

Mark Scheme January 2007

GCE

GCE O Level Biology (7040)

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BIOLOGY 7040, MARK SCHEME

Symbols used in mark points

- ; indicates separate mark points
/ indicates alternatives
eq means allow any correct equivalent

Paper 1

Section A

1. (a) (hot and) dry / eq; (1)
- (b) no / less insulation;
less trapped air / eq; max
heat gain / heat absorbed; (2)
- (c) water loss;
dehydrated; (2)
- (d) (i) more concentrated urine / more urea/salt / less water; (2)
(ii) drier faeces / more solid / harder; (1)
- (e) (i) osmosis;
water out of cells / into blood; (2)
(ii) blood concentrated / thicker / more viscous / eq; (2)
harder to pump blood / slower circulation; (2)
- (f) avoids high day time temperatures / sunlight / cooler;
not seen by predators; max
less sweating; (2)

Total 14 marks

2. (a) passed through body / comes out of anus / not digested / waste
out of body; (1)
- (b) (i) 62.66;; (2)
(1) for adding OR for "188" seen (2)
(ii) cellulose/fibre/roughage present in herbivore diet; (2)
cellulose/fibre/roughage/plants not digested; (2)
- (c) carnivores respire more; max
carnivore more active / pursue/hunt prey / eq; (2)
- (d) less energy/food converted to biomass;
used to maintain body temp. / keep warm; (2)
- (e) (i) 14; (1)
(ii) 62; (1)

Total 11 marks

Section B

3. (a) glucose;
respiration / energy;
cellulose;
cell wall;
starch;
storage / respiration / energy (must be linked); (6)
- (b) no nucleus;
no chloroplasts;
no vacuole;
has plasmids;
has flagella;
slime capsule; max
cell wall not made of cellulose / eq; (3)
- (c) carbon dioxide being absorbed + photosynthesis;
carbon dioxide being released + respiration;
carbon dioxide being released + decomposers/decomposition; max
leaves being eaten; (3)
- (d) C - different temperatures;
O - same species / age / mass / size / plant;
R - repeat idea;
M1- measure mass / length;
2 at start and after period of time;
3 time in months; max
S - same moisture / air / decomposers; (6)
- (e) digested / broken down;
lipase;
fatty acids;
glycerol;
absorbed;
lacteal;
villi;
bile; max
emulsifies / smaller drops / increase surface area; (7)

Total 25 marks

4. (a) stamen;
anther;
filament;
stigma;
style;
ovary;
ovule;
petal / keel / standard / corolla;
sepal;
nectary; max
(6)
- (b) stigma outside petals;
anthers outside petals;
small flowers;
no colour;
large amounts of pollen;
pollen small / dust like / light / smooth;
no nectary / no nectar;
no guidelines;
no scent; max
(3)
- (c) growth of pollen tube down style;
enters ovule via micropyle;
pollen/male nuclei move down (pollen tube);
male nucleus fuses with female gamete / fertilisation;
zygote becomes embryo;
endosperm;
ovule becomes seed;
ovary becomes fruit;
ovary wall becomes pericarp/ fruit wall;
integuments become testa / seed coat;
floral parts/ named structure withers; max
(7)
- (d) C add different amounts of acid to two soils / two pHs;
O use same species / strain of plant / from seeds of same colour;
R repeat in each acidity;
M observe colour of flower;
S 1 grow for stated time;
2 water / temperature/ light intensity / eq; max
(6)
3 water / temperature/ light intensity / eq;
- (e) identical / no variation;
ripen at same time / disease resistant / same stated characteristic / eq;
quicker to produce; max
(3)
large numbers / high yield;

Total 25 marks

5. (a) $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$
 lhs; rhs; balance; (3)
- (b) (i) increased rate (of photosynthesis);
 up to a point / eq;
 determined by other (limiting) factor; (3)
- (ii) less photosynthesis;
 less kinetic energy / less movement (of enzymes) /
 fewer collisions; (2)
- (c) root hair (cells);
 (large) surface area;
 osmosis;
 gradient / eq;
 xylem;
 stem;
 leaves;
 mesophyll;
 air spaces;
 stomata; (max)
 transpiration / evaporation /diffusion; (9)
- (d) C two+ colours;
 O water plant / same plant / same mass of plant /eq;
 R repeat;
 M1 count bubbles of oxygen / other method;
 2 per unit time;
 S1 CO_2 / temp /eq; (max)
 2 CO_2 / temp /eq; (6)
- (e) maize / rice / wheat / oat;
 energy / carbohydrate / starch; (2)

Total 25 marks

6. (a) same organisms / species / animal / plant;
in a habitat / place / area / location / eq; (2)
- (b) (i) bacteria;
increase;
decompose;
respiration;
less oxygen;
kills fish / animals / suffocate;
spread disease; max
(6)
- (ii) loss of plants;
loss of habitat;
damage to food chain/webs / loss of animals; (3)
- (c) C - +/- mineral ions / range of concentrations;
O - same plant / species / size / age;
R - several readings / plants;
M1 - measure growth in mass / length / number;
2 ref time (1 week to 3 months);
S1 - same temperature / light intensity /eq; max
2 same temperature / light intensity /eq; (6)
- (d) (i) respiration;
by cells / tissues;
diffusion;
lungs / alveoli; max
exhaled / eq; (4)
- (ii) liver;
amino acids / deamination;
kidney / eq;
filtration; max
urinated / excreted /urine; (4)

