Cambridge
O Level

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BIOLOGY **5090/21**

Paper 2 Theory **October/November 2016**

MARK SCHEME

Maximum Mark: 80

Published

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Mark schemes will use these abbreviations:

;	separates marking points
/	alternatives
()	contents of brackets are not required but should be implied
R	reject
A	accept (for answers correctly cued by the question, or guidance for examiners)
Ig	ignore (for incorrect but irrelevant responses)
AW	alternative wording (where responses vary more than usual)
AVP	alternative valid point (where a greater than usual variety of responses is expected)
ORA	or reverse argument
underline	actual word underlined must be used by candidate (grammatical variants excepted)
+	statements on both sides of the + are needed for that mark

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Question	Answer	Mark	Guidance
1(a)	(drinking) straw ; (rubber) sheet ;	2	
1(b)	only one lung / balloon ; reference to ribs ; reference to intercostal muscles ; rigid plastic cup doesn't move ; no bronchi / bronchioles ; no alveoli / blood vessels / capillaries ; no cilia / mucus ; lung / balloon not attached to cup / thorax wall ; rubber sheet doesn't move independently / not muscular / pulled down below diaphragm position / flat at rest, not domed ;	4	**A ORA** for all marking points in an answer referring to the human breathing system rather than to the model
1(c)(i)	(move) rubber sheet ; down ;	2	**R** blowing down straw
1(c)(ii)	balloon + inflates / expands / gets bigger **AW** ;	1	

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Question	Answer	Mark	Guidance
1(c)(iii)	(balloon) no longer inflates ; air allowed to pass through hole ; pressure in cup not reduced ; less / no air (moving) through straw ;	3	
	Total:	12	

Question	Answer	Mark	Guidance
2(a)(i)	**A** small + **B** large / **A** smaller / **B** larger ; **A** smooth + **B** spikes **AW** ; **A** wind dispersal / **B** animal dispersal ; **A** light / **B** heavy ;	3	
2(a)(ii)	transfer / movement + of pollen ; from anther ; to <u>stigma</u> ; of another plant (of same species) ;	3	**A** stamen / pollen sac **R** another species

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Question	Answer	Mark	Guidance
2(a)(iii)	(plant species **A**) wind ; reference to light / small / carried (by wind) ; (plant species **B**) insect ; reference to attachment (to insect) / carried (by insect) moving between flowers ;	**3**	
2(b)	large (petals) ; (brightly) coloured / patterned (petals) ; anthers enclosed in flower / not hanging out / erect ; scent ; nectar ;	**2**	
	Total:	**11**	

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Question	Answer	Mark	Guidance
3(a)(i)	**X** drawn on left / right humerus of skeleton ;	1	
3(a)(ii)	humerus / bone / arm ; broken **AW** ;	2	
3(b)(i)	triceps / extensor ;	1	
3(b)(ii)	arrow down from above / below lower arm bones i.e. to left of elbow ;	1	
3(b)(iii)	antagonistic ;	1	
3(c)(i)	3 × larger + humans / 3 × smaller + birds / ratio 1:3 / ratio 5:15 ;	1	must have correct reference to birds and / or humans
3(c)(ii)	reduced weight ; fly further / faster ; more energy efficient **AW** ; more / sufficient oxygen available / carried by the blood / in the bones ; as oxyhaemoglobin ; (for aerobic) respiration ; (release) more / enough energy (for it to fly) ; (to use for) muscle + contraction ;	4	**R** anaerobic (respiration)
	Total:	11	

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Question	Answer	Mark	Guidance
4(a)(i)	1000 / 1 ; cm^3 / dm^3 ;	2	**A** 1 litre / 1 dm^3 for 2 marks **A** ml in place of cm^3, unit must match figure for second mark
4(a)(ii)	malnutrition / deficiency disease ; lack of balanced diet ; reference to low / lack of energy (intake into body) ; (leads to) general lethargy ; reference to lack of fat or carbohydrate (for energy) ; reference to specified problem ; kwashiorkor / named symptom + lack of protein ; scurvy / named symptom + lack of vitamin C ; anaemia or described + lack of iron ;	4	**A** muscle contraction / protein synthesis / cell division / active transport / growth / passage of nerve impulses / maintenance of a constant body temperature / mend or repair tissues

