

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MARK SCHEME for the May/June 2012 question paper
for the guidance of teachers

0610 BIOLOGY

0610/31

Paper 3 (Extended 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.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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| Question | Expected Answers | Marks | | | | | | | | | | | | | | |
|--|---|----------------|--------------------|-------------|---------------|-------------------|---|--------------------|-----------------------------------|-------------|------------|--|------------|--------------------------|------------|-----|
| 1 (a) | <table border="1"> <thead> <tr> <th>function</th> <th>letter</th> </tr> </thead> <tbody> <tr> <td>peristalsis</td> <td>B</td> </tr> <tr> <td>protein digestion</td> <td>C / H / E ;</td> </tr> <tr> <td>insulin production</td> <td>D ;</td> </tr> <tr> <td>deamination</td> <td>J ;</td> </tr> <tr> <td>partially digested food is mixed with bile</td> <td>H ;</td> </tr> <tr> <td>most water is reabsorbed</td> <td>E ;</td> </tr> </tbody> </table> | function | letter | peristalsis | B | protein digestion | C / H / E ; | insulin production | D ; | deamination | J ; | partially digested food is mixed with bile | H ; | most water is reabsorbed | E ; | [5] |
| function | letter | | | | | | | | | | | | | | | |
| peristalsis | B | | | | | | | | | | | | | | | |
| protein digestion | C / H / E ; | | | | | | | | | | | | | | | |
| insulin production | D ; | | | | | | | | | | | | | | | |
| deamination | J ; | | | | | | | | | | | | | | | |
| partially digested food is mixed with bile | H ; | | | | | | | | | | | | | | | |
| most water is reabsorbed | E ; | | | | | | | | | | | | | | | |
| (b) (i) | <table border="1"> <thead> <tr> <th>large molecule</th> <th>nutrients absorbed</th> </tr> </thead> <tbody> <tr> <td>protein</td> <td>amino acids ;</td> </tr> <tr> <td>glycogen</td> <td>Glucose / C₆H₁₂O₆ ;</td> </tr> <tr> <td>fat</td> <td>fatty acids and glycerol ;</td> </tr> </tbody> </table> | large molecule | nutrients absorbed | protein | amino acids ; | glycogen | Glucose / C ₆ H ₁₂ O ₆ ; | fat | fatty acids and glycerol ; | [3] | | | | | | |
| large molecule | nutrients absorbed | | | | | | | | | | | | | | | |
| protein | amino acids ; | | | | | | | | | | | | | | | |
| glycogen | Glucose / C ₆ H ₁₂ O ₆ ; | | | | | | | | | | | | | | | |
| fat | fatty acids and glycerol ; | | | | | | | | | | | | | | | |
| (ii) | calcium / Ca ²⁺ ; iron / Fe ²⁺ ; | [2] | | | | | | | | | | | | | | |
| (iii) | vitamins / named vitamin ; | [1] | | | | | | | | | | | | | | |

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| (c) | <p>MP1 platelets ; MP2 promote / cause / stimulate, clotting ; MP3 thrombin / enzyme ; MP4 (converts) fibrinogen to fibrin ; MP5 soluble to insoluble / fibrin is insoluble ; MP6 mesh / network / web, to trap blood (cells) / prevent blood loss ; MP7 forms scab / hardens ; MP8 phagocytes, engulf / destroy / AW, bacteria / pathogens ; MP9 cells divide by mitosis ; MP10 identical cells ; MP11 (tissues form to) make / grow, epidermis / capillary / new skin ;</p> | [max 5] |
| | | [Total: 16] |
| 2 (a) | <p>pinna / external ear ; fur ; <u>mammary</u> glands / secretes milk ; sweat glands ; endothermic / homoeothermic / AW ; A – warm blooded different types of teeth ; 3 middle ear bones ;</p> | [max 3] |
| (b) | <p>MP1 redirects blood away from skin to (internal / vital) organs ; MP2 vasoconstriction ; MP3 fat under the skin ; MP4 fur / hair ; MP5 traps air ; MP6 fat / air, poor conductors of heat / insulators ; MP7 reduces heat loss ; MP8 by, conduction / convection ; MP9 generate heat, by metabolism / shivering ; A – endothermic MP10 small surface area to volume ratio / large size ;</p> | [max 5] |
| (c) | <p>group of organisms of one species ; live in the same place, at the same time / together ;</p> | [2] |

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| (d) | different species have different, genes / DNA ; | [1] |
| (e) | any two suitable suggestions, e.g. maintaining, genetic diversity ; important in food web ; possible medical application / useful genes ; | [max 2] |
| | | [Total: 13] |
| 3 (a) | K – plumule ; L – radicle ; M – cotyledon ; N – testa ; | [4] |
| (b) | hypha(e) ; | [1] |
| (c) | MP1 substrate, 'fits' into enzyme ; MP2 active site (of enzyme); MP3 shape is complementary ; MP4 substrate is key, enzyme is lock ; MP5 substrate / starch / nutrient, converted (into products) / AW ; MP6 (2) products (molecules) leave ; MP7 enzyme / amylase, can work again on another substrate ; | [max 4] |
| (d) | very little activity until day 5 ; increase to day 11 / peak at day 11 ; decrease to day 15 ; data quote with day <u>and</u> activity ; | [max 3] |
| (e) | ref to different shapes of the lines ; (therefore) there is enzyme activity in both pH ; enzyme activity influenced by / specific to, pH ; data quote ; e.g. quote of activity at pH 8 <u>and</u> pH 5 on a specified day ; suggesting one enzyme prefers acid conditions, but by day 15 less enzyme, produced / available ; | [max 3] |
| | | [Total: 15] |

