
BIOLOGY

5090/22

Paper 2 Theory

October/November 2017

MARK SCHEME

Maximum Mark: 80

Published

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 International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2017 series for most Cambridge IGCSE[®], Cambridge International A and AS Level components and some Cambridge O Level components.

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)
lg	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
<u>underline</u>	actual word underlined must be used by candidate (grammatical variants accepted)
+	statements on both sides of the + are needed for that mark

Question	Answer	Marks	Guidance
1(a)	gamete / egg / ovum / sperm correctly named and labelled ; zygote correctly named and labelled ;	2	
1(b)	uterus / womb / endometrium ;	1	
1(c)	(child A) male ; (child B) male ; (explanation) 1 <u>zygote</u> + X + Y ; 2 <u>mitosis</u> ; 3 <u>identical</u> + cells / twins ;	4	A boy / son for both
1(d)	1 yellow body / follicle / corpus luteum / ovary ; 2 placenta ; 3 progesterone ; 4 inhibited / less / no + FSH / LH + production / release ; 5 FSH / LH + pituitary ; 6 FSH + ovum / egg + maturation / development ; 7 LH + ovum / egg + release ;	4	

Question	Answer	Marks	Guidance
2(a)	<u>homeostasis</u> ;	1	
2(b)	1 <u>body</u> temperature increased ; 2 exercise AW ; 3 increased / high + surrounding AW temperature ; 4 increased / high + surrounding AW humidity ; 5 hot + food / drink ; 6 increased / high + metabolism / respiration ; 7 fever / illness ; 8 ovulation ; 9 wear more clothes AW ;	3	
2(c)	1 sweat ; 2 evaporation ; 3 vasodilation AW ; 4 reduced + metabolism / respiration ; 5 more blood + to skin ; 6 heat loss / radiation ;	3	
2(d)(i)	<u>negative feedback</u> ;	1	
2(d)(ii)	<u>hypothalamus</u> ;	1	

Question	Answer	Marks	Guidance
3(a)	<u>blue</u> ;	1	
3(b)(i)	(G) Bb / heterozygous ; (H) Bb / heterozygous ; (J) bb / homozygous + recessive ;	3	
3(b)(ii)	G + H ;	1	
3(c)	1 parent genotypes / gametes correct from G and H in (b)(i) ; 2 offspring genotypes correct for parent genotypes / gametes ; 3 offspring phenotypes correct for stated genotypes ; 4 genotype / phenotype ratio correct ; 5 correct use of the terms gamete + genotype / phenotype ;	5	

Question	Answer	Marks	Guidance
4(a)	<p>Top line (LHS) humans AW / nut collectors + (RHS) jaguars ; Middle line (LHS) bees + (RHS) agoutis ; Lower line (LHS) orchids + (RHS) (brazil nut) tree ;</p> <p>4 four arrow heads drawn + all pointing upwards ;</p>	4	<p>A singular or plural for all names LHS = Left Hand Side RHS = Right Hand Side</p> <p>lg contents of boxes for point 4</p>
4(b)	<p><u>animal</u> ; agoutis / humans AW / nut collectors ;</p>	2	
4(c)	<p>1 less nectar ; 2 male bees + lack scent ; 3 female bees + not attracted ; 4 less reproduction of bees ; 5 less pollination + of trees ; 6 less trees ; 7 less nut / fruit production ; 8 loss of jobs (for humans) / negative economic impact AW ; 9 less food for agoutis ; 10 death / reduced population + of agoutis OR agoutis seek other food ; 11 less food for jaguars ; 12 death / reduced population + of jaguars OR jaguars seek other food ;</p>	6	

Question	Answer	Marks	Guidance
5(a)(i)	<u>antagonistic</u> ;	1	
5(a)(ii)	<u>triceps</u> ;	1	
5(b)(i)	W ; Y ;	2	
5(b)(ii)	<u>relax</u> ;	1	
5(c)	1 (muscles) in iris ; 2 radial + <u>contract</u> ; 3 circular + <u>relax</u> ; 4 pupil + wider / dilates / expands AW ; 5 more light ; 6 retina / rods / cones / photoreceptors AW ;	3	

