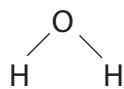


2 Water is a polar molecule. The diagram shows a molecule of water.



(a) Complete the diagram to show the dipole nature of this water molecule. (2)

(b) Name the type of reaction in which a molecule of water is involved in the breaking of a bond in another molecule. (1)

(c) Explain how the properties of water make it an ideal transport medium. (3)

**(Total for Question 2 = 6 marks)**

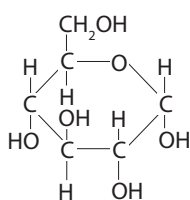


Answer ALL questions.

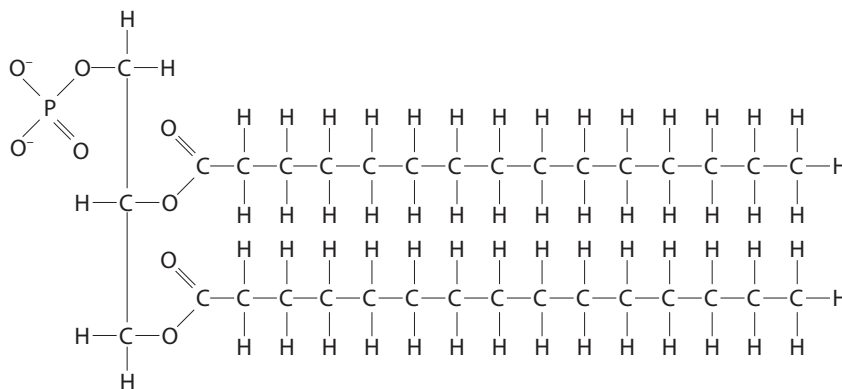
Write your answers in the spaces provided.

Some questions must be answered with a cross in a box . If you change your mind about an answer, put a line through the box  and then mark your new answer with a cross .

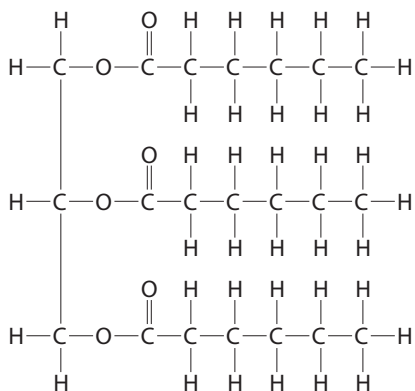
1 The diagram shows four molecules that can be found in living organisms.



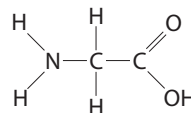
**A**



**B**



**C**



**D**

(a) (i) How many of these molecules contain three elements only?

- A** one  
 **B** two  
 **C** three  
 **D** four

(1)

(ii) State how an unsaturated lipid differs from molecule **C**.

(1)

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(iii) Which of these molecules is transported by tRNA?

(1)

- A
- B
- C
- D

(iv) Which of these molecules could be joined to another molecule of the same type by a peptide bond?

(1)

- A
- B
- C
- D

(v) Which of these molecules is a component of maltose?

(1)

- A
- B
- C
- D

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P 5 1 7 9 5 A 0 3 2 8

(b) Diffusion and active transport are mechanisms by which molecules can enter cells.

Compare and contrast these two mechanisms.

(3)

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**(Total for Question 1 = 8 marks)**



**3** Blood plasma contains glucose dissolved in water. Glucose is a polar molecule that is taken up by muscle cells and used in the synthesis of glycogen.

(a) Explain why water is a good solvent.

(2)

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(b) Describe how glucose enters muscle cells through the cell membrane.

(2)

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- (c) The ratio of glucose to glycogen inside a cell can affect the uptake of water by the cell. This results in a change in cell mass.

Cells with different ratios of glucose to glycogen were placed in tissue fluid and the percentage change in cell mass was recorded.

