

Candidate Name

Centre Number

Candidate Number



For Performance Measurement

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

COMBINED SCIENCE

4003/2

PAPER 2 Theory

JUNE 2023 SESSION

2 hours

Additional materials:
Calculator (Optional)
Answer sheets
String

The Periodic Table is provided on page 14.

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 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 14 printed pages and 2 blank pages.

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[Turn over

1 (a) Parts of a dicotyledonous plant's stem include the phloem and the cambium.

State the function of the

(i) phloem,

_____ [1]

(ii) cambium.

_____ [1]

(b) Describe the method of water movement from the root hair cells across the cortex.

_____ [2]

(c) Blood is made up of different components.

(i) Identify the liquid component of blood.

_____ [1]

(ii) State any **one** function of the component named in (c)(i).

_____ [1]

(d) State **one** other function of blood.

_____ [1]

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2 (a) (i) Name a gas produced during respiration. [1]

(ii) Describe a test for the gas stated in (a)(i). [2]

(b) Fig.2.1 shows the human respiratory system.

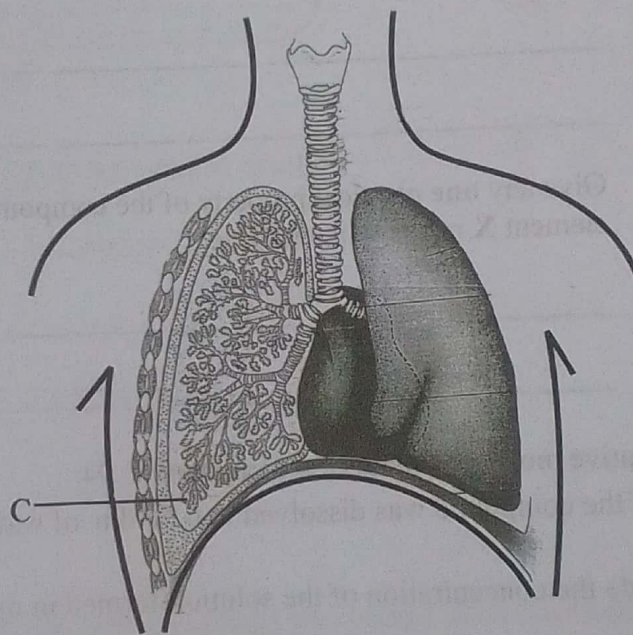


Fig.2.1

(i) Name part C. [1]

(ii) State the function of part C. [1]

(iii) Describe any two adaptations of part C for its function. [2]

3 The symbol of an element X is ${}_{12}^{24}\text{X}$.

(a) (i) State the number of electrons in an atom of element X.

_____ [1]

(ii) Write the electronic configuration for element X.

_____ [1]

(iii) State the type of bonding formed when element X reacts with chlorine.

_____ [1]

(iv) Give any **one** physical property of the compound formed when element X reacts with chlorine.

_____ [1]

(b) The relative molecular mass of a compound is 94.
47 g of the compound was dissolved in 0.50 dm^3 of water.

Calculate the concentration of the solution formed in mol/dm^3 .

[3]

4 (a) Fig.4.1 shows an electrolytic cell.

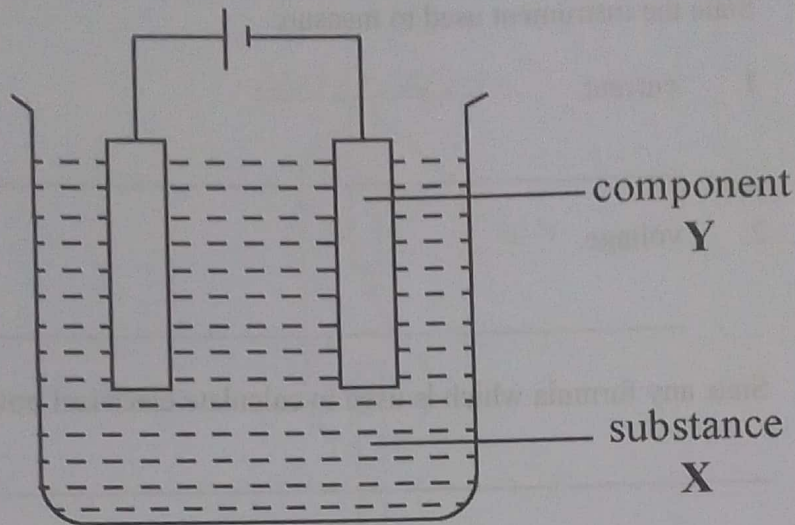


Fig.4.1

(i) State the term used to describe

1. substance X,

2. component Y.

[2]

(ii) Write the energy change that occurs in an electrolytic cell.

[2]

(b) An iron nail is electroplated with copper.

State the material or item that is connected to the

(i) positive terminal,

(ii) negative terminal.

