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**BIOLOGY**

**0610/31**

Paper 3 Theory (Core)

**May/June 2017**

MARK SCHEME

Maximum Mark:80

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**Published**

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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This document consists of **13** printed pages.

**Mark schemes will use these abbreviations**

- ; separates marking points
- / alternatives
- **I** ignore
- **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 any valid point
- **ecf** credit a correct statement / calculation that follows a previous wrong response
- **ora** or reverse argument
- ( ) the word / phrase in brackets is not required, but sets the context
- underline actual word given must be used by candidate (grammatical variants excepted)
- max indicates the maximum number of marks that can be given

Question	Answer	Marks	Guidance
1(a)	<b>A</b> – iris ; <b>B</b> – pupil ;	<b>2</b>	
1(b)(i)	(pupil / <b>B</b> ) becomes smaller / constricts / AW ;	<b>1</b>	<b>ecf</b>
1(b)(ii)	reduces the amount of light (entering the eye) / stops too much light (entering eye) ; protects, retina (cells) / receptors / sensors, from damage / AW ;	<b>2</b>	

Question	Answer	Marks	Guidance
2(a)		<b>6</b>	for <b>each</b> column of lines: 3 or 4 correct = 3 marks 2 correct = 2 marks 1 correct = 1 mark  <b>R</b> if more than 1 line coming from a box

Question	Answer	Marks	Guidance
2(b)	in the blood / in the plasma ;	1	<b>A</b> in the blood stream / in the blood vessels / circulatory system / in the veins / arteries / capillaries  <b>R</b> inside any blood cell (including platelets)

Question	Answer	Marks	Guidance
3(a)	<u>1 dm<sup>3</sup> per min</u> (ute) ;	1	
3(b)	liver ; gall bladder ; brain ; kidney ; testes ; ovaries ; pancreas ; lungs ; spleen ; uterus ; AVP ; ;	2	<b>A</b> any structure that is an organ <b>A</b> artery / vein / bone
3(c)(i)	1100 (%) ; ;	2	ecf from <b>3(a)</b>  $11 \div 1 \times 100$ or $12 - 1 \div 1 \times 100$
3(c)(ii)	<u>oxygen</u> ;  <u>glucose</u> ;	2	either order

Question	Answer	Marks	Guidance
3(c)(iii)	<p>more energy / ATP, needed by heart muscle / it / (skeletal) muscle ;</p> <p>from respiration ;</p> <p>because (heart muscle) has to contract more, strongly / forcefully ;</p> <p>(heart muscle) has to contract, more frequently / heart beats faster ;</p> <p>(because) blood flow to (skeletal) muscles increases / blood flows faster to the (skeletal) muscles ;</p>	3	AW throughout
3(d)(i)	<p>data quote used to support either statement ;</p> <p><i>alimentary canal:</i> decreased (blood flow) / goes down / AW ;</p> <p><i>skin:</i> increased (blood flow) / goes up / AW ;</p>	3	
3(d)(ii)	<p>digestion / absorption not a priority / AW ;</p> <p>blood (volume), needed elsewhere in body / to go to the muscles / AW ;</p> <p>AVP ;</p>	1	

Question	Answer	Marks	Guidance
3(d)(iii)	1 exercise / muscles release heat ; 2 (and so) the body gets hotter / body temp increases ; 3 blood carries heat ; 4 heat lost at skin (surface) ; 5 ref to homeostasis / precise description of ;	3	

Question	Answer	Marks	Guidance
4	<u>glucose</u> ; <u>lactic acid</u> ; alcohol ; carbon dioxide ;	4	

