

Candidate Name

Centre Number

Candidate Number



ZIMBABWE SCHOOL EXAMINATIONS COUNCIL
General Certificate of Education Ordinary Level

COMBINED SCIENCE
PAPER 2 Theory

4003/2
2 hours

JUNE 2024 SESSION

Additional materials:
Calculator (Optional)
Answer booklet

INSTRUCTIONS TO CANDIDATES

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

INFORMATION FOR CANDIDATES

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

This question paper consists of **four** compulsory sections, A, B, C and D.

The Periodic Table is provided on Page 14.

FOR EXAMINER'S USE

Section A	
SECTION B	
Section C	
Section D	
TOTAL	

This question paper consists of 14 printed pages and 2 blank pages.

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Section A

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

- 1 (a) (i) Name any **two** female parts of a flower.

[2]

- (ii) State the part that produces male sex cells in a flower.

[1]

- (b) (i) A farmer in Zimbabwe sow some maize seeds under irrigation in June. The percentage germination was 40%.
Calculate the total number of seeds that were sown if 20 000 seeds germinated.

[2]

- (ii) Explain why the percentage germination was low.

[2]



- 2 (a) Name the organ that is affected by excessive alcohol consumption.

[1]

- (b) Suggest any **two** reasons why people abuse drugs.

1

2

[2]

- (c) Describe the effects of tobacco smoking by a pregnant woman.

[2]

- (d) State any **two** effects of glue sniffing to the human body.

1.

2.

[2]



- 3 A student carried out a research on a particular species of fish. The fish species cannot survive in water with a pH lower than 5.7 or higher than 8.5. The student analysed the pH of water from three rivers, X, Y and Z.

river	pH
X	3.5
Y	7.0
Z	8.1

- (a) (i) State the river which has alkaline water.

[1]

- (ii) Identify the river in which the fish species cannot survive.

[1]

- (b) Define the term *neutralisation*.

[1]

- (c) Calculate the concentration, in moles per dm^3 , of a solution made by dissolving 212.0 g of sodium carbonate (Na_2CO_3) in 0.25 dm^3 water.
[$\text{Mr}(\text{Na}_2\text{CO}_3) = 106$]

[4]

- 4 (a) Fig.4.1 shows displayed formulae of two organic molecules.

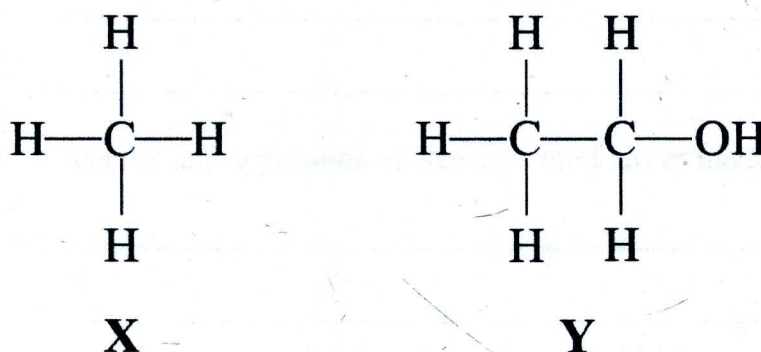


Fig.4.1

- (i) Define the term *homologous series*.

_____ [1]

- (ii) State the homologous series to which each molecule belongs.

X: _____ [2]

Y: _____

- (b) (i) Explain why molecule **Y** **cannot** be classified as a hydrocarbon.

_____ [1]

- (ii) Calculate the percentage composition by mass of hydrogen in molecule **X**.

[3]

- 5 (a) A force of 8 N was applied onto a knife to cut through 0.05 m of a material. Calculate the energy used to cut the material.

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[2]

- (b) Fig.5.1 is an incomplete diagram representing the production of shadows.

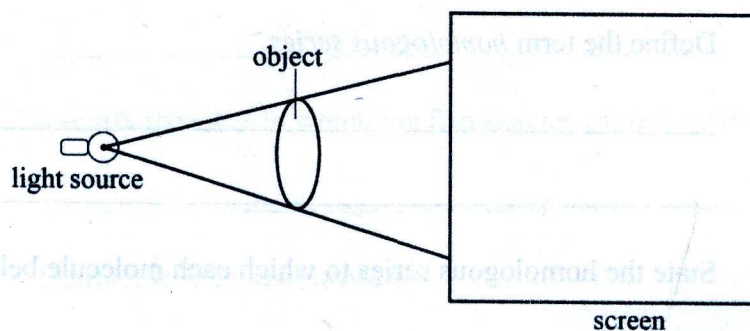


Fig.5.1

Complete the diagram to show the shadow formed.

[2]

- (c) Write the energy chain to show the energy changes that occur when a torch is switched on.

