



CHEMISTRY ONLINE
— **TUITION** —

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BIOLOGY

BIOLOGICAL MOLECULES

LEVEL & BOARD:	AQA (A - LEVEL)
TOPIC:	Lipids
PAPER TYPE:	QUESTION PAPER 2
TOTAL QUESTIONS	05
TOTAL MARKS	37

Lipids - 2

1. a) The characteristics of the bacterium and human immunodeficiency virus' HIV particles are shown in Table 1.

To complete table 1, add a tick indicating where the feature is present. [2 marks]

Table 1

Feature	Bacterium	Human immunodeficiency virus (HIV) particle
RNA		
Cell wall		
Enzyme molecules		
Capsid		

b) When HIV infects a human cell, the following events occur.

- The length of HIV DNA is made up of a single strand.
- A complementary strand to HIV DNA can then be formed by the human cell.

The complementary strand shall be developed in the same manner as new complementary strands are created during a selective replication of human DNA.

Describe how a complementary section of HIV DNA is created. [3 marks]

c) To give you three differences, compare the structure of DNA and mRNA.

[3 marks]

1)

2)

3)

2. a) Explain how different the structure of triglycerides and phospholipids is.

[1 mark]

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b) Tell me how you'd test for the presence of lipids in a sample of food.

[2 marks]

c) Triglycerides are present in animal fats, and have a large proportion of unsaturated fatty acids. Absorption of fat digestion products may increase a person's risk for obesity if he has too much fat in his diet. Fat substitutes may be used to replace triglycerides in food for the purpose of weight loss.

Explain why saturated fat is different from unsaturated fat.

[1 mark]

The structure of a fat substitute is shown in Figure 1.

Figure 1



d) It is not possible for lipase to digest that fat substitute in the gut.

Suggest why?

[2 marks]

e) This fat substitute is a lipid. Despite having a lipid, it is unable to cross the surface membrane of cells that line the gut.

Explain to him why it is not able to cross cell surface membranes. **[1 mark]**

3. In order for cells to produce energy, they continuously hydrolyse ATP.

a) Tell us how in the cell ATP is resynthesized. **[2 marks]**

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b) Explain the two ways in which cellular ATP hydrolysis is carried out.

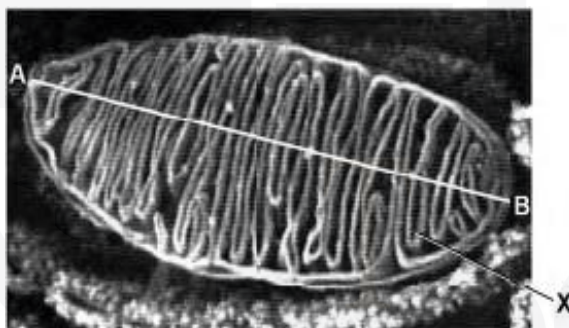
[2 marks]

1)

2)

c) The image, shown in Figure 2, is a scanned electron micrograph of mitochondrion taken from the microscope.

Figure 2



What is the evidence that this image was taken with a scanning electron microscope, as shown in Figure 2? [1 mark]

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d) In Figure 2, identify the portion of mitochondrion known as X. [1 mark]

e) The distance of the mitochondrion from point A to B in Figure 2 is 4 μ m.

In Figure 2, how much magnification do the mitochondria have?

Show your working.

[2 marks]

Magnification

4. a) The ways in which substances may travel through membranes are represented by the letters P, Q, R, S and T.

- P – diffusion through the phospholipid bilayer
- Q – facilitated diffusion
- R – active transport
- S – co-transport
- T – osmosis

Select the letter representing the manner in which the substance will move through a membrane for each of these transport examples on membranes.

Put the appropriate letter in each of the boxes set out.

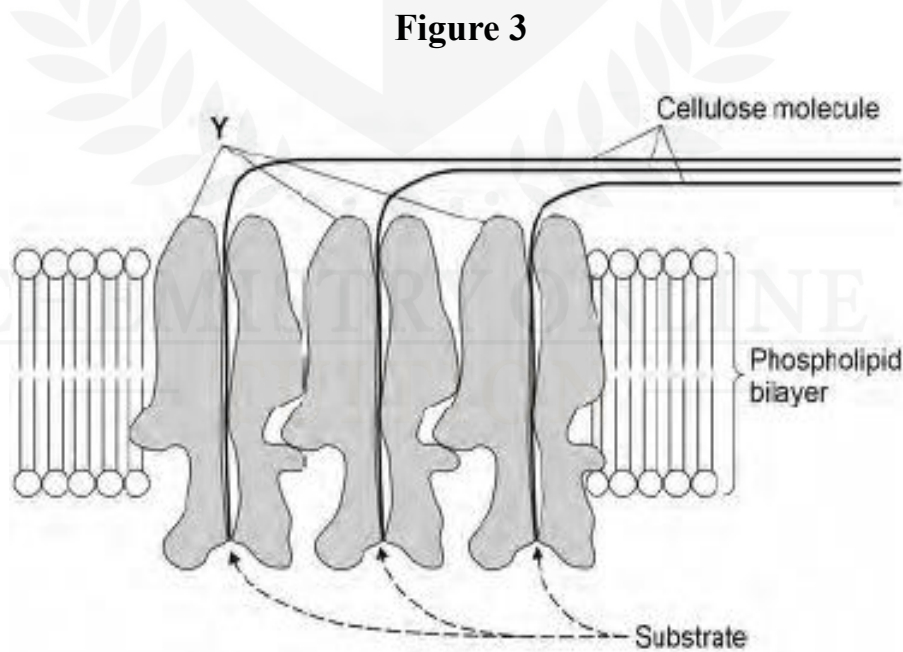
[3 marks]

Transport through a channel protein

Transport of small, non-polar molecules

Transport of glucose with sodium ions

The way a plant cell generates its wall of cells is shown in **Figure 3**



b) Y's a protein, that's what it is. Transporting cellulose molecules through the phospholipid bilayer is one of Y's functions.

