF](#)[Editable Word worksheet](#)[Open online lesson / model](#)

Named files are in this week's folder. Online lesson and video need internet.

[Optional concept video](#)

Worksheet · page 1

Use your printed copy.
Keep the first attempt.

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W3L1 | Lens detective

Monday | 09:30–10:10 | Introduce | Editable pupil sheet

Name: _____ Date: _____

Core first. Write, speak, point or dictate your own words. Keep the first attempt so you can improve it.

Optional support: Total magnification = eyepiece $\times$ objective. A bigger image is not always a clearer image. Describe what you can see before you explain it.

Work together

Choose $\times 4$ then $\times 40$ objectives with a $\times 10$ eyepiece. Predict the total each time.

1. A $\times 10$ eyepiece is used with $\times 4$, $\times 10$ and $\times 40$ objectives. Calculate the three totals.

2. A blurred image is enlarged. Does it necessarily show two close dots more clearly? Explain.

Return to task

Worksheet · page 2

Continuation is optional.
Improve the same work.

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W3L1 | Continue and improve

Use after the core questions when directed

3. Record your route: real microscope / digital model. Give one observation and one thing this route cannot establish.

Optional transfer

Why must the specimen be centred before increasing magnification?

Depth: name an assumption or limit, then say what evidence would strengthen your answer.

Improve the same work

One correction I made, and why:

My request for next time: _____

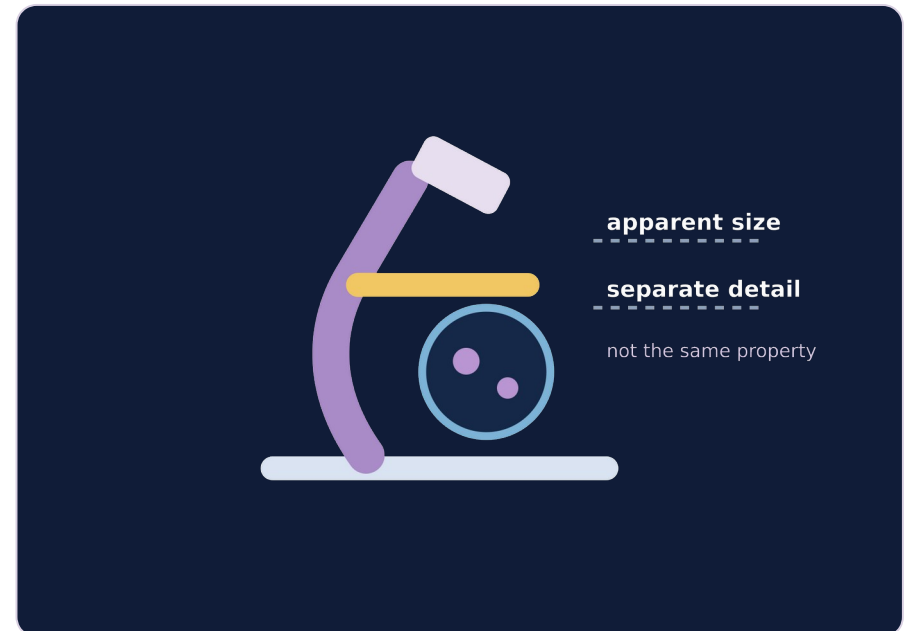
Return to task

Watch, pause and explain

Microscopy

What is the difference between making an image bigger and resolving more detail?

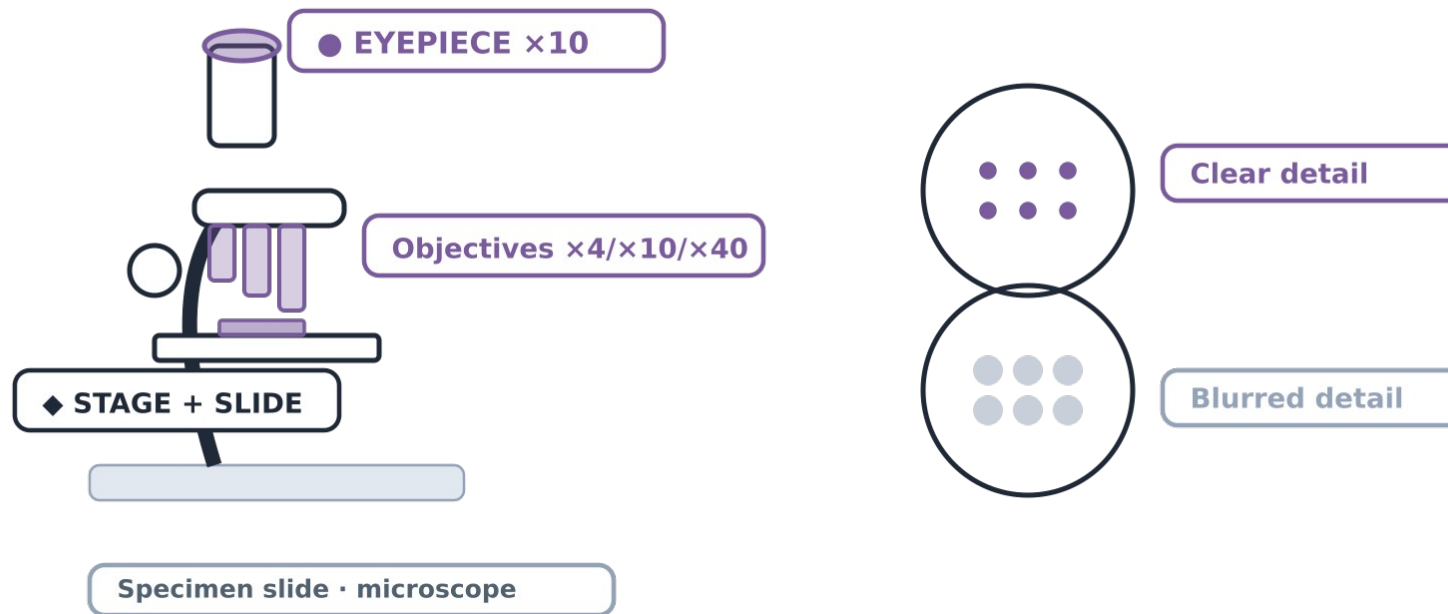
Play freesciencelessons video



No connection? Use the still model and explain the same question.

Look closely at the model

A light microscope on the bench



A model illustration: use the stated data for calculations.

[Return to I Do](#)