[3]

- 6 (a) (i) State Newton's third law of motion.

[1]

- (ii) Identify any application of Newton's third law of motion.

[1]

- (b) (i) **Fig.6.1** shows a box of mass 40 kg being pulled horizontally. A frictional force of 80 N is acting on the box.

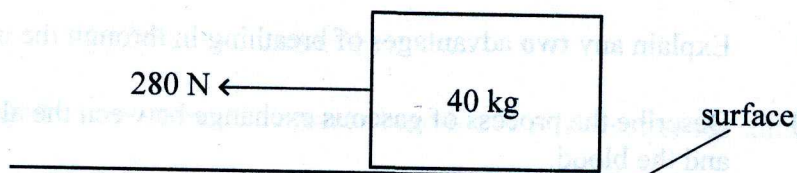


Fig.6.1

- Indicate, using an arrow on the diagram, the frictional force.

[1]

- (ii) Calculate the resultant force.

[2]

- (iii) Calculate the acceleration of the box.

[2]

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Section B

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

For
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Use

- 7 (a) State any **two** laboratory safety rules. [2]
- (b) State any **two** materials that can be used for fire fighting in the laboratory. [2]
- (c) (i) Describe how waste chemicals can be properly disposed off in a laboratory. [2]
- (ii) State any other **two** methods of disposing litter. [2]
- (iii) State **one** disadvantage for each method stated in (ii). [2]
- 8 (a) (i) Explain any **two** advantages of breathing in through the nose. [2]
- (ii) Describe the process of gaseous exchange between the alveolus and the blood. [4]
- (b) (i) State any **two** differences between aerobic and anaerobic respiration. [2]
- (ii) State any **two** diseases of the respiratory system that are linked to tobacco smoking. [2]
- 9 (a) Outline the route of a sperm from the vagina to the site of fertilisation. [2]
- (b) (i) State and explain any **two** adaptations of the sperm to its function. [4]
- (ii) State any **four** differences between an egg cell and a sperm cell. [4]

Section C

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

For
Examine
Use

- 10 Chlorine and bromine are some of the Group VII elements.
- (a) (i) State the number of electrons in a chlorine atom. [1]
 - (ii) Draw a diagram to show the electronic structure of a chlorine atom. [2]
 - (iii) State the charge that is carried by an ion of chlorine. [1]
 - (b) (i) State any **two** physical properties of bromine. [2]
 - (ii) State any **two** uses of bromine. [2]
 - (c) Explain why chlorine displaces bromine ions in an aqueous solution. [2]
- 11 (a) (i) An iron wedding ring is coated with gold.
Name the process that is used to coat the ring. [1]
- (ii) State any **two** reasons for coating the ring with gold. [2]
- (iii) State **one** disadvantage of coating the ring with gold. [1]
- (iv) State, with a reason, any other metal which can be used to coat the ring. [2]
- (b) (i) State any **three** differences between a physical change and a chemical change. [3]
- (ii) Give any **one** example of a compound. [1]

- 12 (a) Fig.12.1 shows the reaction of a magnesium ribbon with steam.

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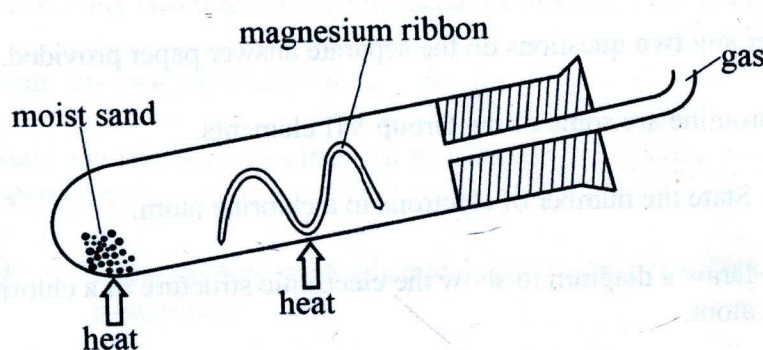


Fig.12.1

- (i) Write the word equation for the reaction. [3]
 - (ii) Name, with a reason, the reducing agent in the reaction. [2]
- (b) Cast iron is an alloy of iron.
- (i) Name the element that is combined with iron to form cast iron. [1]
 - (ii) State any **two** properties of cast iron. [2]
 - (iii) Give any **two** uses of cast iron. [2]

Section D

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

For
Examine
Use

- 13 (a) (i) State any **two** examples of characteristics that show continuous variation. [2]
- (ii) State the type of distribution that is represented by discontinuous variation. [1]
- (b) (i) When making five counts using the tally method, state how many vertical lines and diagonal lines one can make. [2]
- (ii) Identify the type of data presentation method which uses plotted points as a stage in the process of presenting data. [1]
- (c) Describe the stages of constructing a pie chart. [4]
- 14 (a) Write the base units of the newton (N). [1]
- (b) Fig.14.1 shows an instrument used to measure fluid pressure.