Ratio of glucose to glycogen	Percentage change in cell mass (%)
100:0	25.0
80:20	16.5
60:40	4.0
40:60	0.0
20:80	0.0

Analyse the data to explain the effect of these ratios on the percentage change in cell mass. (3)

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(d) Glucose is used in the synthesis of glycogen in muscle cells.

(i) Describe the formation of glycogen from glucose.

(2)

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(ii) Describe how the structure of glycogen is related to its function as a storage molecule.

(2)

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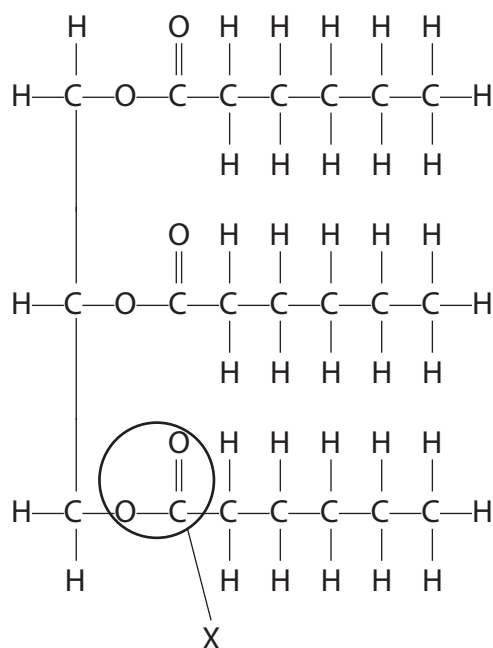
**(Total for Question 3 = 11 marks)**



6 Hydrolytic enzymes are released by organs in the digestive system.

(a) Cells in the pancreas and small intestine synthesise lipase. Lipase hydrolyses lipids in food.

The diagram shows a triglyceride molecule.



(i) Which of the following is the name of the bond labelled X?

(1)

- A ester bond
- B glycosidic bond
- C hydrogen bond
- D phosphodiester bond

(ii) Name the process by which enzymes leave the cells of the pancreas and small intestine.

(1)

(iii) Explain why the pH in the small intestine would change after lipase hydrolyses lipids.

(2)





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(b) The triglyceride in the diagram can combine with protein to form a lipoprotein.

Explain the effect that large quantities of this lipoprotein would have on blood cholesterol levels.

(4)

Area with horizontal dotted lines for writing the answer.



(c) Glycogen and starch can be hydrolysed by enzymes.

Which row shows the correct features of the structure of glycogen?

(1)

<input type="checkbox"/> A	1,4-glycosidic bonds only	branched
<input type="checkbox"/> B	1,6-glycosidic bonds only	unbranched
<input type="checkbox"/> C	1,4-glycosidic bonds and 1,6-glycosidic bonds	branched
<input type="checkbox"/> D	1,4-glycosidic bonds and 1,6-glycosidic bonds	unbranched

(d) Starch contains two different molecules, amylose and amylopectin. The percentage of each molecule found in starch varies depending on its source.

The effect of amylose content on the hydrolysis of starch from different sources by enzymes was investigated.

Source of starch	Amylose content (%)	Percentage of starch hydrolysed after 4 hours (%)
Cassava	20.0	51.9
Peruvian carrot	18.7	54.2
Potato	28.9	39.6
Yellow maize	35.8	37.5

(i) Calculate the ratio of amylose to amylopectin in cassava. Give your answer in simplest form.

(1)

Answer .....



(ii) Explain the relationship between the composition of the starch and the rate of hydrolysis by enzymes.

