

**MARK SCHEME for the October/November 2011 question paper  
for the guidance of teachers**

**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.

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

- Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2011 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.



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### General notes

Do not exceed the section sub-totals or question maxima.

Symbols used in mark scheme and guidance notes.

/ separates alternatives for a marking point

; separates points for the award of a mark

MP mark point – used in guidance notes when referring to numbered marking points

ORA or reverse argument / reasoning

OWTTE or words to that effect

A accept – as a correct response

R reject – this is marked with a cross and any following correct statements do not gain any marks

I ignore / irrelevant / inadequate – this response gains no mark, but any following correct answers can gain marks.

( ) the word / phrase in brackets is not required to gain marks but sets the context of the response for credit.  
e.g. (waxy) cuticle. Waxy not needed but if it was described as a cellulose cuticle then no mark is awarded.

mitosis underlined words – this word only

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Question	Mark Scheme	Mark	Guidance												
1 (a)	<table border="1"> <tr> <td>arachnids</td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>crustaceans</td> <td><input type="checkbox"/></td> </tr> <tr> <td>insects</td> <td><input type="checkbox"/></td> </tr> <tr> <td>myriapods</td> <td><input type="checkbox"/></td> </tr> </table>	arachnids	<input checked="" type="checkbox"/>	crustaceans	<input type="checkbox"/>	insects	<input type="checkbox"/>	myriapods	<input type="checkbox"/>	[1]	if more than 1 box ticked no mark				
arachnids	<input checked="" type="checkbox"/>														
crustaceans	<input type="checkbox"/>														
insects	<input type="checkbox"/>														
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(b)	<table border="1"> <tr> <td>crab</td> <td>name of arthropod</td> </tr> <tr> <td>A</td> <td><i>Araneus;</i></td> </tr> <tr> <td>B</td> <td><i>Buthus;</i></td> </tr> <tr> <td>C</td> <td><i>Hydrachna;</i></td> </tr> <tr> <td>D</td> <td><i>Ixodes;</i></td> </tr> <tr> <td>E</td> <td><i>Oligolophus;</i></td> </tr> </table> <p>any four correctly named – 1 mark each</p>	crab	name of arthropod	A	<i>Araneus;</i>	B	<i>Buthus;</i>	C	<i>Hydrachna;</i>	D	<i>Ixodes;</i>	E	<i>Oligolophus;</i>	[4]	two or more names in a line mark the first.
crab	name of arthropod														
A	<i>Araneus;</i>														
B	<i>Buthus;</i>														
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		<b>[Total: 5]</b>													

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<b>2 (a)</b>	<b>M</b> – trachea; <b>N</b> – bronchus; <b>O</b> – bronchioles;	[3]	A – cartilage, windpipe A – bronchi, l – ref to position left/right A – alveolus / alveoli
<b>(b)</b>	observe rise and fall of chest / OWTTE; count number of inhalations in known period of time;	[2]	A – ref to breathing monitors A – 15 s to 5 mins
<b>(c)</b>	<b>(i)</b> male 1; <b>(ii)</b> female 2; <b>(iii)</b> 1 breathing rate rises with exercise; 2 the rise in breathing rate varies from person to person; 3 (on average) males have higher breathing rates, before running / resting / after running than females/ OWTTE / ORA;  any two – 1 mark each	[1] [1]  [2]	
<b>(d)</b>	1 exercise needs (extra) energy; 2 energy released by respiration; 3 in muscles; 4 (more) oxygen needed; 5 (more) carbon dioxide to be removed; 6 increased breathing rate to provide the oxygen / remove the carbon dioxide;  any four – 1 mark each	[4]	more required at least once in the logical progression – penalise once for complete absence l – refs to anaerobic respiration
		<b>[Total: 13]</b>	



<b>4 (a)</b>	(i) 1 by diffusion; 2 through root hairs; 3 from soil water / in solution in soil water; 4 down concentration gradient;  Any two – 1 mark each	[2]	MP1 A – ref to active transport  MP4 A – against the concentration gradient (linked to active transport)												
	(ii) fungi / bacteria;	[1]	A – decomposers												
<b>(b)</b>	(i) to allow them to be absorbed / carried in plasma;	[1]													
	(ii) bone / tooth / muscle;	[1]	A – ref to enamel or dentine												
<b>(c)</b>	1 minerals in dung / faeces; 2 a concentrated / rich source of phosphates; 3 excreta broken down / minerals released into soil; 4 replaces phosphates removed by plants / crops; 5 thus new plants / crops grow well / no deficiency; 6 thus minerals recycled;  any three – 1 mark each	[3]													
		<b>[Total: 8]</b>													
<b>5 (a)</b>	<table border="1"> <thead> <tr> <th><i>substance</i></th> <th><i>enters the blood</i></th> <th><i>leaves the blood</i></th> </tr> </thead> <tbody> <tr> <td></td> <td>lungs;</td> <td></td> </tr> <tr> <td></td> <td></td> <td>liver;</td> </tr> <tr> <td></td> <td></td> <td>kidney;</td> </tr> </tbody> </table>	<i>substance</i>	<i>enters the blood</i>	<i>leaves the blood</i>		lungs;				liver;			kidney;	[3]	A – alveoli A – Bowman's capsule / glomerulus
	<i>substance</i>	<i>enters the blood</i>	<i>leaves the blood</i>												
		lungs;													
			liver;												
		kidney;													
<b>(b)</b>	prevents / reduces risk of microorganisms entering blood / tissues; stops / reduces loss of blood;	[2]	A – ref to bacteria / viruses I – ref to germs												
		<b>[Total: 5]</b>													

