INSTRUCTIONS

1. Write your examination number in the box provided on this page.

2. Answer all questions.

3. Answer the questions in the spaces provided in this booklet. If you require extra space, an extra page is provided at the back of this booklet.

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| Total (Paper)   | |
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| Grand Total Paper (390) | |
| Coursework      | |
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| Grand Total (600) | |
Biology

Question 1

(a) Name two processes that the leaves of green plants carry out.

(i) ________________________________

(ii) ________________________________

(b) (i) Name the organ shown in the diagram.

Name ________________________________

(ii) Give the function of the organ shown.

Function ________________________________

(c) The parts labelled A and B in the diagram of the microscope work together to perform a single function.

(i) What is the combined function of A and B?

What? ________________________________

(ii) Name the part labelled C in the diagram.

Name ________________________________

(d) Label clearly the pulmonary artery with an A, and the pulmonary vein with a V in the diagram of the heart.
(e) The child in the photograph is helping a dandelion to disperse its seeds.

(i) Why is seed dispersion important for plants?
Why? ____________________________________________

(ii) Give a second way, excluding wind, by which plants disperse seeds.
Give ____________________________________________

(f) The diagram shows a sperm. The tail enables the sperm to swim.

(i) Why does the sperm need to be able to swim?
Why? ____________________________________________

(ii) Where does fertilisation occur?
Where? __________________________________________

(g) (i) Name a plant that can reproduce asexually.
Name ____________________________________________

(ii) Describe the way the plant that you have named reproduces asexually.
Describe __________________________________________

(h) The photograph shows petri dishes containing agar being exposed to the air for 5 to 10 minutes before being covered. One petri dish containing agar was left covered. All of the dishes were kept warm for some days and inspected daily.

(i) What is the function of the agar?
What? ____________________________________________

(ii) Why was one petri dish left covered?
Why? ____________________________________________

(iii) Describe and explain the appearance of the agar in the exposed dishes after some time passed.
Describe __________________________________________
Explain __________________________________________

(7 × 6 + 1 × 10)
Question 2

(a) The diagram shows a human skeleton with a detailed drawing of the structure of the knee joint. The kneecap is not shown.

(i) Name the bones labelled A and B. (6)

Bone A ______________________
Bone B ______________________

(ii) What type of joint is the knee? (3)

Type _______________________

C is synovial fluid. D is a ligament.

(iii) Give the functions of the parts labelled C and D in the knee. (6)

C __________________________
____________________________

D __________________________

(iv) Explain the action of antagonistic pairs of muscles in causing the movement of limbs. You may use a labelled diagram in your answer if you wish. (6)

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
(b) The diagram shows the apparatus used by a pupil when performing an experiment in a school laboratory.

The pupil blew (exhaled) air into test tube X.

The pupil sucked (inhaled) air from test tube Y.

The pupil continued, alternately, blowing and sucking air, as above, until liquid A in one of the test tubes turned milky.

(i) Name liquid A. (3)
Name ____________________________________

(ii) In which test tube, X or Y, did the liquid turn milky? (3)
Which? _________________

(iii) Why did liquid A turn milky in one of the test tubes? (3)
Why? _________________________________________________________

(iv) What conclusion can be made from the result of this experiment regarding the difference in composition between exhaled and inhaled air? (3)
Conclusion? ____________________________________________________

(v) Complete the word equation, below, for aerobic respiration. (6)
Food + ___________ → __________________ + energy + water
Question 3  

(a) The study of a habitat requires the use of sampling instruments, as it is not possible to count every individual organism living there.

The photograph shows a pupil and teacher using a quadrat. The quadrat is placed randomly in a number of sites in the habitat being studied.

(i) How is random sampling achieved when using a quadrat? (3)

How? ____________________________  

_______________________________________________________________

_______________________________________________________________

(ii) Give two different types of data collected (two different tasks performed) at each site in the habitat when using the quadrat. (6)

One __________________________________________________________  

_______________________________________________________________  

Two __________________________________________________________  

_______________________________________________________________

(b) Line transects are also used to sample habitats.

(i) What is a line transect? (3)

What? ___________________________________________________________________

_______________________________________________________________

(ii) Describe how to sample a habitat using a line transect. (6)

_________________________________________________________________  

_________________________________________________________________  

_________________________________________________________________
(c) The photograph shows a pupil with a sweep net. The sweep net is used to collect small animals e.g. insects from vegetation in a habitat so that they can be identified.

