**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**GCE Ordinary Level**

# MARK SCHEME for the May/June 2010 question paper

# for the guidance of teachers

## 5090 BIOLOGY

**5090/22** 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, which would have considered the acceptability of alternative answers.

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.

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**Abbreviations**

Mark schemes will use these abbreviations:

- ; separates marking points
- / alternatives
- **R** reject
- **A** accept (for answers correctly cued by the question, or guidance for examiners)
- AW alternative wording (where responses vary more than usual)
- underline actual word given must be used by candidate (grammatical variants excepted)
- max indicates the maximum number of marks that can be given
- + statements on both sides of the + are needed for that mark

## Section A

**1 (a) (i)** insulin (**A** growth hormone / testosterone) ;

**(ii)** *Even if hormone cannot be made by G.E., all marks still available , organ mark tied to hormone, function marks also tied to hormone*

pancreas / Islets of Langerhans (**A** pituitary / testes ) ; [1]

glucose to glycogen ;

correct ref. liver / muscles ;
*(NB. this mark **alone** may be given as a second mark on **one** line)*

enhanced glucose uptake by cells / increased cell permeability ;

ref. constant blood composition / concentration/reduction of blood glucose ;

(**A** any two functions for any other hormone given) ; [2 max]

**(b) (i)** chromosome / chromatid ; [1]

**(ii)** gene / allele ; [1]

**(c) (i)** sugar (or named) / nitrates (**A** amino acids) ;
solution / broth / water ;
suitable temperature / pH ;

ref. oxygen / air (**A** ref. [an]aerobic) ;
(– since respiration in yeast may be aerobic or anaerobic)

fermenter / stirring / ref. sterility ( i.e. the mechanics of the process) ; [3 max]
(**A** large / suitable container)

**(ii)** (***A** first two on list*)
alcohol / ethanol / $C_2H_5OH$ OR water ;
carbon dioxide / $CO_2$ ; [2]

**2 (a)** **A** 135 - 145 (inc.) (If range given, must fall within these figures) ;
(**A** figure given on graph)
ppm / parts per million ; [2]

**(b) (i)** high concentration of nitrates / AW ;
used to make amino acids / proteins ;
to make protoplasm ;
rapid / AW + cell division ;
plants not yet fully grown ;
less competition ; [3 max]

**(ii)** *Any one from*: high(er) / AW or optimum temperature, more $CO_2$, more light, top-up nitrates, remove some water plants, ref. increased rate of photosynthesis, ; [1]

**(c)** slower $NO_3$ uptake ;
by active transport ;
correct ref. energy (**R** produced / made / manufactured) ;
slower metabolic rate of plant / proteins manufactured more slowly ;
slower rate of growth ; [3 max]

**3** **(a)** *Award **one each** for constituents.*
fibre / roughage ;
bulk / for muscles to push against AW / prevents constipation / prevents bowel cancer ;

peristalsis ;
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water ;

prevents dehydration / ref. osmoregulation ;
medium for enzyme action /digestion /metabolic processes ;
solvent / transport / sweating ; [2 max]

---------- (for importance)
vitamin C

*(any two from)* wound healing, anaemia, bleeding spots on the skin, loose teeth, bleeding gums, prevents scurvy ;;

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vitamin D ;

uptake / storage + of calcium / phosphorus ;
healthy bones / teeth / anti-ricketic ;

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Fe ;

haemoglobin ;
oxygen carriage / absorption ;

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(Accept other vitamins / ions – 1 for name, 2 for importance ;;; [5 max]
**A** name of vitamin in 'importance' – In lists, mark first one only,
**A** 'vitamin**s**' (in the plural, and unspecified) for a mark, but importance must refer to at least **two** separate functions for **one mark**.

