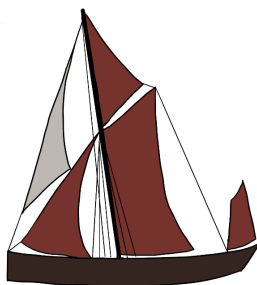

MICROSCOPY & MAGNIFICATION MARK SCHEME

Science Exams Sorted



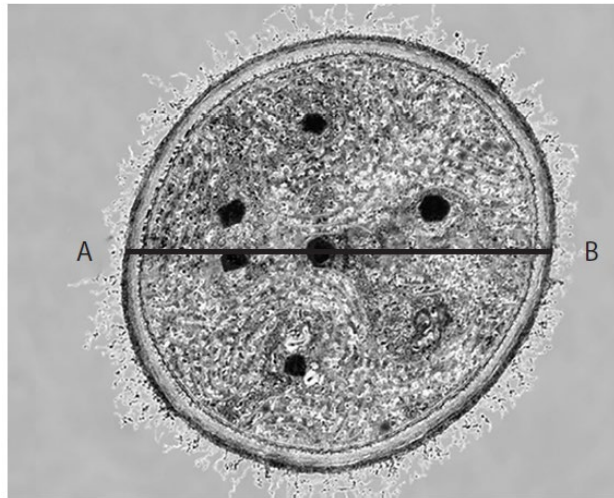
2021

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Microscopy & Magnification Mark Scheme

1. The figure below shows a cyanobacterium magnified 50 000 times.

The line AB shows the diameter of the bacterial cell.



Calculate the actual diameter of the cyanobacterium.

Give your answer in micrometres (μm).

Measurement: 60 (mm) / 6.0 cm	(1)
Conversion: 65 mm = 60 000 μm	(1)
Division: 60 000 $\div$ 50 000	(1)
1.2 (μm)	(3)
Correct answer on answer line with no working scores 3 marks.	
	Total: 3 marks

Edexcel 2019 Higher Paper 1 Q5 b i

2. The figure below shows a root tip with cells in different stages of mitosis.

The image was magnified 400 $\times$.

Explain how a magnification of 400 $\times$ can be obtained using the lenses on a light microscope.

Selection of 40 x objective lens	(1)
Combines with 10 x eye piece lens.	(1)
	Total: 2 marks

Edexcel 2018 Higher Paper 1 Q6 c

Microscopy & Magnification Mark Scheme

3. A light microscope is used to magnify a cell.

a. The actual width of the cell before it is magnified is 0.02 mm.

After magnification the width of the image seen is 3 mm.

Calculate the magnification of this cell.

$3 \div 0.02$	(1)
(X)150	(1)
	Total: 2 marks

b. The diagram shows a light microscope.

Describe how the light microscope is used to obtain clear, detailed images of cells.

Marking guidance		
Level	Marks	Descriptor
Level 1	1 - 2	A limited description that names at least two parts of the microscope or at least one step involved in using a microscope.
Level 2	3 - 4	A simple description that links at least three steps involved, in a logical order, in using a microscope.
Level 3	5 - 6	A detailed description that links most steps involved in using the microscope, in a logical order, to give a clear, detailed image.

A description which includes some of the following points:	
• Prepare microscope slide. • Place the slide on the stage. • Select the smallest objective lens. • Look through the eyepiece. • Adjust the light source. • Use focusing wheel to obtain a clear image. • Move slide to view cells. • Change objective lens to increase magnification. • Refocus to obtain clear image.	
	Total: 6 marks

Edexcel 2018 January Foundation Paper 2 Q5 b

Microscopy & Magnification Mark Scheme

4. The diagram shows a zygote.

The diameter of the diagram is 35 mm. The diagram is 5000 times larger than the actual zygote. Calculate the diameter of the zygote.

35 ÷ 5000	(1)
0.007/7 x 10 ⁻³ (mm)	(1)
	Total: 2 marks

Edexcel 2017 Foundation Paper 2 Q4 b ii

5. The photographs show a 350 year old light microscope and a modern light microscope.
- a. Suggest how the modern light microscope helps us to see cells in greater detail than the 350 year-old microscope. Use the photographs to help you.

