CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge Ordinary Level

MARK SCHEME for the May/June 2015 series

5090 BIOLOGY

5090/22 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.

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

Question	Expected answers	Additional guidance	Marks
1 (a)	carbon dioxide / CO_2 ; respiration / fermentation ; *any two for one mark:* sugar OR carbohydrates OR named / water / protein OR amino acids / oxygen / lipids OR fats / mineral ions OR named ;	 **A** two named mineral ions for 1 mark	[3]
(b)	any temperature in range 56 – 58 °C ;		[1]
(c)	1. rate decreases **+** zero / stops ; 2. enzymes ; 3. denatured ; 4. references to active site / lock and key hypothesis ; 5. yeast dies / destroyed / killed ;	1. **A** number of bubbles per (two) minutes(s) 2. **R** denaturing of yeast / killing of enzymes	[max 3]
(d)	1. rate remains at zero / stays the same / no change / no effect ; 2. denaturing is permanent / enzymes still denatured ; 3. death of yeast ;	1. **A** no gas production / no bubbles 2. **A** active site still changed	[max 2]
			[Total 9]

Question	Expected answers	Additional guidance	Marks
2 (a)	*how the flower is pollinated:* insect / self ; *reason (insect):* 1. stigma / carpel **+** enclosed ; 2. anthers / stamens **+** enclosed ; 3. anthers / stamens **+** small ; 4. white colour may attract (insects) ; *reason (self):* 5. anthers and stigma close ; 6. white / not brightly coloured **+** doesn't attract (insects);	2. **A** not pendulous	[max 2] [1] [max 1]
(b) (i)	tree ;		[1]
(ii)	carbohydrate / sucrose / glucose / sugar ; amino acids ; mineral / ions / salts / nitrate ;	**Ig** water **R** protein **A** phosphate / potassium **Ig** magnesium	[3]
(c)	1. no chlorophyll ; 2. no photosynthesis ; 3. carbohydrates obtained from other organism / cannot make carbohydrates ; 4. no CO_2 requirement ; 5. reduced need for gas diffusion / gas exchange ; 6. ref. reduced / no transpiration / description ;	1. **Ig** chloroplasts	[max 5]
			[Total 11]
3 (a) (i)	*C* – RBC / erythrocyte ; *D* – WBC / phagocyte / polymorph / neutrophil ;	**A** polymorph / neutrophil	[2]

Question	Expected answers	Additional guidance	Marks
(ii)	1. urea ; 2. CO_2 ; 3. iron ; 4. glucose ; 5. (named) vitamins ; 6. water ;	1. **A** uric acid / creatinine	[max 3]
(b) (i)	1. glycogen ; 2. (broken down to) glucose ; 3. (glucose) released / carried in blood / increases blood glucose level ;	**Ig** ref. to glucagon / pancreas	[max 2]
(ii)	fight / flight / fright (or described) ;		[1]
(c) (i)	increased / high **+** blood glucose / sugar level ; presence of glucose / sugar **+** in urine ;		[2]
(ii)	1. insulin ; 2. controlled CHO / sugar in diet ;		[max 1]
			[Total 11]
4 (a) (i)	aa ;		[1]
(ii)	a / A ; A ;		[2]
(b)	chromosome with 2 alleles drawn ; the same two alleles as in Fig. 4.1 ;		[2]
(c)	radiation or type named ; chemicals or mutagenic chemical named ;	**Ig** ref. to inheritance e.g. uv, gamma, alpha e.g. mustard gas, benzene, tar, etc.	[2]

Question	Expected answers	Additional guidance	Marks
(d)	1. parents with normal phenotype / appear normal / do not have mutational condition ; 2. heterozygotes / carriers of recessive allele ; 3. greater chance (correctly qualified) ; 4. children **+** inheriting 2 recessive alleles / being homozygous ; 5. suffering from mutational condition ;	**A** reverse argument throughout **A** mutated as being equiv. to recessive throughout 5. **lg** genetic disease	[max 3]
			[Total 10]
5 (a) (i)	0.38 **+** dm^3 ;		[1]
(ii)	evaporation / water vapour ; from (moist lining of) alveoli / lungs ;	**lg** other named parts of breathing system	[2]
(b)	1. water is absorbed **+** blood ; 2. (from) ileum / small intestine / colon / large intestine ; 3. ref need to prevent water loss / importance of water in body (e.g. solvent / transport) ; 4. water lost by other methods / ref. to any named other method of water loss ;		[max 3]
(c)	water is a solvent / dissolves ; any one named solute ;	**A** salts	[2]
(d)	respiration ;	if qualified must be aerobic	[1]
			[Total 9]

