

**Biology (130 MARKS)**  
**Answer each of the questions 1, 2 and 3.**

**Question 1. ( 52 Marks) All Items (a), (b), (c), etc. (7 × 6 + 1 × 10marks)**

- (a) **any one from:** identical/ same/ same genes/ same chromosomes/ same DNA (6) [6]
- (b) (i) two (3)
- (ii) **any one from:** biceps and triceps/ muscles moving lower arm up and down... (3) [6]
- (c) (i) **any one from:** collects (absorbs) more light/ can make more food/ more photosynthesis (3)
- (ii) phototropism (3) [6]
- (d) sensory nerves to the CNS (brain) (spinal chord)/ from sensor (receptor) (3)
- motor nerves from the CNS (brain) (spinal chord)/ to muscle (effector) (3) [6]
- note:** if the nerve type is not named in the candidate's answer use the order in the question
- (e) A tibia (3)
- B fibula (3) [6]
- note:** allow (3) for reverse order
- note:** mixed spelling, e.g. 'tibula' gets no marks
- (f) **any two from:** producers make (produce) food/ make their own food
- consumers eat (consume) food (animals) (plants)
- decomposers breakdown (decompose) food (dead animals) (dead plants) (waste) (2 × 3) [6]
- note:** correct matching of name and role is essential
- (g) carbon dioxide + water (3)
- glucose (starch) (sugar) + oxygen (3) [6]
- accept:** correct chemical equation for (2 × 3) as above
- (h) A transports sperm (semen) (2)
- B releases sperm (semen)/ insemination/ sexual intercourse (2)
- C produces sperm/ stores sperm/ produces hormones (testosterone) (2)
- head contains nucleus (chromosomes) (genes) (gamete) (DNA)/ (2)
- has acrosome (penetrates egg)/ fertilises egg (2)
- tail movement (2) [10]

**Question 2. (39 marks) All items (a) and (b).**

- (a) (i) What? breakdown of food (3)
- Why? so that the food can enter our bloodstream (be absorbed) (3)
- to make food soluble /releases (extracts) nutrients /get energy (3) **[6]**
- (ii) Give
- stomach: acid kills bacteria (disinfects)/ chemical digestion/ mixes food/ softens food/ produces enzymes/ stores (holds) food/ produces acid (HCl)/ digestion of protein (3)
- liver: produces bile/ helps digest fats/ processes absorbed food/ storage/ breaks down alcohol (toxins)/ detoxify / produces urea (3)
- pancreas: produces enzymes/ helps chemical digestion/ regulates blood glucose/ insulin / hormones/ pancreatic juice (3)
- small intestine: completes digestion/ allows food into the blood stream/ produces enzymes/ absorption/ absorbs food (3)
- large intestine: absorbs water/ produces faeces/ releases (solid) waste/ vitamin production/ storage/ carries (transports) waste (3) **[15]**
- (b) Name **any two from:** A, B, C, D
- Give **note:** follow the letter in the candidates answers when awarding marks for the name
- State **note:** the candidate may indicate the direction of blood flow on on the diagram so treat this part as ‘Show or State’
- A pulmonary vein (3)
- into heart (from the lungs) (3)
- oxygenated (3)
- B aorta (3)
- out of heart (to the body) (3)
- oxygenated (3)
- C pulmonary artery (3)
- out of heart (to the lungs) (3)
- deoxygenated (3)
- D vena cava (3)
- into heart (from the body) (3)
- deoxygenated (3) **[18]**

