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

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.

Cambridge will not enter into discussions about these mark schemes.

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This syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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)

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**	

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	

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	

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	

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	

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

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)

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	

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

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	