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Cambridge International General Certificate of Secondary Education

BIOLOGY

0610/31

Paper 3 Theory (core)

May/June 2016

MARK SCHEME

Maximum Mark: 80

Published

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Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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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 (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	Expected Answers	Marks	Additional Guidance
1 (a) (i)	A – membrane / cell membrane / plasma membrane ; B – cytoplasm ;	[2]	
(ii)	DNA;	[1]	
(b)	<i>diffuses in:</i> oxygen / glucose ; <i>diffuses out:</i> carbon dioxide / water ;	[2]	
(c)	(diffusion) does not need oxygen / respiration / energy (but active transport does); (diffusion) involves movement (of particles) from high to low concentration / down a concentration gradient (but opposite for active transport);	[max 1]	A diffusion is passive
	C – <u>cell wall</u> ; D – vacuole;	[2]	R cell membrane

Page 4	Mark Scheme	Syllabus	Paper
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Question	Expected Answers	Marks	Additional Guidance
(d) (ii)	process: <u>photosynthesis</u> ; animal dependence: 1 (chloroplasts contain chlorophyll) absorb / use / trap, light / energy ; 2 (to) produce glucose / carbohydrate / food, or plants are producers ; 3 (photosynthesis) removes carbon dioxide (from atmosphere) or adds oxygen (to the atmosphere) ; 4 primary consumers / herbivores / animals, gain energy or food / as they eat plants / producers ; 5 secondary consumers / carnivores eat herbivores / primary consumers / other animals ; 6 (animals) need / use oxygen for respiration ;	[1] [max 4] [1 + 4]	AW throughout. Mark independently. 1 other named process If respiration / another process is named, mark the explanation and award points relating to photosynthesis 1 sun (alone) 1 reference to food chain / web unqualified mp 2 and 3 (only) can be obtained from an equation. chemical equation must be correct and balanced
		[Total: 13]	
2 (a) (i)	fur / hair; (external) ears; mammary glands;	[max 1]	

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Question	Expected Answers	Marks	Additional Guidance
(ii)	give birth (to live young) ; suckle young / feed young on milk ; 3 inner ear ossicles ; differentiated teeth ; 2 sets of teeth (deciduous and permanent) / AW ; diaphragm ; sweat glands ; sebaceous glands ;	[max 2]	
(b) (i)	bison ;	[1]	
(ii)	<u>3600</u> (kg) ;	[1]	
(iii)	number between 1300–1400 (kg) ;	[1]	
(iv)	the larg(er) the body mass, the long(er) the life span / AW ora ;	[1]	A positive correlation I proportional unqualified R directly proportional

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Question	Expected Answers			Marks	Additional Guidance
3 (a)	label	name	function	[6]	I vein/ artery R detects temperature of the blood I responds to I fatty acids I dermis
	F	capillary ;	transports blood / heat/ supplies oxygen glucose to cells /removes carbon dioxide;		
	G	receptors/ <u>sensory</u> neurone ;	detect changes in external environment/ stimulus/ touch /pressure /temperature;		
	H				
	J	adipose tissue/ fat/ fatty tissue ;	insulation/ prevention of heat loss/ keeps body warm/ shock absorber/energy store;		
(b) (i)	with no back-pack 6 (arbitrary units); with 9kg back-pack 13 (arbitrary units); 117(%);			[3]	I 116.6%
(ii)	more / increased volume of, sweat produced;			[1]	

Page 8	Mark Scheme	Syllabus	Paper
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Question	Expected Answers	Marks	Additional Guidance
(c)	1 ref. to <u>evaporation</u> ; 2 (of) water / sweat ; 3 (idea of) need for heat / latent heat / energy ; 4 (heat / latent heat / energy for evaporation) taken from / body / skin / blood ; 5 blood carries heat ;	[max 3]	I ref. to heat loss by conduction / convection / radiation I sweat absorbs heat unqualified
		[Total: 13]	
4	<u>glands</u> ; <u>blood</u> ; <u>target</u> ; <u>insulin</u> ; <u>blood</u> ;	[5]	
		[Total: 5]	
5 (a)	xylem ;	[1]	
(b) (i)	rate of transpiration increases as temperature rises / ora ; rate of increase becomes faster as temperature rises / ora ; the higher the temperature the greater the distance moved by the meniscus ora ;	[max 1]	A positive correlation I efficiency R incorrect causal relationship in an ora

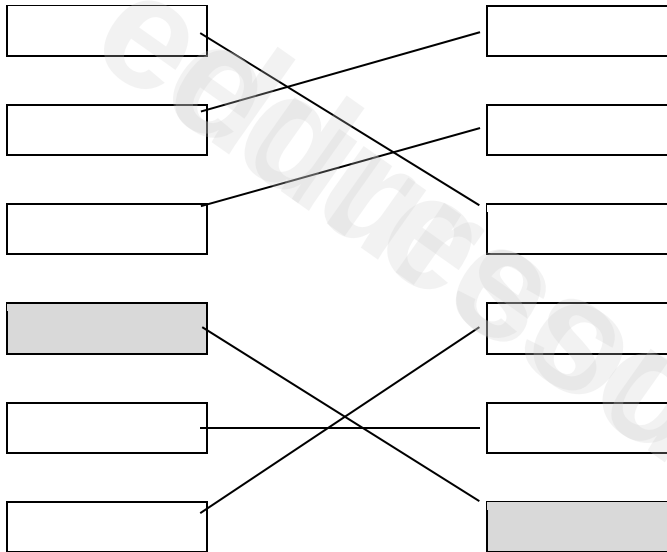
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Question	Expected Answers	Marks	Additional Guidance
(ii)	1 enzymes will be destroyed / cease to function ; 2 shoot / plant / leaf / cells die / no transpiration ; 3 water loss greater than water intake ; 4 difficulty in achieving temperature (in lab) ;	[max 2]	A enzymes denatured A wilting
(c) (i)	less transpiration / (meniscus) will not move as fast or as far / slower rate of movement / less water loss / less water uptake ;	[1]	I smaller / lower results
(ii)	1 smaller leaves ; 2 fewer leaves ; 3 less surface area (for transpiration) ; 4 fewer stomata (through which transpiration can occur) ;	[max 2]	
(d)	humidity ;	[max 1]	A air movement / light (intensity) / carbon dioxide concentration
		[Total: 8]	