[2]

5 (a) (i) State the instrument used to measure

1. current,

2. voltage.

[2]

(ii) State any formula which is used to calculate electrical power.

[1]

(b) Two balloons were rubbed with a woollen material.

(i) State the charge formed on the balloons.

[1]

(ii) Explain how each material got charged during the rubbing process.

[2]

- 6 (a) Fig.6.1 shows a pulley system used to lift a load.

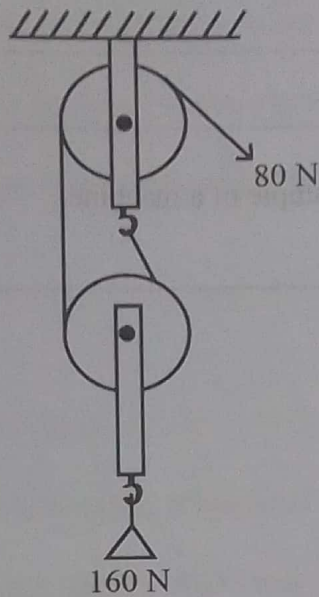


Fig.6.1

- (i) State the velocity ratio of the pulley system.

[1]

- (ii) Calculate the mechanical advantage of the pulley system.

[2]

- (iii) Calculate the efficiency of the pulley system.

[2]

(iv) Give any **one** reason why efficiency of the pulley system is **not** 100%.

[1]

(b) State any **one** other example of a machine.

[1]

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Section B

For
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UseAnswer any **two** questions on the separate answer sheets provided.

- 7 (a) Name a part of the alimentary canal where bile is produced. [1]
- (b) Describe the importance, in digestion, of
- (i) saliva, [2]
- (ii) bile, [2]
- (iii) pancreatic juice. [2]
- (c) Outline the importance of oral hygiene. [3]
- 8 (a) A person infected with HIV/AIDS may become infected with opportunistic diseases.
- (i) Explain what is meant by the term *opportunistic diseases*. [2]
- (ii) Give any **two** examples of opportunistic diseases. [2]
- (b) (i) Describe any **two** methods of mother to child transmission of HIV. [4]
- (ii) State any **two** ways of reducing mother to child transmission of HIV. [2]
- 9 (a) A woman's menstrual cycle runs from day 1 to day 28.
- (i) Describe the process that takes place in the uterus between days 1 – 4 for a woman who is **not** pregnant. [1]
- (ii) Identify the process that takes place in the ovary around the 14th day for the woman. [1]
- (iii) State any **two** female hormones. [2]
- (iv) State any **one** function of each of the hormones stated in (a)(iii). [2]
- (v) Describe the events that take place within one month after an ovum has been fertilised. [4]

Section C

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

- 10 In a titration experiment, a learner found out that 50.0 cm^3 of 1.0 mol/dm^3 sodium hydroxide (NaOH) solution was titrated with 25.0 cm^3 of dilute sulphuric acid (H_2SO_4).
- (a) State the reagent that should be used during the reaction to make the end point visible. [1]
- (b) State the products for the reaction between sodium hydroxide and sulphuric acid. [2]
- (c) State a method of separating the products. [1]
- (d) State the pH of any one of the products. [1]
- (e) Calculate the concentration of the sulphuric acid used given that 1 mole of H_2SO_4 reacts with 2 moles of sodium hydroxide. [5]
- 11 (a) Nitrogen gas and oxygen gas, which are used in industrial processes, can be obtained from atmospheric air.
- (i) Describe how atmospheric air is liquified. [4]
- (ii) State any **one** component of air which is removed during the process. [1]
- (b) (i) Name the method used to separate components of liquid air. [1]
- (ii) State any **one** use of nitrogen and any **one** use of oxygen. [2]
- (c) Describe a positive test for oxygen gas. [2]

- 12 (a) Fig.12.1 shows displayed structural formulae of two organic molecules, A and B.

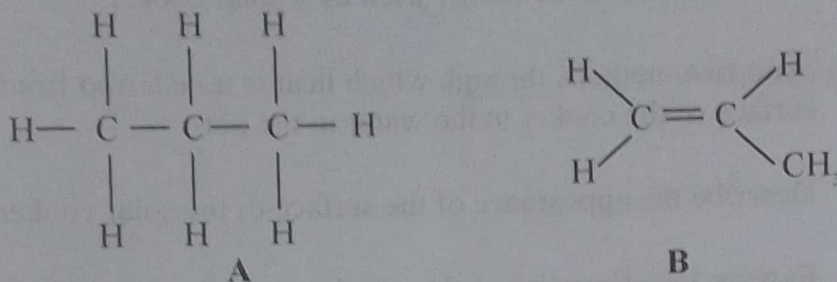


Fig.12.1

- (i) Name the organic molecules A and B. [2]
- (ii) Give any **two** differences between the two organic molecules. [2]
- (iii) State the **two** products of the complete combustion of compound A other than heat energy. [2]
- (b) A hydrocarbon, C, contains 86 % carbon and 14 % hydrogen by mass. Calculate the empirical formula of C. [4]

Section D

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

- 13 (a) (i) Name the source of energy used by a solar cooker. [1]
- (ii) State **two** methods through which heat is transferred from the surface of the cooker to the water in the pot. [2]
- (iii) Describe the appearance of the surface of the solar cooker. [3]
- (iv) Explain how the solar cooker works. [3]
- (b) State the name given to a material that is a poor conductor of heat. [1]
- 14 (a) Fig.14.1 shows one of the four strokes of an engine.

