

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

### **5090 BIOLOGY**

**5090/02**

Paper 2 (Theory), maximum raw mark 80

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.

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.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

- CIE will not enter into discussions or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the October/November 2008 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.



Page 2	Mark Scheme	Syllabus	Paper
	GCE O LEVEL – October/November 2008	5090	02

### 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]

Page 3	Mark Scheme	Syllabus	Paper
	GCE O LEVEL – October/November 2008	5090	02

- (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]

Page 4	Mark Scheme	Syllabus	Paper
	GCE O LEVEL – October/November 2008	5090	02

- 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]

Page 5	Mark Scheme	Syllabus	Paper
	GCE O LEVEL – October/November 2008	5090	02

### 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]

Page 6	Mark Scheme	Syllabus	Paper
	GCE O LEVEL – October/November 2008	5090	02

**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]**