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**BIOLOGY**

**5090/22**

Paper 2 Theory

**October/November 2017**

MARK SCHEME

Maximum Mark: 80

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**Published**

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Mark schemes will use these abbreviations:

<b>;</b>	separates marking points
<b>/</b>	alternatives
<b>()</b>	contents of brackets are not required but should be implied
<b>R</b>	reject
<b>A</b>	accept (for answers correctly cued by the question, or guidance for examiners)
<b>Ig</b>	ignore (for incorrect but irrelevant responses)
<b>AW</b>	alternative wording (where responses vary more than usual)
<b>AVP</b>	alternative valid point (where a greater than usual variety of responses is expected)
<b>ORA</b>	or reverse argument
<b><u>underline</u></b>	actual word underlined must be used by candidate (grammatical variants accepted)
<b>+</b>	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 <b>A</b> ) male ; (child <b>B</b> ) male ;  (explanation) 1 <u>zygote</u> + X + Y ; 2 <u>mitosis</u> ; 3 <u>identical</u> + cells / twins ;	4	<b>A</b> 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 <b>AW</b> ; 3 increased / high + surrounding <b>AW</b> temperature ; 4 increased / high + surrounding <b>AW</b> humidity ; 5 hot + food / drink ; 6 increased / high + metabolism / respiration ; 7 fever / illness ; 8 ovulation ; 9 wear more clothes <b>AW</b> ;	3	
2(c)	1 sweat ; 2 evaporation ; 3 vasodilation <b>AW</b> ; 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)	<b>G + H</b> ;	1	
3(c)	1 parent genotypes / gametes correct from <b>G and H</b> 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><b>Top line</b> (LHS) humans <b>AW</b> / nut collectors + (RHS) jaguars ;  <b>Middle line</b> (LHS) bees + (RHS) agoutis ;  <b>Lower line</b> (LHS) orchids + (RHS) (brazil nut) tree ;</p> <p><b>4</b> four arrow heads drawn + all pointing upwards ;</p>	<b>4</b>	<p><b>A</b> singular or plural for all names  LHS = Left Hand Side  RHS = Right Hand Side</p> <p><b>lg</b> contents of boxes for point <b>4</b></p>
4(b)	<p><u>animal</u> ;  agoutis / humans <b>AW</b> / nut collectors ;</p>	<b>2</b>	
4(c)	<p><b>1</b> less nectar ;  <b>2</b> male bees + lack scent ;  <b>3</b> female bees + not attracted ;  <b>4</b> less reproduction of bees ;  <b>5</b> less pollination + of trees ;  <b>6</b> less trees ;  <b>7</b> less nut / fruit production ;  <b>8</b> loss of jobs (for humans) / negative economic impact <b>AW</b> ;  <b>9</b> less food for agoutis ;  <b>10</b> death / reduced population + of agoutis <b>OR</b> agoutis seek other food ;  <b>11</b> less food for jaguars ;  <b>12</b> death / reduced population + of jaguars <b>OR</b> jaguars seek other food ;</p>	<b>6</b>	

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 <b>AW</b> ; 5 more light ; 6 retina / rods / cones / photoreceptors <b>AW</b> ;	3	



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

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

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