Question	Answer	Marks	Guidance
6(a)	<p>1 plants / leaves / producers / autotrophs ; 2 trap / absorb / need / use / convert AW + light ; 3 into chemical energy OR make carbohydrate / glucose / sugar / starch ; 4 (plants / animals) eaten / food OR reference to herbivores / carnivores / consumer ;</p> <p>5 (plants / photosynthesis) uses + carbon dioxide ; 6 (plants / photosynthesis) produces + oxygen ; 7 respiration + uses glucose / uses oxygen / produces carbon dioxide ; 8 provide a habitat for other living organisms / use of plants by humans ;</p>	6	
6(b)	<p>1 <u>limiting</u> (factor) ; 2 water + insufficient AW ; 3 temperature + too low / high ; 4 carbon dioxide + insufficient AW ; 5 reference to enzymes ; 6 plant cannot store / translocate + sucrose / sugar + more quickly ;</p>	4	

Question	Answer	Marks	Guidance
7(a)(i)	<p><i>(causes)</i></p> <ol style="list-style-type: none"> 1 children ; 2 lack / deficiency AW + calcium ; 3 lack / deficiency AW + vitamin D ; 4 lack of any reasonable named food containing calcium / vitamin D ; 5 lack of sunlight ; <p><i>(symptoms)</i></p> <ol style="list-style-type: none"> 6 bones + soft / weak / bent / brittle / likely to fracture / do not develop properly ; 7 teeth + soft / decay / do not develop properly AW ; 8 bowed legs ; 	4	
7(a)(ii)	<p><i>(causes)</i></p> <ol style="list-style-type: none"> 1 lack / deficiency AW + vitamin C ; 2 lack of any reasonable named food containing vitamin C ; <p><i>(symptoms)</i></p> <ol style="list-style-type: none"> 3 gums bleed ; 4 teeth loose / fall out ; 5 wound healing slow / poor ; 6 joint pain ; 7 shortness of breath ; 8 rough AW skin / weak connective tissue / damaged AW epithelium ; 	4	
7(b)	<ol style="list-style-type: none"> 1 small / soluble / dissolved ; 2 not digested / not broken down / already in simplest form ; 3 <u>diffusion</u> ; 4 through + villi / capillary / cell membrane / partially AW permeable membrane ; 	2	

Question	Answer	Marks	Guidance
8(a)	<ol style="list-style-type: none"> 1 osmosis / diffusion ; 2 from high to low water potential OR down water potential gradient ; 3 through + cell wall ; 4 through + membrane ; 5 <u>root hair</u> ; 	4	
8(b)	<ol style="list-style-type: none"> 1 less energy + released ; 2 less active transport ; 3 less ions absorbed OR ions absorbed more slowly ; 4 less nitrate ions + amino acids / protein / growth ; 5 less magnesium + chlorophyll ; 6 less photosynthesis ; 7 less carbohydrate / glucose / sugar / starch (produced) ; 	6	

Question	Answer	Marks	Guidance
9(a)	<ol style="list-style-type: none"> 1 thin / one cell thick / short distance ; 2 moist ; 3 large surface area ; 4 permeable ; 5 maximum / more / quick / efficient + diffusion / absorption / exchange ; 6 reference to dissolving / in solution ; 	4	
9(b)	<ol style="list-style-type: none"> 1 faster / deeper + breathing ; 2 more + oxygen ; 3 (oxygen) in lungs / inhaled / in blood ; 4 <u>muscle</u> ; 5 faster / increased + respiration / oxidation of glucose ; 6 <u>aerobic</u> ; 7 more energy + required / released ; 8 more + carbon dioxide removed AW ; 9 delays / prevents AW + <u>anaerobic</u> respiration ; 	4	
9(c)	<ol style="list-style-type: none"> 1 less oxygen in atmosphere (at high altitude) ; 2 more + haemoglobin ; 3 oxyhaemoglobin OR more + oxygen carried / supplied ; 4 competitive advantage AW ; 	2	