(i) Name a second item of equipment used to collect small animals for identification. (3)

Name ________________________________

(ii) Draw a labelled diagram, in the box provided, of the item that you have named in (i) above. (6)

(iii) Describe how to use the item that you have named and drawn. (6)

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

(d) Give two reasons why the groups of organisms living together can vary greatly from one part of a habitat to another. (6)

One ____________________________________________________________________

________________________________________________________________________

Two ____________________________________________________________________

________________________________________________________________________
Chemistry

Question 4

(a) The photograph shows the emissions from a coal burning electricity generating station. Name a pollutant present in the emissions and describe its effect on the environment.

Name _______________________________
Effect _______________________________
____________________________________

(b) There are three states of matter: solid, liquid and gas.

(i) Give one property that liquids and gases have in common.
Give _____________________________________________

(ii) Give one property in which liquids and gases differ.
Give __________________________________________

(c) Name any two items of laboratory equipment shown in the diagram.

Item one _____________________________________
Item two _____________________________________

(d) Draw a labelled diagram, in the box provided, of an apparatus that could be used to separate an insoluble solid from a liquid.

For Examiner use only

(1)   (2)
(e) Approximately 98.89% of carbon on the surface of the earth and in the atmosphere is carbon-12 the remaining approximately 1.11% is carbon-13. The numbers 12 and 13 are mass numbers. The atomic number of carbon is 6.

(i) **How many neutrons** are in the nucleus of a carbon-13 atom?

How?

(ii) Enter the **missing word** in the following sentence.

Carbon-12 and carbon-13 are ________________ of carbon.

(f) (i) What is **item A used for** in the titration of an acid with a base?

What?

(ii) What **happens when an acid reacts with a base**?

What?

(g) Give **two uses** of carbon dioxide.

Use one ____________________

Use two ____________________

(h) The apparatus shown in the diagram was used to investigate the reaction of zinc with hydrochloric acid. Hydrogen gas is produced.

(i) Describe a **test for hydrogen**.

__________________________________________

__________________________________________

(ii) Write a **chemical equation** for the reaction of zinc with hydrochloric acid.

__________________________________________

(1) (2)

(7 \times 6 + 1 \times 10)
Question 5

(a) Oxygen can be prepared by decomposing liquid A using solid B as a catalyst. This preparation is shown in the diagram.

(i) Name liquid A.  
Name _________________________________________________________

(ii) Name solid B.  
Name _________________________________________________________

(iii) What is a catalyst?  
What? _________________________________________________________

Carbon was burned in oxygen and the products tested with pieces of moist red and blue litmus paper.

(iv) Give the result of the litmus test described above and make a conclusion based on this result.  
Result and conclusion _____________________________________________

(b) (i) State how to test water to confirm the presence of hardness?  
Test ___________________________________________________________

(ii) Name a metallic element some of whose compounds cause hardness in water.  
Name _________________________________________________________

(iii) Give one effect of hard water.  
Give _________________________________________________________
(i) Name the separation process shown in the diagram. (3)

Name _________________________________________________________

(ii) Name the item labelled C in the diagram. (3)

Name _________________________________________________________

(iii) Identify the part A or B of item C which is connected to the cold tap. (3)

Identify ________________________________________________________

(iv) How could you show that the water collected contains no salt? (3)

How? _________________________________________________________
Question 6

Atoms of elements can combine to form compounds using chemical bonds between their atoms. There are different types of chemical bonds.

(a) The diagram shows a group of water molecules with one enlarged below with its constituent atoms identified by their atomic symbols. Water molecules are very tiny, one teaspoon of water contains approximately $2 \times 10^{23}$ molecules.

(i) Name the type of bonding in the water molecule. (3)
Name ____________________________

(ii) Describe this type of bond. (6)
Describe __________________________
_____________________________________________________________

(iii) Name one other compound with this type of bonding. (3)
Name _________________________________________

(b) The diagram shows sodium ions (+) and chloride ions (-) in part of a crystal of table salt, sodium chloride.

(i) How are sodium ions and chloride ions formed from their atoms? (6)
How? ______________________________________________________________________

(ii) What force holds the ions together in sodium chloride? (3)
________________________________________________________________________

(iii) Name one other compound that is composed of ions. (3)
________________________________________________________________________

For Examiner use only

(1)   (2)
(c) The photograph shows a statue that was cast in the alloy bronze.

(i) What is an alloy? (3)

What? ________________________________

(ii) Name an alloy, other than bronze, and give one use for it. (6)

Name _________________________________
Use ________________________________

(iii) Metals are malleable and ductile. Explain the underlined terms. (6)

Malleable ________________________________
Ductile ________________________________
Physics

Question 7

(a) Give two useful energy conversions that occur when the drill shown in the diagram is being used.

