

EXAMINATIONS COUNCIL OF ZAMBIA

Examination for School Certificate Ordinary Level

**Science**

**5124/1**

**(Chemistry, Physics)**

**PAPER 1 Multiple Choice**

**Monday**

**12 OCTOBER 2015**

Additional materials:

Mathematical tables/Electronic calculator (non-programmable)

Multiple Choice Answer Sheet

Soft clean eraser

Soft pencil (types B or HB is recommended)

**Time: 1 hour**

**Instructions to candidates**

**Do not open this booklet until you are told to do so.**

Look at the left hand side of your answer sheet. Ensure that your name, the school/centre name and subject paper are **printed**. Also ensure that the subject code, paper number, centre code, your examination number and the year are **printed** and **shaded**. Do not change the already printed information.

There are **forty questions** in this paper. Answer **all** questions. For each question, there are **four** possible answers, **A, B, C** and **D**. Choose the one you consider correct and record your choice in soft pencil on the separate answer sheet.

Read very carefully the instructions on the answer sheet.

**Information for candidates**

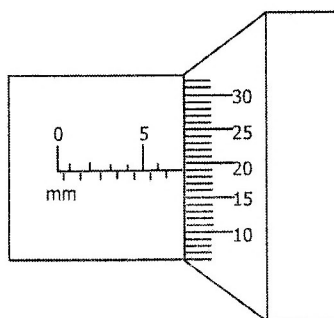
Each correct answer will score one mark. A mark will not be deducted for a wrong answer. Any rough working should be done in this question paper.

The **Periodic Table** is printed on page 11.

**Cell phones are not allowed in the examination room.**

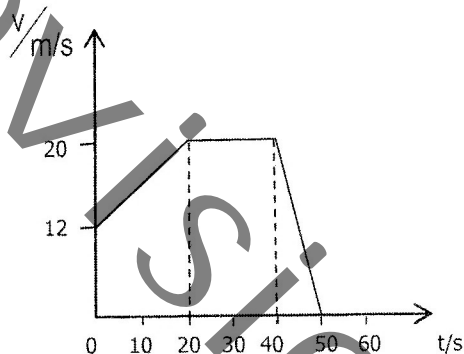


- 1 The diagram below shows part of the micrometre screw gauge. What is the reading shown in the diagram?



- A 6.69 mm
- B 6.86 mm
- C 6.68 cm
- D 5.68 mm

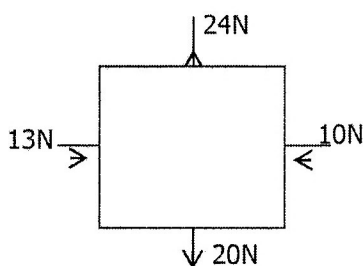
- 2 The velocity time graph for the motion of a trolley is shown below.



What distance did the trolley travel when there was no resultant force acting on it?

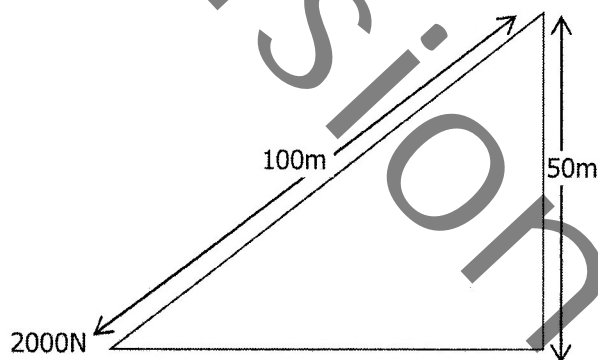
- A 200m
  - B 320m
  - C 400m
  - D 520m
- 3 Which of the following quantities changes when a body is accelerating?
- A Mass of the body.
  - B Weight of the body.
  - C Velocity of the body.
  - D The force acting on the body.
- 4 To find the density of a liquid, a pupil noticed that 90g of the liquid occupied the same volume as 114g of water of density  $1000\text{kg/m}^3$ . What was the density of the liquid?
- A  $0.79\text{g/cm}^3$
  - B  $1.27\text{gcm}^3$
  - C  $2.04\text{g/cm}^3$
  - D  $4.90\text{g/cm}^3$

- 5 A number of forces are acting on a body as shown in the diagram below.



