

Candidate Name

Centre Number

Candidate Number



# ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

## COMBINED SCIENCE

4003/2

PAPER 2 Theory

NOVEMBER 2022 SESSION

2 Hours

Additional materials:  
Answer sheets  
Calculator (Optional)  
String

The Periodic Table is provided on page 15.

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 paper 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.

### INFORMATION FOR CANDIDATES

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

For examiner's use	
Section A	
Section B	
Section C	
Section D	
TOTAL	

This question paper consists of 15 printed pages and 1 blank page.

Copyright: Zimbabwe School Examinations Council, N2022.

## Section A

Answer all questions in this section in the spaces provided on the question paper.

1. Fig.1.1 shows a diagram of a specialised cell.

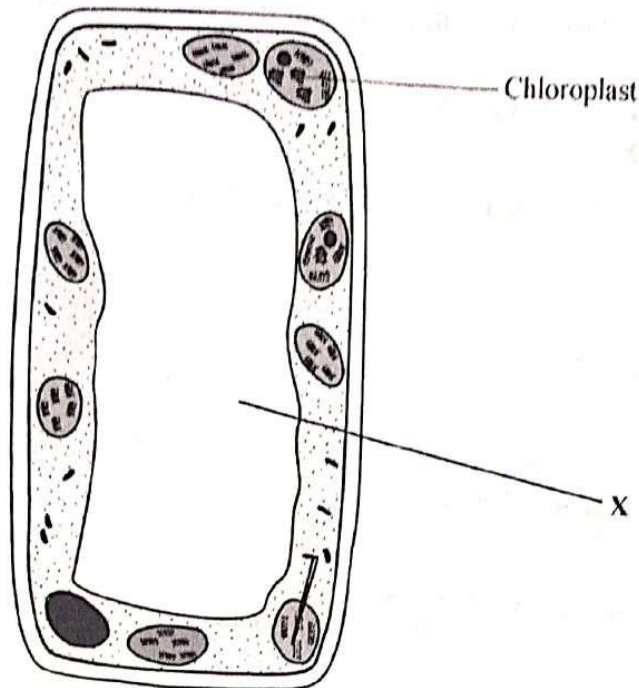


Fig.1.1

- (i) Identify the cell in Fig.1.1. [1]
- (ii) State the function performed by the cell shown in Fig.1.1. [1]
- (iii) Name part X. [1]

- (b) Describe what happens to the glucose and oxygen made in a leaf.

glucose

oxygen

[2]

- (c) (i) Give **one** function of guard cells.

[1]

- (ii) Explain how guard cells are adapted for the function stated in (i).

[1]

2. (a) Name **two** female sex hormones.

[2]

- (b) Describe the roles of the hormones named in (a) in the menstrual cycle.

[3]

- (c) (i) Define the term *ovulation*.

[1]

- (ii) State the range of days of the menstrual cycle when sexual intercourse is most likely to result in pregnancy.

[1]

3. (a) State any **two** processes which can be used to support the kinetic theory.

[2]

- (b) When a gas is compressed, state the property which

- (i) increases,

[1]

(ii) decreases.

[1]

(iii) Explain why it is easier to compress a gas than a solid.

[2]

4. A science teacher orders iron, zinc, copper and magnesium for use during laboratory practical lessons.

From the ordered metals, state the one

(a) (i) which reacts very slowly with air to form a greenish compound,

[1]

(ii) whose powder burns to form a yellow oxide when hot,

[1]

(iii) which burns easily to form a white solid.

[1]

(b) Arrange the four metals in their order of decreasing reactivity.

[2]

- (c) Explain why an iron nail placed in copper sulphate solution becomes coated with copper.

[2]

5. (a) State **one** difference between a petrol engine and a diesel engine.

[1]

- (b) Describe what happens during the power stroke of a petrol engine.

[3]

- (c) Name any **two** gases which are released in car exhaust fumes.

[2]

6. (a) (i) State **one** effect of force.

[1]

- (ii) Name the instrument used for measuring force.

[1]

- (iii) State the Standard International (S. I) unit of force.

[1]

- (b) Fig.6.1 shows an electric circuit in which a cell is used to light a bulb.

