



General Certificate of Secondary Education  
2011

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**Science: Double Award (Non-Modular)**

Paper 1  
Higher Tier

[G8404]

THURSDAY 19 MAY, AFTERNOON

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**MARK  
SCHEME**



			AVAILABLE MARKS	
6	(a)	Higher/very polluted/nearly twice as much P as polluted lake/nearly 5 times P as unpolluted lake;	[1]	8
	(b)	Algal bloom (prevents light penetration); plants under surface can't P/S; so die; bacteria decompose/these plants; bacterial/decomposers use up O <sub>2</sub> ; less O <sub>2</sub> for fish QWC two biological statements	[5] [2]	
7	(a)	150/75 (1 mark) two (answer on own = 2 marks)	[2]	6
	(b)	younger fish escape/not caught/smaller fish escape; survive to reproduce/breed	[2]	
	(c)	quotas; closed seasons, ban fishing; decommissioning of boats; sanctuaries/exclusion zones/nursery areas/breeding areas;	[2]	
8	(a)	asexual/vegetative propagation	[1]	4
	(b)	no variation/all susceptible to disease	[1]	
	(c)	take cuttings; cloning/grafting/tissue culture/micro propagation;	[2]	
9	(a)	(i) sugar/glucose; energy;	[2]	
		(ii) red blood cell/haemoglobin	[1]	
		(iii) diffuses into blood/plasma/tissue fluid	[1]	
	(b)	(i) yeast	[1]	
		(ii) get rid of oxygen/sterilise/kill bacteria/kill microbes otherwise heat might kill the yeast	[1] [1]	
		(iii) cloudy/milky white/milky	[1]	

- (c) (i) blood vessel from body organs to right atrium of heart  
 blood vessel from right ventricle of heart to lungs  
 blood vessel from lungs to left atrium of heart  
 blood vessel from left *ventricle* to body organs [4]
- (ii) aorta [1]
- (iii) needs to pump blood all around the body [1]
- (d) rises;  
 drops; *doesn't* decrease to same level as starting level;  
 quickly rises just after Booster (day 16)/steeper gradient than 1st rises;  
 rises to higher level; [5]
- 10 (a) (i) [1] for separated molecules; [1] for 5 shapes as in diagram correct shapes [2]
- (ii) diffusion; [1]
- (iii) large surface area; villi; 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/lock and 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 moved out/left cell  
 more water inside than outside the potato [2]
- (iv) plasmolysed cell; cell wall = double line;  
 [1] each correct label [4]
- (v) explode/burst; no cell wall; water move in; conc. gradient explained [1] – what happens  
 [1] – why [2]

AVAILABLE  
MARKS

19

		AVAILABLE MARKS
(d) (i)	active uptake/transport	[1]
(ii)	against a concentration gradient/from low to high conc.	[1]
(iii)	less/reduced uptake/slower less <i>respiration</i>	[2]
11 (a) (i)	2 and 3 (need both) or 2nd and 3rd	[1]
(ii)	marsh vegetation → grasshopper → herring → bald eagle (1 correct food chain, 1 arrows) – must have marsh veg. at start	[2]
(iii)	more grasshoppers to eat/more marsh vegetation/ more food/less competition for food	[1]
(iv)	shorter food chain described; less energy lost between trophic levels/less trophic levels	[2]
(v)	mosquito as top bar; salmon and seal	[2]
(vi)	mosquito at top; mosquito smallest; symmetry + pyramid + steps; rest all labels correct in correct order – and correctly labelled;	[4]
(b) (i)	Nitrogen fixing	[1]
(ii)	nitrates have been used to make plant 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 to method	[4]
		22
		18

- 12 (a) (i) Bb; × bb – in this order [2]
- (ii) Punnett square;  
Correct cross; [2]
- (iii) Phenotypes: Black (spots) brown (spots); CM for their Punnett  
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]
- (iv) 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]
- (v) no side effects/cheaper/large scale production/quicker [1]
- (d) (i) Franklin or Wilkins [1]
- (ii) Double helix (centre diagram); [1]
- (e) (i) Mitosis – e.g. muscle cell [1]  
Meiosis – e.g. sperm cell, egg cell [1]
- (ii) Mitosis – produces cells that are: (*any two*) or converse  
identical to parent cell;  
same as each other;  
diploid (parent cell = diploid);  
produces 2 cells (rather than 4 in meiosis);  
1 cell division. [2]

**Total**AVAILABLE  
MARKS

22

**120**