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Cambridge Ordinary Level

MARK SCHEME for the October/November 2014 series

5090 BIOLOGY

5090/21 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)
- **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)	stem ;	[1]	
(ii)	phloem ;	[1]	
(b)	(photosynthesis) produces glucose / sugar / starch / carbohydrates ; changed into sucrose ; passes down the phloem / tissue A ; concentration (of sucrose) varies ; highest when photosynthesis rate is highest / AW ;	[max. 4]	
(c)	(sucrose / sugar turned to) glucose ; used for respiration ; to release energy ; amino acids ; used to make protein ; for growth / repair ;	[max. 4]	**R** produce/make
		[Total: 10]	

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Question	Expected Answer	Mark	Additional Guidance
2 (a)	B = protein / (poly)peptide ; C = protease or named* ; D = amino acids* ; E = <u>glycogen</u> ; F = urea ;	[5]	 *__A__ ecf for incorrect substrate *__A__ ecf for incorrect substrate __R__ urine
(b) (i)	broken down / converted / changed ; (role of) glucagon / adrenaline ; to <u>glucose</u> ; made soluble ;	[max. 2]	
(ii)	<u>respiration</u> ;	[1]	

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(iii)	to release energy ; *any 3 from:* for growth ; mitosis / meiosis / cell division ; active transport ; impulse production ; temperature regulation ; muscular activity / movement ;	[1] [max. 3] [Total: 4]	 **A** production of complex molecules **A** named example
		[Total: 12]	

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Question	Expected Answer	Mark	Additional Guidance
3 (a) (i)	deeper voice / hair on face or named body part / stronger muscles / sperm production / larger genitalia ;	[1]	**A** broadening of shoulders
(ii)	testosterone ;	[1]	
(iii)	testes ;	[1]	**A** testicles / gonads
(b) (i)	F – oestrogen ; G – progesterone ;	[2]	
(ii)	ovulation / release of egg or ovum ;	[1]	
(c)	line drawn at 3 weeks ± 2 squares ; uterus (lining) increasing in thickness ; in preparation for receiving (fertilised) ovum / egg ; ref. time **+** menstruation ;	[4]	**A** zygote / embryo
		[Total: 10]	

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Question	Expected Answer	Mark	Additional Guidance
4 (a)	0.3–0.4 minutes ;	[1]	**A** 18–24 s
(b)	aerobic respiration ;	[1]	
(c)	O_2 curve not as high at start / finish ; O_2 curve drops more quickly / ORA ; damage to alveoli ; less surface area for O_2 absorption ; less O_2 to blood / muscles ; lactic acid curve rises sooner / higher / takes longer to return to normal ; shorter period of aerobic / longer period anaerobic respiration ; more lactic acid build-up ;	[max. 5]	**A** uptake / diffusion
		[Total: 7]	

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Question	Expected Answer	Mark	Additional Guidance
5 (a)	Incisor / canine ;	[1]	
(b)	blood vessels or named ; nerves / nerve endings ;	[2]	
(c)	sugar ; ref. bacteria ; (converted) to acid ; dissolves enamel ; teeth not cleaned / build-up of plaque / tartar ; weak enamel / ref. lack of Ca / F / vit. D ;	[max. 4]	
(d) (i)	reduction in tooth decay ;	[1]	
(ii)	fluoride occurs naturally / addition in toothpaste ; diet with less carbohydrate ; better education / teeth cleaned more often ; genetic differences / teeth less prone to acid attack ;	[max. 3]	
		[Total: 11]	

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Question	Expected Answer	Mark	Additional Guidance
6 (a)	continuous variation ; gradual change / range ; between extremes ; genes + environment ; discontinuous variation ; few and distinct differences ; controlled by genes alone ; any correct example of one or the other correctly linked ;	[max. 5]	**R** if one e.g. correct, the other incorrect

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(b)	some variations are advantageous ; competition ; in the organism's habitat / environment ; organism survives / differential survival / ORA ; breeds / reproduces ; passes on the advantage / beneficial gene / allele ; over many generations / ref. time ; continuous adaptation to the changing environment ; evolution / natural selection / AW ; changes that result from the environment not so important ;	[max. 5]	
		[Total: 10]	

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Question	Expected Answer	Mark	Additional Guidance
7 (a)	*structural similarities*: long / elongated ; providing large surface area ; *functional similarities*: absorption / uptake ; active transport / diffusion ; ions / salts / minerals / named ; water ;	[max. 4]	
(b)	*structural differences:* cell wall / no cell wall ; (root hair) part of one cell ; (villi) many cells / multicellular ; ref. absence of blood vessels / lacteals / ORA ; AVP ; *functional differences:* root hairs **+** absorb from the soil ; villi **+** absorb from the gut ; villi **+** absorb amino acids ; villi **+** absorb glucose ; villi **+** absorb lipids / glycerol / fatty acids ;	[max. 6]	
		[Total: 10]	

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Question	Expected Answer	Mark	Additional Guidance
8 (a) (i)	in testes / anthers / ovaries ; cell division ; halving of chromosome numbers / haploid ; so that diploid number is restored on fertilisation ;	[max. 2]	
(ii)	one (either) colour is controlled by a dominant allele; one by a recessive allele ; one parent heterozygous – (or described, e.g. Rr) ; one is homozygous recessive (or described) ; correct ref. to gametes ; gametes correctly identified for both parents ; how gametes pair to produce offspring in 1:1 ratio ;	[max. 6]	(all points acceptable on an annotated genetic diagram)
(b)	mutation ; ref to a named mutagen ; possible co-dominance ; ref. to heterozygous plants having pink flowers ; ref. availability of certain ions (as in *Hydrangea*) ;	[max. 2]	
		[Total: 10]	

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Question	Expected Answer	Mark	Additional Guidance
9 (a)	between guard cells / through stoma ; into intercellular / air space ; dissolving in water (film) ; diffusion ; through cell wall ; of mesophyll cell (or named) ; to <u>chloroplast</u> ; during photosynthesis ; links with water molecule ; glucose **+** forms starch ;	[max. 7]	
(b)	little magnesium absorbed ; deficiency in chlorophyll ; less light energy trapped ; photosynthesis inhibited / limiting factor / AW ; less glucose / starch / carbohydrate formed ;	[max. 3]	
		[Total: 10]	

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