

A-Level Edexcel

BIOLOGY

UNIT 1(IAL)
2019 — 2023

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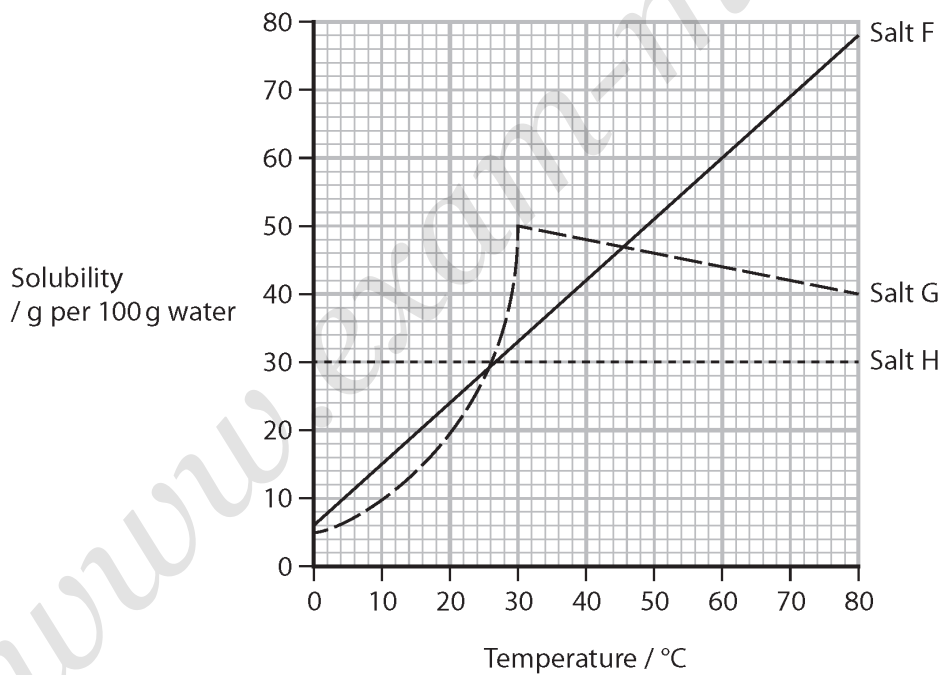
1 - ((WBI11)/1(IAL)_Summer_2019_Q1) - Molecules, Transport And Health

Water is important as a solvent for transport in living organisms.

(a) Draw a diagram of a water molecule to show its dipole nature.

(2)

(b) The graph shows the effect of temperature on the solubility in water of three salts, F, G and H, in the human diet.



(i) Describe the effect of temperature on the solubility of these three salts.

(3)

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(ii) How many times more soluble is salt G than salt H at 30°C?

(1)

- A** 15.00
- B** 1.67
- C** 1.50
- D** 0.60

2 - ((WBI11)/1(IAL)_Summer_2019_Q2) - Molecules, Transport And Health

The risk of developing cardiovascular disease (CVD) can be increased by a number of factors including diet and a history of thrombosis.

Thrombosis is the development of a blood clot in a blood vessel. Blood clots can develop in veins and then move through the circulatory system into the coronary artery.

(a) A diet high in saturated triglycerides raises the levels of cholesterol in the blood.

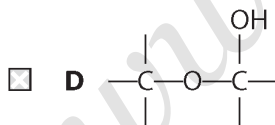
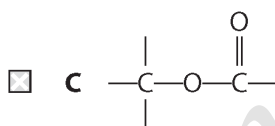
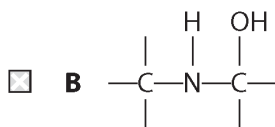
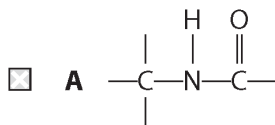
(i) What is the ratio of glycerol to fatty acid in a triglyceride molecule?

(1)

- A 1:1
- B 1:3
- C 3:1
- D 3:3

(ii) Which diagram shows the bond that joins a glycerol molecule to a fatty acid in a triglyceride?