Tell us about the other functions of Y, using information from **Figure 3**.

[2 marks]

c) What is the evidence on Figure 3 that this phospholipid bilayer appears to be part of the cell surface membrane? **[1 mark]**

d) Bonds keep cellulose molecules in the cell wall together, side by side.

Tick () one box that describes the type of bond that holds the cellulose molecules together side by side. **[1 mark]**

Ester

Hydrogen

Ionic

Peptide

5. Scientists investigated the hydrolysis of sucrose in growing plant cells by an enzyme called SPS.

a) Name the sucrose products that have been hydrolysed. **[2 marks]**

1)

2)

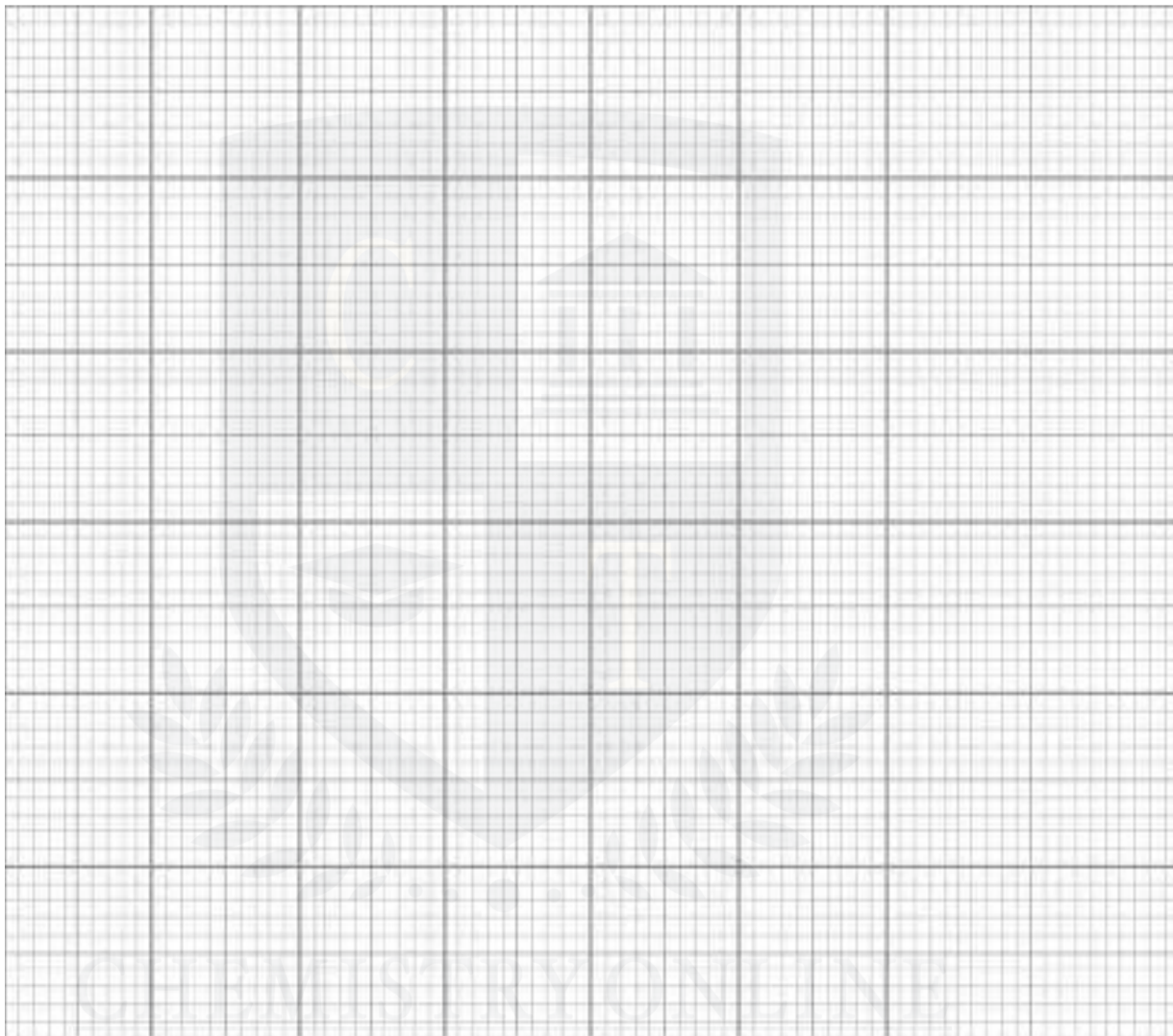
b) Scientists have been growing plant cells in a culture for 12 days. In the beginning, there was just a few cells in this culture. Each day, they determined the mass of sucrose hydrolysed by SPS in the plant cells in 1 hour.

The results are shown in Table 2.

Table 2

Day	Mass of sucrose hydrolysed by SPS in 1 hour / μg	Rate of hydrolysis of sucrose by SPS
0	0.07	
2	0.09	
4	0.11	
6	0.15	
8	0.20	
10	0.24	
12	0.24	

Calculate the rate per minute of the reaction measured by SPS for each day. You can record your rates in standard form and draw a suitable graph from the data you've processed. **[3 marks]**



c) From that data, what can you find out about the growth of plant cells? Let us know how you came to your conclusions. **[3 marks]**



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