

MARK SCHEME for the October/November 2008 question paper

5090 BIOLOGY

5090/02

Paper 2 (Theory), maximum raw mark 80

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All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

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Section A

- 1 (a) (A) plumule ;
- (B) testa/(seed) coat ; [2]
- (b) (i) starch/protein/carbohydrate/fat or oil (R soluble CHO/aa's) ; [1]
 (Do not penalise in (ii) if (i) is blank)
- (ii) enzyme/named enzyme (correct for storage product) ;
 digestion/enzymes activated or need water/hydrolysis ;#
 (large to) small molecules/*(insoluble) to soluble ;#
 (A correctly named small molecule including glucose) ;
 # OR broken down (ONE mark only) ;
- (iii) *in solution ;
 (Ignore refs to diffusion) ;
 through phloem (look for idea movement/translocation) ;
 ref active transport OR ref. leaving/entering + phloem/cells ;
 (* once only, but can be awarded in (ii) in addition to 'one mark only' rule)
- (iv) use correct for substance named anywhere in (b) ; [max 5]
 (e.g. protein for growth, CHO/fat for energy [see 8E (a)]) (R storage)
- (c) O₂ into root ;
 out of leaf ;
- OR CO₂ into leaf ;
 out of root ; [2]
 (A any underground structure)
- OR for ONE mark max. water vapour out of leaf ;
- [Total: 10]**
- 2 (a) (G) kidney ;
 (I) bladder (R gall bladder) ; [2]
- (b) glucose ; [1]
insulin ;
 from pancreas ;
 in blood ;
glycogen ; [max 3]

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- (c) #F + blood/cells ;
 Any **two** from: more urea in **H**, more toxins in **H**, glucose only in **F**,
 amino acids only in **F**, qualified salt concentration in either ;
H + urine ;
 Ref. O₂/CO₂ differences ; [max 4]
 (# A reverse argument for alternative structure)

[Total: 10]

- 3 (a) (J) cuticle or described ;
 (K) spongy (+ mesophyll) (ignore refs to lower epidermis) ; [2]

- (b) (i) one arrow (somewhere) leaving xylem (R any that pass through phloem) ;
 passing into any mesophyll cell ;
 entering air space in spongy mesophyll ;
 passing out of stoma ;
 (sequence must be plausible) [max 3]

- (ii) **X** placed where water enters air space/wall of mesophyll cell ; [1]
 (R **X** on guard cell)

- (c) (i) N ;
 (ii) O ; [2]

- (d) evaporation (R transpiration) ;
 fast(er) in high temperatures ;
 cools/removes heat ; [max 2]

[Total: 10]

- 4 (a) (i) (Q) plasma ; [1]

- (ii) 2 named ions (iron and calcium on syllabus) ;
 iron + red blood cells/haemoglobin ;
 calcium + ref. bones or teeth/blood clotting ; [3]
 (A any others correct with function e.g. Mg activates enzymes/for RBCs,
 Na/K for impulse transmission/ref. effect on cell membrane) (R N / I₂ / S &
 any other elements)

- (b) WBC correctly labelled ;
infected RBC correctly labelled (If several labelled, all must be correct) ; [2]

- (c) (capillary) close to surface ;
 thin/one cell thick ;
 low blood pressure ; [3]
 (A reverse arguments for artery)

[Total: 9]

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- 5 (a) spongy wall/(spongy or uterus) lining/endometrium ;
 (R uterus/uterus wall)
- (b) Ranges can be smaller than those given, max 1 if they give 19–20 days for both.
 A any **one** day within each range, but fertilisation must come before implantation.
- (i) 14–20 days ;
- (ii) 19–25 days ; [2]
- (c) necessary substances can diffuse across placenta ;
 bloods might be of different groups ;
 mother's blood pressure too great ;
 ref. possible exclusion of potentially harmful substances ; [max 3]
 (e.g. pathogens, R diseases)
- (d) (i) below 32 °C (A correct stated range < 31°C) ;
 above 35 °C (A correct stated range 36 < °C) ; [2]
 (Max 1 if no units, units need appear ONCE only)
- (ii) If single, unqualified statements given, take them to refer to human.
 The matching statement for reptile may appear in the question.
- not dependent on temperature/develops at constant temperature ;
 *sex inherited/determined at fertilisation ;
 *ref. to sex/(X) Y chromosomes ;
 *ref. external v. internal development ; [max 3]
 (A develops in egg) (* R negatives such as 'don't hatch')