(1)



(iii) The table gives some information about four fatty acids.

| Fatty acid | Number of double bonds between carbon atoms | Number of carbon atoms |
|-------------|---|------------------------|
| butyric | 0 | 4 |
| stearic | 0 | 18 |
| palmitoleic | 1 | 16 |
| linoleic | 2 | 18 |

Explain which of these fatty acids would have the lowest risk of causing CVD, if included in a diet in equal masses.

(2)

(b) Anticoagulants, antiplatelets and thrombolytics are drugs used to treat blood clots.

(i) One anticoagulant binds to the active site of thrombin.

Explain how this drug reduces blood clotting.

(2)

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(ii) Molecules on the surface of platelets enable them to bind to other molecules.

One of the antiplatelet drugs affects molecules on the surface of platelets.

Explain how this drug reduces blood clotting.

(2)

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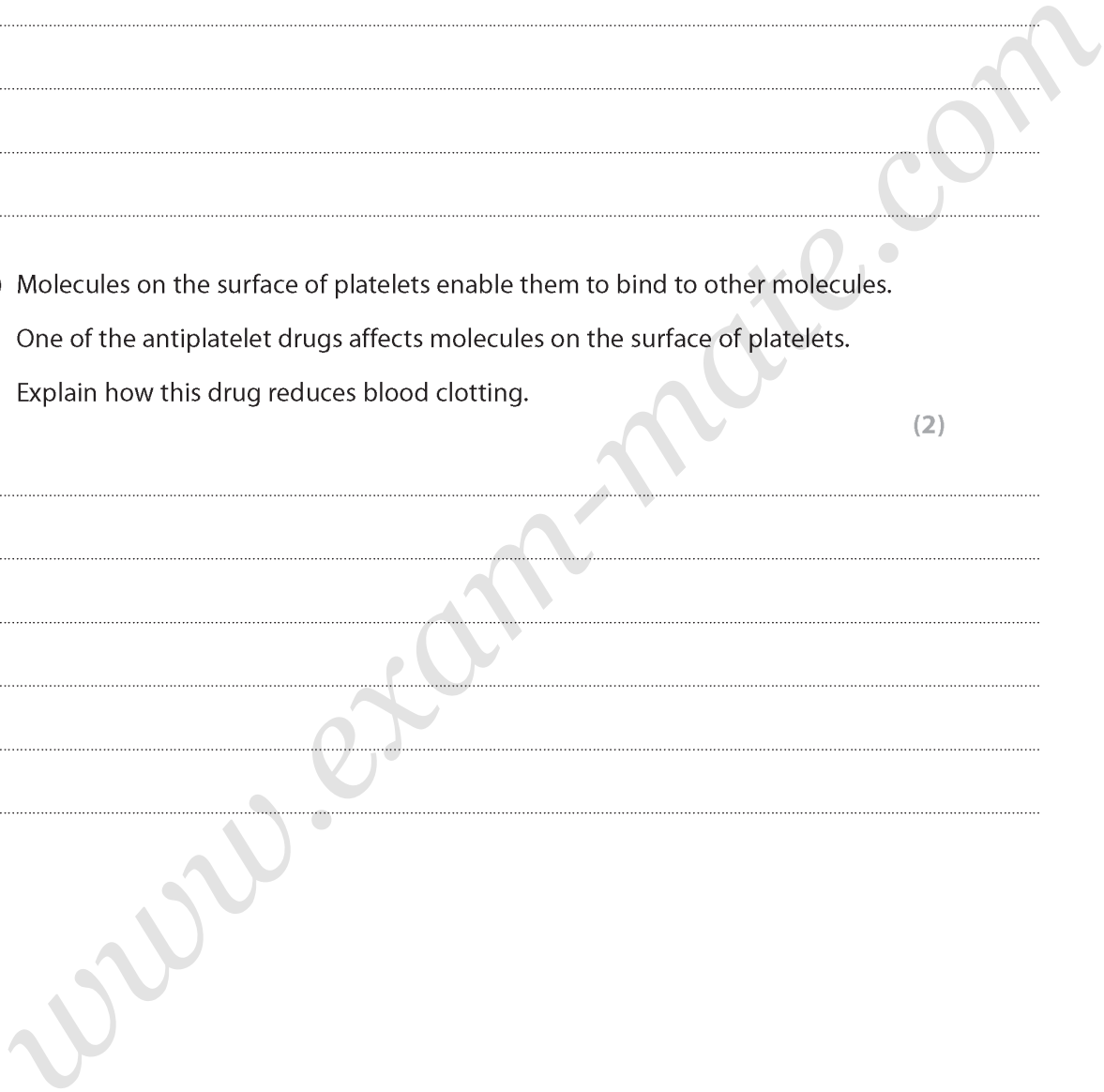
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(iii) One thrombolytic drug converts plasminogen into the active enzyme, plasmin.
Plasmin breaks down fibrin.

