Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

BIOLOGY **0610/31**

Paper 3 Theory (Core) **October/November 2016**

MARK SCHEME

Maximum Mark: 80

Published

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Abbreviations used in the Mark Scheme:

- **;** separates marking points
- / alternatives
- **I** ignore
- **R** reject
- **A** accept (for answers correctly cued by the question, or guidance for examiners)
- AW alternative wording
- 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 words given must be used by the candidate (or grammatical variants of them)

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Question	Answer	Mark	Guidance
1(a)	arthropods; five; exoskeleton; population; carnivore / consumer; producer;	**6**	
1(b)	actual size = $\frac{\text{observed size}}{\text{magnification}}$; *If no correct formula* ref. to, observed / diagram / image, size; ref. to magnification ;	**3**	magnification = $\frac{\text{observed size}}{\text{actual size}}$ = 2 marks
1(c)	to avoid predators / AW; to find their food / AW; ref. to cool temperature / to avoid sun / AW; keep moist / AW; camouflage; AVP;	**2**	**A** humid place
1(d)(i)	both have same genus / both *Porcellana*;	**1**	

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Question	Answer	Mark	Guidance
1(d)(ii)	they are different species; offspring would be infertile;	**1**	
		Total: 13	

Question	Answer	Mark	Guidance
2(a)(i)	a group of receptor cells; which respond to, (specific) stimuli / light / sound / touch / temperature / chemicals;	**2**	**A** receptor **A** detects / reacts to / receives, for responds **I** ref to environment
2(a)(ii)	an, organ / eye, is made of, more than one / many, tissues; working together to perform a function;	**2**	
2(b)(i)	<table><tr><th>function</th><th>letter</th></tr><tr><td>carries impulses to the brain</td><td>**C**;</td></tr><tr><td>contains light receptors to detect light</td><td>**A**;</td></tr><tr><td>controls how much light enters the eye</td><td>**G**;</td></tr><tr><td>refracts light</td><td>**F**;</td></tr></table>	**4**	**A D**
2(b)(ii)	**B**;	**1**	
		Total: 9	

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Question	Answer	Mark	Guidance
3(a)(i)	2.5 g;	**1**	
3(a)(ii)	28.1%;;	**2**	$\frac{1.8 \times 100}{6.4}$ or 0.281×100
3(b)	hot and dry;	**1**	
3(c)(i)	large surface area / elongated cells;	**1**	
3(c)(ii)	**O** at start; **P** before **N**; **M** at the end;	**3**	
3(d)(i)	xylem;	**1**	
3(d)(ii)	mineral ions;	**1**	
		Total: 10	

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Question	Answer	Mark	Guidance
4(a)(i)	disease-causing organism;	**1**	
4(a)(ii)	(direct) contact / through blood / through (named) body fluids; (contaminated) surfaces / AW; (contaminated) food / water / AW; from, animals / (named) vector; through the air / AW;	**2**	
4(a)(iii)	*mechanical* skin / hairs in nose; *chemical* mucus / stomach or hydrochloric acid / gastric juices;	**2**	
4(b)(i)	ref. to white blood cells; phagocytosis / engulfing / description of engulfing; ref. to production of antibodies / causing cells to clump / stick to cell surface AW;	**3**	
4(b)(ii)	vaccination /antibiotics / antifungals / antivirals / antitoxin / antiseptics/AVP;	**1**	
		Total: 9	

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Question	Answer	Mark	Guidance
5(a)(i)	(most fish) 1905 – 1909;	**1**	
5(a)(ii)	(least fish) 1960 – 1964;	**1**	
5(a)(iii)	14.0 × 106 kg;;	**2**	37.4 – 23.4 = 14.0
5(b)	*(no)* fish catches still dropped / little change in catches / AW;	**1**	**I** ref. to lampreys already there and reproducing
5(c)	pollution / contamination, of lakes / water / sea / rivers; specific example e.g. fertilisers / pesticides / oil / petrol / chemicals / sewage; fishing; lack of food; habitat, destruction / interference; other fish species / predator (birds or animals); disease / parasites; AVP; e.g. global warming / acid rain / eutrophication	**3**	

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Question	Answer	Mark	Guidance
5(d)	captive breeding program; zoos / reserves / national parks; ban hunting / laws to protect; conserve / protect, habitat AW; remove predators / competitors; educate / awareness / research; idea of ecotourism;	**2**	
		Total: 10	

Question	Answer	Mark	Guidance
6(a)	<table><tr><td>process</td><td>involves the movement of particles down a gradient</td><td>involves the movement of particles up a gradient</td><td>energy is required to move the particles</td></tr><tr><td>diffusion</td><td>✓</td><td></td><td></td></tr><tr><td>active transport</td><td></td><td>✓</td><td>✓</td></tr></table>	**2**	3 correct ticks = 2 marks 1 or 2 correct ticks = 1 mark

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Question	Answer	Mark	Guidance
6(b)	lungs / alveoli; leaf / stoma(ta); small intestine / ileum / duodenum;	**3**	**A** stomach / liver / kidney / muscle / AVP
6(c)	provides support / turgid / AW;	**1**	
		Total: 6	

Question	Answer	Mark	Guidance
7(a)	breakdown of food, into smaller pieces / to increase SA; ref. to chewing / tearing / using teeth / masticating grinding; without chemical change to the food molecules;	**2**	**R** ref. molecules **I** ref. to enzymes
7(b)(i)	(**Q**) dentine; (**R**) pulp (cavity);	**2**	**A** capillary / nerve
7(b)(ii)	has two cusps AW / has larger SA / is not pointed /canine only has one cusp / canine is pointed ; has two roots / canine only has one root ;	**2**	**I** sharp(er)

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Question	Answer	Mark	Guidance
7(b)(iii)	cement is exposed / AW; cement is softer than enamel; cement decays, easily / quickly AW;	**2**	
7(b)(iv)	avoid eating sugary foods / eat less sugar; do not eat between meals / AW; brush / clean / wash, teeth regularly; use of, dental floss / interdental brushes; use fluoride, toothpaste / water; calcium rich diet; visit dentist;	**2**	**A** avoid, acidic / fizzy, drinks
		Total: 10	

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Question	Answer	Mark	Guidance
8(a)(i)	causes (lung) cancer / AW; causes bronchitis; increased mucus production / more goblet cells / cough; reduces gaseous exchange / coats the alveoli / narrows the lumen of the airways; stops cilia working / AW; stains teeth and fingers;	**2**	
8(a)(ii)	(cigarette smoke) contains carbon dioxide;	**1**	
8(a)(iii)	(cigarette smoke) is acidic / has a low pH;	**1**	
8(a)(iv)	nicotine;	**1**	**A** particulates
8(b)	yellow / brown / sticky / stained, cotton wool or milky limewater or red Universal Indicator;	**1**	**A** many substances pass through the filter

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Question	Answer	Mark	Guidance
8(c)	haemoglobin / red blood cells / erythrocytes, carry / transport, oxygen; carbon monoxide combines with haemoglobin; ref. to permanent bond; (carbon monoxide binding to haemoglobin) prevents O_2 from binding to haemoglobin / AW;	**2**	
		Total: 8	

Question	Answer	Mark	Guidance
9(a)(i)	**V**;	**1**	
9(a)(ii)	**W**;	**1**	
9(a)(iii)	**U**;	**1**	
9(a)(iv)	**X**;	**1**	
9(b)	1:1;	**1**	**A** 50% / 0.5
		Total: 5	

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