



**General Certificate of Secondary Education  
2011**

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**Science: Biology**

Paper 2  
Higher Tier

**[G0904]**

**THURSDAY 2 JUNE, MORNING**

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**MARK  
SCHEME**

		AVAILABLE MARKS
1	(a) (i) Less light;	[1]
	(ii) <u>Absorbed</u> by plant/as energy source/chlorophyll; (During) photosynthesis/produce glucose/starch;	[1] [1]
	(iii) Any <b>TWO</b> from: Temperature; Water/drainage/rainfall/humidity; pH; Minerals/nitrates/fertilizer; CO <sub>2</sub> ; wind exposure;	[2]
	(iv) x-axis label – Sample Areas Accurate plots (×2);	[1] [2]
	(b) (i) A, C, D;	[1]
	(ii) Any <b>TWO</b> from: Wings; Body temperature not constant; Lay eggs No backbone;	[2]
	(iii) Arthropods;	[1]
	(iv) Legs;	[1]
	(c) (i) Death rate <b>higher/faster</b> ; <b>Than</b> birth rate;	[1] [1]
	(ii) People leaving Ireland/ moving away from/moving out of (Ireland);	[1]
	(iii) Any <b>TWO</b> from: Improved food supply; Improved medical care/less disease; Improved sanitation/housing/standard of living; Increased immigration/birth rate/decreased death rate;	[2]
		18

		AVAILABLE MARKS		
2	(a) (i)	Support/protection/movement;	[1]	
		Digestive system;	[1]	
		Transport/explained;	[1]	
		Nervous;	[1]	
	(ii)	Group of <u>organs</u> working together;	[1]	
	(iii)	Air is warmed/moistened;		
		Mucus traps dust/bacteria/air filtered (by hairs);	[2]	
	(b) (i)	A – Trachea;	[1]	
		B – Bronchiole;	[1]	
	(ii)	Any <b><u>THREE</u></b> :		
Large surface area; good blood supply; Thin; moist; good diffusion/concentration gradient; permeable;		[3]		
	Quality of written communication	[2]		
(c) (i)	120,000	[1]		
	(ii)	83;	[1]	
	Heart disease;	[1]		
	Lung cancer; 82;	[1]		
(iii)	10 cigarettes per day <u>8 times</u> risk of dying compared to non smokers;			
	30 per day have <u>25 times</u> the risk;	[2]		
(iv)	Tar;	[1]		
(v)	Addiction to nicotine;	[1]		
			22	

3	(a)	Cell wall	✓	✗	[1]
		Cytoplasm	✓	✓	[1]
		Chloroplast	✓	✗	[1]
		Vacuole	✓	✗	[1]
	(b)	(i)			
		A – Epidermis;			[1]
		B – Cortex;			[1]
		C – Vascular bundle;			[1]
		(ii) Transport;			
		sucrose/sugar/products of photosynthesis/food;			[2]
		(iii) Arrow pointing <i>up</i> in xylem;			[1]
		(iv) Transpiration;			[1]
		(v) Osmosis;			[1]
		(vi) <u>Size</u> of cell; <u>shape</u> /size of vacuole; position of <u>nucleus</u> ;			[3]
		(vii) Root hair (cell); large surface area to <u>absorb</u> water/minerals;			[3]
4	(a)	(i)			
		$(1520 \div 100) \times 40; = 608$ (kJ);			[2]
		(ii) Carbohydrate;			[1]
		Protein;			[1]
		(iii) Needed for growth;			[1]
	(b)	(i)			
		Living organisms are formed/arise; from <u>non-living</u> matter;			[2]
		(ii) Traps/prevents entry of <u>microorganisms</u> ;			[1]
		Allows air/oxygen to enter/leave;			[1]
		(iii) Open flask with no swan neck/sealed;			[1]
		(iv) Low temperature (4°C); <u>slows</u> reproduction/growth;			[2]

AVAILABLE  
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18

		AVAILABLE MARKS
(c) (i)	Allows oxygen to enter or allows carbon dioxide/heat to leave;	[1]
(ii)	Any <b><u>TWO</u></b> from: Warmth; Neutral pH; Oxygen/air (if not given in i); Moisture; Microbes/bacteria;	[2]
(iii)	Any <b><u>TWO</u></b> from: Fruit vegetable peelings; (crushed) egg shells; grass cuttings/plants; Teabags/coffee grounds; (shredded) paper; animal hair/vacuum dust/wood ash;	[2]
(iv)	Earthworm/springtail/woodlouse/other appropriate example;	[1]
5 (a)	AIDS; (Use) condom; Virus; Salmonella; <u>Eating infected</u> food/described;	[1] [1] [1] [1] [1]
(b) (i)	Penicillin;	[1]
(ii)	Any <b><u>TWO</u></b> : While growing/culturing <u>bacteria</u> ; Fungus on plate; Found clear areas around fungus/fungus killed bacteria;	[2]
(c)	Any <b><u>THREE</u></b> from: Skin; Blood clotting/platelet plugs; Mucus membranes; Tears; Acid;	[3]
(d) (i)	Any <b><u>TWO</u></b> from: Antigens (on inactive microorganisms); Stimulate antibody production; Antigen-antibody reaction described/causes clumping;	[2]
(ii)	Any <b><u>ONE</u></b> from: (Rubella) can pass to baby/through placenta; causes brain damage in foetus/miscarriage/stillbirth/blindness/deafness/heart defects/slower than normal growth;	[1]
		18

