

Candidate Name

Centre Number

Candidate Number



ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

COMBINED SCIENCE

4003/2

PAPER 2 Theory

NOVEMBER 2023 SESSION

2 hours

Additional materials:
Calculator (Optional)
Answer sheets
String

The Periodic Table is provided on page 13.

Time 2 hours

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top.

Section A

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

Section B

Answer any **two** questions.

Write your answers on the separate answer sheets provided.

Section C

Answer any **two** questions.

Write your answers on the separate answer sheets provided.

Section D

Answer any **two** questions.

Write your answers on the separate answer sheets provided.

FOR EXAMINER'S USE

Section A

Section B

Section C

Section D

TOTAL

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [] at the end of each question.

This question paper consists of 13 printed pages and 3 blank pages.
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Section A

Answer **all** questions in the spaces provided on the question paper.

- 1 (a) Fig.1.1 shows a specialised cell.

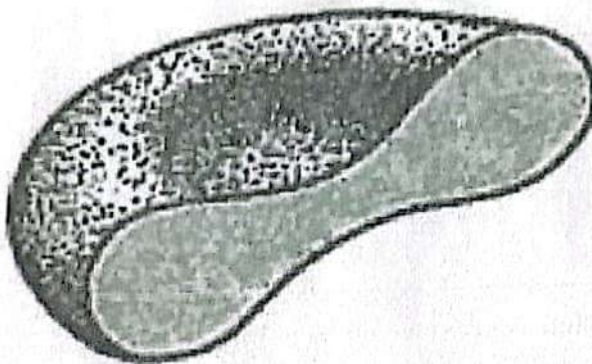


Fig.1.1

- (i) Identify the specialised cell.

[1]

- (ii) State two adaptations of the cell in Fig. 1.1 to its function.

[2]

- (b) (i) Define the term *discontinuous variation*.

[1]



- (ii) State **one** characteristic which shows discontinuous variation.

 _____ [1]

- (c) Explain why trophic levels are limited in a food chain.

 _____ [2]

- 2 (a) State the causative agent of

(i) chancroid,
 _____ [1]

(ii) genital herpes.
 _____ [1]

- (b) Describe **one** way of reducing the spread of chancroid.

 _____ [1]

- (c) Describe how HIV/AIDS differs from genital herpes.

 _____ [2]



- (d) State any two effects of syphilis on an unborn child.

[2]

3

- (a) Table 3.1 shows the effects of substances A and B on litmus paper.

Table 3.1

substance	blue litmus paper	red litmus paper
A	remains blue	turns blue
B	turns red	remains red

- (i) State the purpose of the litmus paper.

[1]

- (ii) Identify the acid-base nature of

1. substance A,

2. substance B.

[2]

- (iii) State any one property of substance B.

[1]



- (b) Write an equation for the reaction between calcium carbonate and hydrochloric acid.

[3]

- 4 (a) Fig.4.1 shows the displayed structural formula of a hydrocarbon.

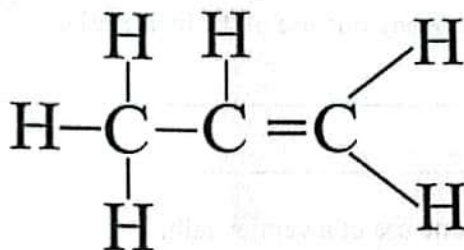


Fig.4.1

- (i) Define the term *hydrocarbon*.

_____ [1]
- (ii) Name the hydrocarbon in Fig. 4.1.
_____ [1]
- (iii) Identify the homologous series to which the hydrocarbon belongs.
_____ [1]
- (iv) Explain why the hydrocarbon is said to be unsaturated.

_____ [1]



- (b) (i) Deduce the empirical formula of the hydrocarbon in Fig. 4.1.

[2]

- (ii) State any one use of the hydrocarbon.

[1]

- 5 (a) State any one use of a vernier callipers.

[1]

- (b) Fig.5.1 shows the scale of a vernier callipers.

