



Rewarding Learning

**General Certificate of Secondary Education
2011**

Science: Double Award (Modular)

Paper 1
Higher Tier

[G8204]

THURSDAY 19 MAY, AFTERNOON

**MARK
SCHEME**

- 1 (a) (i) 1st mark for separated molecules; 2nd mark 5 shapes as in diagram correct shapes [2]
- (ii) diffusion; [1]
- (iii) villi; large/surface area/one cell thick;/ capillary network/good blood supply [2]
- (b) (i) shape indented to match [1]
- (ii) shape doesn't fit or described/substrate specific/locks key [1]
- (iii) more kinetic energy/collisions quicker/more collisions [1]
- (c) (i) all the same length *at the start* [1]
- (ii) temp/amount of drying/volume of solution/ same diameter of cylinder/same age type of potato [1]
- (iii) water left cell moved out/left cell; more water inside than outside the potato [2]
- (iv) Plasmolysed cell; cell wall = double line; 1 for each correct label [4]
- (v) explode/burst; no cell wall; water moves in; conc. gradient explained 1 mark – what happens 1 mark – why [2]
- (d) (i) active uptake/transport [1]
- (ii) against a concentration gradient/from low to high conc. [1]
- (iii) less/reduced uptake/slow less *respiration* [2]

AVAILABLE
MARKS

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- 2 (a) (i) sunlight/sun/light [1]
- (ii) 2 and 3 (need both) or 2nd and 3rd [1]
- (iii) marsh vegetation → grasshopper → herring → bald eagle
(1 correct food chain, 1 arrows) → must have marsh veg.
at start [2]
- (iv) more grasshoppers to eat/more marsh vegetation/more food/
less competition for food [1]
- (v) shorter food chain/described; less energy lost between
trophic levels/
less trophic levels [2]
- (vi) mosquito as top bar; salmon and seal; [2]
- (vii) mosquito at top; mosquito smallest; symmetry + pyramid +
steps; all labels correct in correct order and correctly labelled; [4]
- (b) (i) bacteria A: Nitrogen fixing
bacteria B: Nitrifying
bacteria C: Denitrifying [3]
- (ii) nitrates have been used to make plant tissue grow/make protein/
plants not available for decomposition [1]
- (iii) plough; aerates to reduce denitrifying/increase nitrifying/N fixing
bacteria;
Drain; aerates to reduce denitrifying/increase nitrifying/N fixing
bacteria;
Plant legumes; increase N fixing bacteria;
Slurry/Manure = 1 mark
Explanation needs to link [4]
- 3 (a) (i) 2.5 light intensity = 1 mark and 30 °C = 1 mark
Highest light for least cost/any higher money is wasted; [3]
- (ii) plants die/wilt/enzymes denature/too much water evaporates/
shading/open windows/blinds/use a thermostat/air conditioning [2]
- (b) (i) asexual/vegetative propagation [1]
- (ii) no variation/all susceptible to disease [1]
- (iii) take cuttings; cloning/grafting/tissue culture/micro propagation; [2]

AVAILABLE
MARKS

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- (c) (i) Higher/v. polluted/nearly twice as much P as polluted lake/nearly 5 times P as unpolluted lake; [1]
- (ii) Algal bloom (prevents light penetration); plants under surface can't P/S; so die; bacteria decompose/eat these plants; use up O₂; less O₂ for fish [5]
Quality of written communication – two biological statements [2]
- (d) (i) more leaves/more chloroplasts/more chlorophyll/taller/grow earlier/bigger leaves/larger surface area/different chlorophyll [1]
- (ii) in the genes/genetically [1]
- (iii) death would not survive; before reproduction [2]
- (e) (i) 150/75 (1 mark)
two (answer on own = 2 marks) [2]
- (ii) younger fish escape/not caught/smaller fish escape; /survive to reproduce/breed; [2]
- (iii) quotas; closed seasons; ban fishing; decommissioning of boats; sanctuaries/exclusion zones/nursery areas/breeding areas; [2]
- 4 (a) (i) A: oviduct/fallopian tube
B: ovary
C: vagina [3]
- (ii) production of eggs [1]
- (b) (i) Meiosis [1]
- (ii) so that they are haploid/to restore diploid no; [1]
- (iii) oviduct [1]
- (iv) Mitosis [1]
- (v) implant – into the lining of the womb/specialisation of cells [1]
- (vi) contractions of uterus; mucus plug comes away; waters break; cervix dilates; baby moves down birth canal; head first; umbilical cord is cut; afterbirth; (*any three* in correct order) [3]

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		AVAILABLE MARKS
(c)	(i) condom; sperm does not meet egg/sperm unable to fertilise egg Vasectomy/sterilisation; Chemical;	[3]
	(ii) vasectomy/surgical	[1]
(d)	(i) antibiotics	[1]
	(ii) HIV/AIDS virus; syphilis; bacterium; chlamydia; bacterium;	[2]
	(iii) Use condoms/abstinence/fewer sexual partners	[1]
		20
5	(a) (i) Bb; × bb in this order	[2]
	(ii) Punnett square; Correct cross;	[2]
	(iii) Phenotypes: Black (spots) brown (spots); Ratios: 1 : 1 ;	[2]
	(b) correct gametes Bb; bb All offspring are heterozygous Bb	[3]
(c)	(i) Diabetes;	[1]
	(ii) converts glucose to glycogen/increases the rate of respiration/ increases the uptake of glucose	[1]
	(iii) Stage 3: the plasmid is cut open; Stage 4: the gene for insulin is inserted into the plasmid; Stage 6: the genetically engineered bacterium multiplies rapidly/ reproduces Stage 7: the hormone has to be extracted/bacteria filtered out/the hormone has to be purified/insulin removed	[4]
	(iv) protein	[1]
	(v) no side effects/cheaper/large scale production/quicker	[1]
(d)	(i) Franklin; Wilkins;	[2]
	(ii) Double helix (centre diagram);	[1]
Total		110