**Question 3. (39 marks) All items (a), (b), (c) and (d).**

- (a) (i) Identify **any two from:** burning fossil fuels/ deforestation/  
oil spills/ careless spreading of slurry/ release of silage  
effluent/ release of untreated sewage/ accidents releasing  
radioactive materials/ pollution if qualified/ dumping if  
qualified/ litter, unqualified... (2 × 3)  
**note:** use reasonable judgement. This also applies to item (ii)
- Explain e.g. burning fossil fuels **any one from:** can cause acid  
rain/ releases CO<sub>2</sub>/ global warming/ climate change/  
melting polar ice caps/ rising sea levels... (3) [9]  
**note:** if human activity is too vague allow marks for a good  
explanation. This also applies to item (ii)
- (ii) Identify **any two from:** reforestation/ nature reserves/ caring for  
endangered species/ re-introduction of species/  
elimination of disease causing organisms/ recycle/  
renewable energy (**allow** (2 × 3) for any two named)/  
reduce if qualified/ reuse if qualified... (2 × 3)
- Explain e.g. reforestation **any one from:** reduces CO<sub>2</sub>/ provides  
habits/ reduces (prevents) soil erosion/ reduces leaching  
(mineral loss) from soil... (3) [9]
- (b) What? cell: unit of life/ building block of life/ smallest part of  
an organism... (3)
- tissue: group of cells carrying out the same function/ group of  
cells working together (3)
- organ: two or more tissues working together (3)
- system: two or more organs working together (3) [12]
- (c) Describe **any one from:** tar, nicotine, carbon monoxide.
- tar, organ: lung (3)  
effect: damages alveoli (air sacs)/ can cause cancer/ can  
cause emphysema/ can cause coughing/ increases the risk  
of lung infections/ may cause asthma /affects breathing/ clogs/  
blocks... (3)
- carbon monoxide, organ: heart (3)  
**note:** accept lung for (3) then effect gets zero  
effect: heart has to work harder to supply oxygen/ strain  
on heart/ reduces amount of oxygen in blood... (3)
- nicotine, organ: heart/ brain (3)  
**note:** accept lung for (3) then effect gets zero  
effect: heart beats faster/ brain becomes addicted (3) [6]
- (d) Name gas fired central heating/ bottled gas heaters/ paraffin  
heaters/ stoves/ any named appliance that burns  
fuel inside the house (3) [3]

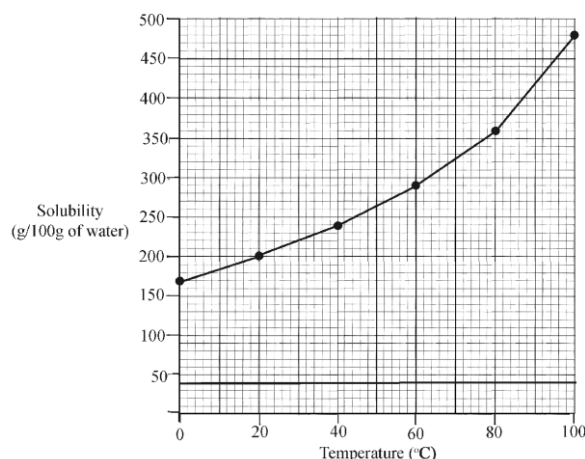
**Chemistry (130 MARKS)**  
**Answer each of the questions 4, 5 and 6.**

**Question 4. (52 marks) All items (a), (b), (c), etc. (7 × 6 + 1 × 10marks)**

- (a) (i) 0 to less than 7/ **accept:** less than 7/ 0 to 7 (3)  
(ii) greater than 7 to 14/ **accept:** greater than 7/ 7 to 14 (3) [6]
- (b) (i) filtration (filter)/ decanting (decantation) (3)  
(ii) evaporation/ distillation / boiling (3) [6]
- (c) (i) liquid/ gas (3)  
(ii) gas (3) [6]
- (d) (i) electrolysis/ voltameter (spelt correctly) (3)  
(ii) only water produced/ no CO<sub>2</sub> produced/ no harmful gases/ no pollution (3) [6]
- (e) (i) any named alkali metal; lithium, sodium, potassium...**accept:** correct symbol (3)  
(ii) fizzes/ releases hydrogen/ makes the water alkaline/ catches fire/ explodes/  
sparks/ floats... (3) [6]  
**allow:** (3) for a correct item from list (ii) for any named metal in (i)
- (f) **any two from:** centre of atom/ contains most of mass/ very small (much smaller  
than the atom)/ positive charge/ protons/ neutrons/ holds the electrons... (2 × 3) [6]  
**note:** if protons and neutrons are on top line accept for (6)
- (g) can be broken down (3)  
by decomposers/ named decomposer (3) [6]  
**allow:** (6) for 'decomposes'/ 'rots'
- (h) (i) air (oxygen) **and** water (moisture) present (4)  
(ii) no air (oxygen) (3)  
(iii) no water (3) [10]

**Question 5. ( 39 Marks) All items (a) and (b).**

- (a) (i) Draw six points correctly plotted (6)  
**allow:** (3) for four points correctly plotted  
 curve through plotted points (3) **[9]**



- (ii) Use Correct reading by candidate at 70°C +/-5 (3)  
 Correct reading by candidate at 50°C +/-5 (3)  
 Correct subtraction by candidate +/- 10 (3) **[9]**  
**note:** if a graph is drawn and then used to estimate solubility consistent with that graph accept the results award (3 × 3) as above.