(4)

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**(Total for Question 6 = 14 marks)**



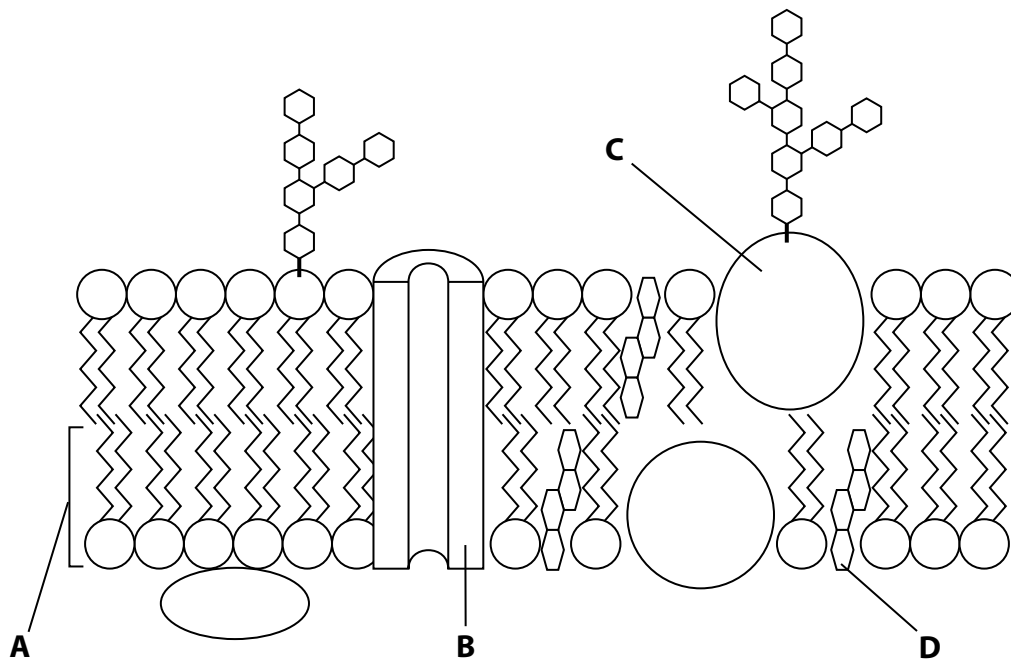
**Answer ALL questions.**

**Write your answers in the spaces provided.**

**Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.**

**1** Cell membranes are involved in the transport of molecules.

The diagram shows the structure of a cell membrane.



(a) Which letter in the diagram labels a phospholipid?

(1)

- A
- B
- C
- D

(b) Which of the following statements is true about a phospholipid?

(1)

- A it has a hydrophobic tail of three fatty acids
- B it has a hydrophilic tail of three fatty acids
- C it has a hydrophobic tail of two fatty acids
- D it has a hydrophilic tail of two fatty acids

(c) Describe how the structure labelled **B** is involved in passive transport.

(3)

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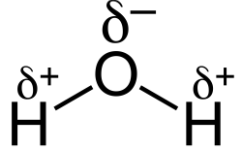
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**(Total for Question 1 = 5 marks)**

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Question Number	Answer	Additional Guidance	Mark
2(a)	<ul style="list-style-type: none"> <li>correct symbol and charge on the oxygen atom (1)</li> <li>correct symbol and charge on both hydrogen atoms (1)</li> </ul>	e.g.  ALLOW one mark for all correct charges without symbols	(2)

Question Number	Answer	Additional Guidance	Mark
2(b)	<ul style="list-style-type: none"> <li>hydrolysis (reaction)</li> </ul>		(1)

Question Number	Answer	Additional Guidance	Mark
2(c)	An explanation that makes reference to the following: <ul style="list-style-type: none"> <li>water is a solvent (1)</li> <li>because water molecules surround { polar molecules / ions } / hydrogen bonds form between water molecules and solute molecules (1)</li> <li>water is liquid so has the ability to flow (1)</li> </ul>	ALLOW allows { polar / ionic molecules / ions } to dissolve  ALLOW separation of ions by water molecules  ALLOW reference to cohesion between water molecules	(3)

Question Number	Answer	Mark
1(a)(i)	<p><b>The only correct answer is B which is two</b></p> <p><i>A is not correct because it contains just C, H, O</i></p> <p><i>C is not correct because it contains just C, H, O</i></p> <p><i>D is not correct because it also contains N</i></p>	(1)

