

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2015 series

0610 BIOLOGY

0610/22

Paper 2 (Core Theory), maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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Abbreviations used in the Mark Scheme

- ; separates marking points
- / separates alternatives within a marking point
- **R** reject
- **ignore** mark as if this material was not present
- **A** accept (a less than ideal answer which should be marked correct)
- **AW** alternative wording (accept other ways of expressing the same idea)
- underline words underlined (or grammatical variants of them) must be present
- **max** indicates the maximum number of marks that can be awarded
- **mark independently** the second mark may be given even if the first mark is wrong
- **ecf** credit a correct statement that follows a previous wrong response
- () the word / phrase in brackets is not required, but sets the context
- **ora** or reverse argument
- **AVP** any valid point

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| 1 | A – hoverfly ; B – (clouded yellow) butterfly ; E – (large yellow) moth ; F – springtail ; | [4] | |
| | | [Total: 4] | |
| 2 (a) (i) | body temperature high / above normal AW ; | [1] | |
| (ii) | sweat secreted AW / sweat glands active ; (sweat / water) evaporates (from skin surface) ; heat / energy for evaporation provided by body ; body cools down ; | max [2] | A ecf if 2(a)(i) answered incorrectly |
| (iii) | blood carries heat AW ; body temperature needs to be maintained AW at 37 °C / reference to homeostasis ; idea of enzyme activity affected adversely by higher temperature ; (more blood flow to the surface) means more heat lost ; by evaporation of sweat / conduction / convection / radiation ; | max [2] | |
| (b) | 33 (°C) ; | [1] | |

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| (c) | (in exercise) muscles contract/work AW ; muscles respire ; (so) release energy (for contraction) ; energy is “lost” as heat ; idea of (body temperature slightly raised) as blood takes time to transport the heat to the body surface/skin ; | max [2] | “more” (or equivalent) must be used at least once in the explanation otherwise max 1 ignore body more active / respire more |
| | | [Total: 8] | |
| 3 (a) (i) | arrow to point from heart to lungs ; | [1] | |
| (ii) | A – <u>renal artery</u> ; B – <u>hepatic vein</u> ; C – <u>pulmonary artery</u> ; | [3] | |
| (iii) | line joining alimentary canal to liver ; <u>hepatic portal vein</u> ; | [2] | |

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|--------------------------------|---|--------------------|--|-----------|--|-------|-----------|-----------|---------------------|-----|----|------|-----------------------------|----|-----|------|-----------------------------|-----|------|----|--------------------------------|----|----|-------|-----|-------------------------------|
| (b) | <table border="1"> <tr> <td rowspan="2">characteristic</td> <td colspan="3">blood vessel</td> </tr> <tr> <td>aorta</td> <td>vena cava</td> <td>capillary</td> </tr> <tr> <td>thick, elastic wall</td> <td>yes</td> <td>no</td> <td>no ;</td> </tr> <tr> <td>valves present along length</td> <td>no</td> <td>yes</td> <td>no ;</td> </tr> <tr> <td>transports oxygenated blood</td> <td>yes</td> <td>no ;</td> <td>no</td> </tr> <tr> <td>amino acids pass through walls</td> <td>no</td> <td>no</td> <td>yes ;</td> </tr> </table> | characteristic | blood vessel | | | aorta | vena cava | capillary | thick, elastic wall | yes | no | no ; | valves present along length | no | yes | no ; | transports oxygenated blood | yes | no ; | no | amino acids pass through walls | no | no | yes ; | [4] | one mark for each correct row |
| | characteristic | | blood vessel | | | | | | | | | | | | | | | | | | | | | | | |
| | | aorta | vena cava | capillary | | | | | | | | | | | | | | | | | | | | | | |
| | thick, elastic wall | yes | no | no ; | | | | | | | | | | | | | | | | | | | | | | |
| | valves present along length | no | yes | no ; | | | | | | | | | | | | | | | | | | | | | | |
| transports oxygenated blood | yes | no ; | no | | | | | | | | | | | | | | | | | | | | | | | |
| amino acids pass through walls | no | no | yes ; | | | | | | | | | | | | | | | | | | | | | | | |
| (c) (i) | <u>coronary</u> artery ; | [1] | | | | | | | | | | | | | | | | | | | | | | | | |
| (ii) | cholesterol / fat / lipid ; | [1] | A thrombus / clot; ignore fatty acids / fatty foods / blood | | | | | | | | | | | | | | | | | | | | | | | |
| (iii) | blockage stops blood flow AW ; oxygen / glucose / nutrients would not reach muscle ; muscle cannot respire ; runs out of energy ; muscle cells die ; more muscle dies than in previous attack ; heart / ventricle cannot contract effectively / cannot pump blood ; | max [3] | A heart tissue / heart muscle throughout but ignore heart unqualified | | | | | | | | | | | | | | | | | | | | | | | |
| | | [Total: 15] | | | | | | | | | | | | | | | | | | | | | | | | |

