

Microscopy and measuring cells: practice questions

6 questions · 18 marks · mark scheme at the back

For Edexcel GCSE Biology 1BI0 and Combined Science 1SC0. **Triple only** is not in Combined Science. **Higher tier** is only on the Higher paper.

Name

Total / 18

- 1** Explain how the development of electron microscopes has increased our understanding of cells. [3 marks]

- 2** Explain when it is appropriate to use an estimation in biology. Give one example. [2 marks]

- 3** A mitochondrion is 2 μm long. What is this length in nanometres? [1 mark]

- A. ☐ 0.002 nm
B. ☐ 20 nm
C. ☐ 2000 nm
D. ☐ 2 000 000 nm

- 4** A student makes a drawing of a plant cell. The drawing is 36 mm wide. The magnification is $\times 400$. Calculate the real width of the cell. Give your answer in μm . [3 marks]

Answer =

5

Higher tier

[3 marks]

A cell has a real diameter of 3.2×10^{-5} m. Its image has a diameter of 6.4×10^{-3} m. Calculate the magnification. Show your working.

Answer =

[illegible]

6

Describe how you would prepare a slide of onion epidermis cells, use a light microscope to observe the cells and make a labelled scientific drawing. **[6 marks]**

[illegible]

Mark scheme

One mark for each point unless a maximum is given. Words in brackets are not needed for the mark.

1. [3]

- electron microscopes have a higher magnification / higher resolution than light microscopes (1)
- so sub-cellular structures can be seen in more detail / more clearly (1) allow example, such as ribosomes or the inside of mitochondria
- so scientists can understand the roles / functions of sub-cellular structures (1)

2. [2]

- when an exact value is not needed / when it is not possible to find an exact value / to check a calculation is sensible (1)
- example, such as estimating the number of cells in a sample by counting a small area / rounding to one significant figure to check an answer (1)

3. [1]

C C 2000 nm (1)

4. [3]

- real size = image size $\div$ magnification (1)
- $36 \div 400 = 0.09$ mm (1)
- $0.09 \times 1000 = 90$ μm (1) correct answer in μm gains full marks; 0.09 mm with no conversion gains 2 marks

5. [3] **Higher tier**

- magnification = size of image $\div$ size of real object (1)
- $(6.4 \times 10^{-3}) \div (3.2 \times 10^{-5})$ (1)
- $\times 200$ (1) allow 200 / 2×10^2 ; correct answer with no working gains full marks

6. [6]

Level 3 5-6	A detailed, logical description covering preparing the slide, using the microscope correctly and producing a drawing. Correct technical terms are used throughout.
Level 2 3-4	A description that covers two of the three areas with some detail, or all three areas with limited detail. Some correct technical terms.
Level 1 1-2	A few isolated points about the method, with little detail or order.

Indicative content

- put a drop of water or stain (for example iodine solution) on a slide
- peel a thin layer of epidermis and lay it flat on the slide using forceps
- lower the coverslip at an angle (with a mounted needle) to avoid trapping air bubbles
- place the slide on the stage and select the lowest power objective lens
- focus using the coarse focus then the fine focus
- change to a higher power objective and use only the fine focus
- draw with a sharp pencil, clear continuous lines, no shading, drawn large
- label with ruled lines that touch the structures, add a title and the magnification