[Total: 11]

[Total for Section A: 50]

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Section B

- 6 (a) Letters are **NOT** essential, but if used, they must be in plausible context.
- (S/sun +) light (energy) ;
 - (T/trees +) trapped AW by chlorophyll (A plants) ;
 - photosynthesis ;
 - production of organic molecule or named ;
 - (A named, or symbols, on a balanced or correct word equation) ;
 - chemical energy ;
 - death of T/tree(s)/plants ;
 - (U/tree +) buried + subjected to pressure ;
 - (U/V/W +) fossil fuel ;
 - (U/V/W +) coal ;
 - (V/W +) mined/removed from ground AW ;
 - (W/X +) burnt/used in industry AW ;
 - (X +) release of energy ; [max 7]
- (b) V or ref. mining AW + depletion of resources/scarring of countryside/damaging habitats (R erosion) ;
- W/X or described + any two from: ;
- oxides of sulfur, oxides of nitrogen, CO₂, CO, particulates ;;
 - greenhouse/global warming + CO₂ ;
 - acid rain/effects of acid rain or CO or particulates ; [max 3]
- [Total: 10]**
- 7 (a) discontinuous – valid example (such as eye colour, tall + dwarf peas, red hair, albinism, sex) ;
- (A labelled bar charts) ; [1]
 - continuous – valid example (A skin colour and labelled graph) ; [1]
 - (R eye colour)
- (i) (discontinuous) few forms ;
- distinct from one another/no intermediates AW ;
 - the result of inheritance ;
 - of genes ;
- (ii) (continuous) many forms ;
- small differences from one to the next/range ;
 - extremes at either end may show considerable difference ;
 - caused by genes + the environment ;
 - e.g. of environmental factor ;
- [max 5]
- (b) mutation (in either (i) or (ii)) ; [1]
- (i) (sickle cell) of gene ;
- affecting haemoglobin (formation) ; [max 1]
- (ii) (Down's) of chromosome/one extra chromosome ; [max 1]
- [Total: 10]**

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Either

- 8 (a) R any points on an equation as question asks for a definition.
 release (A provide/give/supply/evolve/liberate) ;
 (R produce/manufacture/make/use/form) ;
energy ;
 from named substrate/food substance (R food unqualified) ;
 in a cell/mitochondria ; [max 3]
- (b) It must be clear each time which process is being described.
 O_2 + no O_2 ;
 ref. to differing amounts of energy released ;
 substrate completely broken down + not completely broken down ;
 or ref. to all end products (CO_2 & H_2O + lactic acid/alcohol & CO_2) ; [max 2]
- (c) yeast/bacterium/*Lactobacillus*/*Streptococcus* ;
 sugar or named/fruit/grain or flour added/milk/grass/cabbage ;
fermentation ;
 release of CO_2 + dough rising/ CO_2 + bubbles in beverage/
 clotting of milk/pH change/lactic acid production/taste effect/
 preservation (as appropriate for e.g. given) ;
 bread manufacture/alcohol or named beverage/vinegar/
 yoghurt/cheese/silage/sauerkraut (appropriate for e.g.) ;
 ref. controlled temperature/warmth for proving dough ;
 (around 40 °C for yoghurt) ;
 baking kills yeast or evaporates alcohol/
 beer or wine separated from yeast ; [max 5]
- [Total: 10]**

Or

- 8 (a) permeable/salts + water pass (R 'permeable membrane') ;
 by diffusion ;
 Any **two** from: tough, flexible or elastic, supports cell, ;
 maintains shape or a described shape ; ;
 stops cell bursting ; ;
 creates turgor or described (with ref. part played by c.c.w.) ; ;
 helps keep plant upright AW ; [max 5]
- (b) partially/semi-/differentially/selectively + permeable ;
 water enters (R water particles) ;
 by osmosis ;
 a turgor reference (look for ref. to part played by the membrane) ;
 selective entry/selective passage ;
 (of) salts/ions/minerals/or named (R particles/substances) ;
 by active transport ;
 ref. energy requirement ; [max 5]
- [Total: 10]**

[Total for Section B: 30]