What is the magnitude of the resultant force acting on the body?

- A 0N  
 B 3N  
 C 5N  
 D 12N
- 6 A toy car of mass 600g moves through 6m in 2 seconds. The average kinetic energy of the toy car is ...
- A 0.027J  
 B 0.27J  
 C 2.7J  
 D 66.67J
- 7 The diagram below shows an inclined plane used to lift a load of 2000N.



What is the velocity ratio of the inclined plane as a simple machine?

- A 40.0  
 B 20.0  
 C 2.0  
 D 0.5
- 8 Which of the following processes shows that particles of matter are in a random motion?
- A A small drop of oil spreads into a large circular patch on water.  
 B Particles of smoke are seen to move haphazardly.  
 C Bromine gas spreads slowly into a vacuum.  
 D Particles of smoke are seen to move in one direction only.

- 9 Which of the following describes the difference between x-rays and gamma rays?
- A Gamma rays and x-rays have different sources.
  - B Gamma rays travel faster than x-rays.
  - C Gamma rays have a longer wavelength than x-rays.
  - D Gamma rays do not affect photographic films.

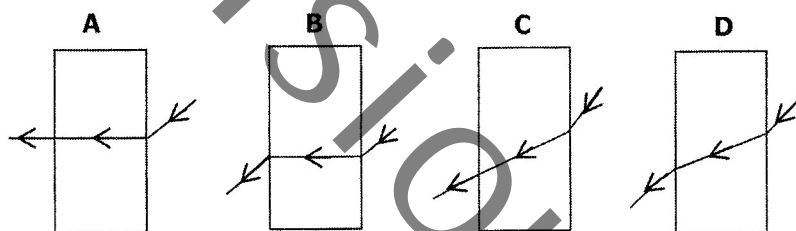
- 10 A ripple tank with a vibrator hitting the surface of water with a frequency of 60Hz produces 10 complete waves in a distance of 15 cm. What is the velocity of the water waves produced?

- A 0.9m/s
- B 9m/s
- C 90m/s
- D 900m/s

- 11 When a sound wave passes through air, the particles of air ...

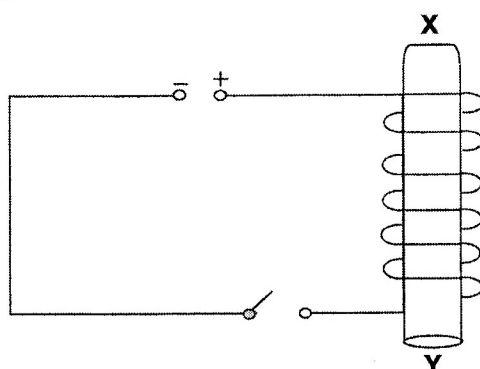
- A oscillate perpendicular to the direction of the wave.
- B oscillate parallel to the direction of the wave.
- C oscillate up and down.
- D do not move at all.

- 12 A ray of light from a ray box is directed on one side of a parallel sided glass block.



Which diagram shows the path of the ray of light through the glass block?

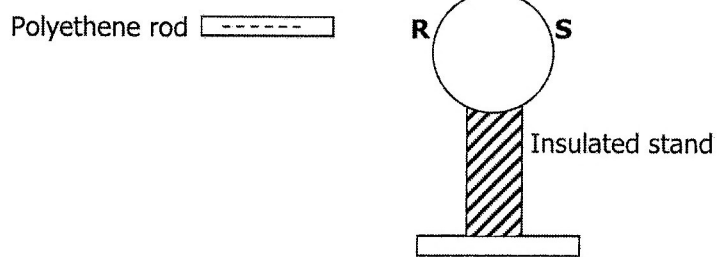
- 13 The diagram below shows a soft iron rod placed inside a solenoid connected to a d.c supply. The ends of the soft iron rod are marked **X** and **Y**.



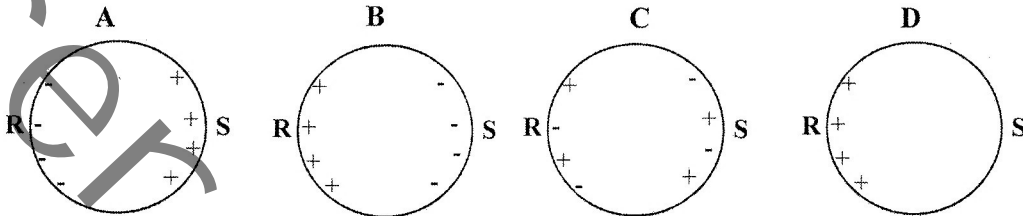
When current is switched on which of the following occurs?