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Question	Answer	Mark	Guidance
4(b)(i)	sterile / not contaminated / no additives ; antibodies / hormones ; no need to warm / at correct temperature ; bonding between mother and child ; better proportions of nutrients **AW** ; does not cost money ; supply / availability on demand ;	**4**	
4(b)(ii)	lack of awareness of the benefits ; mother unable / chooses not to breast-feed ; reference to advertising by bottle milk providers ; not available to do so (e.g. at work / child in care) ; infection / drug addiction / damaged nipples ; mother does not produce (enough) milk ;	**1**	
	Total:	**11**	

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Question	Answer	Mark	Guidance
5	chromosome ; allele(s) ; dominant ; mutation ; radiation / named radiation / radioactivity ;	5	**A** chromatid **A** carcinogens
	Total:	5	

Question	Answer	Mark	Guidance
6(a)	(caused by a) pathogen **/** bacteri(a)(um) ; during sexual ; contact / intercourse **AW** ; mother to baby during birth ;	3	
6(b)	symptoms described ; reference to effect of named organ destruction ; reference to effect on fetus ; leading to death (if untreated) ;	4	**A** sore / ulcer / chancre / papule / headache / raised temp / fever / rash / lesions / hair loss / meningitis / blindness / strokes / dementia / loss of co-ordination **A e.g.** heart / brain / eyes / skin

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Question	Answer	Mark	Guidance
6(c)	(syphilis treated using) antibiotics ; AIDS / it is caused by virus / HIV ; (virus) unaffected / destroyed by antibiotics / bacteria only killed / treated by antibiotics ;	3	**A** penicillin / named antibiotic
	Total:	**10**	

Question	Answer	Mark	Guidance
7(a)	chemical (substance) ; produced by (endocrine / ductless) gland ; (secreted) into / carried by blood ; (effect on) target organ ; destroyed by liver ;	3	**Ig** named examples of hormones
7(b)(i)	insulin is secreted when blood sugar / glucose is (too) high / lowers blood sugar / glucose levels ; (increased) sugar / glucose into cells ; reference to liver / muscle (cells) ; (converted) to glycogen ; (glycogen) for storage / is insoluble ;	3	

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Question	Answer	Mark	Guidance
7(b)(ii)	diabetes ; increased blood sugar / glucose concentration ; sugar / glucose in urine ; frequent urination ; tired / thirsty / weight loss ; insulin (by injection or tablet) ; dietary control ;	4	**A** sweet-smelling breath / urine **R** injection alone as a treatment, insulin required for mark
	Total:	**10**	

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Question	Answer	Mark	Guidance
8(a)	through heart twice (during one circuit) **AW** ; circuit **+** to lungs / pulmonary ; blood to become oxygenated / pick up oxygen ; blood to lose carbon dioxide ; circuit **+** to body tissues / systemic ; to deliver oxygen / glucose (to body tissues) ; collect carbon dioxide ; reference to part of heart **+** named vessel ; low pressure lungs / high pressure body ;	**6**	**A** heart – body – heart – lungs

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Question	Answer	Mark	Guidance
8(b)	one cell thick / thin / 1µm + wall ; small diameter of lumen / RBC single file / width of RBC **AW** ; no muscle / no elastic tissue (compared with artery / vein) ; leaky walls **AW** ; diffusion ; reference to named material ;	**4**	**A** epithelium
	Total:	**10**	

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Question	Answer	Mark	Guidance
9(a)	(to maintain) food stocks (of that species) ; farming / maintaining a particular species ; provides employment / for financial benefit **AW** ; reference to maintenance of biodiversity **/** interrelationship between organisms ; reduction in over-fishing of particular species in the wild ; prevent extinction ; for re-stocking natural populations / sustainability / continuity of availability of supply ;	**4**	

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Question	Answer	Mark	Guidance
9(b)	fewer trees ; less photosynthesis ; less carbon dioxide absorbed / more carbon dioxide remains in atmosphere ; (carbon dioxide is a) greenhouse gas ; global warming / correct named outcome of global warming ; less oxygen produced (by photosynthesis) ; destruction of habitat / species extinction ; loss of soil stability / erosion / leaching ; effect on water cycle ; adverse effect on recreation value of forest ; effect on local human population ; medicinal value of plant species ;	6	**A** greenhouse effect e.g. sea levels rise / ice caps melt e.g. desertification e.g. loss of homes / loss of employment
	Total:	**10**	

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