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Cambridge Ordinary Level

MARK SCHEME for the October/November 2015 series

5090 BIOLOGY

5090/22 Paper 2 (Theory), maximum raw mark 80

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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)
I	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)
max	indicates the maximum number of marks that can be given
+	statements on both sides of the + are needed for that mark

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Question	Expected Answer	Mark	Additional guidance
1 (a) (i)	pollination ;	[1]	**I** insect / wind / cross / self
(ii)	stigma ;	[1]	
(b)	line (continuing) down style ; entering micropyle ; touching / entering embryo sac ;	[3]	
(c) (i)	stigma / style / ovary wall ;	[1]	
(ii)	ovary / ovule / embryo sac / ovum / ova / egg (cell) / gamete ;	[1]	
(d)	from a different species / type / kind of plant ; ref. chemicals on stigma unsuitable ; couldn't germinate / not viable / infertile AW ; not there long enough / grain immature / wrong enzymes ;	[max 1]	**A** e.g. wrong sugar concentration, toxic chemical
		[Total: 8]	

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Question	Expected Answer	Mark	Additional guidance
2 (a) (i)	incisors / canines ;	[1]	
(ii)	rectum / colon / large intestine ; stores faeces / infrequent defaecation AW ; OR stomach ; storing food (ref. defaecation every 6-8 days) ; OR ileum / small intestine ; slower digestion ;	[2]	max 1 mark if function does not match structure
(b)	top: harpy / eagle + (jungle) cat + mosquito ; middle: sloth (left) + moth (right) ; bottom: (tree) + algae ; any 4 arrow heads correct ;	[4]	in any order
(c) (i)	camouflage / less easily seen ; so not eaten / escape predators (or named) AW ; slow moving / cannot escape quickly ;	[max 2]	**I** insulation, source of nutrition
(ii)	faeces decay / decompose / broken down / act as fertiliser ; ions / CO_2 / salts (or named) / nutrients / minerals ; absorbed by tree / plant ; used by tree (e.g. growth) ; provides food / habitat for sloth ; to hide faeces from predators ;	[max 3]	
		[Total: 12]	

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Question	Expected Answer	Mark	Additional guidance
3 (a)	right ventricle ; blood flows from right atrium to right ventricle / pressure increases ;	[2]	**A** pressure increases with incorrect chamber for 1 mark
(b)	increases when heart / ventricle + contracts / pumps ; decreases when heart / ventricle + relaxes / doesn't pump ;	[2]	**A** for 1 mark : ref. heart beat / pulse
(c) (i)	capillaries / lung /alveoli / air sac / venule ;	[1]	
(ii)	CO_2 lost * ; O_2 gained / oxygenated * ; haemoglobin / oxyhaemoglobin ; change in pH / less acidic ; ref. to diffusion gradient / concentration gradient ;	[max 3]	*OR **A** gas exchange for 1 mark
(d)	wider variations in pressure AW ; pressure high(er) AW ; left ventricle wall large / thick / more muscular ; blood has further to travel / takes longer ; more or many fluctuations / undulations AW ;	[max 3]	**I** increasing pressure
		[Total: 11]	

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Question	Expected Answer	Mark	Additional guidance
4 (a) (i)	**L** ;	[1]	
(ii)	any 2 from : **G** , **H** , **I** ;	[1]	**M** incorrect as doesn't contain cells
(b)	stomata / **J** / guard cells open **ORA** ;	[1]	
(c) (i)	**H** – xylem ; **I** – phloem ;	[2]	
(ii)	(**H**) carries water ; minerals / salts / ions ; (provides) support ; (**I**) carries sucrose / sugar ; amino acids ; to / from leaf (phloem only) / rest of plant / through plant ;	[max 4]	
(d)	carbon dioxide ; from respiration ; OR water <u>vapour</u> ; from transpiration (stream) ; cannot escape / stomata or guard cells closed ;	[3]	gas stated must be CO_2 OR water <u>vapour</u> 2 marks for explanation
		[Total:12]	