Question	Expected answers	Additional guidance	Marks
6 (a)	1. name of fruit or seed ; 2. adaptation that brings animal and plant into contact ; 3. how fruit or seed as carried away ; 4. how fruit or seed is discarded by animal ; 5. ref to distance from parent plant / another location ;	1. must fit the description if one is given 2. e.g. taste, colour, hooks, etc. 3. e.g. internally, in intestine, eaten, attached to fur 4. e.g. defaecation, scratched off / falls off / spat out	[max 4]
(b) (i)	1. seeds not viable / dormant / AW ; 2. temperature not suitable ; 3. (amount of) water ; 4. <u>some</u> of the seeds may require light ; 5. pH ;		[max 2]
(ii)	1. ref. to competition ; 2. *accept two from* (for) light / nutrients / water ;; 4. ref. unsuitable temperature / pH ; 5. diseases ; 6. eaten (by herbivores / insects / pests) / damage by animals ; 7. toxins in soil ;	1. **A** overcrowding 2. **Ig** refs to too much **Ig** CO_2 and O_2	[max 4]
			[Total 10]

Question	Expected answers	Additional guidance	Marks
7 (a) (i)	1. requires energy ; 2. from respiration 3. movement of ions / molecules / substances / particles ; 4. (through) living / cell membrane ; 5. against concentration gradient / described ; 6. correct example, e.g. mineral ions and root hair cells / glucose and ileum	2. **R** produced from respiration 4. **Ig** partially permeable 6. **A** intestine for ileum	[max 4]
(ii)	1. water ; 2. down (water) concentration / water potential gradient ; 3. partially permeable membrane ; 4. by diffusion ; 5. passive / energy not required ;		[max 3]
(b)	1. water uptake ; 2. ref. water potential higher outside of cell / ref. concentration gradient ; 3. increase in volume / cell swells ; 4. membrane cannot withstand pressure ; 5. cell bursts ;	1. **Ig** osmosis 3. **Ig** turgidity 4. **A** no cell wall 5. **A** haemolysis	[max 3]
			[Total 10]

Question	Expected answers	Additional guidance	Marks
8 (a)	1. bacteria (or named e.g. *Lactobacillus*) ; 2. milk ; 3. incubation / 32 – 50 °C ; 4. reproduction of bacteria ; 5. ref. to enzymes / lactase ; 6. sugar / lactose ; 7. to lactic acid ; 8. coagulation / curdling of **+** milk / protein / casein ; 9. imparts texture / flavour ;		[max 6]
(b)	1. spores ; 2. produce hyphae / mycelium ; 3. enzymes ; 4. ref. suitable temperature ; 5. external digestion / description of ; 6. of starch ; 7. of protein ; 8. soluble / diffusible OR named ; 9. ref. (fungal) <u>respiration</u> ;	5. **A** saprotrophic / saprophytic 8. **A** simple sugars 9. **Ig** refs to anaerobic	[max 4]
			[Total 10]

Question	Expected answers	Additional guidance	Marks
9 (a)	1. bacterium / spirochaete / *Treponema* ; 2. ulceration / chancre / sore **+** on contact part of body ; 3. swollen lymph glands ; 4. rash / description ; 5. flu-like symptoms / examples ; 6. weight loss ; 7. hair loss ; 8. numbness / paralysis / loss of coordination ; 9. stroke ; 10. dementia ; 11. blindness ; 12. deafness ; 13. heart disease ;	5. raised temperature / fever / headache / sore throat	[max 6]
(b)	antibiotic / named antibiotic ;		[1]

Question	Expected answers	Additional guidance	Marks
(c)	1. drugs (antiretrovirals / ARVs) can contain the disease ; 2. stick to one partner / avoid casual sex ; 3. abstinence ; 4. barrier contraception AW ; 5. screen blood ; 6. don't share / sterilise + needles / razors / surgical equipment / toothbrushes ; 7. HIV testing / contact tracing ; 8. education ;	4. **Ig** contraception unqual	[max 3]
			[Total 10]