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|-----------------|---|--|----------|------------|----------|---|---|----------|---|--------------------------------------|--------------|---|------------------------------------|-----------|---|---|---------|---|--|------|---|---|-----|--|
| 4 (a) | <table border="0"> <tr> <td style="text-align: center;">term</td> <td></td> <td style="text-align: center;">definition</td> </tr> <tr> <td style="text-align: center;">genotype</td> <td style="text-align: center;">X</td> <td style="text-align: center;">having two different alleles of the same gene</td> </tr> <tr> <td style="text-align: center;">dominant</td> <td style="text-align: center;">X</td> <td style="text-align: center;">the physical features of an organism</td> </tr> <tr> <td style="text-align: center;">heterozygous</td> <td style="text-align: center;">X</td> <td style="text-align: center;">the genetic make-up of an organism</td> </tr> <tr> <td style="text-align: center;">phenotype</td> <td style="text-align: center;">X</td> <td style="text-align: center;">an allele that is expressed in a heterozygote</td> </tr> <tr> <td style="text-align: center;">haploid</td> <td style="text-align: center;">X</td> <td style="text-align: center;">a length of DNA which codes for a specific protein</td> </tr> <tr> <td style="text-align: center;">gene</td> <td style="text-align: center;">X</td> <td style="text-align: center;">containing a single set of unpaired chromosomes</td> </tr> </table> | term | | definition | genotype | X | having two different alleles of the same gene | dominant | X | the physical features of an organism | heterozygous | X | the genetic make-up of an organism | phenotype | X | an allele that is expressed in a heterozygote | haploid | X | a length of DNA which codes for a specific protein | gene | X | containing a single set of unpaired chromosomes | [5] | <p>R if more than one line from each LH box</p> <p>5 or 6 correct = 5 4 correct = 4 3 correct = 3 2 correct = 2 1 correct = 1</p> |
| term | | definition | | | | | | | | | | | | | | | | | | | | | | |
| genotype | X | having two different alleles of the same gene | | | | | | | | | | | | | | | | | | | | | | |
| dominant | X | the physical features of an organism | | | | | | | | | | | | | | | | | | | | | | |
| heterozygous | X | the genetic make-up of an organism | | | | | | | | | | | | | | | | | | | | | | |
| phenotype | X | an allele that is expressed in a heterozygote | | | | | | | | | | | | | | | | | | | | | | |
| haploid | X | a length of DNA which codes for a specific protein | | | | | | | | | | | | | | | | | | | | | | |
| gene | X | containing a single set of unpaired chromosomes | | | | | | | | | | | | | | | | | | | | | | |

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| (b) (i) | cell division to give (two/identical) cells; | [1] | |
| (ii) | asexual reproduction; growth of tissues AW; development of new structures; replacement of cells; example of mitosis occurring (e.g. in embryo/skin cells) ; | max [2] | A cancer |
| (c) (i) | <i>(XX and XY)</i> X X X Y ; XX XX XY XY ; | [2] | both pairs needed in correct sequence for 1 mark four needed in any order for 1 mark, but must be correct sequence if lines drawn |
| (ii) | 50%/0.5/½/2 in 4/1 in 2/1:1; | [1] | |
| (iii) | M placed between line drawn above mother and father and line above gamete circles ; | [1] | |
| | | [Total: 12] | |
| 5 (a) (i) | <u>incisor</u> ; | [1] | |

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| (ii) | K – enamel; L – dentine; M – root; N – pulp (cavity); | [4] | |
| (b) | bacteria (in the mouth) ; respire or feed on sugar or food / form plaque ; anaerobic (respiration) ; produce AW acid ; acid destroys AW enamel ; (idea of) bacteria access internal structure via hole made ; | max [3] | ignore bacteria attacking AW the enamel acid production mark must follow from explanation |
| | | [Total: 8] | |
| 6 (a) (i) | 10 (years); | [1] | |
| (ii) | 0–4 years; 12–20 years; | [2] | either order ignore if years not given |