		AVAILABLE MARKS	
(e)	(i) 84(%)	[1]	22
	(ii) $450-75/ = 375$ ; increase $\div 75 \times 100/=$ 500%;	[1] [1]	
(f)	(i) Natural; Passive;	[1] [1]	
	(ii) Any <b><i>TWO</i></b> from: Body produces the antibodies; Memory cells remain in system (blood)/long lasting; Does not take effect immediately;	[2]	
	(iii) <u>Antibodies</u> received from mother/in breast milk;	[1]	
6	(a) (i) A – stomach; B – duodenum;	[1] [1]	
	(ii) Emulsifies (fats)/neutralises stomach acids; Liver;	[2]	
	(iii) Peristalsis;	[1]	
	(b) (i) Line to small intestine from aorta B; Line from small intestine to liver; Correct arrows on both lines;	[1] [1] [1]	
	(ii) A – Hepatic artery; B – Aorta; C – Renal vein;	[1] [1] [1]	
	(c) (i) Deamination;	[1]	
	(ii) Liver;	[1]	
	(iii) (Acid) converted to carbohydrate; used for energy/stored/changed to fat;	[2]	
	(iv) <u>Toxic/poisonous</u> (waste product); Maximum of TWO from: Urea transported to kidneys/in blood; Ultrafiltration/urine formed; (Urine) passed down ureters/ <u>stored</u> in bladder; (Urine) excreted through <u>urethra</u> ;	[1] [2]	18

- 7 (a) (i) A – Nitrogen fixation; [1]  
 B – Decomposition; [1]
- (ii) Anaerobic conditions; OR Nitrates dissolve; [2]  
 Denitrification occurs; Washed away/leached;
- (iii) Nitrification; [1]
- (iv) Needed for amino acids/proteins; [2]  
 For growth/repair;
- (b) (i) Add (extra) nutrients/replace nutrients removed with harvest; [2]  
Increase crop growth/yield/profit;
- (ii) Any **TWO** from: [2]  
 Known content/amount of nitrogen;  
 Easy to store/handle;  
 Released/absorbed faster;
- (iii) Dissolves in rainwater; [2]  
 Leach/run off into rivers/streams/lakes/ponds;
- (iv) Algal/bloom; [3]  
 Decomposition/decay;  
 Death of fish/aquatic organisms;
- (v) Eutrophication; [1]
- (vi) Any **THREE** from: [3]  
 Less fertilizers;  
 Spread when not raining;  
 Spread only during growing season;  
 Spread away from waterways;
- (vii) Any **TWO** from: [2]  
 Adds humus;  
 Improves soil texture/drainage/aeration;  
 Slower release/longer effect;

AVAILABLE  
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22

- 8 (a) (i)  $5.2 - 3.4 \div 10$ ;  
0.18 kg per week [2]
- (ii) Rate slows down/described; [1]
- (iii) Calcium; [1]
- (iv) Height/length; [1]  
Number of cells; [1]
- (b) (i) Mitosis [1]
- (ii) Nuclear membranes drawn in both cells;  
1 white, 1 black chromosome in **each** cell; [2]
- (iii) X – Cell membrane; [1]  
Y – Nuclear membrane; [1]
- (iv) Stage B has no nucleus/nuclear membrane/nuclear  
membrane has disappeared;  
Chromosomes have doubled/replicated/stage B  
has 2 pairs of chromosomes; [2]
- (c) (i) Chemical messenger; [1]
- (ii) Making identical copy; [1]
- (iii) Offspring will all contain the **HGH gene/produce HGH**; [1]
- (iv) Any **THREE** from:  
Gene is a length of DNA/part of a chromosome;  
In a double helix;  
Made up of base pairs;  
(Sequence of bases) codes for an amino acid/protein; [3]
- (v) Easier to extract/purify; [1]
- (vi) Any **TWO** from:  
Fast growing/easy to grow;  
Can be grown on cheap substrate/carbohydrate;  
No nucleus so DNA easy to find/modify;  
No ethical issues; [2]

Total

AVAILABLE  
MARKS

22

160