- As (iii) Draw graph drawn correctly (3) **[3]**

- (b) (i) Describe any suitable experiment involving the pouring (downward flow) of CO<sub>2</sub> and some indicator of that downward flow e.g. extinguishing a lighted candle/ turning lime water milky  
 appropriate diagram with at least one item labelled (2 × 3)  
**note:** if prep. of CO<sub>2</sub> is given showing the upward displacement of air in a correct diagram with at least one item labelled award (2 × 3)  
 complete appropriate description of the experiment (2 × 3) **[12]**  
**note:** prep. of CO<sub>2</sub> gets no marks here

- (ii) Explain CO<sub>2</sub> when poured (3)  
 moves down through air (3) **[6]**  
**note:** if prep. of CO<sub>2</sub> is given and the candidate refers to the upward displacement of air by CO<sub>2</sub> award (2 × 3)

**Question 6. (39 marks) All items (a) and (b).**

- (a) (i) Distinguish element: made of one kind of atom/ all the atoms have the same atomic number/ can not be broken down/ simplest form of matter/ can not be separated by chemical means (3)
- compound: made of two or more elements (different atoms) chemically combined/ can be separated by chemical means. (3) [6]
- (ii) Complete (1) for each correct entry.  
**note:** three or more correct add (3) to the total mark
- | Property            | Iron        | Sulfur | Iron sulfide |         |     |
|---------------------|-------------|--------|--------------|---------|-----|
| Colour              | Silver/grey | yellow | grey (black) | (6 × 1) | [9] |
| Attracted by Magnet | yes         | no     | no           | +       |     |
|                     |             |        |              | (3)     |     |
- (b) (i) Name **any two from:** sulfur dioxide/ sulfur trioxide/ nitrogen monoxide/ nitrogen dioxide (2 × 3) [6]  
**accept:** correct chemical formulas
- (ii) Give sulfur dioxide (trioxide): burning fossil fuels/ volcanic eruptions  
nitrogen (monoxide) dioxide: car/ car exhausts/ exhausts/ lightening (6) [6]  
**note:** allow (6) for any correct source of a gas producing acid rain, as above, if name of gas is incorrect.  
**note:** allow (6) for any correct source of carbon dioxide if it is the gas named e.g. burning fossil fuels/ respiration/ forest fires...
- (iii) How? part(s) of the sculpture would be eroded (worn away) (dissolved) / colour change/ blacken (3) [3]
- (iv) Write  $\text{CaCO}_3 + \text{HCl}$  (3)  
 $\text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$  (3)  
 Balanced:  $\text{CaCO}_3 + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$  (3) [9]  
**accept:** correct equation for another acid

