Rewarding Learning

General Certificate of Secondary Education
2011

# Science: Biology

Paper 2
Higher Tier

**[G0904]**

**THURSDAY 2 JUNE, MORNING**

# MARK SCHEME

| | | | | | AVAILABLE MARKS |
|---|---|---|---|---|---|
| **1** | **(a)** | **(i)** | Less light; | [1] | |
| | | **(ii)** | Absorbed by plant/as energy source/chlorophyll; | [1] | |
| | | | (During) photosynthesis/produce glucose/starch; | [1] | |
| | | **(iii)** | *Any **TWO** from:*<br>Temperature;<br>Water/drainage/rainfall/humidity;<br>pH;<br>Minerals/nitrates/fertilizer;<br>$CO_2$;<br>wind exposure; | [2] | |
| | | **(iv)** | *x*-axis label – Sample Areas | [1] | |
| | | | Accurate plots (×2); | [2] | |
| | **(b)** | **(i)** | A, C, D; | [1] | |
| | | **(ii)** | *Any **TWO** from:*<br>Wings;<br>Body temperature not constant;<br>Lay eggs<br>No backbone; | [2] | |
| | | **(iii)** | Arthropods; | [1] | |
| | | **(iv)** | Legs; | [1] | |
| | **(c)** | **(i)** | Death rate **higher/faster**; | [1] | |
| | | | **Than** birth rate; | [1] | |
| | | **(ii)** | People leaving Ireland/<br>moving away from/moving out of (Ireland); | [1] | |
| | | **(iii)** | *Any **TWO** from:*<br>Improved food supply;<br>Improved medical care/less disease;<br>Improved sanitation/housing/standard of living;<br>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 organs working together; | [1] | |
| | | **(iii)** | Air is warmed/moistened;<br>Mucus traps dust/bacteria/air filtered (by hairs); | [2] | |
| | **(b)** | **(i)** | **A** – Trachea; | [1] | |
| | | | **B** – Bronchiole; | [1] | |
| | | **(ii)** | *Any **THREE**:*<br>Large surface area; good blood supply;<br>Thin; moist; good diffusion/concentration gradient;<br>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 8 times risk of dying compared to non smokers;<br>30 per day have 25 times the risk; | [2] | |
| | | **(iv)** | Tar; | [1] | |
| | | **(v)** | Addiction to nicotine; | [1] | 22 |

| | | | | | | AVAILABLE MARKS |
|---|---|---|---|---|---|---|
| **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 ***up*** in xylem; | | | [1] | |
| | | **(iv)** Transpiration; | | | [1] | |
| | | **(v)** Osmosis; | | | [1] | |
| | | **(vi)** Size of cell; shape/size of vacuole; position of nucleus; | | | [3] | |
| | | **(vii)** Root hair (cell); large surface area to absorb water/minerals; | | | [3] | 18 |
| **4** | **(a)** | **(i)** (1520 ÷ 100) × 40; = 608 (kJ); | | | [2] | |
| | | **(ii)** Carbohydrate; | | | [1] | |
| | | Protein; | | | [1] | |
| | | **(iii)** Needed for growth; | | | [1] | |
| | **(b)** | **(i)** Living organisms are formed/arise; from non-living matter; | | | [2] | |
| | | **(ii)** Traps/prevents entry of microorganisms; | | | [1] | |
| | | Allows air/oxygen to enter/leave; | | | [1] | |
| | | **(iii)** Open flask with no swan neck/sealed; | | | [1] | |
| | | **(iv)** Low temperature (4 ºC); slows reproduction/growth; | | | [2] | |

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

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

| | | | | | | AVAILABLE MARKS |
|---|---|---|---|---|---|---|
| 7 | **(a)** | **(i)** | A – Nitrogen fixation; | | [1] | |
| | | | B – Decomposition; | | [1] | |
| | | **(ii)** | Anaerobic conditions;<br>Denitrification occurs; | *OR* | Nitrates dissolve;<br>Washed away/leached; [2] | |
| | | **(iii)** | Nitrification; | | [1] | |
| | | **(iv)** | Needed for amino acids/proteins;<br>For growth/repair; | | [2] | |
| | **(b)** | **(i)** | Add (extra) nutrients/replace nutrients removed with harvest;<br>Increase crop growth/yield/profit; | | [2] | |
| | | **(ii)** | *Any **TWO** from:*<br>Known content/amount of nitrogen;<br>Easy to store/handle;<br>Released/absorbed faster; | | [2] | |
| | | **(iii)** | Dissolves in rainwater;<br>Leach/run off into rivers/streams/lakes/ponds; | | [2] | |
| | | **(iv)** | **Algal**/bloom;<br>Decomposition/decay;<br>Death of fish/aquatic organisms; | | [3] | |
| | | **(v)** | Eutrophication; | | [1] | |
| | | **(vi)** | *Any **THREE** from:*<br>Less fertilizers;<br>Spread when not raining;<br>Spread only during growing season;<br>Spread away from waterways; | | [3] | |
| | | **(vii)** | *Any **TWO** from:*<br>Adds humus;<br>Improves soil texture/drainage/aeration;<br>Slower release/longer effect; | | [2] | 22 |

| | | | | AVAILABLE MARKS |
|---|---|---|---|---|
| **8** | **(a)** | **(i)** | 5.2 – 3.4 ÷ 10;<br>0.18 kg per week [2] | |
| | | **(ii)** | Rate slows down/described; [1] | |
| | | **(iii)** | Calcium; [1] | |
| | | **(iv)** | Height/length; [1]<br>Number of cells; [1] | |
| | **(b)** | **(i)** | Mitosis [1] | |
| | | **(ii)** | Nuclear membranes drawn in <u>both</u> cells;<br>1 white, 1 black chromosome in **each** *cell*; [2] | |
| | | **(iii)** | **X** – Cell membrane; [1]<br>**Y** – Nuclear membrane; [1] | |
| | | **(iv)** | Stage B has no nucleus/nuclear membrane/nuclear membrane has disappeared;<br>Chromosomes have doubled/replicated/stage B has 2 pairs of chromosomes; [2] | |
| | **(c)** | **(i)** | Chemical messenger; [1] | |
| | | **(ii)** | Making <u>identical</u> copy; [1] | |
| | | **(iii)** | Offspring will all contain the **HGH gene/produce HGH**; [1] | |
| | | **(iv)** | *Any **<u>THREE</u** from:*<br>Gene is a length of DNA/part of a chromosome;<br>In a double helix;<br>Made up of base pairs;<br>(Sequence of bases) codes for an amino acid/protein; [3] | |
| | | **(v)** | Easier to extract/purify; [1] | |
| | | **(vi)** | *Any **<u>TWO</u** from:*<br>Fast growing/easy to grow;<br>Can be grown on cheap substrate/carbohydrate;<br>No nucleus so DNA easy to find/modify;<br>No ethical issues; [2] | 22 |
| | | | **Total** | **160** |