

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge Ordinary Level

MARK SCHEME for the October/November 2014 series

5090 BIOLOGY

5090/22

Paper 2 (Theory), maximum raw mark 80

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Mark schemes will use these abbreviations:

- ; separates marking points
- / alternatives
- () contents of brackets are not required but should be implied
- **R** reject
- **A** accept (for answers correctly cued by the question, or guidance for examiners)
- **AW** alternative wording (where responses vary more than usual)
- **AVP** alternative valid point (where a greater than usual variety of responses is expected)
- **ORA** or reverse argument
- underline actual word underlined must be used by candidate (grammatical variants excepted)
- **max** indicates the maximum number of marks that can be given
- **+** statements on both sides of the + are needed for that mark

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| Question | Expected Answer | Mark | Additional Guidance |
|------------------|--|--------------------|----------------------------|
| 1 (a) (i) | (dorsal) <u>aorta</u> ; | [1] | |
| (ii) | <u>left ventricle</u> ; | [1] | |
| (b) | (amino acids) 0.05 ; (glucose) 0.10 to 0.15 ; (mineral ions) 0.72 to 2.22 ; (proteins) 8.00 ; (urea) 0.03 to 2.03 ; | [5] | |
| (c) | B would contain some / more / high (glucose) / C would contain more / high (glucose) / D would contain more / high (glucose) ; lack of Insulin ; glucose would not be converted into glycogen ; kidney unable to / doesn't reabsorb all glucose ; | [max. 3] | |
| | | [Total: 10] | |

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| Question | Expected Answer | Mark | Additional Guidance |
|------------------|---|--------------------|----------------------------|
| 2 (a) (i) | oesophagus / gullet ; | [1] | |
| (ii) | <u>peristalsis</u> ; | [1] | |
| (b) | ref. protection / barrier / prevents damage / breakdown / digestion ; of walls ; acid / HCl ; ref. protease ; walls are made of protein ; ref. lubrication ; | [max. 5] | |
| (c) (i) | heart not involved / no connection between E and the heart / AW ; | [1] | |
| (ii) | less mucus in E ; acid (from stomach) ; (acid) damages the cells/walls ; (acid) neutralised (by the medication) ; | [max. 2] | |
| | | [Total: 10] | |

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| Question | Expected Answer | Mark | Additional Guidance |
|------------------|---|-------------------|----------------------------|
| 3 (a) (i) | <u>photosynthesis</u> ; | [1] | |
| (ii) | as sucrose / sugar ; in solution ; via the phloem ; | [max. 2] | |
| (b) | urine / nitrogenous waste / NH ₃ / other named ; faeces / egested waste ; decomposition ; by bacteria ; enzymes ; release of nitrates/salts/ions/named ions ; absorbed by plant/pitcher ; used to make proteins/amino acids ; for growth / repair ; carbon dioxide ; from respiration ; for photosynthesis ; to make glucose/carbohydrate/starch ; | [max. 5] | |
| | | [Total: 8] | |

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| Question | Expected Answer | Mark | Additional Guidance |
|-----------------|--|--------------------|----------------------------|
| 4 (a) | glucose / $C_6H_{12}O_6$ (substrate) ; (yeast) alcohol / ethanol / C_2H_5OH ; (yeast) carbon dioxide / CO_2 ; (muscles) lactic acid / lactate / $C_3H_6O_3$; | [4] | |
| (b) (i) | food / glucose deficiency / AW ; (killed) by alcohol ; poisoned by competing organisms (e.g. bacteria) ; | [max. 2] | |
| (ii) | (killed) by heat / baking / high temperature ; | [1] | |
| (c) | lactic acid removed / broken down / converted ; by circulation / blood / AW ; lactic acid not toxic (at concentrations experienced) ; | [max. 2] | |
| (d) | substrate / glucose not completely broken down ; chemical energy ; still contained within product / lactic acid / alcohol ; | [max. 2] | |
| | | [Total: 11] | |

