Rewarding Learning

General Certificate of Secondary Education
2011

Science: Double Award (Non-Modular)

Paper 1
Higher Tier

[G8404]

THURSDAY 19 MAY, AFTERNOON

MARK SCHEME

				AVAILABLE MARKS
1	**(a)**	radius and scapula	[2]	
	(b)	biceps	[1]	
	(c)	nerve/motor neuron/neuron	[1]	4
2	**(a)**	A – starch; B – protein; C – sugar and vitamin *C* (need both); glucose/fructose not allow sucrose must be vitamin C not named food	[3]	
	(b)	Benedicts	[1]	
	(c)	blue to purple (need both)/lilac/mauve	[1]	5
3	**(a)**	2.5 light intensity [1]; 30 °C [1]; Highest light for least cost/any higher money is wasted;	[3]	
	(b)	plants die/wilt/enzymes denature/*too* much water evaporates; blinds/shading/open door, windows/use a thermostat/ air conditioning	[2]	5
4	**(a)**	DNA/genetics; Genes; environment	[2]	
	(b)	The animals in the population in the future would be *taller*/average height would be taller.	[1]	3
5	**(a)**	more leaves/more chlorophyll/different chlorophyll/taller – /grow earlier/bigger leaves/more chloroplasts/larger surface area	[1]	
	(b)	in the genes/genetically	[1]	
	(c)	death/would not survive; before reproduction	[2]	4

			AVAILABLE MARKS
6	**(a)** Higher/very polluted/nearly twice as much P as polluted lake/nearly 5 times P as unpolluted lake; [1]		
	(b) Algal bloom (prevents light penetration); plants under surface can't P/S; so die; bacteria decompose/these plants; bacterial/decomposers use up O_2; less O_2 for fish [5] QWC two biological statements [2]		8
7	**(a)** 150/75 (1 mark) two (answer on own = 2 marks) [2]		
	(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]		6
8	**(a)** asexual/vegetative propagation [1]		
	(b) no variation/all susceptible to disease [1]		
	(c) take cuttings; cloning/grafting/tissue culture/micro propagation; [2]		4
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 [1] otherwise heat might kill the yeast [1]		
	(iii) cloudy/milky white/milky [1]		

AVAILABLE MARKS

(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] 19

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
(d)	**(i)**	active uptake/transport	[1]	
	(ii)	against a concentration gradient/from low to high conc.	[1]	
	(iii)	less/reduced uptake/slower less *respiration*	[2]	22
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]	18

				AVAILABLE MARKS
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]	22
			Total	**120**