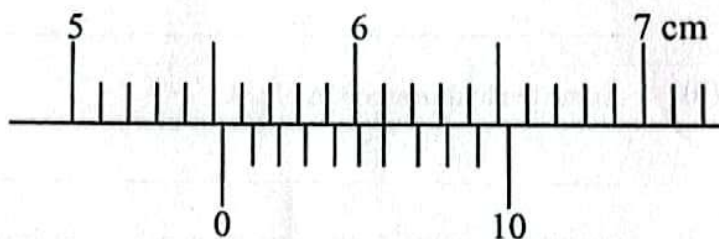


Fig.5.1

State the reading shown on the vernier callipers in Fig. 5.1.

[1]



- (c) (i) 1 cm^3 of water has a mass of 1 g.
Calculate the density of 50 cm^3 of water.

[3]

- (ii) Convert 50 cm^3 to litres.

[1]

- 6 (a) (i) State the law of magnetism.

[1]

- (ii) Give any **one** example of a magnetic material and a non-magnetic material.

magnetic _____

non-magnetic _____

[2]

- (b) Table 6.1 shows the differences between a motor and a generator.

- (i) Complete Table 6.1.

Table 6.1

	motor	generator
power source	present	absent
form of energy produced		

[2]

- (ii) State any **one** appliance which has an electric motor.

[1]



Section B

Answer any **two** questions on the separate answer sheets provided.

- 7 (a) State any **three** differences between inhaled and exhaled air. [3]
- (b) (i) State the word equation for aerobic respiration. [2]
- (ii) Explain why little energy is produced during anaerobic respiration. [2]
- (iii) Give any **three** differences between respiration and photosynthesis. [3]
- 8 (a) State any **two** functions of transpiration. [2]
- (b) Explain any **two** ways in which plants are adapted to reduce water loss by transpiration. [4]
- (c) Explain why high concentration of salts in the soil reduces transpiration. [4]
- 9 (a) Fig.9.1 shows a blood vessel.

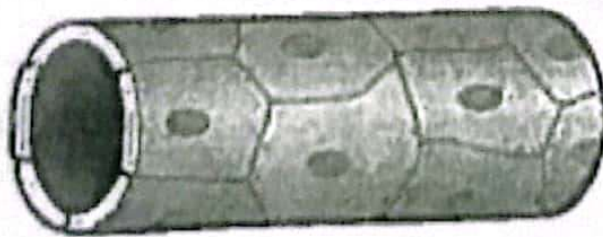


Fig.9.1

- (i) Explain the structure of the blood vessel. [4]
- (ii) State **two** differences in blood composition between the blood in the aorta and the blood in the vena cava. [2]
- (b) Outline the path taken by blood from the right atrium until it reaches the left atrium. [4]



Section C

Answer any **two** questions on the separate answer sheets provided.

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- (a) Table 10.1 shows characteristics of three elements A, B and C. The letters are **not** the real symbols of the elements.

Table 10.1

element	proton number	mass number	electronic configuration
A		23	2, 8, 1
B	18	40	
C	8	16	2, 6

- (i) Complete Table 10.1 by writing the proton number of element A and the electronic configuration of element B. [2]
- (ii) State the Group to which element A belongs. [1]
- (iii) Identify, using A, B or C, the element that is a noble gas. [1]
- (b) (i) Draw a dot and cross diagram to show the bonding between elements A and C. [2]
- (ii) State any **one** physical property of the compound formed between elements A and C. [2]
- (c) Calculate the number of moles in 69 g of element A. [2]

Sulphuric acid is manufactured by the contact process.

- (a) Name the **two** raw materials that are used in the production of sulphur trioxide. [2]
- (b) Give any **two** conditions needed for the production of sulphur trioxide. [2]
- (c) Describe how each condition stated in (b) affects the production of sulphur trioxide. [2]
- (d) Describe the dilution stage in the contact process. [2]
- (e) Calculate the relative molecular mass of sulphuric acid (H_2SO_4). [2]

- 12 Fig.12.1 shows an experiment between iron (III) oxide (Fe_2O_3) and coke (C).