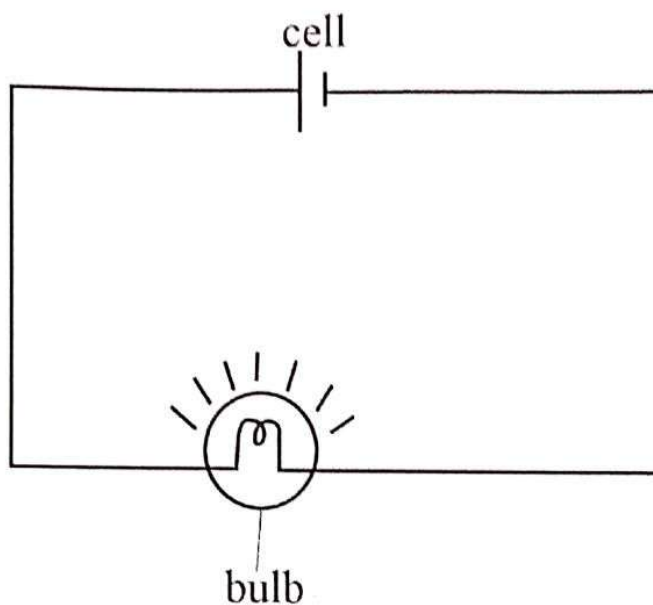


Fig.6.1

Construct an energy chain for Fig.6.1.

[2]

- (c) (i) State any one effect of energy.

[1]



(ii) Suggest **one** advantage of solar energy.

For  
Examiner  
Use

[1]



## Section B

Answer any **two** questions.

Write your answers on the separate answer sheets provided.

7. (a) (i) Name the causative pathogen of malaria. [1]  
 (ii) State any **three** symptoms of malaria. [3]  
 (b) State any **two** diseases that may be caused by tobacco smoking. [2]  
 (c) (i) State any **two** effects of excessive alcohol consumption. [2]  
 (ii) Explain why drinking alcohol while driving is **not** allowed in Zimbabwe. [2]
8. (a) (i) Explain the difference between mechanical digestion and chemical digestion. [2]  
 (ii) Mention any **two** uses of amino acids in the body. [2]  
 (b) (i) Name any **two** types of teeth. [2]  
 (ii) State the function of each type of tooth named in (b)(i). [2]  
 (c) Describe any **two** ways of keeping teeth health. [2]
9. (a) (i) Define the term *asexual reproduction*. [1]  
 (ii) Describe **four** advantages of asexual reproduction. [4]  
 (b) (i) State any **two** methods of contraception. [2]  
 (ii) Describe any **three** effects of an increase in human population on the environment. [3]

## Section C

Answer any **two** questions.

Write your answers on the separate answer sheets provided.

10. (a) (i) Describe the manufacture of ethanol by fermentation. [3]
- (ii) State any **two** uses of ethanol. [2]
- (b) (i) Name the homologous series to which ethanol belongs. [1]
- (ii) Draw the structural formula of ethanol. [1]
- (c) An organic compound X was analysed and found to contain the following percentages:  
52.2% carbon    13.0% hydrogen    34.8% oxygen  
Calculate the empirical formula of X. [3]
11. (a) Fuels release energy when they burn.
- (i) State **one** example of a
1. gaseous fuel,
2. solid fuel. [2]
- (ii) Give **two** advantages of gaseous fuels over solid fuels. [2]
- (b) Explain a danger of incomplete combustion of fuel in a bedroom which has poor ventilation. [2]
- (c) (i) State any **two** properties of an acid. [2]
- (ii) State any **two** properties of a base. [2]

12. (a) Fig.12.1 gives a flow chart showing the domestic process of producing peanut butter.

For  
Examiner's  
Use

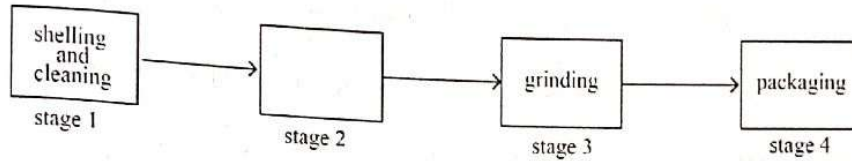


Fig.12.1

Name the equipment needed for

- (i) stage 1, [2]
  - (ii) stage 3. [2]
- (b)
- (i) Describe what happens during stage 2. [2]
  - (ii) Explain the importance of stage 2. [3]
  - (iii) Describe how peanut oil is produced from peanut butter. [1]
  - (iv) State any **two** uses of peanut oil. [2]

## Section D

Answer any two questions.