Explain how this drug reduces the formation of blood clots.

(2)

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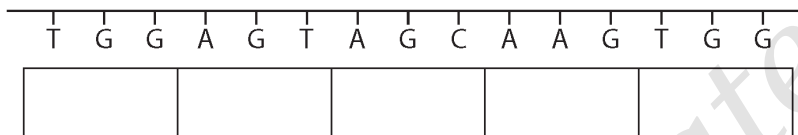
3 - ((WBI11)/1(IAL)_Summer_2019_Q3) - Molecules, Transport And Health

The sequence of bases in DNA determines the sequence of amino acids in a polypeptide.

The table shows four amino acids and their genetic codes.

| Amino acid | Genetic code |
|------------------|--|
| alanine (Ala) | GCT or GCC or GCA or GCG |
| lysine (Lys) | AAA or AAG |
| serine (Ser) | AGT or AGC or TCT or TCC or TCA or TCG |
| tryptophan (Trp) | TGG |

(a) The diagram shows a DNA base sequence.



(i) Complete the diagram to show the sequence of amino acids coded by this DNA base sequence.

(1)

(ii) Explain why only five amino acids are coded by this sequence of bases.

(2)

(b) Explain why some amino acids, such as alanine, have more than one genetic code.

(3)

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(c) Of the 64 possible genetic codes, 61 code for amino acids.

(i) Calculate the percentage of genetic codes that code for amino acids.

Give your answer to four significant figures.

(1)

Answer %

(ii) Explain the role of the other three genetic codes.

(2)

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(d) Messenger RNA (mRNA) and transfer RNA (tRNA) are involved in the synthesis of a polypeptide chain from DNA.

Which row of the table shows the codon on mRNA and the anticodon on tRNA that correspond to tryptophan?

(1)

| | Codon on mRNA | Anticodon on tRNA |
|----------------------------|---------------|-------------------|
| <input type="checkbox"/> A | ACC | TGG |
| <input type="checkbox"/> B | ACC | UGG |
| <input type="checkbox"/> C | UCC | AGG |
| <input type="checkbox"/> D | UCC | TGG |

ANSWERS

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1 - ((WBI11)/1(IAL)_Summer_2019_Q1) - Molecules, Transport And Health


| Question number | Answer | Additional guidance | Mark |
|-----------------|---|--|------|
| (a) | A diagram that includes the following: <ul style="list-style-type: none"> 2 hydrogens joined to an oxygen (by covalent bonds) (1) the charge distribution (1) | <p>e.g. lines, overlapping circles, shared electrons</p> | (2) |

| Question number | Answer | Additional guidance | Mark |
|-----------------|---|---|------|
| (b)(i) | A description that includes the following points: <ul style="list-style-type: none"> for F increase in temperature increases solubility (1) for G increase in temperature increases up to 30°C and then decreases the solubility (1) for H temperature has no effect (on solubility) (1) | <p>ACCEPT 'It' for solubility throughout</p> <p>ACCEPT positive correlation</p> <p>Do not piece together</p> <p>ACCEPT solubility {remains constant / does not change} with an increase in temperature</p> | (3) |

| Question number | Answer | Mark |
|-----------------|---|------|
| (b)(ii) | The only correct answer is B 1.67 <i>A is incorrect because $50 \div 30 = 1.67$</i> <i>C is incorrect because $50 \div 30 = 1.67$</i> <i>D is incorrect because $50 \div 30 = 1.67$</i> | (1) |