Total 25 marks

7. (a) (i) auxin;
cell elongation;
auxin moves away from light / moves to dark side;
positive / towards;
phototropism; max
(3)
- (ii) positive / towards / down;
geotropism;
water;
minerals;
anchorage; max
(3)
- (iii) negative / away / upwards;
geotropism;
for light; max
(2)
- (b) faster / eq;
shorter duration / eq;
electrical;
neurones;
only to target cells; max
(4)
- (c) (i) receptor;
sensory neurone;
relay / intermediate neurone;
motor neurone;
synapse;
passage of impulse on diagram;
effector / muscle; max
(5)
- (ii) rapid response / eq;
prevents damage / burning; (2)
- (d) C two+ levels of exercise / before and after exercise;
O same person / age/ mass / gender / eq;
R repeat;
M1 measure sweat production;
2 how measured / ref to time;
S1 same temperature / time of day / eq; (6)
2 same temperature / time of day / eq;

Total 25 marks

PAPER TOTAL 100 MARKS

Paper 2

1. (a) oesophagus / gullet;
stomach;
large intestine / colon;
anus / rectum; (4)
- (b) (i) digestion / breakdown;
(starch into) maltose;
amylase;
maltose to glucose;
maltase; max (3)
- (ii) digestion / breakdown;
trypsin / chymotrypsin / protease / eq;
polypeptides / peptides / amino acids; max (2)
- (c) (i) aids peristalsis / prevents constipation; (1)
- (ii) lubricates food / helps food to be swallowed / maintains
blood concentration / for chemical reactions / transport
/ coolant; (1)
- (iii) bone / teeth / prevents rickets; (1)
- (iv) haemoglobin / red blood cells / prevent anaemia; (1)

Total 13 marks

2. (a) P - iris;
Q - cornea;
R - suspensory ligament;
S - optic nerve; (4)
- (b) lens fatter / thicker / more curved;
ciliary muscles contract;
suspensory ligaments loosen / slacken / eq;
light bent / refracted; max (3)
- (c) no retinal cells / rods / cones / receptors / eq;
blind spot; (2)

Total 9 marks

3. chemicals / pollutants / substances / elements / toxic materials /
fumes / vapours / waste products / sewage / eq;
water / rivers / sea / eq;
oil / gas / coal / eq;
water / moisture;
sulphuric acid / sulphurous acid;
acid;
organisms / plants / animals / eq;

Total 7 marks

4. (a) (i) wall thinner / less muscle / eq; (1)
- (ii) lungs / alveoli;
pulmonary artery;
oxygen added / oxygenated;
carbon dioxide lost; max
pulmonary vein; (2)
- (iii) aorta; (1)
- (b) (i) adrenal (gland); (1)
- (ii) heart rate increases;
(more) glucose;
(more) oxygen / aerobic;
respiration;
energy / ATP; max
removal of carbon dioxide / lactic acid; (3)

Total 8 marks

5. (a) (i) fungus; (1)
- (ii) carbon dioxide; (1)
- (iii) let gas/carbon dioxide out;
stop oxygen/air getting in / anaerobic conditions; max
stop other organisms getting in / contamination; (2)
- (b) (i) B; (1)
- (ii) yeast dying / eq;
no sugar / food; max
build up of ethanol / ethanol toxic; (2)

Total 7 marks

6. (a) three pairs of legs / six legs;
three body parts / head, thorax, abdomen;
pair of antennae; max
compound eye; (3)
- (b) **Genotype of fly** **Phenotype of fly**
(Aa) long wings;
aa; (short wings) (2)
- (c) (i) 3:1; (1)
- (ii) 60; (1)
- (d) adult → egg; → larva/maggot; → pupa; → egg (3)

Total 10 marks

7. (a) capybara / mammal; (1)
- (b) hair / fur;
ears / pinnae; (2)
- (c) (i) 500; (1)
- (ii) respiration;
excretion / urine;
heat loss;
movement; (3) **max**
indigestible / faeces / uneaten; **mark first three**
- (d) loss of habitat / food chain disruption / extinction;
soil erosion / eq;
leaching / eq;
less carbon dioxide absorbed / carbon dioxide increase / global
warming / greenhouse effect; (3) **max**
less transpiration / evaporation / rainfall; **mark first three**

Total 10 marks

8. (a) S half each axis;
L line join to points and labelled/key;
A correct way, labelled with units;
P ;; (5)
- (b) $26/14$ [divided by 14 = (1)]
 $1.86 / 1.857;;$ (2)
- (c) (i) slower at 20°C;
reference to numbers; (2)
- (ii) less kinetic energy / molecules move less / fewer
collisions; (1)
- (d) less respiration;
enzymes denatured / destroyed / eq; (2)
- (e) carbon dioxide;
sodium / potassium hydroxide / soda lime; **NOT** limewater (2)

Total 14 marks

9. (a) (i) 46 / 23 pairs; (1)
- (ii) male;
X and Y present / not same length; (2)
- (b) number chromosomes / number of pairs;
size / shape of chromosomes; max
genes; (2)
- (e) (i) DNA / nucleic acid; (1)
- (ii) mutation; (1)
- (iii) (sexual) reproduction / gametes / fertilisation / meiosis; (1)

Total 8 marks

10. (a) (i) A: cell wall;
B: cytoplasm;
C: chloroplast; (3)
- (ii) trap/absorb light;
photosynthesis / light to chemical energy; (2)
- (iii) $0.035 / 3.5 \times 10^{-2}$;;
one for 35 (mm) or 3.5 (cm) in working (2)
- (b) (i) live in wet places;
no risk of dehydration / recognition that waxy cuticle
prevents water loss; (2)
- (ii) one cell thick / thin / large surface area to volume ratio
/ eq;
diffusion of gases / easy for gases to enter cells; max
no need to control water loss / transpiration; (2)
- (iii) lower epidermis;
no mesophyll cells;
guard cells;
palisade cells;
spongy cells / air spaces;
xylem;
phloem; max
upper epidermis; (3)

Total 14 marks

PAPER TOTAL 100 MARKS

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