LRN International GCSE: Combined Science (7160)

Candidate Name	
Candidate Number	
Centre Name	
Centre Number	

Paper 2: Theory   **Sample Paper**

2 hours

It is necessary to respond on the answer sheets provided alongside this question paper. Additionally, you can use a soft pencil (preferably of type B or HB), a clean eraser and a dark blue or black pen.

INSTRUCTIONS:
- You must write your name, candidate number, centre name and centre number on the answer sheets in the designated spaces.
- The paper consists of xx questions, and it is essential that you attempt all of them.
- Attempt all the questions using a dark blue or black pen.
- It is important to follow the instructions provided on the answer sheets.
- Do not use correction fluid.
- Avoid writing on any bar codes.
- You are allowed to use a calculator if needed.
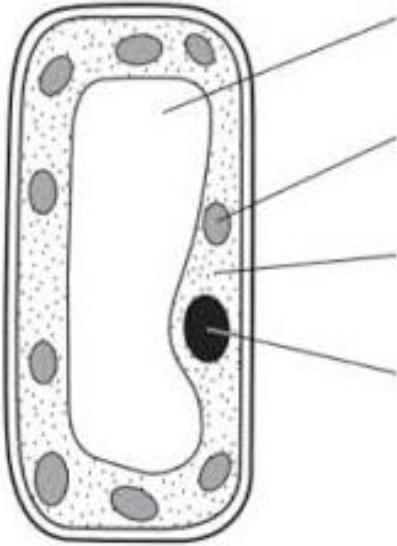- A periodic table is found at the back of the paper.

INFORMATION:
- This paper has a total of 120 marks.
- The number of marks assigned for every question or its parts is indicated within brackets [ ].
- Rough work must be completed on this question paper.

Part A: Biology Section (40 Marks)

Question 1: Plant Biology (10 marks)

(a) The diagram below shows a leaf cell.

      i) Label the vacuole and chloroplast on the diagram. (2 marks)

      ii) State the main function of the chloroplast. (1 mark)

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      iii) Explain how the structure of the cell wall supports its function. (2 marks)

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(b) Plants absorb water from the soil.

i) Describe how osmosis enables water absorption in root hair cells. (3 marks)

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ii) Suggest two adaptations of root hair cells for efficient absorption. (2 marks)

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Question 2: Enzymes (8 marks)

(a) Enzymes are biological catalysts.

i) Define the term catalyst. (1 mark)

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ii) Explain how temperature affects enzyme activity. (3 marks)

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(b) Digestion involves enzymes.

i) Name the enzyme that breaks down starch. (1 mark)

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ii) State the products of starch digestion. (1 mark)

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iii) Bile is involved in digestion. Explain its role in fat digestion. (2 mark)

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Question 3: Circulatory System (8 marks)

(a) The diagram shows part of the circulatory system in humans.
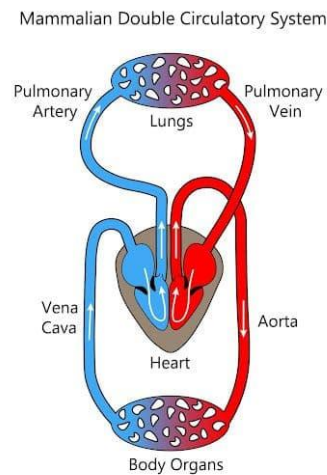
Image courtesy of tyrone

i) Compare the structure of arteries and veins. (4 marks)

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ii) Explain the function of capillaries in tissue exchange. (2 marks)

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(b) White blood cells play an important role in defending the body.

i) Name one type of white blood cell and describe its function. (2 marks)

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Question 4: Genetics (6 marks)

(a) Genetic variation is essential for survival.

i) Explain how sexual reproduction leads to genetic variation. (3 marks)

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(b) Human activities can reduce biodiversity.

i) Define biodiversity. (1 mark)

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ii) Suggest two ways in which deforestation reduces biodiversity. (2 marks)

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Question 5: Respiratory System (8 marks)

(a) The human respiratory system is essential for gas exchange.

i) Name the two gases exchanged in the alveoli. (1 mark)

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ii) Explain how the structure of alveoli makes them efficient for gas exchange. (3 marks)

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(b) Smoking can damage the respiratory system.

i) State one harmful chemical found in cigarette smoke and its effect on the lungs. (2 marks)

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ii) Suggest two ways in which smoking increases the risk of cardiovascular disease. (2 marks)

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Question 5: Atomic Structure (8 marks)