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| (iii) | <p>increase ;</p> <p>more rapid / faster AW ;</p> <p>calculation from figures from Fig. 6.1 in support ;</p> <p>(14–20 years is) time of adolescence / puberty / start of the menstrual cycle ;</p> <p>sex hormones stimulate development / growth or growth of named reproductive organ ;</p> <p>named sex hormone;</p> | max [3] | <p>ignore growing up / getting ready to have children</p> <p>testosterone / oestrogen / progesterone</p> <p>A growth hormone</p> |
| (b) (i) | <p>poor development of bones / teeth / weak or brittle bones / rickets or osteoporosis or osteopenia</p> | [1] | <p>ignore poor development in general</p> <p>A fetus takes calcium from maternal bones</p> |
| (ii) | <p>low birth weight ;</p> <p>poor brain development ;</p> <p>addicted to nicotine / withdrawal symptoms / irritable baby ;</p> <p>AVP ;</p> | max [1] | <p>R blood contains tar / lungs under-developed / respiratory conditions</p> <p>ignore poor development of baby</p> <p>e.g. low oxygen concentration in the blood at birth</p> |
| | | [Total: 8] | |

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| 7 (a) (i) | <p>from left:</p> <p>photosynthesis;</p> <p>respiration;</p> <p>feeding;</p> <p>decomposition / respiration;</p> | [4] | |
| (ii) | <p>glucose + oxygen ; \longrightarrow</p> <p>carbon dioxide + water ;</p> | [2] | <p>R if energy given on LHS</p> <p>ignore if energy given on RHS</p> <p>If chemical equation is given it must be correct and balanced = 2 mark / 1 mark per “side”</p> <p>ignore mixed chemical and word equation</p> |

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| (b) | death of animals and plants/loss of medicinal chemicals ; migration of animals/spread of animal borne diseases ; species extinction/loss of habitat/loss of biodiversity ; disruption of food chains ; less photosynthesis ; increase in carbon dioxide concentration ; global warming/rising sea levels/ice caps melt ; loss of soil/soil erosion/landslides/soil not stabilised by roots ; flooding ; changes to water cycle/weather patterns/desertification ; AVP ; | max [3] | ignore reduction in oxygen concentration ignore reference to ozone layer/acid rain |
| (c) (i) | 3 units + 2 units = 5 units 5/20 units ; 25(%) ; | [2] | correct answer with no working gets 2 marks |

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| (ii) | contains sewage / chemical in sewage / minerals / harmful bacteria / parasites / pathogens ; contains (harmful cleaning) chemicals / named chemical / drugs / hormones ; pH of water is too low ; | max [1] | idea that these need to be removed / treated | | | | | | | | | | | | |
| (iii) | (vitamin) C; | [1] | A ascorbic acid | | | | | | | | | | | | |
| | | [Total: 17] | | | | | | | | | | | | | |
| 8 (a) (i) | villus ; | [1] | A villi | | | | | | | | | | | | |
| (ii) | absorption ; | [1] | A increase the surface area | | | | | | | | | | | | |
| (b) | <table border="1"> <thead> <tr> <th>food type</th> <th>enzyme involved in digestion</th> <th>products of digestion</th> </tr> </thead> <tbody> <tr> <td>starch</td> <td>amylase / carbohydrase ;</td> <td>simple sugar</td> </tr> <tr> <td>fat</td> <td>lipase ;</td> <td>fatty acids and glycerol ;</td> </tr> <tr> <td>protein</td> <td>protease;</td> <td>amino acids ;</td> </tr> </tbody> </table> | food type | enzyme involved in digestion | products of digestion | starch | amylase / carbohydrase ; | simple sugar | fat | lipase ; | fatty acids and glycerol ; | protein | protease; | amino acids ; | [4] | |
| food type | enzyme involved in digestion | products of digestion | | | | | | | | | | | | | |
| starch | amylase / carbohydrase ; | simple sugar | | | | | | | | | | | | | |
| fat | lipase ; | fatty acids and glycerol ; | | | | | | | | | | | | | |
| protein | protease; | amino acids ; | | | | | | | | | | | | | |

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| (c) | synthesis of proteins / enzymes / other chemicals ; breakdown / deamination (of amino acids) ; (resulting in) urea formation ; (residue of amino acid molecule) used for energy / respired ; AVP ; | max [2] | |
| | | [Total: 8] | |