Question Number	Answer	Additional Guidance	Mark
1(a)(ii)	would contain double bonds between the carbons (in a fatty acid chain) / C=C	ALLOW kink(s) in {fatty acid / hydrocarbon }chain	(1)

Question Number	Answer	Mark
1(a)(iii)	<p><b>The only correct answer is D which is an amino acid</b></p> <p><i>A is not correct because it is not an amino acid so not transported by tRNA</i></p> <p><i>B is not correct because it is not an amino acid so not transported by tRNA</i></p> <p><i>C is not correct because it is not an amino acid so not transported by tRNA</i></p>	(1)

Question Number	Answer	Mark
1(a)(iv)	<p><b>The only correct answer is D which is an amino acid</b></p> <p><i>A is not correct because it is not an amino acid so not joined together by peptide bonds</i></p> <p><i>B is not correct because it is not an amino acid so not joined together by peptide bonds</i></p> <p><i>C is not correct because it is not an amino acid so not joined together by peptide bonds</i></p>	<b>(1)</b>

Question Number	Answer	Mark
1(a)(v)	<p><b>The only correct answer is A which is glucose</b></p> <p><i>B is not correct because it is not a glucose molecule so not a component of maltose</i></p> <p><i>C is not correct because it is not a glucose molecule so not a component of maltose</i></p> <p><i>D is not correct because it is not a glucose molecule so not a component of maltose</i></p>	<b>(1)</b>



Question Number	Answer	Additional Guidance	Mark
<b>1(b)</b>	<p>An answer that makes reference to three of the following:</p> <p><u>Similarities</u></p> <ul style="list-style-type: none"> <li>• both move molecules through the {phospholipid bilayer / cell surface membrane} (1)</li> <li>• (in both) molecules can move through proteins (1)</li> </ul> <p><u>Differences</u></p> <ul style="list-style-type: none"> <li>• diffusion occurs down a concentration gradient whereas active transport occurs against a concentration gradient (1)</li> <li>• diffusion is {passive / does not require ATP} whereas active transport requires ATP (1)</li> </ul>	<p>ALLOW { partially / semi permeable } membrane</p> <p>ALLOW diffusion from high to low concentration and active transport from low to high concentration</p> <p>ALLOW energy for ATP</p>	<b>(3)</b>

Question Number	Answer	Additional Guidance	Mark
3(a)	An explanation which includes reference to two of the following: <ul style="list-style-type: none"> <li data-bbox="383 320 1330 391">• description of water as a {polar / dipole / dipolar} molecule (1)</li> <li data-bbox="383 427 1330 497">• water surrounds (polar) molecules allowing them to dissolve (1)</li> <li data-bbox="383 534 1330 569">• hydrogen bonds form (1)</li> </ul>	ALLOW correct description of uneven charges	(2)

Question Number	Answer	Additional Guidance	Mark
3(b)	A description that makes reference to the following: <ul style="list-style-type: none"> <li data-bbox="383 786 1285 821">• carrier proteins (located in membrane) (1)</li> <li data-bbox="383 858 1285 893">• (glucose enters by) facilitated diffusion (1)</li> </ul>	ALLOW channel proteins	(2)

Question Number	Answer	Additional Guidance	Mark
3 (c)	<p>An explanation which makes reference to three of the following:</p> <ul style="list-style-type: none"> <li>• the percentage change in cell mass decreases as glucose decreases (1)</li> <li>• glucose is soluble / comparison between solubility (1)</li> <li>• higher ratio of glucose molecules has an osmotic effect (on the cell) / glycogen molecules does not have an osmotic effect (on the cell) (1)</li> <li>• water enters by osmosis (and increases cell mass) (1)</li> </ul>	<p>ALLOW converse ALLOW converse for glycogen</p> <p>ALLOW converse for glycogen</p> <p>ALLOW water molecules are not attracted to glycogen molecules ALLOW correct references to {water / osmotic / solute} potential</p>	<b>(3)</b>