**Physics (130 MARKS)**  
**Answer each of the questions 7, 8 and 9.**

**Question 7. (52 marks) All items (a), (b), (c), etc. (7 × 6 + 1 × 10marks)**

- (a) (i) radiation (3)
- (ii) solar array is safer, no risk of pollution/ nuclear reactors are less safe, they could release radioactive material(s) (radiation)/ nuclear reactors could become unstable (meltdown) (explode) (contaminate)... (3) **[6]**
- note:** reason must be matched with source, order of answering same as order in question
- (b)  $5 \times 7 \times 20$  (3)
- 700 (3) **[6]**
- allow:** (6) for 700/ 7 alone  
 (-3) for incorrect unit
- (c) high: dry/ settled/ little wind/ fine/ sunny/ fair (3)
- low: wet (rain)/ unsettled/ windy/ cloudy (3) **[6]**
- note:** hot and cold alone get no marks for high and low. If hot/ cold are qualified ignore hot/ cold and award marks e.g. high: 'hot and settled', low: 'cold and unsettled'
- (d) which?:  $100 \text{ cm}^3$ / second/ greater volume (3)
- reason: greater volume (mass) (3) **[6]**
- (e) it conducts heat away/ conducts/ bad insulator/ cotton good insulator (6) **[6]**
- (f) it separates into colours/ spectrum/ rainbow (3)
- violet (3) **[6]**
- accept:** blue/ indigo/ UV/ purple for (3)
- (g) one magnetic field line correctly drawn (3)
- second magnetic field line correctly drawn (3) **[6]**
- allow:** (3) for two lines without correct arrows (without arrows)
- (h) (i) **any one from:** walking/ brakes/ using sand paper/ climbing/ playing football/ abseiling/ sharpening a knife/ grip... (3)
- (ii) **any one from:** car (cyclist) moving through air/ between moving parts of machinery in contact/ space capsule re-entering the atmosphere/ boat moving through water/ wear and tear... (3)
- (iii) lubrication/ smooth surfaces/ wheels/ castors /wet surface/ ball (roller) bearings... (2)
- (iv) **any one from:** streamlining/ smooth surface/ shape of vehicle/ spoilers (attachments to create a smooth air flow, reduce turbulence, drag)/ by decreasing the speed (slowing down)/ aerodynamic... (2) **[10]**
- allow:** (2) for an item from (iv) if it appears in (iii)

**Question 8. (39 marks) All items (a) and (b)**

- (a) (i) Distinguish mass: amount of matter/ kg (kilogram)/ g (gram)/  
doesn't change/ not a force/ a scalar (3)
- weight: force (pull) of gravity on a body/ mg/  $m \times 10$ /  
weight can change/ pull of the earth/ effect of gravity/  
a force/ a vector/ N (Newton) (3) [6]
- accept**: mass  $\times$  gravity for (3)
- (ii) Define force (3)
- $\times$  distance (3)
- allow**: (3) for turning effect
- Calculate
- $20 \times F = 4 \times 30$  (3)
- $F = 6.N$  (3) [12]
- allow**: (6) for '6' alone
- note**: incorrect calculation with correct answer gets no marks
- (iii) Give **any one from**: spanner/ door handle/ bottle opener/ pliers  
scissors/ pincers/ claw hammer/opening (closing) a door... (3) [3]
- note**: door on its own no marks
- (b) (i) Explain as the altitude increases the pressure decreases/ pressure  
decreases with altitude/ pressure increases with decreasing  
altitude (3)
- not direct: the graph is a curve/ pressure drops faster as  
as altitude increases/ not a straight line/ pressure increases  
faster as altitude decreases /not directly proportional (3) [6]
- (ii) Give any **two** from: gravity is greater/ air is denser/ height (depth)  
of air is greater (2  $\times$  3) [6]
- (iii) What? increases (3)
- Reason it increases the energy needed for water to vaporise (water  
molecules to separate) (form a gas)/ harder to vaporise (boil) (3) [6]



**Question 9. (39 marks) All items (a) and (b).**

- |     |                      |  |            |         |
|-----|----------------------|--|------------|---------|
| (a) | (i) <u>Draw</u>      | five points correctly plotted<br><b>allow:</b> (3) for three points correctly plotted<br>straight line through, or close to, five points | (6)<br>(3) | [9]     |
|     | (ii) <u>Describe</u> | proportional<br><b>allow:</b> (6) one goes up so does the other at the same rate   | (6)        | [6]     |
|     | (iii) <u>Use</u>     | <u>size:</u> 1 (one) +/- 0.1<br><b>accept:</b> a value correct for the candidate's graph<br><u>unit:</u> $\Omega$ (Ohm)                  | (3)<br>(3) | <br>[6] |
|     | (iv) <u>Enter</u>    | A in meter symbol in series with R<br>V in meter symbol in parallel with R   | (3)<br>(3) | <br>[6] |
|     | (v) <u>How?</u>      | variable resistor/ rheostat/ change the battery (power supply)/<br>change resistance (not R)   | (3)        | [3]     |
| (b) | (i) <u>What?</u>     | reflected sound/bounced  | (3)        | [3]     |

Calculate

$$\text{speed} = \frac{\text{distance}}{\text{time}} = \frac{500}{1.5} = 333 \text{ m s}^{-1}$$

<b>award:</b> (3) correct definition <i>or</i> (3) correct substitution	(3)
333	(3) [6]

**allow:** (6) for 333 alone

**allow:** (3) for  $\frac{250}{1.5}$  *or* 166.6