



2: Cells as the basic units of life – Topic questions

The questions in this document have been compiled from past papers, as indicated in the table below.

Use these questions to formatively assess your learners' understanding of this topic.

Question	Year	Series	Paper number
1	2017	May/June	21
3(c)(d)	2017	May/June	22
6	2016	May/June	21

The mark scheme for each question is provided at the end of the document.

- 1 (a) Each of the statements **A** to **D** describes a structure found in eukaryotic cells.

Identify the structure that is described in each statement.

A An organelle that contains 70S ribosomes.

.....

B A thread-like structure composed of DNA and histone proteins.

.....

C The organelle that modifies and packages proteins for secretion.

.....

D The structure that synthesises rRNA and combines it with proteins.

.....

[4]

- (b) Prokaryotes and plant cells have cell walls.

Outline the composition of the cell wall of a prokaryote **and** the composition of the cell wall of a plant cell to show how they differ.

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.....

[2]

[Total: 6]

3 Malaria is a disease caused by the protocist, *Plasmodium*. The organism has a very complex life

Fig. 3.1 is a transmission electron micrograph showing the developing *Plasmodium* cells inside a protective structure known as an oocyst. In this stage of the life cycle the oocysts are found in the mosquito gut. When mature, the *Plasmodium* cells are released and travel to the salivary glands of the mosquito.

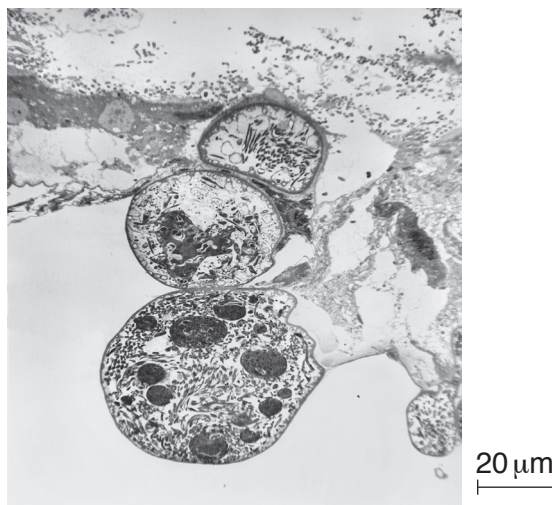


Fig. 3.1

(c) The magnification used in Fig. 3.1 can also be obtained using a light microscope.

Suggest why an electron microscope was used to obtain this image instead of a light microscope.

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.....

.....[2]

(d) Use the scale bar to calculate the magnification of the image shown in Fig. 3.1.

Write down the formula and use it to make your calculation. Show your working.

formula

magnification ×[3]

[Total: 5]

- 6 Fig. 6.1 shows an incomplete diagram of the fluid mosaic model of membrane structure. The diagram shows the cell surface membrane of a eukaryotic cell.

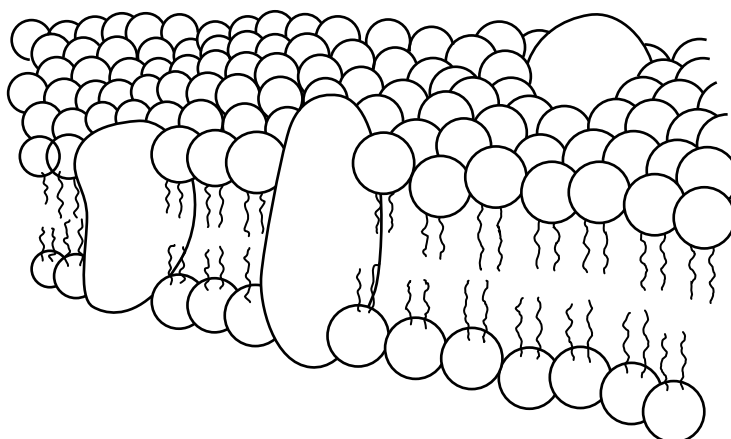


Fig. 6.1

- (a) State what is meant by the term fluid mosaic.

