

**MARK SCHEME for the October/November 2010 question paper
for the guidance of teachers**

5125 SCIENCE (PHYSICS AND BIOLOGY)

5125/04

Paper 4 (Theory – Biology), maximum raw mark 65

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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Page 2	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE O LEVEL – October/November 2010	5125	04

- 1 (a) **A** – artery, **B** – vein; [1]
- (b) (i) any two from:
A/artery is thicker walled than vein;
A/artery has smaller lumen than vein;
B/vein has valve, artery does not; [2]
- (ii) any two answers that match those in (i) – ora for each:
artery has to withstand greater (blood) pressure;
blood moves faster in artery than in vein;
valve needed to prevent backflow in vein; [2]
- (c) (i) blood flow to heart is reduced/prevented;
heart muscle does not receive enough oxygen; [2]
- (ii) any two from:
smoking;
obesity;
lack of exercise; [2]
- 2 (a) (i) plumule; [1]
- (ii) radicle; [1]
- (b) oxygen; [1]
- (c) (i) glucose + oxygen → carbon dioxide + water;
(ignore energy on right but penalise on left or on arrow) [1]
- (ii) cotyledons; [1]
- (d) at 2 °C enzyme action is very slow so seeds germinate very slowly;
35 °C is optimum for enzymes so seeds germinate quickly;
at 60 °C enzymes are denatured so seeds do not germinate; [3]

Page 3	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE O LEVEL – October/November 2010	5125	04

- 3 (a) (i)** carbon dioxide + water → glucose + oxygen;
(ignore energy/light on arrow or on left but penalise on right,
ignore chlorophyll on arrow but penalise on left or right) [1]
- (ii)** from (sun)light;
absorbed by chlorophyll; [2]
- (b)** phloem; [1]
- (c) (i)** sexual reproduction produces genetically dissimilar offspring;
asexual reproduction produces genetically identical offspring; [2]
- (ii)** sexual reproduction – new varieties produced/allows variation;
asexual reproduction – only one parent plant required/does not require pollination/
produces new plants more quickly; [2]
- (d)** seeds in fruit are transported/dropped by animals;
allowing colonisation of new areas by strawberry plants; [2]
- 4 (a) (i)** photosynthesis; [1]
- (ii)** combustion; [1]
- (b) (i)** glucose → (carbon dioxide) + ethanol;
(ignore energy on right but penalise on left or above arrow) [1]
- (ii)** any two from:
aerobic requires oxygen/anaerobic does not require oxygen;
aerobic produces more energy/anaerobic produces less energy;
aerobic respiration produces water not ethanol; [2]
- (c) (i)** carbon dioxide put into the air by A is removed by B; [1]
- (ii)** C is burning of fossil fuels;
when burned these fuels burn to produce carbon dioxide; [2]
- (d) (i)** teeth reduce the size of food particles;
allowing more contact with enzymes/increasing rate of breakdown reaction; [2]
- (ii)** soluble products of digestion pass through wall of small intestine;
into the blood; [2]

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	GCE O LEVEL – October/November 2010	5125	04

- 5 (a) mechanical
surgical
natural
chemical
hormonal
All five correct = 3 marks, three or four correct = 2 marks, two correct = 1 mark [3]

- (b) Any three from:
advantage – it is a 100% certain method;
because ova cannot travel down oviduct to be fertilised/sperm cannot travel up oviduct to fertilise ova;
disadvantage – method is permanent/irreversible;
so woman cannot later change her mind to become pregnant; [3]

Section B

- 6 (a) Any five from the following, but max three from one list (effects or problems):
- effects:
reduced self-control/aggression;
slowing of reactions;
addiction;
withdrawal symptoms;
- problems:
liver disease;
unwanted pregnancy;
crime;
spread of sexually transmitted diseases;
lack of employment;
increased likelihood of accident; [5]

- (b) any two measures with any three further marking points:
- increase tax on/price of alcoholic drinks;
people will not be able to afford to drink so much;
may increase poverty for families of drunks;
- reduce hours that drinks can be purchased;
people will not be able to drink for so long;
businesses selling drinks will lose profit;
- increase minimum age for drinking alcohol;
younger people will not be able to drink;
hard for those selling drinks to check age of drinkers;
- increase penalties for drunken behaviour;
some people will be deterred from drinking too much;
may increase poverty for families of drunks;
- accept any other reasonable answers [5]

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	GCE O LEVEL – October/November 2010	5125	04

- 7 (a) water enters root hair cell;
by osmosis;
down water concentration gradient from soil;
water travels up stem in xylem;
by capillarity/transpiration pull;
water leaves through stomata;
by diffusion/transpiration; [7]
- (b) Any three from:
water is required for photosynthesis;
cell reactions are carried out in solution;
water maintains shape of cells;
turgor pressure holds plant upright;
sugar is transported as solution; [3]
- 8 (a) excretion is removal from organism;
of toxic materials;
of waste products of metabolism;
these materials would poison the body if they remained;
e.g. urea;
e.g. carbon dioxide; [6]
- (b) amino acids are converted to urea;
in the liver;
urea is carried by blood to the kidneys;
in kidneys urea is filtered out of the blood to form urine;
(urine is excreted) [4]