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**BIOLOGY**

**0610/32**

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.

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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	<table border="1"> <thead> <tr> <th>name of tree</th> <th>letter</th> </tr> </thead> <tbody> <tr> <td>go to 2</td> <td></td> </tr> <tr> <td>go to 4</td> <td></td> </tr> <tr> <td>go to 3</td> <td></td> </tr> <tr> <td><i>Hedera</i></td> <td><b>E</b></td> </tr> <tr> <td><i>Magnolia</i></td> <td><b>C</b></td> </tr> <tr> <td><i>Quercus</i></td> <td><b>A</b></td> </tr> <tr> <td><i>Aesculus</i></td> <td><b>B</b></td> </tr> <tr> <td><i>Sorbus</i></td> <td><b>D</b></td> </tr> </tbody> </table>	name of tree	letter	go to 2		go to 4		go to 3		<i>Hedera</i>	<b>E</b>	<i>Magnolia</i>	<b>C</b>	<i>Quercus</i>	<b>A</b>	<i>Aesculus</i>	<b>B</b>	<i>Sorbus</i>	<b>D</b>	<b>4</b>	1 correct = 1 mark 2 correct = 2 marks 3 or 4 correct = 3 marks 5 correct = 4 marks
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Question	Answer	Marks	Guidance												
2(a)	<table border="1"> <tr> <td>process</td> <td>letter</td> </tr> <tr> <td>ingestion</td> <td>A ;</td> </tr> <tr> <td>mechanical digestion</td> <td>A / D ;</td> </tr> <tr> <td>secretion of protease</td> <td>D / E ;</td> </tr> <tr> <td>absorption of nutrients</td> <td>F ;</td> </tr> <tr> <td>egestion</td> <td>H ;</td> </tr> </table>	process	letter	ingestion	A ;	mechanical digestion	A / D ;	secretion of protease	D / E ;	absorption of nutrients	F ;	egestion	H ;	5	
process	letter														
ingestion	A ;														
mechanical digestion	A / D ;														
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absorption of nutrients	F ;														
egestion	H ;														
2(b)(i)	are <u>protein</u> (s) ; that function as biological <u>catalysts</u> ;	2	I speeds up reaction												
2(b)(ii)	fatty acid(s) ; glycerol ;	2	either order												
2(b)(iii)	carbon, hydrogen and oxygen ;	1													
2(b)(iv)	butter ; olive oil ;	2													
2(b)(v)	carbohydrate ; protein ; vitamins ; mineral salts ; fibre / roughage ; water ;	3	I fat A named vitamin once A named mineral once I examples of foods												

Question	Answer	Marks	Guidance
2(b)(vi)	for energy / respiration / metabolism ; insulation / thermal insulation / electrical insulation / myelin / maintains temperature ; storage of fat / vitamins ; making cell membranes ; protection (against mechanical damage) / cushions organs / shock absorber ; help body absorb vitamins / AW ; AVP ; e.g. hormones , buoyancy	1	A reduce heat loss / keeps body warm  R insulin

Question	Answer	Marks	Guidance
3(a)		4	1 mark for each correctly linked hormone
3(b)	reduce blood glucose / sugar (concentration) ; or (promotes conversion of) glucose to glycogen ;	1	I regulates / controls
3(c)(i)	ovum / egg (cell) / ova ;	1	
3(c)(ii)	flagellum ; enzymes / acrosome ; small size / streamlined ; mitochondria (in flagellum) ; only one set of chromosomes / haploid ;	2	

Question	Answer	Marks	Guidance
3(c)(iii)	meiosis ;	1	
3(d)(i)	increased breathing rate ; dilates airways in the lungs; increased, heart / pulse rate ; pupil dilation ; increased blood pressure; increased / divert, blood to muscles; speeds up reaction time; AVP ;	2	<p><b>A</b> increased depth / volume of breathing</p> <p><b>A</b> increased blood glucose concentration / increased metabolic rate</p> <p><b>A</b> increased mental awareness</p>
3(d)(ii)	<i>the following three boxes ticked</i> bungee jumping ; sitting an exam ; hearing a sudden noise ;	3	

Question	Answer	Marks	Guidance
4(a)	chemical ; cells ; nutrient ; oxygen ;	4	
4(b)(i)	80 (kJ) ;;	2	1 mark for correct working if answer wrong 1600 x 0.05 or equivalent calculation
4(b)(ii)	carbon dioxide ; water ;	2	either order
4(b)(iii)	muscle contraction / muscle doing work / (muscle) movement ; metabolism / enzyme reactions / chemical reactions / digestion; protein synthesis ; cell division / cell repair; active transport ; growth ; passage of nerve impulses ; maintenance of a constant body temperature ; excretion;	3	I exercise  A reproduction  A shivering / keep warm / homeostasis
4(c)	(muscle produces) lactic acid ; <b>ora</b> <b>or</b> (muscle) does not produce carbon dioxide / ethanol / alcohol ; <b>ora</b>	1	A <b>ora</b> only if yeast stated
4(d)	brewing / making alcoholic drinks / making beer / bread-making / biofuels / making ethanol / making carbon dioxide ;	1	A fermentation