(i) ________________________________

(ii) ________________________________

(b) Copper, aluminium and iron rods are set-up as shown in the diagram. A metal ball is attached by wax to the end of each rod. Hot water is poured into the beaker. The ball falls from the copper rod first. What conclusion can be drawn from this observation?

Conclusion ________________________________

(c) The diagram shows a container with three spouts. The container is filled with water. Jets of water pour out of the spouts. Why does the jet of water from the bottom spout travel the furthest out from the container?

Why? ________________________________

______________________________

(d) A plastic pen when rubbed with a dry cloth can attract small pieces of paper which ‘stick’ to it.

(i) Why does this happen?

Why? ________________________________

(ii) Explain why the pieces of paper fall from the pen after some time.

Explain ________________________________
(e) The photograph, taken from a satellite above the earth, shows the shadow of the moon on the earth's surface.

(i) Where does the light falling on the earth's surface come from?

Where? ____________________________

(ii) What property of light enables the formation of shadows?

What? ____________________________

(f) The diagram shows a circuit with a wire over a compass.

(i) What happens to the compass needle when the switch is closed?

What? ____________________________

(ii) Which effect of electric current is demonstrated by this experiment?

Which? ____________________________

(g) What causes an echo?

What? ____________________________

(h) (i) If a bulb ‘blows’ (fails) in circuit A does the second bulb stay on (glowing)? Give a reason for your answer.

Does? ____________________________

Reason ____________________________

(ii) If a bulb ‘blows’ (fails) in circuit B does the second bulb stay on (glowing)? Give a reason for your answer.

Does? ____________________________

Reason ____________________________

(7 \times 6 + 1 \times 10)
Question 8

(a) A pupil measured the volume of a potato using the items of laboratory equipment, labelled A and B as shown in the diagram.

(i) Name the items labelled A and B.

A ______________________________
B ______________________________

(ii) The potato had mass 175 g and volume 125 cm³. Calculate the density of the potato. Give the units of density with your answer.

(iii) Why did the potato sink in the water?

(b) The diagram shows a light dependent resistor (LDR) and a graph of the resistance of the LDR against the brightness of light falling on it.

(i) Give an everyday use for an LDR.

(ii) Describe an experiment to measure the resistance of an LDR under varying degrees of brightness of light. Draw the circuit diagram in the box provided. Explain how you would vary the brightness of the light. You do not have to state how the brightness of the light was measured.
(c) A pupil performed an experiment on a resistor to investigate the relationship between potential difference (voltage) applied to the resistor and the current flowing through the resistor. The data from this experiment is in the table.

<table>
<thead>
<tr>
<th>Potential difference (Volts)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
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<tr>
<td>Current (Amperes)</td>
<td>0.00</td>
<td>0.05</td>
<td>0.10</td>
<td>0.15</td>
<td>0.20</td>
<td>0.25</td>
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(i) Draw a graph of potential difference (voltage) on the y-axis against current on the x-axis in the grid below.  

(ii) Calculate the resistance of the resistor used in this experiment.  

Calculate ______________________________________________________

(iii) What is the evidence from the graph that potential difference (voltage) is directly proportional to current in this case?  

What? _________________________________________________________
Question 9

(a) The **boiling point of water** can be determined using the apparatus shown in the diagram.

(i) Why are **boiling (anti-bumping) chips** added to the water? (3)

Why? _______________________________________

(ii) At what **temperature** does **water boil**, at **standard** (normal) **atmospheric pressure**? (3)

What? _______________________________________

(iii) What **effect** does the **raising of pressure** have on the **boiling point** of water? (3)

Effect of raising pressure ________________________

(iv) What **effect** does the **lowering of pressure** have on the **boiling point** of water? (3)

Effect of lowering pressure _______________________

(b) The photograph shows a solar panel being installed. Water passing through the panel is heated by the sun.

(i) How does **heat** from the **sun travel**, through the **vacuum of space**, to the earth? (3)

How? _______________________________________

(ii) Give **one advantage or one disadvantage** of fitting solar panels to your home? (3)

Advantage _______________________________________

Or

Disadvantage _______________________________________

For Examiner use only (1) (2)
(c) A stone was dropped from the top of a tall cliff. The stones approximate velocity was measured each second as it fell. The data collected during this experiment is given in the graph.

(i) Define velocity.

(ii) Use data from the graph to estimate the acceleration of the stone as it fell. Give the units of acceleration with your answer.

(iii) Name the force that caused the stone to fall.

(iv) The stone had a mass of 2 kg. What was the weight of the stone on earth? Give the unit.
EXTRA WORK SPACE

Indicate clearly the number and part of the question(s) that you are answering.

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(1) (2)