CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 series

0610 BIOLOGY

0610/21 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.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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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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<table>
<tr><th>question number</th><th>mark scheme</th><th>marks</th><th>guidance</th></tr>
<tr><td>1</td><td>
<table>
<tr><th>difference</th><th>monocotyledons</th><th>eudicotyledons</th></tr>
<tr><td>number of cotyledons in the seed</td><td>1</td><td>2</td></tr>
<tr><td>pattern of leaf veins</td><td>parallel / AW ;</td><td>branched / network / AW ;</td></tr>
<tr><td>number of petals present</td><td>3 / multiples of (up to 60) ;</td><td>4 or 5 / multiples of (up to 60) ;</td></tr>
</table>
</td><td>[4]

[Total: 4]</td><td></td></tr>
<tr><td>2 (a) (i)</td><td>bacteria (in mouth) ;

(bacteria) change or respire sugar / named sugar (in food) ;

(sugar) to acid / lactic acid ;

acid dissolves / attacks, enamel / teeth / dentine / top layer / AW ;

<u>anaerobic</u> respiration ;</td><td>max [4]</td><td></td></tr>
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2 (a) (ii)	*brushing*: dislodges, plaque / bacteria / food (particles) / sugars (from mouth) **;** *rinsing*: removes, plaque / bacteria / food (particles) / sugars (from mouth) **;** *not eating sweet foods between meals*: bacteria have, less sugar / food (to respire / use) bacteria respire less / less acid produced **;**	[3]	**A** <u>antiseptic</u> mouth-wash kills / inhibits bacteria
2 (b) (i)	*incisors:* chop / cut / bite / AW **;** *canines:* pierce / tear / grip / AW **;** *premolars and molars:* grind / crush / chew / AW **;**	[3]	**R** chew **A** canines chop / cut / bite food **A** increases surface area of the food / breaks up large chunks / AW
2 (b) (ii)	moves food (between teeth) / AW **;** mixes food with saliva / amylase **;** helps form a bolus **;**	max [1]	

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2 (c)	food small enough (to be swallowed) **ora** ; increases surface area ; for more rapid enzyme action / digestion ; food mixed with, enzyme / amylase ; food mixed with saliva / mucus (to make swallowing easier) ; prepares stomach for receiving food / AW ;	max [2] **[Total: 13]**	**A** makes food softer
3 (a)	bronchiole ; larynx ; trachea ;	[3]	one mark for each labelled line in the correct position.
3 (b)	large surface area (per volume) ; thin / small diffusion distance ; moist / wet / liquid film ; (alveolar) wall permeable ; well ventilated / diffusion gradient maintained ; well supplied with capillaries / diffusion gradient maintained ;	max [3]	**A** answers in context applying to animals other than mammals.
3 (c) (i)	82.95 (dm^3 / min) ;	[1]	

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3 (c) (ii)	breaths more rapid / AW **;** breaths deeper / heavier / AW **;**	[2]	**A** diaphragm / external intercostal muscles, contract more rapidly / frequently
3 (c) (iii)	more oxygen needed **;** more (cell) respiration carried out **;** more energy is required **;** more muscle contraction **;**	max [1] **[Total: 10]**	

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4 (a)	desertification / AW ; soil erosion / landslides / land unstable / AW ; (rapid run-off leads to) local flooding ; rivers silt up ; less transpiration ; (dry air) so less rainfall ; climate change / changed weather patterns / disruption of water cycle ; carbon dioxide added to atmosphere by burning trees / AW ; less photosynthesis so less carbon dioxide removed from atmosphere / more carbon dioxide remains ; more carbon dioxide leads to, global warming / greenhouse effect / sea levels rising ; lack of food / shortage of shelter / homes / nesting sites / loss of habitat ; organisms die / extinction of species / loss of bio-diversity / food chains disrupted / nutrient cycles disrupted / reference to migration ;	max [4]	**ignore** references to ozone layer / acid rain

