



**General Certificate of Secondary Education
2012**

Science: Double Award (Modular)

Paper 1
Higher Tier

[G8204]

WEDNESDAY 30 MAY, AFTERNOON

**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]

AVAILABLE
MARKS

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- 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
consequential marking applies from (iv) [2]

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]

AVAILABLE
MARKS

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			AVAILABLE MARKS		
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; <i>if in wrong order then [1] max.</i>	[2]		
		(ii) production of antibodies/active immunity/vaccination if correctly described	[1]		
					16

			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 or converse for white lions	[2]
	(c)	(i) isolate human gene /DNA that codes for insulin; remove the plasmid (from bacterium)/ring of DNA; cut plasmid (open); join plasmid and human gene ; put (it) back into the bacterium;	[5]
		(ii) place in a fermenter/bioreactor/tank; bacteria multiply/reproduce/divide/mitosis; or 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) X-ray (diffraction/crystallography); Wilkins/Franklin; 3D structure/ model ; Watson/Crick; complementary base pairs ; Chargaff; (Any two)	[4]
Total			29
Total			110