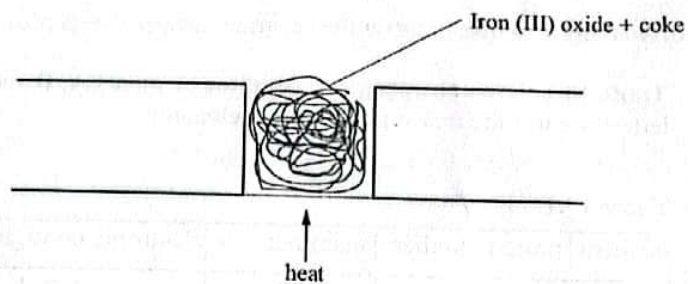


Fig.12.1

- (a) Explain the term *oxidation*. [1]
- (b) Write a balanced chemical equation for the reaction. [2]
- (c) Identify the oxidising agent in the reaction. [1]
- (d) (i) Name two elements which are added to the solid product to make stainless steel. [2]
- (ii) State any two properties of stainless steel. [2]
- (iii) Give any two uses of stainless steel. [2]



Section D

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Answer any **two** questions on the separate answer sheets provided.

Fig.13.1 shows a piece of an unidentified material being heated. After five minutes, the heat was felt on the other end.

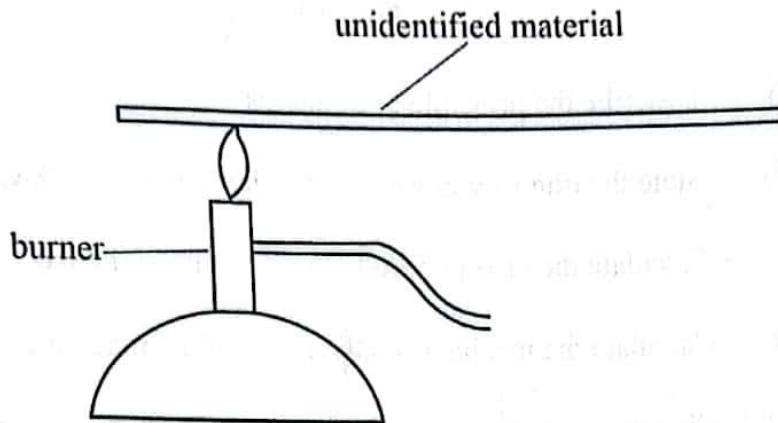


Fig.13.1

- | | | |
|-------|---|-----|
| (i) | Identify, with a reason, the type of material that was used in the investigation. | [2] |
| (ii) | Explain why heat conduction is fast in solids. | [1] |
| (iii) | State the method by which heat energy is transferred in Fig. 13.1. | [1] |
| (b) | (i) State any two types of potential energy. | [2] |
| | (ii) State the law of conservation of energy. | [2] |
| (c) | Explain why a tyre gets hot after travelling a long distance. | [2] |

- 14 Fig.14.1 shows a machine used to lift a 50 kg bag of maize.

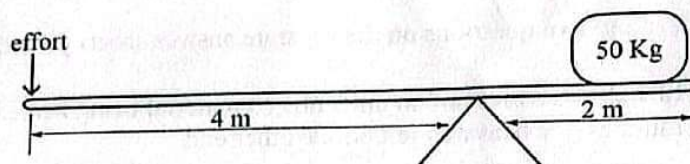


Fig.14.1

- (a) (i) Describe the principle of moments. [1]
- (ii) State the **one** way in which a machine makes work easier. [1]
- (b) (i) Calculate the effort needed to just lift the 50 kg bag. [3]
- (ii) Calculate the mechanical advantage of the machine. [2]
- (iii) Give any **two** examples of machines that use the same principle as that shown in Fig.14.1. [2]
- (c) Suggest a reason why the machine in Fig. 14.1 is not 100% efficient. [1]
- 15 (a) (i) Explain why copper and polythene have different electrical conductivities. [3]
- (ii) Name a non-metal which is a good electrical conductor. [1]
- (b) A Christmas tree was decorated with light bulbs. It was observed that when one of the lights on the Christmas tree broke, the rest went off as well.
- (i) State the type of connection used to connect the light bulbs. [1]
- (ii) Describe the effect of breaking one light bulb to the ammeter reading. [1]
- (c) State the function of a fuse. [1]
- (d) State any **two** safety precautions that one must take before rescuing an electrocuted person. [2]
- (e) Give **one** difference between direct current (d.c) and alternating current (a.c). [1]



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