



Pearson

Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCE
In Biology (6BI01) Paper 01
Lifestyle, Transport, Genes and Health

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

| Question Number | Answer | Mark |
|-----------------|--|------|
| 1(a)(i) | <p>1(a)(i). The only correct answer is C - infection</p> <p><i>A is not correct because blood clotting would contribute to atherosclerosis</i></p> <p><i>B is not correct because blood clotting may increase blood pressure</i></p> <p><i>D is not correct because blood clotting has no impact on body mass so will have no effect on obesity</i></p> | (1) |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 1(a)(ii) | <p>1(a)(ii). The only correct answer is C – cell fragments</p> <p><i>A is not correct because platelets are not antibodies – they do not attach to antigens</i></p> <p><i>B is not correct because platelets are not antioxidants</i></p> <p><i>D is not correct because platelets are not enzymes</i></p> | (1) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 1(a)(iii) | <p>1(a)(iii). The only correct answer is D – an insoluble protein</p> <p><i>A is not correct because fibrin is not soluble, it forms insoluble fibres</i></p> <p><i>B is not correct because fibrin is a polypeptide so consists of many different amino acids joined together</i></p> <p><i>C is not correct because fibrin is not an enzyme</i></p> | (1) |

| Question Number | Answer | Mark |
|-----------------|--|------|
| 1(a)(iv) | <p>1(a)(iv). The only correct answer is C – an enzyme</p> <p><i>A is not correct because thrombin is a protein made from prothrombin in the blood plasma</i></p> <p><i>B is not correct because thrombin is a globular protein</i></p> <p><i>D is not correct because thrombin is a protein in the plasma not a compartment/structure within a cell</i></p> | (1) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|---|---|------|
| 1(b)(i) | <ol style="list-style-type: none"> 1. {vasoconstriction / nicotine } causes high (blood) pressure / eq ; 2. increased damage to { endothelium / walls } of arteries ; 3. (increases the) risk of {atheroma / atherosclerosis / eq} ; 4. idea of positive feedback ; | ACCEPT inflammatory response , description of process | (3) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|--|--|------------|
| 1 (b) (ii) | <p>1. antihypertensive drugs / eq ;</p> <p>2. vasodilation / reduce heart rate / eq ;</p> <p>3. reduce {blood pressure / atheroma / atherosclerosis / damage to endothelium / eq} ;</p> <p>OR</p> <p>4. statins / eq ;</p> <p>5. lower blood cholesterol levels / eq ;</p> <p>6. reduces risk of atherosclerosis / eq ;</p> <p>OR</p> <p>7. anticoagulant drugs / platelet inhibitory drugs / eq ;</p> <p>8. reduce risk of blood clot forming / eq ;</p> <p>9. reduces risk of atherosclerosis / eq ;</p> | <p>NB: Drug type needs to be correctly matched to the description of how it works.</p> <p>1. ACCEPT ACE inhibitors / calcium channel blockers / diuretics / beta blockers / named example</p> <p>3. NOT reduce risk of CVD / blood clots</p> <p>4. ACCEPT stanols / sterols / named example</p> <p>6. NOT reduce risk of CVD / blood clots</p> <p>7. ACCEPT named example</p> <p>9. NOT reduce risk of CVD</p> | (3) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|--------------|---------------------|------|
| 2 (a) (i) | hydrolysis ; | | (1) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|---|---------------------|------|
| 2 (a) (ii) | (α 1,4 / α 1,6) glycosidic ; | NOT β | (1) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|--------------------------------------|---------------------|------|
| 2 (b) (i) | no {starch / substrate } left / eq ; | | (1) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|--|---------------------|------|
| 2(b) (ii) | 1. more {kinetic energy / movement / eq} ; 2. more {collisions / enzyme substrate complexes formed / eq } ; | | (2) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|---|---------------------------------|------|
| 2(b) (iii) | 1. steeper curve to the left of 23°C ; 2. graph levels off at the same height as the other two lines ; | NOT above max quantity produced | (2) |

