

Full Higher Separate content. ★ = Higher Tier. ◆ = Separate Science only.

Q1. Write the formula for calculating magnification.

[1 mark]

Q2. A cell image is 45 mm long at $\times 300$ magnification. (a) Calculate the actual cell length in mm. (b) Convert this to μm .

[3 marks]

Q3. Describe how to prepare a slide of onion cells for viewing under a light microscope.

[3 marks]

★ HIGHER TIER

Q4. ★ Compare light and electron microscopes in terms of magnification, resolution and suitability for different purposes.

[4 marks]

Total: 11 marks

Q1 (1 mark)

Write the formula for calculating magnification.

- Magnification = Image size ÷ Actual size [1]

Q2 (3 marks)

A cell image is 45 mm long at $\times 300$ magnification. (a) Calculate the actual cell length in ...

- (a) Actual size = $45 \div 300 = 0.15$ mm [1]
- (b) 0.15 mm $\times 1000 = 150$ μm [1]
- Units stated correctly in both answers [1]

Q3 (3 marks)

Describe how to prepare a slide of onion cells for viewing under a light microscope.

- Cut a thin section of onion epidermis / peel a single layer [1]
- Place on a glass slide with a drop of water / iodine stain [1]
- Carefully lower a coverslip at 45° to avoid air bubbles [1]

Q4 (4 marks) [★ HT]

★ Compare light and electron microscopes in terms of magnification, resolution and suitability...

- Light: max $\sim \times 1500$; electron: much higher ($\times 500,000+$) [1]
- Light: resolution ~ 200 nm; electron: ~ 0.1 nm — can resolve much finer detail [1]
- Light: can view living cells; electron: must be dead, in vacuum, complex preparation [1]
- Electron microscope used to study organelle ultrastructure (e.g. cristae of mitochondria, ribosomes) not visible with light [1]