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Question	Expected Answers	Marks	Additional Guidance												
6 (a)	change the genetic material (of an organism); by removing / changing / inserting (individual) genes; from one organism / species to another;	[max 2]													
(b)	<table><tr><th>example</th><th>benefit</th></tr><tr><td>to make (bacteria) produce insulin ;</td><td>treat diabetes / cheaper method of production ;</td></tr><tr><td>crop plants resistant to herbicides / pesticides ;</td><td>kill weeds / other pests without killing plant so more food produced ;</td></tr><tr><td>crop plants resistant to insects ;</td><td>less of plant eaten by insect – more food produced ;</td></tr><tr><td>crop plants produce more vitamins ;</td><td>fewer cases of vitamin deficiency ;</td></tr><tr><td>any valid example ;</td><td>any valid benefit ;</td></tr></table>	example	benefit	to make (bacteria) produce insulin ;	treat diabetes / cheaper method of production ;	crop plants resistant to herbicides / pesticides ;	kill weeds / other pests without killing plant so more food produced ;	crop plants resistant to insects ;	less of plant eaten by insect – more food produced ;	crop plants produce more vitamins ;	fewer cases of vitamin deficiency ;	any valid example ;	any valid benefit ;	[max 4]	I references to artificial selection mark as a pair, but benefit must match example
example	benefit														
to make (bacteria) produce insulin ;	treat diabetes / cheaper method of production ;														
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any valid example ;	any valid benefit ;														
		[Total: 6]													

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Question	Expected Answers	Marks	Additional Guidance
7		[4]	5 or 4 correct = 4 3 correct = 3 2 correct = 2 1 correct = 1
		[Total: 4]	
8 (a) (i)	<i>L</i> – renal artery ; <i>M</i> – ureter ;	[2]	
(ii)	<i>produced by:</i> liver ; <i>transferred in:</i> blood / plasma / blood vessels / circulation ;	[2]	

Page 12	Mark Scheme	Syllabus	Paper
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Question	Expected Answers	Marks	Additional Guidance
(b)	1 student drank less water / ate fewer foods, containing water ; 2 student sweated more / AW ; 3 (as) it was a hotter day ; 4 (as) student exercised / student had a fever ; 5 student ate a lot of salty food ; 6 lower humidity so water (vapour) lost in exhalation ;	[max 3]	ignore numbered lines A student had diarrhoea; student vomited; student lost a lot of blood; I renal failure on that day / student cried
(c)	1 screening / removal of large solids / twigs / plastic / etc. ; 2 settling out / grit settles to bottom of tank ; 3 microbes / bacteria decompose (digest) organic material ; 4 digestion of materials in liquid by (aerobic) microorganisms ; 5 aeration ; 6 materials in sludge digested by (anaerobic) bacteria ; 7 filtration ; 8 chlorination or sterilisation / use of disinfectants / bactericides / bacteria killed ;	[max 3]	A filtration once only unless qualified
		[Total: 10]	

Page 13	Mark Scheme	Syllabus	Paper
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Question	Expected Answers	Marks	Additional Guidance										
9 (a) (i)	<table><tr><td>component</td><td>food</td></tr><tr><td></td><td></td></tr><tr><td>protein ;</td><td></td></tr><tr><td>carbohydrate ;</td><td></td></tr><tr><td></td><td>any example of plant cell wall material / any fruit or vegetable ;</td></tr></table>	component	food			protein ;		carbohydrate ;			any example of plant cell wall material / any fruit or vegetable ;	[3]	
component	food												
protein ;													
carbohydrate ;													
	any example of plant cell wall material / any fruit or vegetable ;												
(ii)	minerals / ions / named mineral ; vitamins / named vitamin ; water ;	[max 2]	A ecf from table if group not given there										

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Question	Expected Answers	Marks	Additional Guidance
(b)	1 use of agricultural machinery / tractors / trucks ; improved efficiency / greater land area cultivated / plant more seeds / harvest more of the crop / harvest faster / spray pesticides / irrigate the crop ; 2 use of (artificial) fertilisers ; improved yields / grow faster ; 3 use of herbicides / pesticides / insecticides ; no competition from weeds / pests or increases yields ; 4 selective breeding ; improve quality / quantity of produce ; 5 use of glass houses / poly-tunnels ; protect crops from adverse environment / provide optimum growing environment / grow out of season / increased yields ; 6 any valid example ; with improvement ;	[max 4]	example and improvement must match A increased yields for any of the explanations A explanations in terms of increased speed or efficiency and I references to an example being easier
(c)	1 death of organisms ; 2 disrupts food chains / webs / eutrophication ; 3 habitat destruction / soil erosion ; 4 changes in precipitation ;	[max 2]	A deforestation A reduced biodiversity
		[Total: 11]	