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.....[2]

- (b) State the thickness of a cell surface membrane.

.....[1]

- (c) List four features of cell surface membranes of eukaryotic cells that are **not** visible in Fig. 6.1.

1

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2

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3

.....

4

.....[4]

[Total: 7]

Mark scheme abbreviations

;	separates marking points
/	alternative answers for the same point
A	accept (for answers correctly cued by the question, or by extra guidance)
R	reject
AW	alternative wording (where responses vary more than usual)
<u>underline</u>	actual word given must be used by candidate (grammatical variants accepted)
max	indicates the maximum number of marks that can be given
ora	or reverse argument
mp	marking point (with relevant number)
ecf	error carried forward
I	ignore
AVP	alternative valid point

Question	Answers	Marks
1(a)	A chloroplast / mitochondrion ; B chromosome(s) / chromatid / chromatin ; C Golgi (body / apparatus / complex) ; D nucleolus ;	4
1(b)	<i>max 1 if only written about prokaryote wall or only about plant wall</i> 1 prokaryote cell wall has, <u>peptidoglycan</u> / <u>murein</u> ; 2 plant cell wall has, cellulose / polymer of <u>β</u> glucose ; I lignin 3 AVP ; e.g. prokaryote wall is made of chains crossed linked by, peptides / amino acids hydrogen bonds between cellulose molecules (within microfibrils) in plant cell wall A cellulose chains other components such as pectins / hemicelluloses in plant cell walls	max 2
		Total: 6

Question	Answer	Marks
3(c)	<p><i>look for ora</i></p> <p>1 higher / better / AW, resolution / resolving power ;</p> <p>2 $\left\{ \begin{array}{l} 0.5 \text{ nm (A } 0.2\text{--}1 \text{ nm) compared to, } 200 \text{ nm } 0.2 \mu\text{m (A range } 100\text{--}300 \text{ nm)} \\ \text{or} \\ \text{electrons have shorter wavelength ;} \\ \text{R electron microscope has a shorter wavelength} \\ \text{or} \\ \text{idea that cell structures too small to interfere with light waves ora} \end{array} \right\}$</p> <p>3 better able to distinguish between two points ; A as a definition if mp 1 achieved</p> <p>4 (can see) more detail ; <i>treat 'clearer' as neutral</i></p> <p>5 able to make thinner sections / able to see inside (oocyst) ;</p> <p>6 can continue to obtain higher magnifications and see more detail ;</p>	max 2
3(d)	<p>(magnification =) $\frac{\text{image / scale bar (length)}}{\text{actual / object (length)}}$; A triangle / letters only</p> <p>(x) 500 ; <i>using 10mm as measured length</i> A calculated values for measured length of 9mm or 11 mm allow one mark if correct answer given with units allow one mark if incorrect answer and correct measurement and correct working correct measurement and formula but incorrect conversion measurement $\pm 2 \text{ mm}$ and correct working</p>	3

Question	Answers	Marks
6(a)	fluid phospholipids (and proteins), move / AW ; mosaic proteins / glycoproteins, scattered / AW (in the phospholipid bilayer) ; A different types of proteins I pattern unqualified	2
6(b)	7 nm ; A any size or range within 6 nm and 10 nm A 7 nanometres	1
6(c)	cholesterol ; unsaturated fatty acids ; A phospholipid tails carbohydrate chains added to protein(s) / glycoproteins ; A oligosaccharides <i>for carbohydrate chains</i> carbohydrate chains added to lipids / glycolipids ; glycocalyx ; channel protein(s) / AW ; A aquaporin(s) ; carrier proteins / AW ; peripheral / extrinsic, proteins ; attachment to, cytoskeleton / microfilaments ; receptor(s) ; antigen(s) ; AVP ;	Max 4
		Total: 7