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| Question | Expected Answer | Mark | Additional Guidance |
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| 5 (a) (i) | <u>control</u> ; | [1] | |
| (ii) | rate + drops/reduces/AW ; rapidly / AW / quoted figures (85 to 62 + bpm) ; during first 4 months ; remains (more or less) constant ; (constant at) 59 / 60 / 61 / 62 + bpm ; | [max. 3] | A stays low |
| (b) | line / curve starts at <u>36 months</u> ; drops with similar gradient to line K ; to between 70 and 74 bpm ; levels to run parallel with the J and K ; | [max. 3] | |
| (c) | arteries / arterioles ; <u>muscular</u> wall ; relax / prevent constriction ; larger lumens / dilation / widens / AW ; ref. reduces + deposits/atheroma/AW ; less + resistance/friction /AW ; | [max. 4] | |
| | | [Total: 11] | |

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| Question | Expected Answer | Mark | Additional Guidance |
|-----------------|--|--|----------------------------|
| (a) | <p><i>ovule:</i> in ovary ;</p> <p>contains female gamete ;</p> <p>ref. to haploid ;</p> <p><i>seed:</i> ovule after fertilisation ;</p> <p>ref. diploid (or with ref. fruit) ;</p> <p>(grows) <u>larger</u> than ovule ;</p> <p>stores food / ref. cotyledons ;</p> <p>contains (rest of) embryo / radicle + plumule ;</p> <p>(surrounded by) testa ;</p> <p>ref. dispersal ;</p> <p><i>fruit:</i> seed(s) + ovary (wall)/ pericarp ;</p> <p>ref. dispersal ;</p> | <p>[max. 2]</p> <p>[max. 3]</p> <p>[max. 1] [total: 6]</p> | |

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| (b) | <p>dry ;</p> <p>light ;</p> <p>(may be) winged / hairy / feathery / helicopter / parachute ;</p> <p>large surface area ;</p> <p>to allow wind to detach it from parent plant ;</p> <p>to delay its descent ;</p> <p>(allow it to be carried) long distance AW / away from parent plant ;</p> | [max. 4] | |
| | | [Total: 10] | |

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| Question | Expected Answer | Mark | Additional Guidance |
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| 7 (a) | fast / instant ; automatic / involuntary / spontaneous / unconscious / AW ; response / reaction ; to a stimulus ; | [max. 3] | A ref. to no decision involved |
| (b) (i) | named stimulus* ; correct receptor / named* ; impulse / electrical + pulse ; sensory / afferent / receptor + motor / efferent / effector neurones, in correct order ; CNS / spinal cord* ; correct or named effector* ; correct action (of effector)* ; | [max. 5] | * description must match example R brain if it directs response |
| (ii) | automatic / innate / does not need to be learnt ; ref. protection / aids survival / damage limitation ; | [2] | A example, e.g. prevents too much light entering eye |
| | | [Total: 10] | |

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| Question | Expected Answer | Mark | Additional Guidance |
|------------------|---|--------------------|----------------------------|
| 8 (a) (i) | starting with a producer ; plausible food chain with 3 consumers + arrows in correct direction ; | | I ref to the Sun |
| (ii) | labelled pyramid with organisms named in food chain ; in correct order with named producer labelled at bottom ; pyramid of correct proportions for given food chain ; | [max. 4] | |
| (b) | some organisms / parts remain uneaten ; energy lost in faeces / undigested food ; urine / excretory products / excretion ; respiration ; energy lost as heat ; homeostasis / named example ; in movement / muscular contraction (or any e.g. of same) ; in nervous impulses ; catabolic reactions / named ; active transport ; ref. decomposition / decay | [max. 6] | |
| | | [Total: 10] | |

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| 9 (a) | <p>blood goes through heart twice (in one complete circuit of the body) ;</p> <p>circulation to/from lungs / pulmonary ;</p> <p>circulation to/from (rest of) body / systemic ;</p> <p>lungs + low pressure ;</p> <p>body + high pressure ;</p> | [max. 4] | |
| (b) | <p>two sides to the heart / heart completely divided ;</p> <p>four chambers / two atria + two ventricles / all 4 named chambers ;</p> <p>beats continually ;</p> <p>right side / atrium + receives blood from body ;</p> <p>right side / ventricles + pumps blood to lungs ;</p> <p>left side / atrium receives blood from lungs ;</p> <p>left side / ventricle + pumps blood to (rest of) body ;</p> <p>left ventricle thicker-walled / more muscular + than right ventricle ;</p> <p>ventricles thicker-walled / more muscular + than atria ;</p> <p>further to pump blood / generate higher pressure ;</p> <p>ref. valves + one-way flow / prevent backflow ;</p> | [max. 6] | |
| | | [Total: 10] | |