Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

BIOLOGY **0610/31**

Paper 3 Theory (Core) **May/June 2017**

MARK SCHEME

Maximum Mark:80

Published

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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

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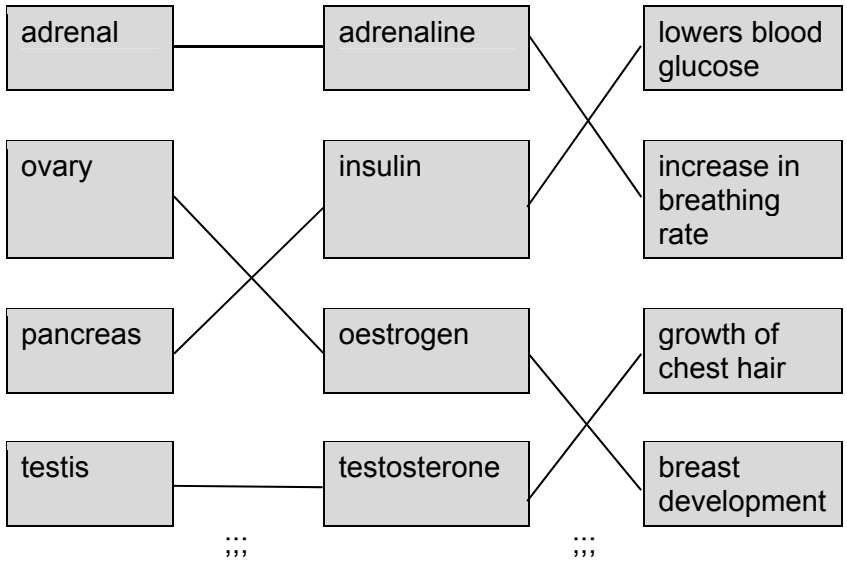
Question	Answer	Marks	Guidance
1(a)	**A** – iris ; **B** – pupil ;	**2**	
1(b)(i)	(pupil / **B**) becomes smaller / constricts / AW ;	**1**	**ecf**
1(b)(ii)	reduces the amount of light (entering the eye) / stops too much light (entering eye) ; protects, retina (cells) / receptors / sensors, from damage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

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

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

Question	Answer	Marks	Guidance
3(a)	1 dm^3 per min(ute) ;	**1**	
3(b)	liver ; gall bladder ; brain ; kidney ; testes ; ovaries ; pancreas ; lungs ; spleen ; uterus ; AVP ; ;	**2**	**A** any structure that is an organ **A** artery / vein / bone
3(c)(i)	1100 (%) ; ;	**2**	ecf from **3(a)** 11 ÷ 1· 100 or 12 – 1÷1· 100
3(c)(ii)	oxygen ; glucose ;	**2**	either order

Question	Answer	Marks	Guidance
3(c)(iii)	more energy / ATP, needed by heart muscle / it / (skeletal) muscle ; from respiration ; because (heart muscle) has to contract more, strongly / forcefully ; (heart muscle) has to contract, more frequently / heart beats faster ; (because) blood flow to (skeletal) muscles increases / blood flows faster to the (skeletal) muscles ;	**3**	AW throughout
3(d)(i)	data quote used to support either statement ; *alimentary canal:* decreased (blood flow) / goes down / AW ; *skin:* increased (blood flow) / goes up / AW ;	**3**	
3(d)(ii)	digestion / absorption not a priority / AW ; blood (volume), needed elsewhere in body / to go to the muscles / AW ; AVP ;	**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	glucose ; lactic acid ; alcohol ; carbon dioxide ;	**4**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>5(a)</td><td>
<table>
<tr><th>D / E</th><th>adaptive feature</th><th>help in survival</th></tr>
<tr><td>D</td><td>(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
;</td><td>seize / eat prey
swallow / catch / grip large prey
swimming / defence
swimming
prevent dehydration / waterproof
for camouflage
vision when submerged
;</td></tr>
<tr><td>E</td><td>claws / nails / talons
beak
wings
(tail) feathers
forward facing eyes
AVP
;</td><td>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
;</td></tr>
</table>
</td><td>4</td><td>feature and reason must match
feature must be visible
AW throughout</td></tr>
</table>

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

Question	Answer	Marks	Guidance
6(a)(i)		**3**	

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 ;