| 4 | (a) | <p>MP1 attach to virus / bacteria / antigens ; MP2 prevent movement around the body ; MP3 prevent entry into <u>cells</u> ; MP4 stop division ; MP5 combine with / neutralise, toxins ; MP6 clump, bacteria / viruses, together ; MP7 help phagocytes engulf virus / bacteria ;</p> | [max 3] | | | | | | | | | |
|-----------------------|---------------------------------|--|--------------------|---------|-------------------|-------------------------|-----------------------|---------------------------------|--------------------|--------------------------|-----------|---------------------------------|
| | (b) | <p>kidney would be rejected ; (lymphocytes produce anti-A) antibodies ; (antibodies) attach to blood vessels ;</p> | [max 2] | | | | | | | | | |
| | (c) | no, blood / capillaries / antigens / antibodies / white cells / lymphocytes, in the cornea ; | [max 1] | | | | | | | | | |
| | (d) | $I^A I^O \times I^B I^O$; $I^A I^O + I^B I^O$; $I^O I^O$; | [3] | | | | | | | | | |
| | (e) | <table border="1"> <thead> <tr> <th>term</th> <th>example</th> </tr> </thead> <tbody> <tr> <td>a dominant allele</td> <td>I^A</td> </tr> <tr> <td>heterozygous genotype</td> <td>$I^A I^O / I^B I^O / I^A I^B$;</td> </tr> <tr> <td>codominant alleles</td> <td>I^A and I^B ;</td> </tr> <tr> <td>phenotype</td> <td>(blood) group, A / B / AB / O ;</td> </tr> </tbody> </table> | term | example | a dominant allele | I^A | heterozygous genotype | $I^A I^O / I^B I^O / I^A I^B$; | codominant alleles | I^A and I^B ; | phenotype | (blood) group, A / B / AB / O ; |
| term | example | | | | | | | | | | | |
| a dominant allele | I^A | | | | | | | | | | | |
| heterozygous genotype | $I^A I^O / I^B I^O / I^A I^B$; | | | | | | | | | | | |
| codominant alleles | I^A and I^B ; | | | | | | | | | | | |
| phenotype | (blood) group, A / B / AB / O ; | | | | | | | | | | | |
| | | | [Total: 12] | | | | | | | | | |

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| 5 (a) (i) | circulatory system | blood vessels that carry oxygenated blood | [2] |
| | maternal | V ; | |
| | fetal | Y / Y and X ; | |
| (ii) | umbilical cord ; <i>Any one of the following:</i> tied / clamped ; cut ; (part attached to mother) comes away with placenta ; (part attached to baby) drops off ; | | [2] |
| (iii) | MP1 oxygen, from maternal / to fetal ; MP2 carbon dioxide, from fetal / to maternal ; MP3 named nutrients from maternal / to fetal ; MP4 water, either direction or both ; MP5 antibodies, from maternal / to fetal ; MP6 urea / nitrogenous waste, from fetal / to maternal ; MP7 passage of hormones, from maternal / to fetal / both directions ; MP8 diffusion in correct context ; MP9 active transport in correct context ; (amino acids) | | [max 4] |
| (b) | <i>oestrogen and progesterone</i> MP1 develops, (lining of) uterus / endometrium ; MP2 prevent, shedding of lining / menstruation ; MP3 inhibit (release of) FSH ; MP4 by pituitary gland ; MP5 prevent egg cells / follicles, developing (in ovary) / ovulation ; MP6 promote development / growth, of mammary glands ; | | [max 3] |
| | | | [Total: 11] |

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| 6 (a) | <p>MP1 reduction of (wild) habitat / change the ecosystem ;</p> <p>MP2 area too small to support many organisms ;</p> <p>MP3 populations, are too small / isolated, to survive / breed;</p> <p>MP4 disruption to food chain / food web ;</p> <p>MP5 flooding ;</p> <p>MP6 erosion ;</p> <p>MP7 leaching of minerals ;</p> | [max 3] |
| (b) | <p>MP1 more energy available ;</p> <p>MP2 energy loss, within / between, <u>trophic levels</u> ;</p> <p>MP3 energy lost in animal's, metabolism / respiration / movement / excretion ;</p> <p>MP4 little energy for animal growth ;</p> <p>MP5 (about) 90% loss / (only) 10% passed on to humans ;</p> | [max 3] |
| (c) | <p>MP1 burning trees gives off carbon dioxide ;</p> <p>MP2 less photosynthesis ;</p> <p>MP3 so less carbon dioxide, absorbed ;</p> <p>MP4 less oxygen produced ;</p> <p>MP5 cows give off, methane ;</p> <p>MP6 methane, greenhouse gas ;</p> <p>MP7 traps heat in the atmosphere ;</p> <p>MP8 less transpiration ;</p> <p>MP9 reduced rainfall ;</p> | [max 3] |
| (d) | <p>soils, are thin / have little humus content ;</p> <p>no / less, recycling organic material ;</p> <p>competition for minerals from crop ;</p> <p>constant cultivation, removes / overuses, minerals ;</p> <p>plant pest population increases ;</p> | [max 2] |
| (e) | <p>less, forest cleared ;</p> <p>less energy used ;</p> <p>less water used in paper production from recycled paper ;</p> <p>less waste to, landfill ;</p> <p>less rubbish burnt, so less carbon dioxide given off ;</p> | [max 2] |
| | | [Total: 13] |