(a) The diagram below shows the electronic structure of an atom.
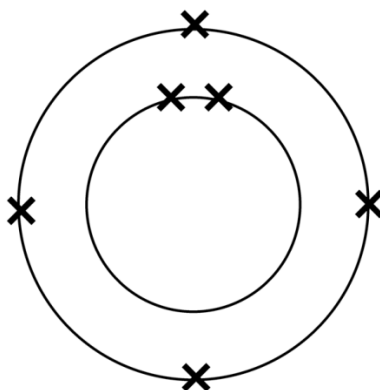
i) State the name of this atom. (1 marks)

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ii) Draw the electronic configuration of an oxygen atom below. (2 marks)

(b) Elements can form ionic or covalent bonds.

i) Define an ionic bond. (2 marks)

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ii) Explain why ionic compounds conduct electricity when molten but not when solid. (3 marks)

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Question 6: Chemical Reactions (7 marks)

a) The reaction between hydrochloric acid and sodium hydroxide is an example of neutralization.

i) Write the balanced chemical equation for this reaction. (2 marks)

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ii) State one common use of this neutralization reaction. (1 mark)

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(b) Calcium carbonate reacts with hydrochloric acid to produce carbon dioxide gas.

i) Write a balanced chemical equation for the reaction. (2 marks)

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ii) Suggest a test to confirm the presence of carbon dioxide gas. (2 marks)

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Question 7: Experimental Chemistry (7 marks)

(a) The rate of a chemical reaction can be increased by using a catalyst.

i) Define the term catalyst. (1 mark)

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ii) Explain how increasing temperature affects the rate of reaction. (3 marks)

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(b) Chemical experimental techniques can be used to separate certain mixtures.

i) Describe how you would obtain pure salt from a mixture of salt and sand. (3 marks)

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Question 8: Forms of Carbon (7 marks)

(a) Carbon exists in different forms.

i) Name two allotropes of carbon. (2 marks)

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ii) Explain why diamond is a hard substance. (2 marks)

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(b) The burning of fossil fuels produces carbon dioxide.

i) State one harmful effect of carbon dioxide on the environment. (1 mark)

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ii) Suggest two ways to reduce the impact of burning fossil fuels. (2 marks)

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Question 9: Metal Chemistry (11 marks)

a) Metals are widely used in daily life.

i) State two physical properties of metals. (2 marks)

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ii) Explain why metals are malleable. (2 marks)

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(b) Transition metals have unique properties.

i) Name one transition metal and a typical use for it. (2 marks)

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(c) Electrolysis is a process used to extract certain metals.

i) Define electrolysis. (2 marks)

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    ii) During the electrolysis of molten lead(II) bromide, identify the product formed at the cathode and the product formed at the anode. (2 marks)
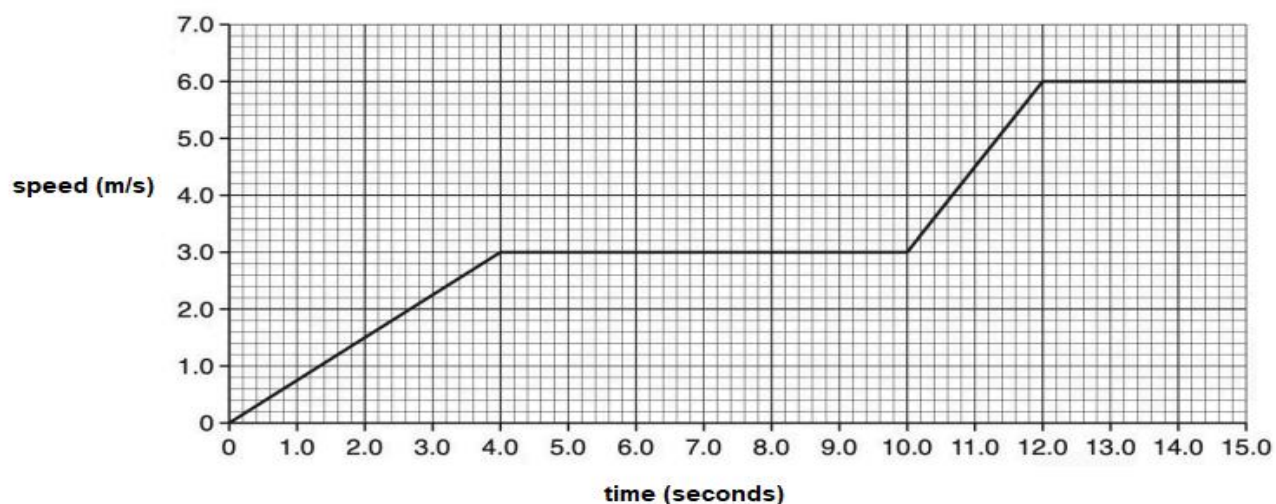
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(d) Suggest one reason why electrolysis is an expensive method of metal extraction. (1 mark)

