



*Rewarding Learning*

**General Certificate of Secondary Education  
2012**

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**Science: Double Award (Modular)**

Paper 1  
Higher Tier

**[G8204]**

**WEDNESDAY 30 MAY, AFTERNOON**

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**MARK  
SCHEME**

- 1 (a) (i) to destarch it/so that any starch present at the end was made during the experiment; [1]
- (ii) to kill the leaf/stop chemical reactions;  
(boil in) alcohol/ethanol; [2]
- (iii) turn off Bunsen burner/use an electric water-bath; [1]
- (iv) blue/black [1]
- (b) (i) heat /temperature; [1]  
*not humidity/light*
- (ii) higher yield/more tomatoes/bigger plants/bigger harvest/more tomatoes; [1]
- (c) (i) the shape doesn't match/it fits it/enzyme is specific/lock and key/  
specificity/substrate is specific/enzyme specific; [1]
- (ii) more than two glucose molecules; joined together; [2]
- (iii) shape of enzyme/active site is changed by heat/denatured/  
enzyme changed shape; [1]
- (d) Any **two** (adaptation with corresponding explanation) from:  
Adaptation – microvilli/large surface area;  
Explanation – increased absorption area/for quicker/more absorption;  
*not easier*  
Adaptation – lots of them;  
Explanation – more absorption/quicker absorption/more absorption;  
**or**  
Adaptation – thin epithelium/one cell thick/thin walls;  
Explanation – short diffusion distance;  
**or**  
Adaptation – permeable or semi-permeable;  
Explanation – to allow molecules to pass across;  
**or**  
Adaptation – good blood supply/blood supply close to the wall;  
Explanation – main diffusion/concentration gradient/quick distribution around  
body;  
**or**  
Adaptation – villi can move/muscle in villi;  
Explanation – to allow more glucose/products of digestion to come in contact;  
**or**  
Adaptation – lacteal;  
Explanation – to allow absorption of fats/fatty acids and glycerol; [4]
- (e) (i) hepatic portal vein; [1]  
insulin; [1]  
glycogen; [1]  
urea; [1]
- (ii) removed because it is toxic/harmful/poisonous  
removed by kidney; [2]

- 2 (a) (i) sun/sunlight; *not light on its own* [1]
- (ii) vegetation → beetle → centipede → toad → fox  
 correct food chain (all organisms in correct order);  
*must contain fox*  
 arrows in the correct direction from the plant; [2]
- (iii) vegetation at bottom and largest;  
 fox is the smallest and the top;  
 shape symmetrical and in order; [3]
- (iv) fox [1]
- (v) more toads eaten by foxes;  
 fewer rabbits available to foxes/kestrel/stoats eat more rabbits/more  
 competition for rabbits/stoats have less voles to eat so more toads eaten  
 by foxes; [2]
- (b) (i)  $850 - (85 + 300 + 250) = 850 - 635 = 215 \text{ kJ}$ ; [2]  
 [1] *for correct working if final answer is wrong*
- (ii) 85 kJ; [1]
- (c) (i) 1972–1999; [1]
- (ii) more fish are being removed (caught) than are replaced (born)/  
 reproduced; [1]
- (iii) Any **four** from:  
 • quotas  
 • use large mesh size  
 • set up sanctuaries/breeding areas/nursery areas/seasons/no  
 fishing zones  
 • decommission boats/selling boats  
 • licences  
 • smaller nets [4]
- (iv) (see graph)  $80\,000 - 50\,000$ ; divided by 3 = 10 000;  
 10 000 on own = [2] [2]
- (v) 14 years  $(220\,000) - 80\,000$ ;  $\div 10\,000$ ;  
 140 000 [2]  
*consequential marking applies from (iv)*

