

## MARK SCHEME for the October/November 2008 question paper

**5090 BIOLOGY**

**5090/02**                      Paper 2 (Theory), maximum raw mark 80

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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) O<sub>2</sub> into root ;  
out of leaf ;
- OR CO<sub>2</sub> 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. O<sub>2</sub>/CO<sub>2</sub> 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 / I<sub>2</sub> / 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 ; [1]  
(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, CO<sub>2</sub>, CO, particulates ;;  
greenhouse/global warming + CO<sub>2</sub> ;  
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]**