Write your answers on the separate answer sheets provided.

13. (a) A 400 kg car is moving with a constant velocity of 100 m/s.

(i) Define the term *velocity*.

[2]

(ii) Calculate the momentum of the car.

[3]

- (b) Fig.13.1 shows an inclined plane.

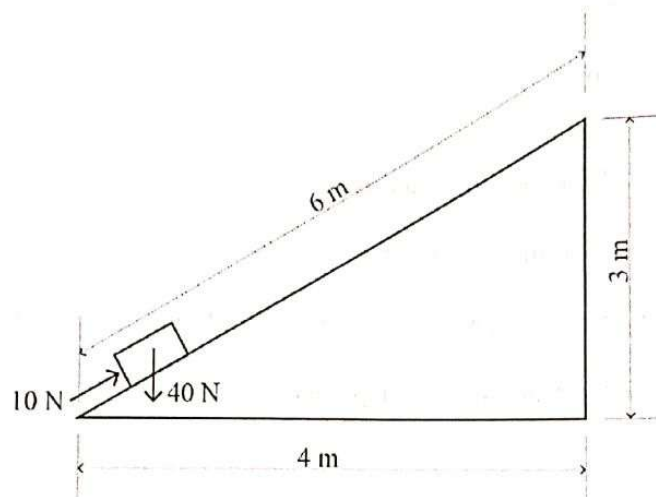


Fig.13.1

(i) Calculate the mechanical advantage, MA, of the inclined plane. [2]

(ii) Calculate the velocity ratio, VR, of the inclined plane. [2]

(iii) State any **one** factor that results in more energy losses in machines. [1]

14. (a) Fig.14.1 shows water in a pot being heated on a hot plate.

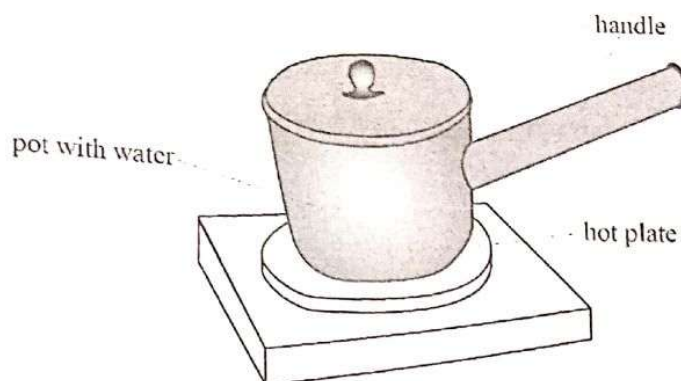


Fig.14.1

- (i) State the method of heat transfer from the hot plate to the pot. [1]
- (ii) State, giving a reason, a suitable material for making the handle of the pot. [2]
- (iii) Explain the process of convection in terms of the kinetic theory of matter. [3]
- (b) (i) Define the term *lightning*. [1]
- (ii) State any three precautions to be taken against lightning. [3]

For  
Examiner's  
Use

15. (a) (i) List any **one** source of light energy. [1]
- (ii) Describe the evidence that shows that light travels in a straight line. [1]
- (b) Fig. 15.1 shows **two** musical instruments, A and B.



A



B

Fig.15.1

Explain how sound is produced in

- (i) instrument A, [2]
- (ii) instrument B. [2]
- (c) (i) Define the term *work*. [1]
- (ii) Calculate work done when a weight of 600 N is lifted vertically through 6.5 m. [3]



# DATA SHEET The Periodic Table of the Elements

Group																			
I	II													III	IV	V	VI	VII	O
<div><div>1 H Hydrogen</div><div>2 He Helium</div></div>																			
3 Li Lithium	4 Be Beryllium													5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon
11 Na Sodium	12 Mg Magnesium	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 Cs Caesium	56 Ba Barium	57 La Lanthanum	58 Ce Cerium	59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium	64 Gd Gadolinium	65 Tb Terbium	66 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thulium	70 Yb Ytterbium	71 Lu Lutetium			
87 Fr Francium	88 Ra Radium	89 Ac Actinium	90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium			
<div><div>58-71 Lanthanoid series</div><div>90-103 Actinoid series</div></div>																			

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

The volume of one mole of any gas is 28 dm<sup>3</sup> at room temperature and pressure (r.t.p.)