AVAILABLE  
MARKS

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- 3 (a) (i) minerals run-off (via drainage ditch)/slurry run-off/run-off of fertiliser/leaching/organic waste/septic tank/septic tank contents/sewage from farm/sewage; [1]
- (ii) Any **five** from:
- increase in growth of algae/algae bloom
  - algae block out light from the other underwater; they can't photosynthesise
  - algae and plants **die**
  - bacteria start to **decay** algae and plants (decompose/breakdown)
  - **bacteria** respire and **use up oxygen**
  - fish and other animal life die
- [5]
- (b) (i) quadrat [1]
- (ii) Any **four** from:  
 identify plant species;  
 estimate percentage cover;  
 calculate average/record;  
 and repeat several times for reliability in one area;  
 repeat in the other area; [4]  
*if use co-ordinates/line transect/belt transect/throw/random numbers*
- Quality of written communication [2]
- (iii) e.g.  
 temperature; thermometer;  
 sun/light; light meter/LDR;  
 pH; pH meter;  
 rain/rainfall; rain gauge/measuring cylinder;  
 wind; anemometer;  
 soil moisture; moisture meter – or oven described;  
 humidity; hygrometer;  
 (Any **two** pairs) [4]
- (c) (i) Type of bacteria – nitrogen fixing;  
 Source of nitrogen – nitrogen (in the air);  
**or**  
 Type of bacteria – nitrifying bacteria;  
 Source of nitrogen – ammonia; [2]
- (ii) denitrifying (bacteria); [1]
- (d) spread slurry/brown manure/plough the plants back into the ground/green manure/plant legumes/don't harvest crop or leave plants/aeration/ploughing but only with increasing nitrogen fixing bacteria or process nitrifying bacteria [1]
- (e) active transport/uptake; [1]

- 4 (a) (i) vagina/cervix; [1]
- (ii) fertilisation; in oviducts/Fallopian tubes; [2]
- (iii) implantation; [1]
- (iv) placenta/umbilical cord; [1]
- (v) oxygen/glucose/vitamins/minerals/hormones/amino acids/alcohol/drugs/  
carbon monoxide/iron/calcium/water/antibodies/proteins/microbes or  
named/viruses  
(Any two) [2]
- (vi) anywhere on the uterus wall or lining/neck of uterus dilates/waters  
break; [1]
- (vii) cervix dilates/ruptures/amniotic membrane/mucus plug comes away/  
afterbirth comes away/cervix opens/placenta comes out; [1]
- (b) (i) condom; diaphragm; [2]
- (ii) condom; [1]
- (iii) gonorrhoea/syphilis/chlamydia; [1]
- (c) (i) engulf/surround/absorb/takes in/ingest;  
digest/breakdown/dissolve; [2]  
*if in wrong order then [1] max.*
- (ii) production of antibodies/active immunity/vaccination if correctly  
described [1]

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			AVAILABLE MARKS
5	(a)	(i) GG and Gg;	[2]
		(ii) Gg and Gg parents; Punnett; 1 cross correct; 1 circle around gg;	[4]
		(iii) two Punnett squares; both cross with gg (for 2nd mark);	[2]
		(iv) Any offspring white (know gold parent was heterozygous)/if no white offspring it is not heterozygous (Gg);	[1]
	(b)	(i) camouflaged/hiding/blend in; easier to hunt/easier to escape predator to reproduce;	[2]
		(ii) (survival to) breed/reproduce; pass on allele for gold colour; pass on genes <b>or</b> converse for white lions	[2]
	(c)	(i) isolate human <b>gene</b> /DNA that codes for insulin; remove the plasmid (from bacterium)/ring of DNA; cut plasmid (open); join plasmid and human <b>gene</b> ; put (it) back into the bacterium;	[5]
		(ii) place in a fermenter/bioreactor/tank; bacteria multiply/reproduce/divide/mitosis; <b>or</b> bacteria multiply; separation/purification/extraction/harvested;	[2]
	(d)	(i) T; <i>on left</i> A; <i>on right</i> <i>if A and T in wrong order then</i> [1]	[2]
		(ii) double; helix;	[2]
		(iii) protein/polypeptide/dipeptide;	[1]
		(iv) <b>X-ray</b> (diffraction/crystallography); Wilkins/Franklin; 3D structure/ <b>model</b> ; Watson/Crick; complementary <b>base pairs</b> ; Chargaff; (Any <b>two</b> )	[4]
<b>Total</b>			29
<b>Total</b>			<b>110</b>