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>6(a)(ii)</td><td>
<table>
<tr><td>feature</td><td>non –smoker</td><td>smoker</td></tr>
<tr><td>bacteria present in mucus</td><td>few</td><td>many / more ;</td></tr>
<tr><td>total diameter / bronchiole size</td><td>wide / larger / longer</td><td>narrow / smaller ;</td></tr>
<tr><td>shape of lumen</td><td>circular</td><td>oval ;</td></tr>
<tr><td>number of muscle cells</td><td>many / more</td><td>few / less ;</td></tr>
<tr><td>size of muscle cells</td><td>small</td><td>large ;</td></tr>
<tr><td>AVP</td><td></td><td>;</td></tr>
</table>
</td><td>2</td><td></td></tr>
<tr><td>6(b)</td><td>bacteria cause infections ;

bacteria (trapped) in mucus ;

insufficient / damaged cilia ;

(so) mucus / bacteria, not removed / stay in / build up in, (lung / bronchiole)
or
mucus / bacteria, will enter alveoli ;

AVP ;</td><td>2</td><td></td></tr>
<tr><td>6(c)</td><td>carbon monoxide ;

tar ;

nicotine ;

particulates ;

AVP ; ;</td><td>2</td><td></td></tr>
</table>

Question	Answer	Marks	Guidance
7	<table><tr><th colspan="2">Description</th><th>Name</th><th>Letter</th></tr><tr><td>1</td><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td>2</td><td></td><td>Plumbago maritime</td><td>J</td></tr><tr><td></td><td></td><td>Plumbago lanceolata</td><td>K</td></tr><tr><td>3</td><td></td><td>Ilex aquifolium</td><td>L</td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td>4</td><td></td><td>Nymphaea alba</td><td>G</td></tr><tr><td></td><td></td><td></td><td></td></tr><tr><td>5</td><td></td><td>Trifolium pratense</td><td>M</td></tr><tr><td></td><td></td><td>Lupinus arboreus</td><td>H</td></tr></table> ;;;;;	**5**	1 correct = 1 mark 2 correct = 2 marks 3 correct = 3 marks 4 or 5 correct = 4 marks 6 correct = 5 marks

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>8(a)</td><td>breakdown of molecules ;
large to small (molecules) / food to small(er) molecules ;
insoluble to soluble (molecules) ;</td><td>3</td><td></td></tr>
<tr><td>8(b)</td><td><table><tr><th>name of structure</th><th>letter from Fig. 8.1</th></tr><tr><td>salivary gland</td><td>P</td></tr><tr><td>anus</td><td>X ;</td></tr><tr><td>large intestine</td><td>W ;</td></tr><tr><td>mouth</td><td>N ;</td></tr><tr><td>pancreas</td><td>U ;</td></tr><tr><td>stomach</td><td>S ;</td></tr></table></td><td>5</td><td></td></tr>
</table>

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Question	Answer	Marks	Guidance
8(c)	*function of the liver* production of bile ; formation of urea / breakdown of (excess) amino acids ; breakdown of, alcohol or toxins / harmful substances ; glucose converted to glycogen ; **ora** glycogen stored ; AVP ; *function of the small intestine* digestion / breakdown of food / absorption **;**	**2**	max 1 from each section 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
8(d)	protein is, digested / acted on / broken down, by protease / named protease ; protease from, stomach / pancreas / small intestine ; (digested to) polypeptides / amino acids AW ; acid conditions in stomach ; alkaline / neutral conditions in small intestine ; AVP ;	**4**	e.g. activation of enzymes
8(e)	oral rehydration therapy / AW **;**	**1**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>9(a)(i)</td><td>**X** = epidermis ;

Y = palisade (mesophyll) ;</td><td>**2**</td><td>**R** lower epidermis I cuticle

I mesophyll unqualified
R spongy mesophyll</td></tr>
<tr><td>9(a)(ii)</td><td>to let light through / light can reach, (palisade) mesophyll cells / chloroplasts ;</td><td>**1**</td><td></td></tr>
<tr><td>9(b)(i)</td><td>**Z** = stoma ;</td><td>**1**</td><td>**A** stomata / guard cell **R** stroma</td></tr>
<tr><td>9(b)(ii)</td><td><u>diffusion</u> ;</td><td>**1**</td><td></td></tr>
<tr><td>9(b)(iii)</td><td><table><tr><td></td><td colspan="3">movement of gas</td></tr><tr><td>name of gas</td><td>into leaf</td><td>out of leaf</td><td>no movement</td></tr><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></table></td><td>**3**</td><td></td></tr>
<tr><td>9(c)(i)</td><td>glucose;

oxygen ;</td><td>**2**</td><td>either order</td></tr>
<tr><td>9(c)(ii)</td><td><u>chlorophyll</u> ;</td><td>**1**</td><td></td></tr>
</table>