Question	Answer		Marks	Guidance
5(a)	<b>D / E</b>	adaptive feature	help in survival	4 feature and reason must match  feature must be <b>visible</b>  AW throughout
	<b>D</b>	(canine) teeth  large mouth / jaws / beak  (long / strong), tail  webbed, toes / feet  scaly / rough, skin / has scales  markings / AW  eyes on top of head  AVP ;	seize / eat prey  swallow / catch / grip large prey  swimming / defence  swimming  prevent dehydration / waterproof  for camouflage  vision when submerged ;	
	<b>E</b>	claws / nails / talons  beak  wings  (tail) feathers  forward facing eyes  AVP ;	catch / tear prey / perching / defence  tear / hold food / offence / defence  flight / search for prey / hunt / escape predators  retain body heat / helps in flight  to see prey from a distance ;	

Question	Answer	Marks	Guidance
5(b)	<p>2 → 1 → 4 → 3 → 5  or ; ; ;  1 → 2 → 4 → 3 → 5</p>	3	1 and 2 at start in either order 3 after 4 (somewhere) 5 at the end

Question	Answer	Marks	Guidance															
6(a)(i)	<table border="1"> <thead> <tr> <th data-bbox="280 579 434 632">feature</th> <th data-bbox="434 579 907 632">non-smoker</th> <th data-bbox="907 579 1361 632">smoker</th> </tr> </thead> <tbody> <tr> <td data-bbox="280 632 434 715">length of cilia</td> <td data-bbox="434 632 907 715">long / large / big</td> <td data-bbox="907 632 1361 715">short / small ;</td> </tr> <tr> <td data-bbox="280 715 434 798">number of cilia</td> <td data-bbox="434 715 907 798">many / more / large</td> <td data-bbox="907 715 1361 798">few / little / less ;</td> </tr> <tr> <td data-bbox="280 798 434 880">size of air space</td> <td data-bbox="434 798 907 880">wide</td> <td data-bbox="907 798 1361 880">narrow</td> </tr> <tr> <td data-bbox="280 880 434 1002">size of mucus layer</td> <td data-bbox="434 880 907 1002">thin / narrow / less / small / evenly distributed</td> <td data-bbox="907 880 1361 1002">thick / wide / big / more / large / uneven thickness ;</td> </tr> </tbody> </table>	feature	non-smoker	smoker	length of cilia	long / large / big	short / small ;	number of cilia	many / more / large	few / little / less ;	size of air space	wide	narrow	size of mucus layer	thin / narrow / less / small / evenly distributed	thick / wide / big / more / large / uneven thickness ;	3	
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6(b)	<p>bacteria cause infections ;</p> <p>bacteria (trapped) in mucus ;</p> <p>insufficient / damaged cilia ;</p> <p>(so) mucus / bacteria, not removed / stay in / build up in, (lung / bronchiole) or mucus / bacteria, will enter alveoli ;</p> <p>AVP ;</p>	<b>2</b>																						
6(c)	<p>carbon monoxide ;</p> <p>tar ;</p> <p>nicotine ;</p> <p>particulates ;</p> <p>AVP ; ;</p>	<b>2</b>																						