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Part C: Physics Section (40 Marks)

Question 10: Motion and Kinematics (7 marks)

    (a) The graph below shows the motion of a car.

i) Define velocity. (1 mark)

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ii) Describe the motion of the car during the first four seconds. (2 marks)

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iii) Determine which part of the journey has the greatest acceleration. Show your working and give a reason for your choice. (2 marks)

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(b) A cyclist applies a force of 50 N to move 5 m forward.

i) Calculate the work done. (2 marks)

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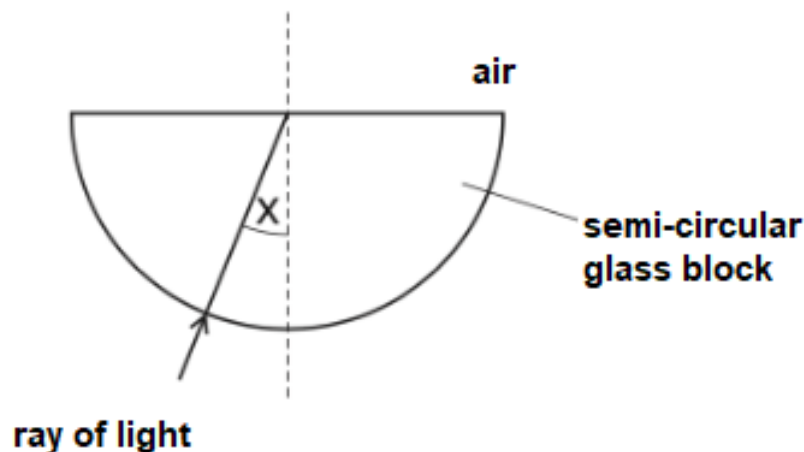
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Question 11: Refraction and Waves (7 marks)

a) The diagram below shows light refracting through a glass block.

i) Complete the ray diagram to show the path of light as it enters and leaves the block. Please note that the angle of incidence is less than the critical angle. (2 marks)

air

X

semi-circular
glass block

ray of light

ii) Define refraction. (1 mark)

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(b) Waves can be classified as transverse or longitudinal.
   i) State one example of each type of wave. (2 marks)

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ii) Describe the difference between transverse and longitudinal waves. (2 marks)

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Question 12: Moments and Circuits (7 marks)

(a) The principle of moments states that for a system in equilibrium, the clockwise and anticlockwise moments are equal.

    i) State the formula for calculating the moment of a force. (1 mark)

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    ii) A seesaw is in equilibrium with a 30 N force on one side, 2 m from the pivot. Calculate the force on the other side if it is 1.5 m from the pivot. (2 marks)

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(b) Electrical circuits have safety features.
    i) Name two safety devices used in household circuits. (2 marks)

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    ii) Explain the function of each device. (2 marks)

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Question 13: Energy (6 marks)

a) Renewable energy sources such as solar power are increasingly used.
i) State one advantage and one disadvantage of using solar energy. (2 marks)

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(b) A 100 W bulb is used for 2 hours.
i) Calculate the energy consumed in kilowatt-hours. (2 marks)

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ii) If electricity costs $0.15 per kilowatt-hour, calculate the cost of using the bulb. (2 marks)

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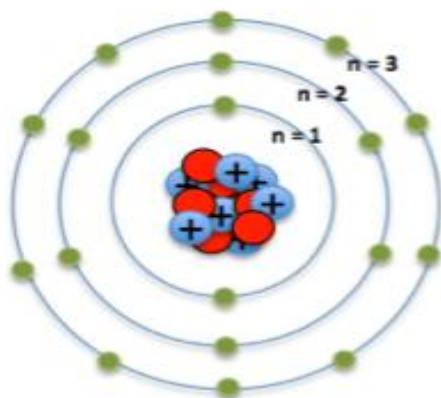**Question 14: Nuclear Physics (13 marks)**

(a) The diagram below shows an atom.

i) Label the nucleus and one electron on the diagram. (2 marks)

ii) Define the term isotope. (2 marks)

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iii) Carbon-14 is a radioactive isotope. Describe one medical or industrial use of radioactive isotopes. (2 marks)

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(c) Nuclear decay involves the emission of radiation.

i) Name the three types of radiation emitted during nuclear decay. (3 marks)

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ii) Compare the penetrating powers of alpha, beta, and gamma radiation. (3 marks)

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iii) Suggest one way to protect workers handling radioactive materials. (1 mark)

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End of Paper