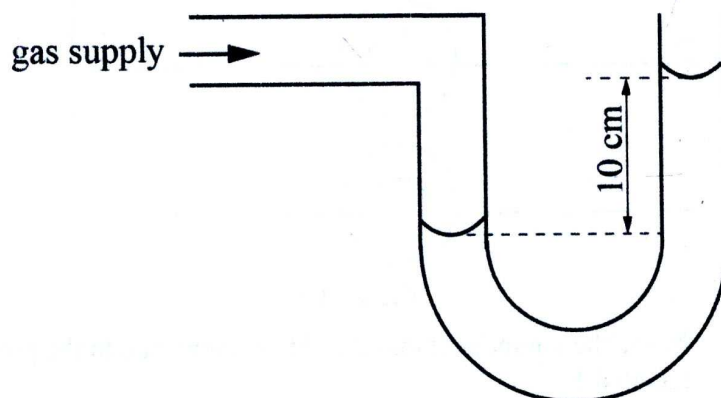


Fig.14.1

- (i) Name the instrument used to measure fluid pressure. [1]
- (ii) The liquid in the instrument in b(i) has a density of 0.3 kg/m^3 and it rises by 10 cm on one arm when connected to a gas supply. Find the pressure of the gas if atmospheric pressure is 2 Pa. [3]
[Take g to be 10 N/kg].

(c) Explain why the base of a dam is broader or thicker than the top. [2]

(d) (i) Describe how a siphon works. [2]

(ii) State any **one** other application where pressure is exerted to a fluid. [1]

15 (a) (i) Define the term *electric current*. [1]

(ii) State the Standard International (S I) unit of

1. voltage,

2. current.

[2]

(b) Fig.15.1 shows an incomplete circuit.

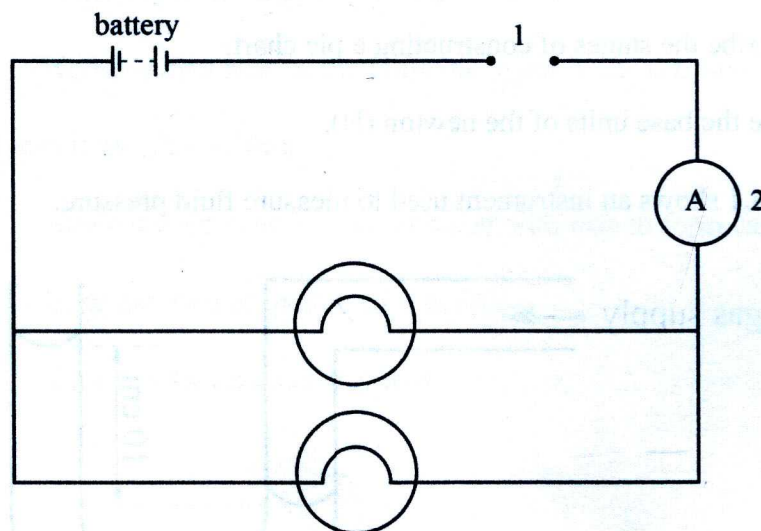


Fig.15.1

(i) Name the component that should be connected to the position labelled 1. [1]

(ii) Describe the function of the component labelled 2. [1]

(iii) Describe the arrangement of bulbs in the circuit. [1]

- (c) Fig.15.2 shows another electric circuit.

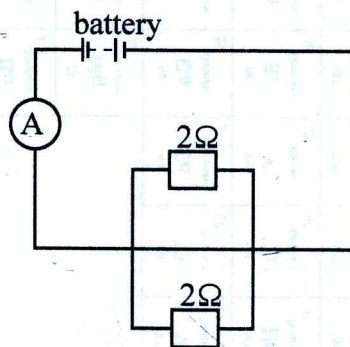


Fig.15.2

- (i) Calculate the total resistance of the resistors in the circuit. [2]
- (ii) State Ohm's law. [2]

DATA SHEET

The Periodic Table of the Elements

Group

Group																				
I	II											III	IV	V	VI	VII	O			
																			4 He Helium 2	
7 Li Lithium 3	9 Be Beryllium 4											1 H Hydrogen 1								
23 Na Sodium 11	24 Mg Magnesium 12																			
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36			
85 Rb Rubidium 37	86 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	101 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54			
133 Cs Cesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	210 Rn Radon 86			
226 Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89																		

*58-71 Lanthanoid series
†90-103 Actinoid series

Key

a	X	a = relative atomic mass
b	X	X = atomic symbol
b		b = proton (atomic) Number

The volume of one mole of any gas is 28 dm³ at room temperature and pressure (r.t.p.)