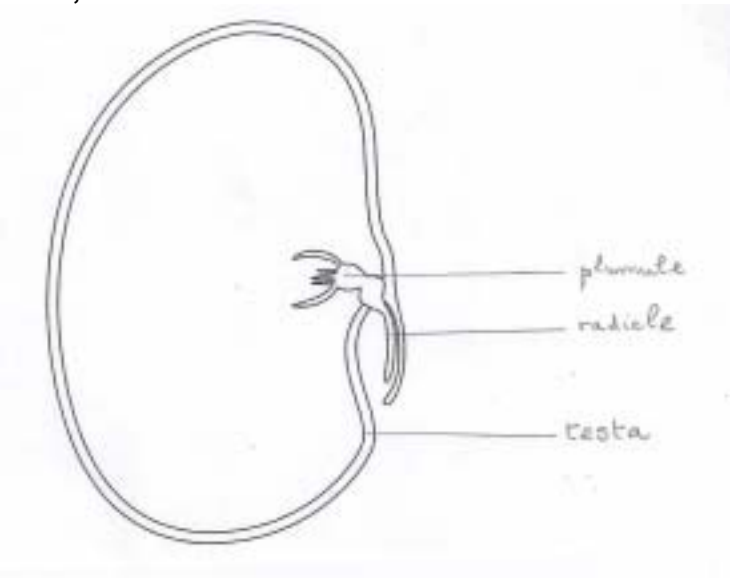
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4 (b)	*air:* carbon dioxide / carbon monoxide / oxides of sulfur / methane / oxides of nitrogen / CFCs / oxides of lead / ozone / smoke / dust / AVP **;** *land:* sewage / pesticides / herbicides / insecticides (or examples) / fertilisers / nuclear waste / chemical waste / land-fill / litter or rubbish / oil spillage / heavy metals / AVP **;** *water:* fertilisers / pesticides / herbicides / insecticides / human excrement / nuclear waste / reproductive hormones / antibiotics / chemical waste / industrial waste / litter or rubbish / chlorine / oil spillage / AVP **;**	max 3 **[Total: 7]**	6 correct =3 4-5 correct =2 1-3 correct =1 **ignore** car fumes / car exhaust / forms of radiation **A** specific examples in place of litter e.g. plastic bottles **ignore** waste unqualified note that any one pollutant can be given credit in one category only

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5 (a)	*mutation:* a change / error **;** in a, gene / chromosome / DNA **;** *heterozygous:* having, two different alleles / a dominant allele and a recessive allele **;** of a particular gene **;** *recessive allele:* alternative form of a gene **;** only expressed, in absence of the dominant (allele) / if homozygous **;**	[6]	**A** not pure breeding **ignore** symbols alone e.g. Hh **ignore** symbols alone
5 (b)	(sun-cream) absorbs / blocks / stops Sun's rays **;** prevents ionising radiation / harmful Sun's rays from reaching skin / cells / body **;** reference to cancer / melanoma / mutation **;**	max [1]	**R** repels / reflects radiation **ignore** ref to tanning / sunburn
5 (c) (i)	1: aa **;** 2: Aa **;** 3: aa **;** 9: Aa **;**	[4]	**A** if recessive allele is given first (e.g. aA)
5 (c) (ii)	couple R	[1]	**A** individuals 6 and 7
5 (c) (iii)	if it was recessive all their offspring would have shown the condition **;** but individual 11 / AW is normal, so must be dominant / AW **;**	[2] **[Total: 14]**	

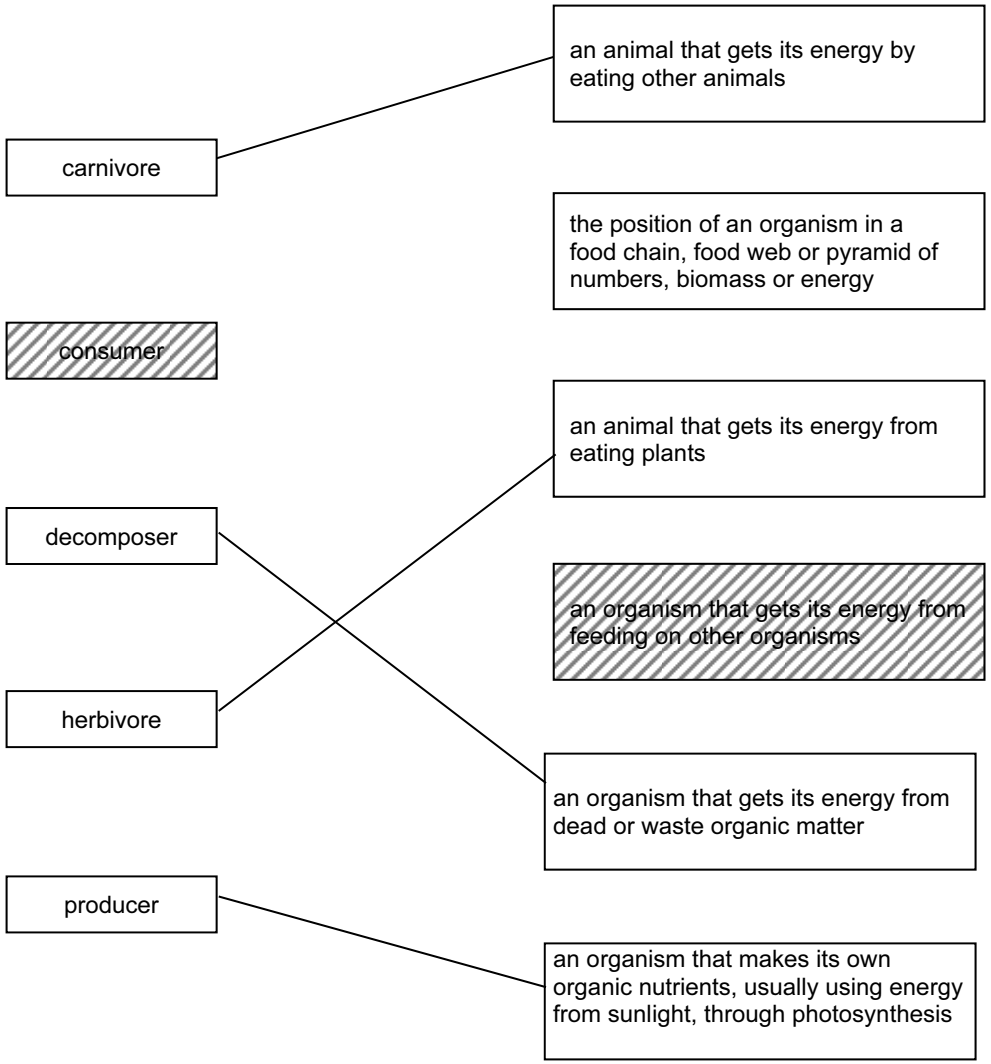
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6 (a)	plumule ; radicle ; testa ;  	[3]	
6 (b)	cotyledon ;	[1]	**ignore** endosperm
6 (c)	colonise new areas / more space (for plant to grow) ; reduce competition (for resources / named resource) ;	max [1] **[Total: 5]**	