Question Number	Answer	Additional Guidance	Mark
<b>3 (d)(i)</b>	A description which includes reference to the following: <ul style="list-style-type: none"> <li>• joining together in condensation reactions (1)</li> <li>• forming {1,4 and 1,6} glycosidic bonds (1)</li> </ul>		<b>(2)</b>

Question Number	Answer	Additional Guidance	Mark
<b>3 (d)(ii)</b>	A description which includes reference to the following: <ul style="list-style-type: none"> <li>• branched molecule for more rapid hydrolysis (1)</li> <li>• compact so more can be stored (1)</li> </ul>	ALLOW broken down  ALLOW 'doesn't take up much space'	<b>(2)</b>

Question Number	Answer	Additional Guidance	Mark
6(a)(i)	A – ester		(1)

Question Number	Answer	Additional Guidance	Mark
6(a)(ii)	Exocytosis	Allow exocytosis	(1)

Question Number	Answer	Additional Guidance	Mark
6(a)(iii)	An explanation that makes reference to the following: <ul style="list-style-type: none"><li>• (glycerol and) fatty acids produced (when lipids are hydrolysed) (1)</li><li>• fatty acids would cause the pH to decrease (1)</li></ul>		(2)

Question Number	Answer	Additional Guidance	Mark
<b>6(b)</b>	<p>An explanation that makes reference to:</p> <ul style="list-style-type: none"> <li>increased (blood) cholesterol (1)</li> <li>(because) the triglyceride is saturated (1)</li> <li>The lipoprotein is an LDL (1)</li> </ul> <p>And one of the following:</p> <ul style="list-style-type: none"> <li>{ lipoproteins / LDLs } transport cholesterol (1)</li> <li>LDL binds to receptors (on cell surface membranes) / LDL accumulates in blood if receptors overloaded (1)</li> </ul>	<p>Do not allow reference to HDL</p> <p>Do not allow if answers also make reference to decreased cholesterol</p> <p>Allow saturated fatty acids</p>	<b>(4)</b>

Question Number	Answer	Additional Guidance	Mark
<b>6(c)</b>	C - 1,4-glycosidic bonds and 1,6-glycosidic bonds and branched		<b>(1)</b>

Question Number	Answer	Additional Guidance	Mark
<b>6(d)(i)</b>	<ul style="list-style-type: none"> <li>correct answer (1)</li> </ul>	<p><u>Example of calculation</u></p> $100 - 20 = 80$ $20 : 80 = 1 : 4$ <p><b>1 : 4</b></p> <p>Do not allow any reference to percentages</p>	<b>(1)</b>

Question Number	Answer	Additional Guidance	Mark
<b>6(d)(ii)</b>	<p>An explanation that makes reference to four of the following:</p> <ul style="list-style-type: none"><li>• as amylose content increases the percentage of starch hydrolysed decreases (1)</li><li>• the less amylose present the greater the proportion of amylopectin (1)</li><li>• amylose is unbranched / amylopectin is branched (1)</li><li>• amylopectin contains (1,4 and) 1,6-glycosidic bonds (1)</li><li>• { branches / a greater number of terminal ends } increases the rate of hydrolysis (1)</li></ul>	<p>Allow converse</p> <p>Allow converse</p>	<p><b>(4)</b></p>

**Biology A AS Paper 1**

Question Number	Acceptable Answer	Additional guidance	Mark
<b>1(a)</b>	A		<b>(1)</b>

Question Number	Acceptable Answer	Additional guidance	Mark
<b>1(b)</b>	C		<b>(1)</b>

Question Number	Acceptable Answer	Additional guidance	Mark
<b>1(c)</b>	<p>A description that makes reference to the following:</p> <ul style="list-style-type: none"> <li>• B is a channel protein (1)</li> <li>• which allows the movement of {large / charged / polar} molecules (1)</li> <li>• by diffusion from high concentration to low concentration / down concentration gradient (1)</li> </ul>		<b>(3)</b>

(Total for Question 1 = 5 marks)