Cambridge O Level

Cambridge Assessment International Education
Cambridge Ordinary Level

BIOLOGY **5090/22**

Paper 2 Theory **October/November 2017**

MARK SCHEME

Maximum Mark: 80

Published

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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 accepted)
+	statements on both sides of the **+** are needed for that mark

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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** zygote **+** X **+** Y ; **2** mitosis ; **3** identical **+** 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**	

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Question	Answer	Marks	Guidance
2(a)	homeostasis ;	1	
2(b)	**1** body 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)	negative feedback ;	1	
2(d)(ii)	hypothalamus ;	1	

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Question	Answer	Marks	Guidance
3(a)	blue ;	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	

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Question	Answer	Marks	Guidance
4(a)	**Top line** (LHS) humans **AW** / nut collectors **+** (RHS) jaguars **;** **Middle line** (LHS) bees **+** (RHS) agoutis **;** **Lower line** (LHS) orchids **+** (RHS) (brazil nut) tree **;** **4** four arrow heads drawn **+** all pointing upwards **;**	**4**	**A** singular or plural for all names LHS = Left Hand Side RHS = Right Hand Side **Ig** contents of boxes for point **4**
4(b)	animal **;** agoutis / humans **AW** / nut collectors **;**	**2**	
4(c)	**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 **;**	**6**	

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

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Question	Answer	Marks	Guidance
6(a)	**1** plants / leaves / producers / autotrophs **;** **2** trap / absorb / need / use / convert **AW +** <u>light</u> **;** **3** into chemical energy **OR** make carbohydrate / glucose / sugar / starch **;** **4** (plants / animals) eaten / food **OR** reference to herbivores / carnivores / consumer **;** **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 **;**	**6**	
6(b)	**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 **;**	**4**	

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Question	Answer	Marks	Guidance
7(a)(i)	*(causes)* **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 **;** *(symptoms)* **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)	*(causes)* **1** lack / deficiency **AW +** vitamin C **;** **2** lack of any reasonable named food containing vitamin C **;** *(symptoms)* **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)	**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)	**1** osmosis / diffusion **;** **2** from high to low water potential **OR** down water potential gradient **;** **3** through **+** cell wall **;** **4** through **+** membrane **;** **5** root hair **;**	**4**	
8(b)	**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**	

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Question	Answer	Marks	Guidance
9(a)	**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)	**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)	**1** less oxygen in atmosphere (at high altitude) **;** **2** more **+** haemoglobin **;** **3** oxyhaemoglobin **OR** more **+** oxygen carried / supplied **;** **4** competitive advantage **AW ;**	**2**	

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