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7	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;"></th> <th style="width: 25%;">Description</th> <th style="width: 45%;">Name</th> <th style="width: 25%;">Letter</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">2</td> <td></td> <td><i>Plumbago maritime</i></td> <td>J</td> </tr> <tr> <td style="text-align: center;">3</td> <td></td> <td><i>Plumbago lanceolata</i></td> <td>K</td> </tr> <tr> <td style="text-align: center;">4</td> <td></td> <td><i>Nymphaea alba</i></td> <td>G</td> </tr> <tr> <td style="text-align: center;">5</td> <td></td> <td><i>Trifolium pratense</i></td> <td>M</td> </tr> <tr> <td></td> <td></td> <td><i>Lupinus arboreus</i></td> <td>H</td> </tr> </tbody> </table> <p style="text-align: right; margin-top: 10px;">.....</p>				Description	Name	Letter	1				2		<i>Plumbago maritime</i>	J	3		<i>Plumbago lanceolata</i>	K	4		<i>Nymphaea alba</i>	G	5		<i>Trifolium pratense</i>	M			<i>Lupinus arboreus</i>	H	<b>5</b>	1 correct = 1 mark 2 correct = 2 marks 3 correct = 3 marks 4 or 5 correct = 4 marks 6 correct = 5 marks
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8(a)	breakdown of molecules ; large to small (molecules) / food to small(er) molecules ; insoluble to soluble (molecules) ;	<b>3</b>															
8(b)	<table border="1" data-bbox="488 435 1182 821"> <thead> <tr> <th data-bbox="488 435 958 518">name of structure</th> <th data-bbox="958 435 1182 518">letter from Fig. 8.1</th> </tr> </thead> <tbody> <tr> <td data-bbox="488 518 958 569">salivary gland</td> <td data-bbox="958 518 1182 569"><b>P</b></td> </tr> <tr> <td data-bbox="488 569 958 620">anus</td> <td data-bbox="958 569 1182 620"><b>X ;</b></td> </tr> <tr> <td data-bbox="488 620 958 671">large intestine</td> <td data-bbox="958 620 1182 671"><b>W ;</b></td> </tr> <tr> <td data-bbox="488 671 958 722">mouth</td> <td data-bbox="958 671 1182 722"><b>N ;</b></td> </tr> <tr> <td data-bbox="488 722 958 774">pancreas</td> <td data-bbox="958 722 1182 774"><b>U ;</b></td> </tr> <tr> <td data-bbox="488 774 958 821">stomach</td> <td data-bbox="958 774 1182 821"><b>S ;</b></td> </tr> </tbody> </table>	name of structure	letter from Fig. 8.1	salivary gland	<b>P</b>	anus	<b>X ;</b>	large intestine	<b>W ;</b>	mouth	<b>N ;</b>	pancreas	<b>U ;</b>	stomach	<b>S ;</b>	<b>5</b>	
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8(c)	<p><i>function of the liver</i></p> <p>production of bile ;            formation of urea / breakdown of (excess) amino acids ;            breakdown of, alcohol or toxins / harmful substances ;            glucose converted to glycogen ; <b>ora</b>            glycogen stored ;            AVP ;</p> <p><i>function of the small intestine</i></p> <p>digestion / breakdown of food / absorption ;</p>	<b>2</b>	<p>max 1 from each section</p> <p>e.g. deamination / formation of cholesterol /            breakdown of, red blood cells or            haemoglobin / breakdown of hormones /            metabolism of lactic acid / stores vitamins            and minerals / formation of (named) plasma            proteins</p>
8(d)	<p>protein is, digested / acted on / broken down, by            protease / named protease ;</p> <p>protease from, stomach / pancreas / small intestine ;</p> <p>(digested to) polypeptides / amino acids AW ;</p> <p>acid conditions in stomach ;</p> <p>alkaline / neutral conditions in small intestine ;</p> <p>AVP ;</p>	<b>4</b>	<p>e.g. activation of enzymes</p>
8(e)	<p>oral rehydration therapy / AW ;</p>	<b>1</b>	

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9(a)(i)	X = epidermis ; Y = palisade (mesophyll) ;	2	R lower epidermis I cuticle I mesophyll unqualified R spongy mesophyll																				
9(a)(ii)	to let light through / light can reach, (palisade) mesophyll cells / chloroplasts ;	1																					
9(b)(i)	Z = stoma ;	1	A stomata / guard cell R stroma																				
9(b)(ii)	<u>diffusion</u> ;	1																					
9(b)(iii)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th colspan="3">movement of gas</th> </tr> <tr> <th>name of gas</th> <th>into leaf</th> <th>out of leaf</th> <th>no movement</th> </tr> </thead> <tbody> <tr> <td>carbon dioxide</td> <td>✓;</td> <td></td> <td></td> </tr> <tr> <td>oxygen</td> <td></td> <td>✓;</td> <td></td> </tr> <tr> <td>water vapour</td> <td></td> <td>✓;</td> <td></td> </tr> </tbody> </table>		movement of gas			name of gas	into leaf	out of leaf	no movement	carbon dioxide	✓;			oxygen		✓;		water vapour		✓;		3	
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