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Question	Expected Answer	Mark	Additional guidance
5 (a)	*any 2 from :* oxides of sulfur **;** acid rain **;** OR oxides of nitrogen **;** acid rain / greenhouse gas / ref. global warming **;** OR carbon monoxide **;** effect on O_2 carriage by blood AW / greenhouse gas / ref. global warming **;** breathing difficulties (related to any correct gas) **;**	[max 4]	**I** CFCs, hydrocarbons (methane), ozone, chlorine **R** harm caused if gas incorrect **A** plausible harm caused if no gas named
(b)	(**S**) recycling of water AW **;** sewage treatment / water treatment / use as fertliliser / use in an anaerobic digester **;** reduce amount of pollutants entering water **;** prevention of disease / eutrophication / death of or harm to organisms **;** (**T**) recycling of paper / tree-based products **;** prevents deforestation **;** prevents named consequence of deforestation e.g. soil erosion, flooding **;** fewer harmful emissions / less <u>air</u> pollution **;**	[max 3]	max 2 marks available for either **S** or **T**
		[Total: 7]	

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Question	Expected Answer	Mark	Additional guidance
6 (a)	any named tooth ; cut / tear food * ; crush / grind / smash food * ; ref. saliva(ry) ; moistening / lubricating / softening ; ref. action of tongue ; ref. to (optimum) pH ; (salivary) amylase ; acts on starch ; changing it to maltose ; ref. terms mechanical / chemical + digestion ;	[max 6]	*__A__ chew / masticate / bite / break up alone for one mark __R__ crush / cut + molecules __A__ reducing sugar
(b)	ref. swallowing ; peristalsis ; oesophagus / gullet ; wave of / rhythmic contraction AW ; of circular muscles ; behind / pushing + food / bolus ;	[max 4]	__I__ references to longitudinal
		[Total: 10]	

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Question	Expected Answer	Mark	Additional guidance
7 (a) (i)	water lost / plant dehydrated ; by transpiration / evaporation / through stomata ; faster than it is gained ; cells / tissues lose turgor / become flaccid / plasmolysed AW ; no longer support plant ; any condition leading to wilting ;	[max 4]	**A** lack of water, low humidity, high light intensity, high temperature, wind
(ii)	(mature plant) root system undamaged **ORA** ; ref. root hairs ; water uptake sufficient for plant **ORA** ; plant cells / tissues turgid **ORA** ; xylem supports older plants / ref. lignin ;	[max 3]	**I** ref. more / less water uptake
(b)	plant / leaves will wilt ; water lost ; from cells / tissues ; by osmosis / diffusion ; lower water potential in soil water / ref. correct water potential gradient AW ;	[max 3]	
		[Total: 10]	

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Question	Expected Answer	Mark	Additional guidance
8 (a)	bacterial cell has cell wall ; no (true) nucleus ; ref. different arrangement of DNA eg plasmid ; (may) have flagella ; capable of independent existence ; size reference e.g. bacterial cells smaller ; bacteria produce spores ; bacteria have slime capsules / no mitochondria / smaller ribosomes ;	[max 3]	**A** reverse argument throughout **I** tail
(b)	conversion of nitrogen ; to ammonium / amino acids ; free-living (bacteria) or named (*Azotobacter)* ; in root nodules / named bacteria (*Rhizobium*) ; leguminous plant / named plant ;	[max 3]	**I** fixation of nitrogen as mentioned in question
(c)	decomposition / breakdown / decay ; of organic matter / faeces / urea ; using up O_2 / aerobic / dissolved oxygen decreases ; for respiration ; resulting in lack of O_2 / anaerobic conditions ; ref. eutrophication ;	[max 4]	**A** dead plants / dead algae
		[Total: 10]	

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Question	Expected Answer	Mark	Additional guidance
9 (a)	both cell <u>division</u> ; (mitosis) in body cells or named ; for growth / repair / replacement ; chromosome number retained AW ; ref. asexual reproduction / single parent ; produces copy / identical / similar ; produces two cells ; (meiosis) in ovaries* / ovule ; testes* / anthers ; ref. gamete / sex cell production ; chromosome number halved / cells become haploid ; sexual reproduction ; <u>genetically</u> different ; produces four cells ;	[max 7]	max 4 marks for mitosis or meiosis **A** in zygote **I** growth / repair *within* a cell * OR **A** gonads for one mark **I** fertilisation
(b)	name of correct organism / crop / technique ; always an exact / similar copy ; known characteristics / flavour AW ; more certain outcome / can be conducted in controlled conditions; not reliant on pollination (agent) ; only one parent needed ; quick(er) ; less expensive / greater profit / higher yield / more offspring ;	[1] [max 2] [3]	**A** cutting, micro-propagation, tubers, bulbs, layering, runners
		[Total: 10]	

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