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<b>6 (a)</b>	<b>(i)</b> (tropic level) 1 / producers;	[1]	I – ref to primary
	<b>(ii)</b> cheetah / hyena / lion;	[1]	
<b>(b)</b>	<b>(i)</b> (animal / consumer / organism) that eats plants / vegetation; it eats <u>only</u> plants / does not eat meat / other consumers;	[2]	A – ref to animal that gets energy from plants
	<b>(ii)</b> because of its size it is basically free of predators;	[1]	
<b>(c)</b>	<b>(i)</b> bacteria / fungi / (fly) maggots;	[1]	A – named example A – MP1, 3 and 4 in terms of carbon dioxide
	<b>(ii)</b> 1 various mineral / ions removed from soil by plants; 2 need to be replaced; 3 or plant regrowth is restricted; 4 decomposers release minerals from dead remains; 5 without this action get build up of dead material; 6 also soil becomes less fertile;  any three – 1 mark each	[3]	
<b>(d)</b>	grass, zebra / impala, cheetah, hyena OR acacia, impala, cheetah, hyena chain of four organisms from food web; shown in correct order; arrows showing direction of energy flow;	[3]	<b>NO MARK</b>
		<b>[Total: 10]</b>	

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<b>7</b>	<p>1 herbicides kill competing species / weeds;  2 reduces competition for minerals / ions;  3 reduces competition for light / removes shading of crop;  4 reduces competition for water;  5 reduces competition for space  6 some weeds have antagonistic effect of crop plants;  7 crop grows faster / process bigger yield;  8 weeds can harbour harmful bacteria / fungi / insects;</p> <p>any four – 1 mark each</p>	[4]	<p>A – named example, I – ref to nutrients</p> <p>MP2–5 A – less competition unqualified for 1 mark if no specific examples given  MP8 A – in context of harm to crop plant, A – pests</p>
		<b>[Total: 4]</b>	
<b>8 (a)</b>	<p>1 growth / germination needs energy;  2 seed respire;  3 using food reserves / named example;  4 no photosynthesis happening;</p> <p>any three – 1 mark each</p>	[3]	A – carbohydrate, starch, sugar, glucose, fat
<b>(b)</b>	<p>1 shoot above ground;  2 leaves are green;  3 exposed to light;  4 photosynthesis starts;  5 new materials formed / named example;  6 more formed than reserves used up;</p> <p>any three – 1 mark each</p>	[3]	
<b>(c)</b>	13 days;	[1]	A – 12.8 to 13.2 days
		<b>[Total: 7]</b>	



<b>9 (a)</b>	(i) <b>A</b> – sperm cell; <b>B</b> – white blood cell / phagocyte / leucocyte;	[2]	A – lymphocyte											
	(ii) fusing with ovum / egg (cell) / fertilisation / forming zygote; has tail to swim to reach ovum;	[2]	I – ovule A – is haploid, streamlined, has acrosome, mitochondria,											
	(iii) to surround / engulf / digest / destroy microorganisms / phagocytosis;	[1]	A – produce antibodies											
<b>(b)</b>	<table border="1"> <thead> <tr> <th><i>type of cell</i></th> <th><i>number of chromosomes</i></th> </tr> </thead> <tbody> <tr> <td><i>nerve cell C</i></td> <td>46</td> </tr> <tr> <td><i>cell A</i></td> <td>23;</td> </tr> <tr> <td><i>cell B</i></td> <td>46;</td> </tr> <tr> <td><i>red blood cell D</i></td> <td>0;</td> </tr> </tbody> </table>		<i>type of cell</i>	<i>number of chromosomes</i>	<i>nerve cell C</i>	46	<i>cell A</i>	23;	<i>cell B</i>	46;	<i>red blood cell D</i>	0;	[3]	
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<b>10 (a)</b>	(i) when both of a pair of alleles are identical / same;	[1]	A – genes for alleles
	(ii) (thalassaemia allele is) recessive; present in both parents but not affecting them / OWTTE;	[2]	
	(iii) TT and Tt;	[1]	
<b>(b)</b>	<p>1 parent genotypes Tt and Tt;</p> <p>2 gametes</p> <p style="text-align: center;"> <span style="border: 1px solid black; padding: 2px;">T</span>      <span style="border: 1px solid black; padding: 2px;">t</span>      <span style="border: 1px solid black; padding: 2px;">T</span>      <span style="border: 1px solid black; padding: 2px;">t</span> ; </p> <p>3 offspring genotypes TT    Tt    Tt    tt;</p> <p>4 phenotypes not    not    not    affected;                   affected affected affected</p>	[4]	<p>apply ECF for lines following from an erroneous line</p> <p>NB – MP4 must have at least one affected offspring to answer question</p>
<b>(c)</b>	<p>(i) iron;</p> <p>(ii) have insufficient / malformed haemoglobin; therefore cannot carry enough oxygen; thus cannot release sufficient energy by respiration;</p> <p>any two – 1 mark each</p>	<p>[1]</p> <p>[2]</p>	
		<b>[Total: 11]</b>	