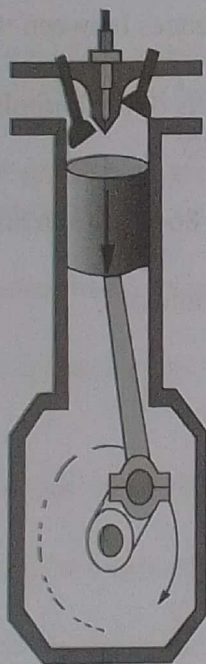


Fig.14.1

- (i) Identify, giving **two** reasons, the stroke shown. [3]
- (ii) Name the type of the engine that consists of the stroke shown in Fig.14.1. [1]
- (iii) Give a reason for the answer in (ii). [1]
- (iv) State **one** advantage and **one** disadvantage of the engine stated in (ii). [2]

- (b) Explain how a car braking system works. [3]
- 15 (a) (i) Suggest an instrument that can be used to measure the external diameter of a very thin object. [1]
- (ii) Name an instrument that can be used to measure the length of a building. [1]
- (iii) Express the newton (N) in its base units. [2]
- (b) Fig.15.1 shows a concrete block of mass 2600 kg resting on its biggest face.

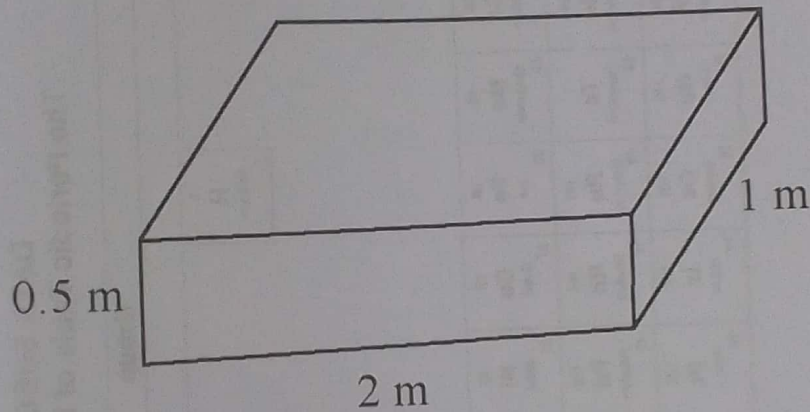


Fig.15.1

- (i) Calculate the pressure exerted by the block. [4]
[Take g as 10 N/m^2]
- (ii) Explain how the pressure exerted by the block changes if it is rested on one of the smallest faces. [2]

DATA SHEET

The Periodic Table of the Elements

I		II		Group										III		IV		V		VI		VII		O																																																																					
7 Li Lithium	3 Be Beryllium	11 B Boron	12 C Carbon	13 Al Aluminium	14 Si Silicon	15 P Phosphorus	16 S Sulphur	17 Cl Chlorine	18 Ar Argon	19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton	37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon	55 Ba Barium	56 La Lanthanum	57 Ce Cerium	58 Pr Praseodymium	59 Nd Neodymium	60 Pm Promethium	61 Sm Samarium	62 Eu Europium	63 Gd Gadolinium	64 Tb Terbium	65 Dy Dysprosium	66 Ho Holmium	67 Er Erbium	68 Tm Thulium	69 Yb Ytterbium	70 Lu Lutetium	71 Hf Hafnium	72 Ta Tantalum	73 W Tungsten	74 Re Rhenium	75 Os Osmium	76 Ir Iridium	77 Pt Platinum	78 Au Gold	79 Hg Mercury	80 Tl Thallium	81 Pb Lead	82 Bi Bismuth	83 Po Polonium	84 At Astatine	85 Rn Radon	86 Fr Francium	87 Ra Radium	88 Ac Actinium	89 Th Thorium	90 Pa Protactinium	91 U Uranium	92 Np Neptunium	93 Pu Plutonium	94 Am Americium	95 Cm Curium	96 Bk Berkelium	97 Cf Californium	98 Es Einsteinium	99 Fm Fermium	100 Md Mendelevium	101 No Nobelium	102 Lr Lawrencium

*89-71 Lanthanoid series
90-103 Actinoid series

Key
X = atomic symbol
s = proton (atomic) number

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