Question	Answer	Marks	Guidance										
5(a)	(pulmonary) artery correctly labelled ; (pulmonary) vein correctly labelled ;	2											
5(b)	(presence of) valves ; thin(ner) walls ; wide(r) lumen ; less, muscular / elastic, tissues / fibres ;	2											
5(c)	<table border="1"> <thead> <tr> <th>component of blood</th> <th>function</th> </tr> </thead> <tbody> <tr> <td>red blood cells</td> <td>carries / transport oxygen ;</td> </tr> <tr> <td>white blood cells</td> <td>phagocytosis / antibody production / defence / immunity ;</td> </tr> <tr> <td>platelets</td> <td>clotting ;</td> </tr> <tr> <td>plasma</td> <td>transport of, blood cells / ions / (soluble) nutrients (named) / hormones / carbon dioxide / heat / urea / water / named molecule / enzymes ;</td> </tr> </tbody> </table>	component of blood	function	red blood cells	carries / transport oxygen ;	white blood cells	phagocytosis / antibody production / defence / immunity ;	platelets	clotting ;	plasma	transport of, blood cells / ions / (soluble) nutrients (named) / hormones / carbon dioxide / heat / urea / water / named molecule / enzymes ;	4	
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Question	Answer	Marks	Guidance						
6(a)(i)	arrow pointing upwards for shoot and arrow pointing downwards for root ;	1							
6(a)(ii)	gravitropism ;	1							
6(b)	<b>B</b> – lack of / no, moisture / water ; <b>C</b> – lack of / no, oxygen ; <b>D</b> – (too) cold / lack of warmth / inappropriate temperature ;	3							
6(c)(i)	<table border="1"> <thead> <tr> <th>mineral ion</th> <th>function in plants</th> </tr> </thead> <tbody> <tr> <td>nitrate</td> <td>making, amino acids / proteins ;</td> </tr> <tr> <td>magnesium</td> <td>for chlorophyll ;</td> </tr> </tbody> </table>	mineral ion	function in plants	nitrate	making, amino acids / proteins ;	magnesium	for chlorophyll ;	2	
mineral ion	function in plants								
nitrate	making, amino acids / proteins ;								
magnesium	for chlorophyll ;								
6(c)(ii)	root hair cell ;	1							

Question	Answer	Marks	Guidance
7(a)	small ears ; reduce heat loss ; <b>or</b> fur / coat ; reduce heat loss / insulation / keep body temperature constant; <b>or</b> white, hair/fur ; for camouflage ; <b>or</b> large body / small surface area to volume ratio ; reduce heat loss ; <b>or</b> large feet ; spread weight on snow / ice ; <b>or</b> dark / black nose lips ; heat absorption AW ;	<b>2</b>	explanation must relate to the given feature features must be visible in Fig. 7.1
7(b)	1 variation within, populations / organisms ; 2 more offspring produced than will survive ; 3 competition (for resources) ; 4 best adapted survive ; 5 best adapted reproduce ; 6 passing on their, alleles (to the next generation) ;	<b>4</b>	

Question	Answer	Marks	Guidance
7(c)(i)	<p><i>reasons for becoming endangered</i></p> <p>climate change/ global warming ;            habitat destruction / ice melting ;            hunting / poaching ;            pollution ;            reduced (access to) food supply ;            AVP ; e.g. disease</p> <p><i>conservation methods</i></p> <p>protecting habitats / national park ;            ref to education ;            captive breeding programmes ;            zoos / wildlife park / sanctuary / protecting species ;</p>	4	max 3 from either section

Question	Answer	Marks	Guidance								
8(a)(i)	<u>male 20–34</u> ;	1									
8(a)(ii)	16 (%) ;	1									
8(b)	<table border="1"> <thead> <tr> <th>component in cigarette smoke</th> <th>effect on the body</th> </tr> </thead> <tbody> <tr> <td>carbon monoxide</td> <td>reduces oxygen carrying capacity of blood / AW ;</td> </tr> <tr> <td>tar</td> <td>(named) cancer / irritates airways / damages cilia / COPD / emphysema / (stimulates) increased mucus production ;</td> </tr> <tr> <td>nicotine</td> <td>addictive / stimulant / increases blood pressure ;</td> </tr> </tbody> </table>	component in cigarette smoke	effect on the body	carbon monoxide	reduces oxygen carrying capacity of blood / AW ;	tar	(named) cancer / irritates airways / damages cilia / COPD / emphysema / (stimulates) increased mucus production ;	nicotine	addictive / stimulant / increases blood pressure ;	3	
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8(c)	stress / too much salt in diet / too much fat in diet / obesity / genetic predisposition / age / gender / diabetes / cholesterol / lack of exercise / high blood pressure ;;	2									