UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the October/November 2011 question paper for the guidance of teachers

5090 BIOLOGY

5090/21 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.

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Abbreviations

Mark schemes will use these abbreviations:

;	separates marking points
/	alternatives for the same making point
R	reject
A	accept (for answers correctly cued by the question, or guidance for examiners)
AW	accept Alternative Wording (where responses vary more than usual)
underline	actual word given must be used by candidate (grammatical variants derived from the same stem are excepted – e.g. excretion and excretory)
max	indicates the maximum number of marks that can be given
+	statements on both sides of the + are needed for that mark

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Section A

1 **(a)** **A** – bacterium (or named) + no nucleus/wall + no vacuole/slime capsule (A ref. nuclear strand AW/no nuclear membrane AW);

B – fungus/yeast + not angular/no central or large vacuole/budding;

C – animal or named + no cell wall/*only* cell membrane (A *Amoeba*/protozoan*)* (R protoctist) (R named cells); [3]

(b) **(i)** 2 from: eye/light receptor, cilia/flagella, locomotion;; [2]

(ii) 2 from: cell wall, starch, chloroplast/chlorophyll;; [2]

[Total: 7]

2 **(a)** asexual/vegetative;
<u>sexual</u> (Ignore asexual); [2]

(b) 2 from:
more certain, known quality/quantity of fruit or described*,
favourable conditions, greater % of fruit is flesh, faster,
greater profit/higher yield, (*allow ecf if wrong type of reproduction);; [2]

(c) interferes with movement of gases/blocks stomata;
interference with transpiration;
digests cell contents/ref. enzymes/separates cells;
takes nutrients from the plant;
kills cells/protective toxins released by cells;
no/less photosynthesis;
blocks veins/vascular bundles/phloem/xylem; [max 4]

(d) (A reverse argument) plants close together;
genetically identical;
little variation/mutation;
all/very large numbers lack resistance; [max 3]

[Total: 11]

3 **(a)** one per line, mark the first, any 2 from:
detection of pressure, temperature, pain, touch;; [2]
(A for ONE mark max. a reference to the detection of stimuli)

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(b) dilation;
more blood;
blood carries heat;
heat lost from + body surface/skin/named heat transfer method;
capillaries supply sweat glands; [max 3]

(c) **(i)** (A reverse argument) very little sweat lost;
no need to sweat/sweating would be detrimental AW;
fur would inhibit evaporation;
less heat lost;
*ref. low external temperature; [max 2]

(ii) stores energy;
supplies energy/heat;
insulates (against heat loss);
*ref. low external temperature; [max 2]

(iii) (A reverse argument)
(for ears/tail) reduced surface/small surface area;
ref. small surface area to volume ratio for the whole animal (Assume that 'it' = the yak);
from which heat can be lost;
*ref. low external temperature; [max 2]
(n.b. * = once only)

[Total: 11]

4 **(a)** no/less water near soil surface;
no/less water for photosynthesis;
no/less* carbohydrate manufacture;
no/less water for salts or named to dissolve/be absorbed/cell sap;
no/fewer proteins*/chlorophyll made (*Accept 'food' for ONE mark);
roots too short to reach water;
more herbivores to eat grass;
trees can lose leaves in times of stress; [max 4]

(b) more food/vegetation in abundance AW;
more different types of habitat;
less competition; [max 2]

(c) **(i)** (ORA) longer necks;
fewer of them; [2]

(ii) any ONE from: more foliage found higher up/have to eat leaves, mutation, those with shorter necks die/do not breed AW (ORA), natural selection; [1]

[Total: 9]

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5 **(a)** **(i)** chromosomes/genes; [1]

(ii) DNA (mark the first); [1]

(b) 1 and 2 in either order: stripey + black (abdomens) AW;
long + short wings (A no wings); [2]

(c) **(i)** black body/short wings;
hybrid cross yields 1:3/1 in 4/fewer of recessive phenotype AW; [2]

(ii) rr × RR (any matching upper and lower case letters);
r (r) R (R) + gametes*/G/g/or encircled;
Rr;
long wings/stripey + Rr (A anywhere);
all of this genotype/phenotype AW (A 'all the same');
rr × Rr;
r (r) R r + gametes* (* = once only);
Rr + rr;
long/stripey short/black;
1:1 / 50/50; [max 6]

[Total: 12]

Section B

6 **(a)** human/named donor animal/named cell;
gene or DNA for hormone/insulin;
cut/removed from chromosome;
ref. use of enzymes;
inserted into plasmid/DNA;
of bacterium;
culture medium AW (R agar plate);
oxygen supplied/aeration;
suitable temperature/pH/sterility;
bacteria divide/reproduce;
the gene makes insulin/hormone;
separated from infusion; [max 7]

(b) conditions (or named) can be controlled;
for maximum yield/large amounts;
no harm to human;
no harm to animal/sheep AW;
insulin is (exact) match of <u>human</u> insulin– not of another animal AW;
cheaper AW/higher profits/safer/no transmission of disease; [max 3]

[Total: 10]

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7 **(a)** zygote;
division;
mitosis (A anywhere);
blastocyst or described;
implantation AW;
in uterus lining (R wall);
placenta;
membrane(s) or named/amnion/amniotic sac;
named food substance/minerals;
oxygen;
nitrogenous excretion/urea/CO_2;
diffusion;
development of organs/named organs/cells or tissues become specialised; [max 7]

(b) might not be sterile/A ref. possible contamination;
no antibodies;
needs warming/temperature ref.;
less satisfactory bonding;
can lead to obesity in later life AW/wrong proportions of nutrients;
expensive;
supplies may be limited; [max 3]

[Total: 10]

Section C

8 **(a)** urea;
carbon dioxide;
water;
salts;
toxins/broken-down hormones;
bile salts/pigments; [max 3]

(b) urea/water/salts/toxins/broken down hormones + kidneys;
blood/blood vessels/named vessel/capillaries;
bladder + urine/urination;
ureter + urethra (both correctly spelt);
water/CO_2 + lungs/alveoli;
diffusion + from capillaries (for CO_2);
breathing (out);
water/salts/urea + sweat;
sweat glands;
from blood/capillaries;
sweat ducts/pores;
ref. faeces ONLY in an explanation of how bile salts/pigments are removed; [max 7]

[Total: 10]

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9 **(a)** water
carbon dioxide;
oxygen;
chlorophyll degradation products/CHOs/proteins/toxins; [max 3]

(b) water + soil/environment;
water + respiration;
to leaves/stomata*;
evaporates;
during transpiration;
CO_2 + from respiration;
in cells;
oxygen + from photosynthesis;
in named photosynthetic cell or tissue/chloroplast;
<u>diffusion</u> (once, anywhere);
through stomata*;
other substances + ref. manufacture within plant cells;
ref leaf fall/food for herbivores; [max 7]
(* Once only)

[Total: 10]

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