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7 (a) (i)	finch (in a box) above level of tree and grass **;** arrowed line from tree to finch **;** **R** if no arrow head / arrow head in wrong direction / extra incoming line two arrowed lines from finch to hawk **and** eagle **;** **R** if no arrow heads / arrow heads in wrong direction / extra outgoing line	[3]	
7 (a) (ii)	increase in hawks **;** as not eaten (by eagles / no predators / AW) **;** increase in hawks **;** decrease in, everything eaten by the hawk / decrease in finch / crow **;** decrease in crows / finches **;** as more hawks to eat them **;** increase in finches **;** as fewer eagles to eat them **;** increase in aphids and locusts **;** as fewer crows to eat them **;** any logical suggestion **;** with reason **;**	max [4]	

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7 (b)		[4] **[Total: 11]**	award 1 mark for each correct line **R** any box on the left with more than 1 line coming from it

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<table>
<tr><td>8 (a)</td><td>protein ;

acts as a (biological) catalyst ;

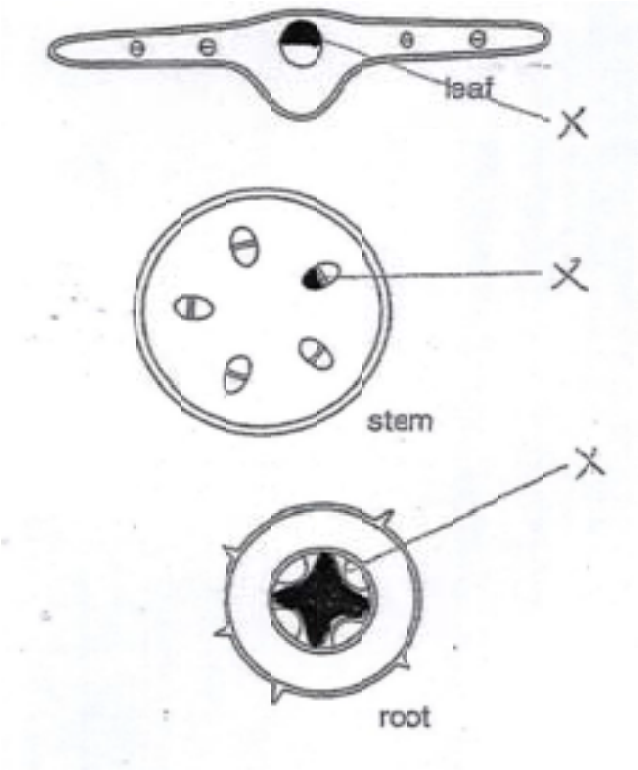
speeds up / alters rate of (chemical) reaction or is not altered / used up by reaction ;</td><td>max [2]</td><td>ignore specific processes / specific enzymes</td></tr>
<tr><td>8 (b)</td><td>L: pH 2 ;
M: pH 8 ;</td><td>[2]</td><td>A 1.9 – 2.1 for L
A pH 7.8 – 8.2 for M</td></tr>
<tr><td>8 (c)</td><td>
<table>
<tr><th>name of enzyme</th><th>substrate</th><th>one end-product</th></tr>
<tr><td>amylase</td><td>starch ;</td><td>maltose / glucose ;</td></tr>
<tr><td>lipase</td><td>fat ;</td><td>glycerol / fatty acids ;</td></tr>
<tr><td>protease</td><td>protein ;</td><td>amino acids ;</td></tr>
</table>
</td><td>[6]

[Total: 10]</td><td></td></tr>
</table>

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9 (a)	movement of sugars / named sugar / amino acids ; in phloem ; from region of production / leaves / source ; to region of utilisation / storage / growth ; energy required / AW ;	max [3]	**A** water and sugars / water and amino acids **R** starch

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9 (b)	*correctly labelled:* *xylem in leaf* ; *xylem in stem* ; *xylem in root* ;  	[3] **[Total: 6]**	

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