CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge Ordinary Level

MARK SCHEME for the October/November 2014 series

5090 BIOLOGY

5090/21 Paper 2 (Theory), maximum raw mark 80

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.

Cambridge is publishing the mark schemes for the October/November 2014 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

CAMBRIDGE
International Examinations

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

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]	

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]	

(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]	

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]	

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]	

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]	

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

(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]	

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]	

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]	

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]	