**(b)** less (overall) fat content ;
particularly saturated fat ;
ref. deposition in blood vessels / atheroma / raised blood pressure
heart disease or problem (**A** atherosclerosis) ; [2 max]

**(c)** correct constituents / AW ;
in correct proportions ;
antibodies ;
non-allergenic ;
readily available / cheap / correct temperature ;
unlikely to be sterile / uncontaminated (**A** more hygienic) ; [4 max]

**4** **(a)** homeostasis ; [1]

**(b)** **C** – receptor / sensor ;
detecting changes (in temperature) (**A** even if misidentified) ;
**D** – sensory / afferent + neurone / nerve cell or fibre (**R** nerve) ;
impulses to CNS / brain / spinal cord / (**A** even if misidentified) ; [4]

**(c)** more blood ;
to capillaries ;
(vaso)dilate (**A** with ref. to capillaries or arteri(ol)es) ;
blood carries heat ;
more heat lost ;
lowers body temperature (still) further / hypothermia / AW ; [3 max]

**5** **(a)** cytoplasm ; [1]

**(b)** **(i)** *Mark the first two structures mentioned.*
chloroplast(s) ;
cell wall ; [2]

**(ii)** ***A*** *all converse points( ref. palisade cell) as long as cell type is clear.*
no vacuole / no cell sap ;
one chloroplast only ;
large chloroplast / ref shape of chloroplast ;
round / spherical shape of cell ;
no tonoplast / vacuolar membrane / AW ;
cell is entire organism / not part of a tissue ;
ref. position of nucleus ; [4 max]

**(c)** asexual (**A** no sexual) reproduction (**A** vegetative reproduction)
binary fission ;
mitosis ;
identical (**R** similar) offspring / no variation / clone ;
no (**A** limited) natural selection ;
no (**A** limited) evolution ;
no meiosis / no fertilisation / no gametes / only one parent
(**R** no mutation) ; [4 max]

**[Total: 50]**

## Section B

**6** **(a)** stoma(ta) ;
Intercellular / air + space ;
diffusion (anywhere) ;
dissolves ;
mesophyll (cell) / named (any relevant ref.) ;

chloroplast ;
*water (as a reactant) ;
*light / photolysis ;

photosynthesis ;
*glucose / starch ; [7 max]
(*__A__ formulae and __A__ on equation)

**(b)** changed to sucrose ;
suitable enzyme reference ;
in solution ;
translocated / carried + phloem ;
from cells (when made) / into cells (when stored) ; [3 max]

**7** **(a)** 1 new insects start to eat plants / plants decrease in numbers ;
2 new insects increase in numbers / reproduction ;
3 competition with AW established herbivores ;
4 established herbivores might not find suitable food ;
5 numbers of established herbivores decline / die ;
6 knock-on effect on carnivores AW ;
7 if established herbivores find new food source, remaining producers decrease in numbers ;

*(Further possible impacts on the food web)*

8 ref. natural predators (may be no natural predators, or they may achieve a balance with existing natural predators) ;

new insects may die out – therefore no effect on food web ;
new insects may introduce diseases ; [6 max]

**(b)** correct ref. ecosystem / ecological balance ;
(if removed) correct ref. food web / chain ;
may hold clues for curing disease ;
may supply drugs / medical or cosmetic preparations ;
moral or aesthetic argument / prevention of extinction / maintenance of gene pool / maintains biodiversity / may be of future value ; [4 max]

**8E (a)** capillaries / blood vessels damaged ;
bleeding / blood flow ;
platelets / thrombokinase / prothrombin / thrombin ;
<u>fibrinogen</u> ;
<u>fibrin</u> ;
clotting ;
scab (or described) ;
new cell growth ;
re-establishment of bacteria-proofing / skin re-seals ;
white blood cells or named ;
antibodies / antitoxin ;
phagocytosis or described ; [8 max]

**(b)** bright red in colour / oxygenated blood ;
blood leaves in spurts / ref pulse in arteries ; [2]
(Ignore references to pressure)

**8O (a)** [pre]molar + grinding / [canine]incisor + cutting) / teeth + <u>mechanical</u> digestion (**R** chewing) ;
saliva(ry) ;
starch to maltose* (**A** disaccharide, **R** sucrose) ;
amylase* ;
bolus (or described – **A** action of tongue / action of mucin) ;

**(b)** starch to maltose* [once only in **(a)** or **(b)**] ;
amylase* [once only in **(a)** or **(b)**] ;
maltose to glucose ;
lipase ;
fats to fatty acids and glycerol ;
absorbed by villi ;
capillaries + glucose / amino acids ;
lacteals / lymph for fatty acids + glycerol (**A** fat) ;
emulsification of fats AW ;
by bile ;
ref. to protein digestion ; [10 max]