2 - ((WBI11)/1(IAL)_Summer_2019_Q2) - Molecules, Transport And Health

| Question number | Answer | Mark |
|-----------------|---|------|
| (a)(i) | The only correct answer is B 1 : 3 <i>A is incorrect because triglycerides are composed of one glycerol molecule and three fatty acids</i> <i>C is incorrect because triglycerides are composed of one glycerol molecule and three fatty acids</i> <i>D is incorrect because triglycerides are composed of one glycerol molecule and three fatty acids</i> | (1) |

| Question number | Answer | Mark |
|-----------------|--|------|
| (a)(ii) |  <p>The only correct answer is C.</p> <p>A is incorrect because this shows a peptide bond B is incorrect because an ester bond does not contain a nitrogen D is incorrect because there should be a double O on the carbon</p> | (1) |

| Question number | Answer | Additional guidance | Mark |
|-----------------|--|---|------|
| (a)(iii) | <p>An explanation that includes the following points:</p> <ul style="list-style-type: none"> palmitoleic and linoleic (acid) (1) because they {are unsaturated fatty acids / have double bonds (between carbon atoms)} (1) <p>OR</p> <ul style="list-style-type: none"> linoleic (acid) (1) because it has {two / the most} double bonds (between carbon atoms) (1) | <p>ACCEPT converse in the context of butyric acid and stearic acid having the lowest risk</p> <p>IGNORE chain length</p> <p>ACCEPT polyunsaturated</p> <p>IGNORE chain length</p> | (2) |

| Question number | Answer | Additional guidance | Mark |
|-----------------|---|---|------|
| (b)(i) | <p>An explanation that includes the following points:</p> <ul style="list-style-type: none"> because thrombin would not be able to bind to fibrinogen (1) therefore fibrin is not formed (1) | <p>ACCEPT fits active site / thrombin – fibrinogen complexes</p> <p>ACCEPT less fibrin formed</p> | (2) |

| Question number | Answer | Additional guidance | Mark |
|-----------------|--|--|------|
| (b)(ii) | <p>An explanation that includes the following points:</p> <ul style="list-style-type: none"> because the platelets would not be able to bind to fibrin (1) therefore the {mesh / clot} would not be formed (1) <p>OR</p> <ul style="list-style-type: none"> and therefore do not release thromboplastin (if not binding to each other / endothelium) (1) | <p>ACCEPT not able to bind to {blood cells / other platelets / endothelium} less sticky</p> | (2) |

| Question number | Answer | Additional guidance | Mark |
|-----------------|--|--|------|
| (c)(ii) | An explanation that includes the following points: <ul style="list-style-type: none"> (remaining codes are) stop {codons / codes} (on RNA / DNA) (1) therefore no more amino acids can be added to the {polypeptide chain / protein} (1) | <p>DO NOT ACCEPT start codons</p> <p>ACCEPT ends translation / signals end of (m)RNA</p> | (2) |

| Question number | Answer | Mark | | |
|-----------------|---|------|-----|-----|
| (d) | <p>The only correct answer is B.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>ACC</td> <td>UGG</td> </tr> </table> <p><i>A is incorrect because T binds to A and C to G on mRNA and U binds to T and G binds to C on tRNA</i> <i>C is incorrect because T binds to A and C to G on mRNA and U binds to T and G binds to C on tRNA</i> <i>D is incorrect because T binds to A and C to G on mRNA and U binds to T and G binds to C on tRNA</i></p> | ACC | UGG | (1) |
| ACC | UGG | | | |

4 - ((WBI11)/1(IAL)_Summer_2019_Q4) - Molecules, Transport And Health

| Question number | Answer | Additional guidance | Mark |
|-----------------|--|--|------|
| (a)(i) | An answer that includes the following points: <ul style="list-style-type: none"> an increase in the number of (DNA) {molecules / double helices} (1) each (new molecule) consists of one {parent / original / old} strand and one new strand (1) | ACCEPT {two / new} molecules are made (from one molecule) | (2) |

| Question number | Answer | Additional guidance | Mark |
|-----------------|--|--|------|
| (a)(ii) | (DNA) helicase / polymerase / ligase (1) | ACCEPT swivelase / untwistase / topoisomerase | (1) |

| Question number | Answer | Additional guidance | Mark |
|-----------------|--|---|------|
| (a)(iii) | An explanation that includes the following points: <ul style="list-style-type: none"> because it results in genetically identical (daughter) cells (1) | ACCEPT same {genetic information / | |