Any two linked statements from the following:	
Focusing wheel.	(1)
For sharper/clearer image.	(1)
More/better/stronger (objective) lenses.	(1)
Greater magnification.	(1)
Or	
Electric light.	(1)
Brighter/clearer image.	(1)
Or	
Stage/stage clips.	(1)
Holds the slide steady.	(1)
Or	
Light underneath.	(1)
Brighter/clearer image/ light goes through the slide.	(1)
	Total: 2 marks

Microscopy & Magnification Mark Scheme

- b. Complete the sentence by putting a cross (x) in the box next to your answer. Structures in bacterial cells are so small they can only be seen using

B – an electron microscope.	(1)
	Total: 1 mark

- c. The photograph shows an animal cell magnified using a modern light microscope.
The magnified animal cell has a diameter of 30 mm. The actual diameter of the animal cell is 0.1 mm.

Calculate how many times the animal cell has been magnified.

$30 \div 0.1$	(1)
300	(1)
	Total: 2 marks

Edexcel 2014 Foundation Paper 2 Q3 a i, ii & b i

6. Bacteria are microscopic organisms.

- a. State a part of the light microscope that magnifies the bacteria.

Objective lens / eye piece lens.	(1)
	Total: 1 mark

- b. Photograph A was taken using a light microscope and photograph B was taken using an electron microscope.

Describe two advantages of using an electron microscope to view bacteria.

A description including two of the following:	
Image has more clarity/is clearer. Accept: more focussed.	(1)
More detail can be seen. Accept: named bacterial cell components	(1)
Larger image can be seen. Accept: idea of greater magnification.	(1)
	Total: 2 marks

Edexcel 2013 Foundation Paper 2 Q2 c i & ii

Microscopy & Magnification Mark Scheme

7. The diagram shows a light microscope.

- a. Complete the sentence by putting a cross (x) in the box next to your answer. The focusing wheel is used to

D – produce a clear detailed image.	(1)
	Total: 1 mark

The diagram shows an animal cell as seen using a light microscope.

- b. The length of this cell before it is magnified is 0.005 mm. Calculate the length of the image after it has been magnified x400.

2 (mm)	(1)
	Total: 1 mark

Edexcel 2012 November Foundation Paper Q2 a

8. The figure below shows a plant cell drawn to scale.

Calculate the length of the chloroplast labelled in the figure above.

An answer of 6 / 6.25 / 6.3 scores 2 marks	(2)
	Total: 2 marks

AQA 2018 Foundation Paper 1 Q2 (iii)

9. Ribosomes and mitochondria are not shown in the figure below.

- a. What type of microscope is needed to see ribosomes and mitochondria?

Electron (microscope).	(1)
	Total: 1 mark

- b. What is the advantage of using the type of microscope you named in part (a)?

Tick one box.

Higher magnification.	(1)
	Total: 1 mark

Microscopy & Magnification Mark Scheme

The cheek cell in the figure below is magnified 250 times. The width of the cell is shown by the line D to E.

Calculate the width of the cheek cell in micrometres (μm). Complete the following steps.

- c. Measure the width of the cell using a ruler.

45 (mm)	(1)
	Total: 1 mark

- d. Work out the real width of the cell in mm.

45 / 250 or 0.18 (mm)	(1)
	Total: 1 mark

- e. Convert mm to μm .

180 (μm)	(1)
	Total: 1 mark

- f. A red blood cell is 8 μm in diameter.

A bacterial cell is 40 times smaller.

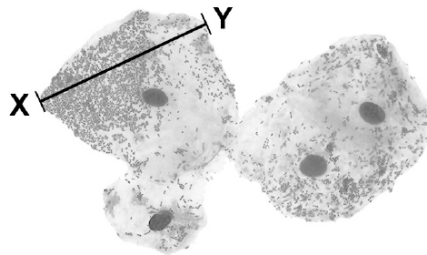
Calculate the diameter of the bacterial cell. Tick one box.

0.2 μm	(1)
	Total: 1 mark

AQA 2018 Specimen Foundation Paper 1 Q3 iii, iv & v

Microscopy & Magnification Mark Scheme

10. The figure below shows some different cells.



- a. The real length from point X to point Y is 0.06 mm

Calculate the magnification.

Use the equation: $\text{magnification} = \frac{\text{size of image}}{\text{real size of object}}$

24 (mm) or 2.4 (cm)	(1)
$24 \div 0.06$	(1)
$\times 400$	(1)
An answer of ($\times$) 400 scores 3 marks An answer of ($\times$) 40 scores 2 marks	
	Total: 3 marks

- b. The cells shown in the figure above were viewed using a light microscope.

Give two advantages of using an electron microscope instead of a light microscope.

High(er) magnification.	(1)
Ignore bigger / zoom	
High(er) resolution or high(er) resolving power.	(1)
Allow see more detail	
	Total: 2 marks

AQA 2019 Higher Paper 1 Q1 (v – vi)