| Question Number | Answer | Additional Guidance | Mark |
|------------------|---|--|------------|
| 2(b) (iv) | 1. range of amylase concentrations used / eq ; 2. control {volume / concentration } of starch ; 3. method of controlling temperature at 23°C e.g. temperature controlled water bath ; 4. {record / compare } initial rate of reaction / description of how dependent variable measured ; | 4. e.g. quantity of maltose produced, time for starch to be completely broken down | (4) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|---|---------------------|------|
| 3(a) | <p>Difference</p> <p>1. active transport requires { energy / ATP } whereas facilitated diffusion does not / eq</p> <p>OR</p> <p>2. active transport { moves molecules against the concentration gradient / eq } whereas facilitated diffusion allows molecules to { move down the concentration gradient / eq } ;</p> <p>Similarity</p> <p>3. both use proteins ;</p> | | (2) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|--|---|------|
| 3(b) | <p>Vitamin C :</p> <p>1. polar / ionic ;</p> <p>2. cannot pass through {phospholipid bilayer / hydrophobic region / eq} / uses protein {channels / carriers } ;</p> <p>Vitamin D:</p> <p>3. non polar ;</p> <p>4. will dissolve in phospholipid bilayer / eq ;</p> | <p>1. ACCEPT charged</p> <p>2. ACCEPT not charged</p> | (4) |

| Question Number | Answer | Additional Guidance | Mark |
|------------------------|--|--|-------------|
| 3(c) | 1. water will move out of cells by osmosis ; 2. to an area of higher solute concentration ; 3. idea that cell volume will reduce ; | 1. IGNORE diffuse 4. ACCEPT lower water potential / higher salt concentration 5. ACCEPT cells will shrink | (3) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|---|---------------------|------|
| 4(a) | 1. provides a large surface area ; 2. short diffusion pathway / eq ; | | (1) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|---|------------------------|------|
| 4(b) | 1. brings { oxygen to / carbon dioxide away from } exchange surface ; 2. maintains {concentration / diffusion} gradient / eq ; | ACCEPT alveoli / lungs | (2) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|--|--|------|
| 4(c) | 1. provides a large surface area ; 2. movement of blood maintains {concentration / diffusion} gradient ; 3. capillaries have a thin wall / short diffusion pathway / eq ; 4. brings { carbon dioxide to / oxygen away from } exchange surface ; 5. reference to { haemoglobin / red blood cells / erythrocytes / respiratory pigment } to carry oxygen ; | 3 IGNORE one cell thick NOT cell wall 4 ACCEPT alveoli / lungs | (3) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|---------------|---------------------|------|
| 5(a) (i) | deoxyribose ; | | (1) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|--------|---------------------|------|
| 5(a) (ii) | 5 ; | | (1) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|-----------|--|------|
| 5(a) (iii) | thymine ; | NOT thiAmine or thyAmine ACCEPT thimine / thimyne | (1) |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 5(b) (i) | <p>5(b)(i). The only correct answer is B – letter Q</p> <p><i>A is not correct because P is a ribosome</i></p> <p><i>C is not correct because R is a tRNA molecule with a distinctive shape</i></p> <p><i>D is not correct because S is an anticodon part of the tRNA molecule</i></p> | (1) |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 5(b) (ii) | <p>5(b)(ii). The only correct answer is C – letter S</p> <p><i>A is not correct because Q is an mRNA molecule that has codons not the anticodons</i></p> <p><i>B is not correct because R is not the part of the tRNA molecule that will bind with the mRNA</i></p> <p><i>D is not correct because T is the codon on the mRNA molecule</i></p> | (1) |

