

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

GCE Ordinary Level

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## **MARK SCHEME for the October/November 2012 series**

### **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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Page 2	Mark Scheme	Syllabus	
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- 1 (a) A – tongue;  
B – larynx/voice box;
- (b) peristalsis; [1]
- (c) closes/covers;  
trachea/windpipe/air passage/larynx/voice box/B;  
helped by raising of larynx **AW**;  
preventing the entry of food / preventing food going to lungs or respiratory system / prevents choking **AW** / allows food to enter oesophagus **AW**; [Max 3]
- (d) (i) digestion / enzymatic action / hydrolysis;
- & (ii) amylase;  
(from) saliva / salivary glands;  
starch;  
to maltose;  
neutralisation / ref. pH; [Max 4]  
(each marking point allowed under (i) or (ii) )

[Total: 10]

Page 3	Mark Scheme	Syllabus	
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- 2 (a) genes / mutation / named common mutagen;  
environment / habitat / named environmental factor;
- (b) evolution / speciation; [1]
- (c) different/changed environment;  
mutation(s);  
variations + advantageous **AW** / better adapted;  
survive;  
reproduce / passed on;  
cumulative effect / over many generations;  
leading to change in phenotype / appearance / or e.g.; [Max 4]
- (d) difference in genes/DNA;  
difference in chromosomes;  
ref to problems with fertilisation;  
no sexual attraction / incompatible;  
geographical separation; [Max 2]
- [Total: 9]
- 3 (a) any 2 correct ions;;  
any correct function for each ion;;  
e.g.  
nitrate;  
protein / amino acid production / named protein / DNA;  
magnesium;  
chlorophyll; [Max 4]

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(b) decomposition/decay/putrefaction/enzyme action;

\*by bacteria;

\*fungi;

of named chemical in plant leaves;

nitrification (or described);

[Max 4]

(c) chlorophyll/chloroplasts + absorbs light/photosynthesis;

leaves do not receive enough light/in shade **AW**;

to absorb water/moisture/water vapour;

water store/retains water/dead leaves lack water;

[Max 3]

**[Total: 11]**

4 (a) (i) pulse (beat);

in artery in leg;

increased pressure;

ref. one pulse beat/kick for every heart beat;

[Max 4]

(ii) adrenaline/heart beats faster;

[1]

(b) blood + legs/feet;

in veins;

no use of leg muscles ;

blood not pushed from one set of valves to the next;

increases mass/weight of the (lower) leg;

[Max 4]

**[Total: 9]**

Page 5	Mark Scheme	Syllabus
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- 5 (a) 10/11 minutes;
- (b) smoker/has recently smoked/passive smoking;
- (c) Any 2 from:
- carbon monoxide/CO;
  - affect on O<sub>2</sub> carriage/fatty deposits in walls of bvs;
  - carbon dioxide/CO<sub>2</sub>;
  - prevents loss of CO<sub>2</sub> from blood;
  - tar;
  - carcinogenic properties/lung cancer/inhibits gaseous diffusion/damages alveolar walls or cilia; [4]
- (d) (i) increase;
- followed by decrease;
  - reading from graph with units; [Max 2]
- (ii) arterial constriction, fat deposits or diameter reduction/heart rate increases/heart pumps harder or faster AW; [1]
- (iii) prolonged raised pressure/cumulative effect;
- damage to capillaries/ref. thin walls of capillaries;
  - any relevant effect e.g. damage to kidneys/brain/heart/blood vessels; [Max 2]
- [Total: 11]

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6 (Fig. 6.1)

xylem;

strengthened/lignified;

for support/keep firm or straight+ **G**/wall **AW**;

\*carries water;

\*ions/salts/minerals;

[Max 5]

(Fig. 6.2)

palisade (mesophyll);

for photosynthesis/to make carbohydrates;

**J** + (cell) membrane;

partially/differentially/selectively/semi- + permeable;

controls or allows entry into/out (of cell);

water + osmosis/diffusion;

**K**/space + vacuole/cell sap;

ref. water potential/concentration difference;

ref. turgidity **AW**;

[Max 5]

[Total: 10]

Page 7	Mark Scheme	Syllabus	
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- 7 (a) removal from organism/body;  
toxic/poisonous;  
waste (products);  
from metabolism or described;

[Max 3]

- (b) filters/removes substances from + blood;  
using partially permeable membrane **AW**;  
ref. dialysis fluid;  
urea/nitrogenous products;  
salt(s)/ions/small molecules;  
toxins/poisons;  
ref. relative concentrations **AW**;  
excess water/ref. osmoregulation;  
large molecules stay in blood;  
such as proteins;  
ref. diffusion;

[Max 7]

[Total: 10]

Page 8	Mark Scheme	Syllabus	
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8 (a) active site (of enzyme);  
of particular/special/complementary/exact + shape;  
fits substrate molecule/ref enzyme-substrate complex;  
splitting or joining of substrate molecule(s)/products formed;  
(the idea) molecule(s) or product released;  
enzyme ready to be used again/unchanged;  
ref. specificity; [Max 5]

(b) \*reaction becomes faster with higher temperature;  
faster movement of molecules/more collisions;  
\*ref. maximum/optimum;  
\*slows rapidly;  
\*stops;  
(heat has) changed/destroyed (shape) of active site;  
denatured/lost 3D structure;  
substrate no longer fits; [Max 5]

[Total: 10]

9 (a) it is a diagram;  
of traditional pyramid shape/wider at the bottom;  
(showing) mass/weight;  
of organisms/living things/plants + animals;  
the larger the block the greater the mass;  
at each trophic level;  
ref. producers;  
consumers/herbivores/carnivores;  
in an ecosystem/food web/food chain;  
shows change in mass/is relative; [Max 6]



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- (b) represents number;
- of individual (organisms);
- different organisms differ in mass;
- one organism may have many others (feeding) on it;
- \*thus shape may be different;
- not that of a pyramid;
- plausible drawing;

[Max 4]

[Total: 10]

[Paper Total: 80]