UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the May/June 2012 question paper

for the guidance of teachers

5090 BIOLOGY

5090/22 Paper 2 (Theory), maximum raw mark 80

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Abbreviations

Mark schemes will use these abbreviations:

;	separates marking points
/	alternatives
R	reject
A	accept
AW	alternative wording
	underline actual word given must be used
max	the maximum number of marks that can be given
+	statements on both sides of the + are needed

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Section A

1 (a) (i) A pupil / aqueous humour / anterior chamber;
B cornea; [2]

(ii) dilates / gets big / enlarges / opens / gets wide / expands; [1]

(iii) **Z** on ciliary muscle / iris / external muscle; [1]

(b) reasonable ref. light receptors / sensitive cells / rods / cones;

not in contact with optic nerve;

no impulses;

to brain;

no picture formed / unable to see / blindness;
(R blurred vision or reduced visionary powers)

less / no nutrition for retina; [max. 3]

(c) failure to focus (all) light (rays);

blurred image AW;

any reference to the passage of light rays being impaired
(e.g. reflection / refraction / deflection / absorption / convergence);

ref. possible change in elasticity / ability to accommodate;

faded colour vision; [max. 3]

2 (a) (i) Mark as follows:
Award 2 marks for a correct answer with no working;;
Award 3 marks for a correct answer with any working;;;
Award 2 marks max. for correct working with no or wrong answer;;

Answer: 4.7(6)(%) (A 4.7 / 4.8);;

Examples of correct working are as shown below :
$\frac{1600}{4}$ / OR $1600 \times \frac{25}{100}$ / OR 400 (;)

$\frac{400}{8400}$ (;) [3]

(ii) higher (R ref. to higher GDA); [1]

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(b) more or a high amount AW fibre / roughage; [1]

(c) **(i)** bones;
soft / weak / deformed / bent / ref. bandy legs ; [2]
(R bent 'legs' – that is the effect of the knee joint.)
(Mark the first effect in a list)

(ii) C;

vitamin D / uptake of calcium / calcium used by bones AW; [max. 2]

3 **(a)** **(i)** cell wall + correct drawing (outside existing line);

(ii) nucleus + correct drawing (must be in cytoplasm);

(iii) vacuole / cytoplasm + correct drawing (if vacuole, must be larger than the nucleus.); [3]

If no marks scored through unacceptable drawings, allow max. 1 if all 3 are shown in the correct positions – vacuole in the middle, cell wall on the outside and nucleus between.

(b) elongation of cell (R cylindrical);

loss of cell contents / or one named content (A ref. death of cell / hollow)
(R chloroplasts / dissolving of cell contents.);

loss of end walls;

addition of thickening / strengthening material / lignin; [max. 3]

(c) (*stem*) contains xylem;

(xylem is) thickened / strengthened / contains lignin;

provides support;

(*leaf*) xylem less important for support;

loss of water / transpiration;

water not replaced / doesn't reach leaves;

cells become flaccid / lose turgor AW (R plasmolysed);

cells unable to support weight of leaf / wilts; [max. 5]

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4 **(a)** animal dispersal (A plausible named animal);

attraction + colour / succulence / smell;

(fruit) eaten / ref. food;

time for digestive processes AW;

seeds are **not** digested;

pass out with faeces / egested AW;

ref. seeds discarded elsewhere; [max. 5]

(b) **(i)** ref. to interference with the sexual reproductive process / infertility;

meiosis / reduction division not possible;

gamete formation / seed production impaired AW; [max. 1]

(ii) (A reverse argument re. diploid animals)

many plants can reproduce asexually / propagate vegetatively;

mitosis unaffected / meiosis not involved;

triploids more hardy / survive better AW; [max. 2]

(c) chromosomes;

mutation / ref. to meiosis AW ;

gamete + one extra / 24 (chromosomes);

one extra (chromosome) / 47 + inherited / handed on; [max. 3]
(mark not awarded for saying offspring have 47 chromosomes)

5 **(a)** **(i)** 37–39 °C (A range or any temperature within the range); [1]

(ii) (If first line blank, then Max. 1 for location if correct for function)

A any human enzyme or enzyme from biotechnology ;

location (specific rather than general) correct for enzyme;

function correct for named enzyme (substrate + product); [3]

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(b) denatured / destroyed;

stops working / no product made / cannot be used again;

relevant ref. active site;

substrate no longer fits / no formation enzyme-substrate complex AW;

correct use of lock and key idea;

possible effect of heat on shape of substrate molecule; [max. 5]

[Total: 50]

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Section B

6 (a) testa / seed coat + protection (any qualification must be plausible);

testa / testa + water entry / gas or named gas passage;

endosperm / cotyledons / seed leaves + food storage;

cotyledons / seed leaves + first (green) leaves;

cotyledons / seed leaves + eventually used for photosynthesis;

embryo + forms (new) plant;

radicle + (young) root;

plumule + (young) shoot / stem;

micropyle + water entry;

micropyle + gas or O_2 entry / CO_2 exit; [max. 7]

(b) water uptake + a function (e.g. dissolution);

oxygen uptake + respiration / for energy release;

any named e.g. of energy use (cell division / active transport);

ref. mitosis / cell division + growth;

enzyme action + why it is needed; [max. 3]

7 (a) (Marking points are available on an annotated drawing)

shows the number of organisms at each (trophic) or named level ;
(R species)
width / length of band indicates the number;

number of organisms decreases towards the top of the pyramid;

correct ref. to **two** technical terms from the following :
producers / consumers / herbivores / carnivores / trophic level;
(R named example)

in food chain / web / ecosystem (R habitat / named e.g. of a food web);

ref. to an anomalous situation (e.g. trees / single tree); [max. 4]

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(b) ref. Sun;

light (energy) to chemical energy;

absorbed by / inside plants or producers / photosynthesis;

named photosynthetic product;

food for / eaten by + animals / herbivores / consumers / decomposers;

lost as heat;

(from) respiration / ref ATP;

any ***two** uses of energy (for **two** marks);;

*Any two from: active transport, muscle contraction / movement / locomotion, e.g. of anabolism / protein synthesis / making large molecules, temperature control, nervous impulses, growth, cell division / mitosis / meiosis

does not pass back to producers / plants / Sun; [max. 6]

8 (a) (i) (osmosis) ref. <u>diffusion</u>;

of water ;

from high to low (water) molecular concentration or water potential / low to high solute concentration.;

Ref. to partially permeable membrane AW;

passive / no energy required ;

e.g. of an application; [max. 4]

(ii) (active transport) movement of ions / molecules / substances;

against a concentration gradient;

needs living or cell membrane;

energy required;

from respiration;

e.g. of an application; [max. 4]

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(b) thin walls / one cell thick + alveoli / air sacs / capillaries;

haemoglobin + oxygen absorption;

ref. relatively high concentration of oxygen in the lungs / oxygen regularly replenished / more oxygen in the air than in the blood;

continuous movement of blood;

large surface area / alveoli have rich supply / surrounded by capillaries; [max. 2]

9 **(a)** toxic / poisonous materials (R harmful);

waste products + metabolism AW;
(R refs. to salts)

urea;

liver / blood + kidneys;

urine;

urethra;

sweat;

skin / (epi)dermis;

carbon dioxide;

from cells / blood + alveoli;

exhaled / breathed out / expelled or removed from lungs AW; [max. 8]

(b) undigested food;

cellulose / fibre / lignin / roughage;

not from metabolism AW; [max. 2]

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