| Question Number | Answer | Mark |
|-----------------|---|------|
| 5(b) (iii) | <p>5(b)(iii). The only correct answer is C - peptide bonds</p> <p><i>A is not correct because they are not called amino bonds, because the amino group is only one of the groups bonded together</i></p> <p><i>B is not correct because hydrogen bonds because a covalent bond is formed</i></p> <p><i>D is not correct because phosphodiester bonds do not form between amino and carboxyl groups, no phosphate is involved</i></p> | (1) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|---------------|---------------------|------|
| 5(b) (iv) | translation ; | | (1) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|---|--|-------------------|
| *5(c) | <p>(QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence)</p> <ol style="list-style-type: none"> 1. idea that DNA used as a template to make mRNA ; 2. reference to RNA polymerase ; 3. reference to complementary base pairing / examples provided ; 4. idea that triplet of DNA bases makes one codon ; 5. one codon codes for one (specific) amino acid / eq ; 6. the primary structure is the sequence of amino acids / eq; | <p>QWC – emphasis on logical sequence.</p> <p>1. ACCEPT Idea that one gene codes for one polypeptide</p> <p>4 & 5 combined allow one mark for triplet of DNA codes for one amino acid</p> | <p>(4)</p> |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|--|---------------------|------|
| 6(a) | Diagram showing: 1. correct R group $\text{-CH}_2\text{-CH}_2\text{-COOH}$ connected to central C atom ; 2. NH_2 connected to central C atom ; 3. H and COOH connected to central C atom ; | | (3) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|---|---|------|
| 6 (b) (i) | 1. one amino acid changed / eq ; 2. idea of a change in one { triplet / codon } ; 3. substitution of one base ; | 3. ACCEPT idea that other mutations involving { more than one base / addition / deletion } may { change whole sequence / missing amino acids / eq } ; | (2) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|--|--|------|
| 6 (b) (ii) | 1. (one) different R group / eq ; 2. Idea that they have different charge e.g. one is polar other is non-polar ; 3. different bonds formed ; 4. different { tertiary structure / bonding to other molecules / affinity to oxygen / eq } ; | 1. IGNORE different sequence of R groups 3. ACCEPT named bond or bond in different place NOT peptide | (3) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|---|---|------|
| 6 (c) (i) | 1. capillary has a narrower lumen than an artery / eq ; | ACCEPT capillary has a narrow lumen / small diameter / eq | (1) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|--|---|------|
| 6 (c) (ii) | 1. less oxygen reaches tissues / eq ; 2. { less / no } (aerobic) respiration possible / eq ; 3. cell { damage / death } / eq ; | 2. ACCEPT more anaerobic respiration 3. ACCEPT idea that lactic acid causes pain | (3) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|---|-------------------------|------|
| 7(a) (i) | 1. $5 \text{ dm}^3 = 5000 \text{ cm}^3$; 2. $\frac{5000}{200} = 25$ (min) ; | correct answer scores 2 | (2) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|-------------|---------------------|------|
| 7(a) (ii) | diffusion ; | | (1) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|--|---------------------|------|
| 7(a)(iii) | 1. removes {waste / excess/ eq} { urea / water / salts / eq } ; 2. ensures that dialysis fluid has a lower concentration of {urea / eq} than the blood / eq ; 3. maintains concentration of { glucose / salt } in the blood / eq ; | | (2) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|---|---|------------|
| 7 (b) | <ol style="list-style-type: none"> 1. increased risk of { higher blood cholesterol / cholesterol deposits / eq } ; 2. leading to formation of {atheroma / plaque / atherosclerosis / eq } ; 3. increased risk of blood clot formation / eq ; 4. loss of elasticity of artery / narrowing of lumen / eq ; 5. idea of causing increase in blood pressure ; | <ol style="list-style-type: none"> 1. ACCEPT LDL for cholesterol 3. ACCEPT thrombus 4. ACCEPT {hardening / narrowing / blocking / eq } of artery 5. IGNORE heart attack | (4) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|--|---|------|
| 8(a) | 1. $(7 - 9) \div 9$; 2. $-0.22 \times 100 = -22.2\%$; | Correct answer gains 2 marks ACCEPT - 22%, 22.2% and 22% | (2) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|--|--|------|
| *8(b) | <p>(QWC – Spelling of technical terms must be correct and the answer must be organised in a logical sequence)</p> <ol style="list-style-type: none"> energy requirement increases with age up to age {15 / 15 to 17 / 18 / 18 to 34 / 18 to 54} ; for both men and women ; energy requirement decreases {for older age groups / above 55 / above 65 / eq} ; Energy requirement depends on activity level as well as age ; Idea that you need to compare ages with the same activity levels ; Energy requirements depend on body size ; idea that energy requirements (BMR) depends on the number of cells to be supplied ; suitable manipulation of figures to illustrate points made ; | <p>QWC emphasis is on clarity of expression</p> <ol style="list-style-type: none"> ACCEPT increase is greater for men than women ACCEPT metabolism decreases with age | (5) |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|---|--------------------------------|------------|
| 8(c) | 1. idea of energy imbalance ; 2. calculation of imbalance for boys and girls = 0.5 for boys and 1.5 for girls (MJ day ⁻¹) ; 3. (leading to) gain in weight / development of obesity / eq ; 4. (due to) storage of {fat / glycogen} ; | 1. ACCEPT excess energy intake | (4) |