**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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<table>
<tr><th>Question</th><th>Expected Answers</th><th>Marks</th></tr>
<tr><td>1 (a)</td><td>
<table>
<tr><th>function</th><th>letter</th></tr>
<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>
</table>
</td><td>[5]</td></tr>
<tr><td>(b) (i)</td><td>
<table>
<tr><th>large molecule</th><th>nutrients absorbed</th></tr>
<tr><td>protein</td><td>amino acids ;</td></tr>
<tr><td>glycogen</td><td>Glucose / $C_6H_{12}O_6$ ;</td></tr>
<tr><td>fat</td><td>fatty acids and glycerol ;</td></tr>
</table>
</td><td>[3]</td></tr>
<tr><td>(ii)</td><td>calcium / $Ca^{2+}$ ;<br>iron / $Fe^{2+}$ ;</td><td>[2]</td></tr>
<tr><td>(iii)</td><td>vitamins / named vitamin ;</td><td>[1]</td></tr>
</table>

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

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

**4 (a)**

**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 ;

[max 3]

**(b)**

kidney would be rejected ;
(lymphocytes produce anti-A) antibodies ;
(antibodies) attach to blood vessels ;

[max 2]

**(c)**

no, blood / capillaries / antigens / antibodies / white cells / lymphocytes, in the cornea ;

[max 1]

**(d)**

$I^AI^O \times I^BI^O$ ;
$I^A\ I^O + I^B\ I^O$ ;
$I^OI^O$ ;

[3]

**(e)**

| term | example |
|---|---|
| a dominant allele | **$I^A$** |
| heterozygous genotype | $I^AI^O$ / $I^BI^O$ / $I^AI^B$ ; |
| codominant alleles | $I^A$ **and** $I^B$ ; |
| phenotype | (blood) group, A / B / AB / O ; |

[3]

**[Total: 12]**

**5 (a) (i)**

| circulatory system | blood vessels that carry oxygenated blood |
|---|---|
| maternal | V ; |
| fetal | Y / Y **and** X ; |

[2]

**(ii)** umbilical cord ;
*Any one of the following:*

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)** *oestrogen and progesterone*

**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]**

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