

2.2 Size of specimens

Name: _____ Class: _____ Date: _____

Total: 9 marks

KEY WORDS magnification

• specimen

• size of specimens

• cells

• tissue

Objective

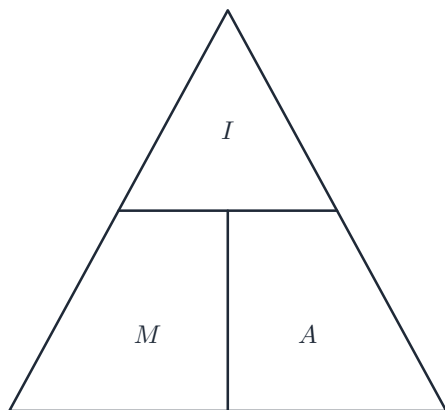
Build the skills to answer exam questions on the **size of specimens** – the **magnification** formula and converting units.

You must be able to:

- use magnification = image size ÷ actual size (and rearrange it)
- convert between mm and μm
- give magnification as a number with no unit

1 Key knowledge and worked examples

■ Magnification



I = image size

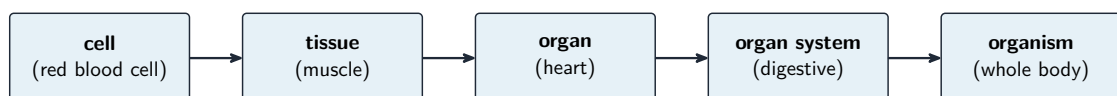
M = magnification

A = actual size

$$M = \frac{I}{A}$$

cover a letter to get its formula

Cover the quantity you want: magnification = image ÷ actual; actual = image ÷ magnification



Cells make tissues, organs and organ systems

Image 5.00 mm at $\times 250$: actual = $\frac{5.00}{250} = 0.02 \text{ mm} = 20 \text{ } \mu\text{m}$.

Units: 1 mm = 1000 μm . Always use the same unit before dividing.

2 Practice

2.1 Write the formula for magnification. [1]

2.2 Convert 0.05 mm into μm . [1]

3 Exam-style questions

3.1 Magnification has the unit: [1]

- ☐ **A** mm
B μm
C no unit
D cm

3.2 A cell has an actual size of 40 μm . It is drawn 20 mm wide.

(a) Convert the actual size to mm. [1]

(b) Calculate the magnification of the drawing. [2]

3.3 A structure is shown at $\times 400$ and its image size is 8.0 mm. Calculate its actual size in μm . [3]

Solutions

Each answer shows the steps, then the **result**.

2.1

$$\text{magnification} = \frac{\text{image size}}{\text{actual size}}$$

2.2

- $1 \text{ mm} = 1000 \text{ } \mu\text{m}$

$$0.05 \text{ mm} \times 1000 = \mathbf{50 \text{ } \mu\text{m}}$$

3.1 C

- magnification is a **ratio**, so it has **no unit**
- A, B and D are length units

3.2

(a)

$$40 \text{ } \mu\text{m} = \frac{40}{1000} \text{ mm} = \mathbf{0.04 \text{ mm}}$$

(b)

$$\text{magnification} = \frac{\text{image size}}{\text{actual size}} = \frac{20 \text{ mm}}{0.04 \text{ mm}} = \times \mathbf{500}$$

3.3

- $\text{actual} = \text{image} / \text{magnification}$

$$\frac{8.0 \text{ mm}}{400} = 0.02 \text{ mm}$$

- $0.02 \times 1000 = \mathbf{20 \text{ } \mu\text{m}}$