



Rewarding Learning

**General Certificate of Secondary Education
2011**

Science: Biology

Paper 2
Higher Tier

[G0904]

THURSDAY 2 JUNE, MORNING

**MARK
SCHEME**

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

AVAILABLE MARKS
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2	(a) (i)	Support/protection/movement; Digestive system; Transport/explained; Nervous;	[1] [1] [1] [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; B – Bronchiole;	[1] [1]
	(ii)	<i>Any THREE:</i> 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; Heart disease; Lung cancer; 82;	[1] [1] [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]

AVAILABLE MARKS
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3	(a)	Cell wall	✓	✗	[1]
		Cytoplasm	✓	✓	[1]
		Chloroplast	✓	✗	[1]
		Vacuole	✓	✗	[1]
3	(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)	$(1520 \div 100) \times 40; = 608 \text{ (kJ)}$;		
Carbohydrate;					[1]
Protein;					[1]
(iii)		Needed for growth;			[1]
(b) (i)		Living organisms are formed/arise; from <u>non-living</u> matter;			[2]
		Traps/prevents entry of <u>microorganisms</u> ;			[1]
		Allows air/oxygen to enter/leave;			[1]
	Open flask with no swan neck/sealed;			[1]	
(iv)	Low temperature (4 °C); <u>slows</u> reproduction/growth;			[2]	

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			AVAILABLE MARKS	
	(c) (i)	Allows oxygen to enter or allows carbon dioxide/heat to leave;	[1]	18
	(ii)	Any <u>TWO</u> from: Warmth; Neutral pH; Oxygen/air (if not given in i); Moisture; Microbes/bacteria;	[2]	
	(iii)	Any <u>TWO</u> 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;	[1]	
		(Use) condom;	[1]	
		Virus;	[1]	
		Salmonella;	[1]	
		<u>Eating infected</u> food/described;	[1]	
	(b) (i)	Penicillin;	[1]	
	(ii)	Any <u>TWO</u> : While growing/culturing <u>bacteria</u> ; Fungus on plate; Found clear areas around fungus/fungus killed bacteria;	[2]	
	(c)	Any <u>THREE</u> from: Skin; Blood clotting/platelet plugs; Mucus membranes; Tears; Acid;	[3]	
	(d) (i)	Any <u>TWO</u> from: Antigens (on inactive microorganisms); Stimulate antibody production; Antigen-antibody reaction described/causes clumping;	[2]	
	(ii)	Any <u>ONE</u> from: (Rubella) can pass to baby/through placenta; causes brain damage in foetus/miscarriage/stillbirth/blindness/deafness/heart defects/slower than normal growth;	[1]	

			AVAILABLE MARKS		
(e)	(i)	84(%)	[1]	22	
	(ii)	450-75/ = 375; increase ÷ 75 × 100/= 500%;	[1] [1]		
(f)	(i)	Natural; Passive;	[1] [1]		
	(ii)	Any TWO 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; B – Decomposition;	[1] [1]
	(ii) Anaerobic conditions; Denitrification occurs;	[2]
	OR Nitrates dissolve; Washed away/leached;	[1]
	(iii) Nitrification;	[1]
	(iv) Needed for amino acids/proteins; For growth/repair;	[2]
	(b) (i) Add (extra) nutrients/replace nutrients removed with harvest; <u>Increase</u> crop growth/yield/profit;	[2]
	(ii) Any <i>TWO</i> from: Known content/amount of nitrogen; Easy to store/handle; Released/absorbed faster;	[2]
	(iii) Dissolves in rainwater; Leach/run off into rivers/streams/lakes/ponds;	[2]
	(iv) Algal /bloom; Decomposition/decay; Death of fish/aquatic organisms;	[3]
	(v) Eutrophication;	[1]
	(vi) Any <i>THREE</i> from: Less fertilizers; Spread when not raining; Spread only during growing season; Spread away from waterways;	[3]
	(vii) Any <i>TWO</i> from: Adds humus; Improves soil texture/drainage/aeration; Slower release/longer effect;	[2]

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- 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

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