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.

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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.

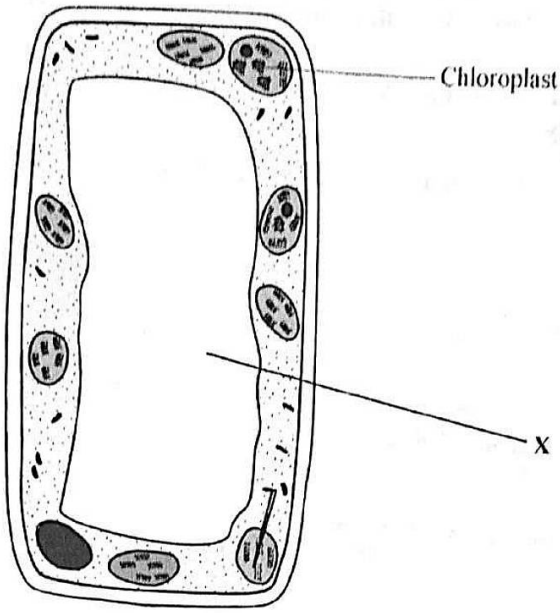


Fig.1.1

(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]

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(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]

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(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]

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(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]

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(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]

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(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.

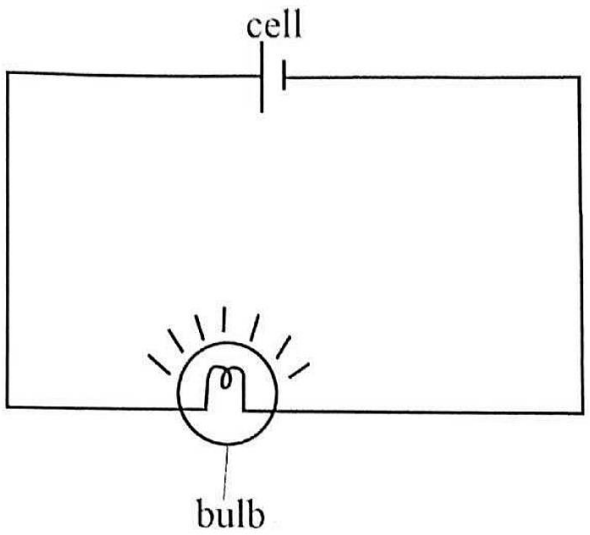


Fig.6.1

Construct an energy chain for **Fig.6**.1.

.....

.....

[2]

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

.....

.....

[1]

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

.....

.....

.....

[1]

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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]

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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]

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

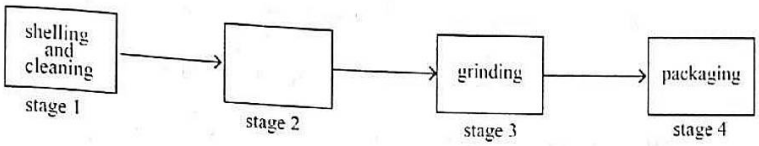


Fig.12.1

Name the equipment needed for

(i) stage 1,

(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]

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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.

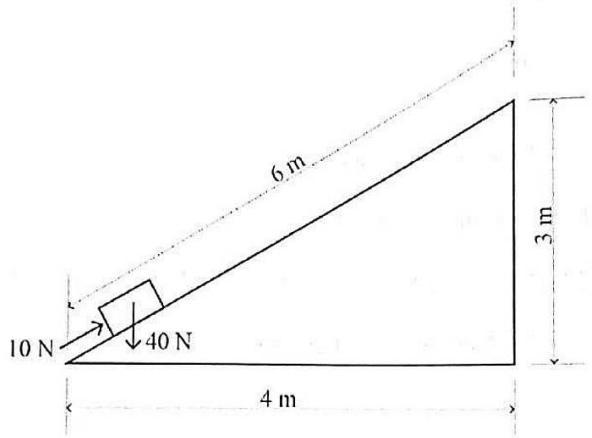


Fig.13.1

(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]

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

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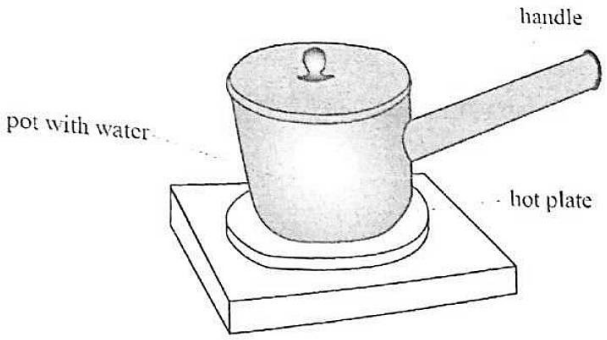


Fig.14.1

(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]

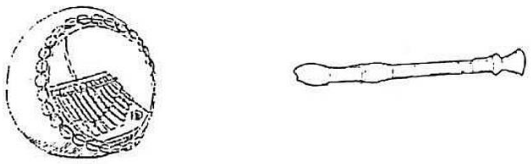
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15. (a) (i) List any **one** source of light energy. [1]

(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]

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DATA SHEET
The Periodic Table of the Elements

Group	I	II										III	IV	V	VI	VII	0
																	4 He Helium 2
	7 Li Lithium 3	9 Be Beryllium 4					1 H Hydrogen 1					11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
	23 Na Sodium 11	24 Mg Magnesium 12										27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
	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	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	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 Caesium 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	Po Polonium 84	At Astatine 85	Rn Radon 86
	Fr Francium 87	226 Ra Radium 88	227 Ac Actinium † 89															

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

	140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
	232 Th Thorium 90	Pa Protactinium 91	238 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 103

Key

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

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

[Turn over

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