- A **X** attracts pieces of iron filings.
- B **X** becomes the South Pole.
- C **Y** becomes the North Pole.
- D **Y** does not attract pieces of iron filings.

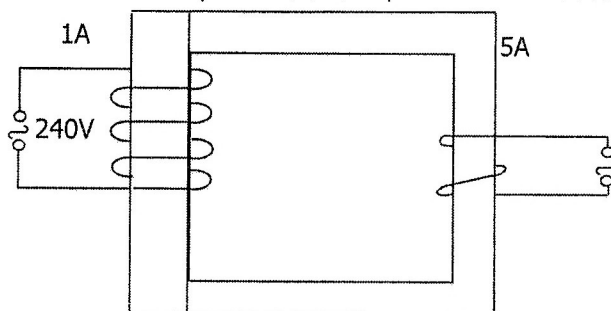
- 14 The diagram below shows a charged polyethene rod which is moved near to end **R** of a metal sphere mounted on an insulating stand?



Which of the following shows the correct charge distribution on the sphere?



- 15 A battery moves a charge of  $60\text{C}$  around a circuit at a constant rate in 20 seconds. What is the current flowing in the circuit?
- A 80A  
B 40A  
C 3.0A  
D 0.3A
- 16 A heater is connected to a 200V supply. If the heating element has a resistance of  $10\Omega$ , how much electrical energy is supplied to the heater in 2 minutes?
- A 800 000J  
B 480 000J  
C 8 000J  
D 4 000J
- 17 The diagram below shows an ideal transformer which is supplied with an alternating voltage of 240V and a current of 1A. If the secondary current is 5A, what is the secondary voltage?



- A 1400V  
B 1200V  
C 240V  
D 48V

18 What is the purpose of **X-plates** and **Y-plates** in a Cathode Ray Tube?

	<b>X-Plates</b>	<b>Y-Plates</b>
<b>A</b>	Deflecting electrons horizontally	Deflecting electrons vertically
<b>B</b>	Deflecting electrons vertically	Deflecting electrons horizontally
<b>C</b>	Accelerating electrons	Deflecting electrons vertically
<b>D</b>	Deflecting electrons horizontally	Accelerating electrons

19 Which of the following radiations is **NOT** deflected by an electric field?

- A** Alpha
- B** Beta
- C** Gamma
- D** Proton

20 The radioactive nucleus  ${}_{38}^{90}\text{Sr}$  strontium undergoes beta decay.

Which of the following is the correct nuclear equation?

- A**  ${}_{38}^{90}\text{Sr} \longrightarrow {}_{39}^{90}\text{Y} + \beta$
- B**  ${}_{38}^{90}\text{Sr} \longrightarrow {}_{38}^{91}\text{Y} + \beta$
- C**  ${}_{38}^{90}\text{Sr} \longrightarrow {}_{40}^{90}\text{Y} + \beta$
- D**  ${}_{38}^{90}\text{Sr} \longrightarrow {}_{39}^{91}\text{Y} + \beta$

21 Which changes occur when a liquid at 50°C becomes a gas at 120°C?

	<b>Separation of particles</b>	<b>Energy of particles</b>	<b>Attractive force between particles</b>
<b>A</b>	decreases	increases	decreases
<b>B</b>	decreases	decreases	increases
<b>C</b>	increases	increases	decreases
<b>D</b>	increases	decreases	increase

22 Of the techniques below, which one can be used to separate cellular components of blood from blood plasma?

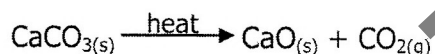
- A** Centrifugation
- B** Chromatography
- C** Distillation
- D** Filtration

- 23 Element **X** has an electronic configuration 2, 8, 8, 1 while that of **Y** is 2, 8, 6.  
Which one of the following is true about the compound formed between **X** and **Y**?
- A Covalent compound of formula  $X_2Y$ .
  - B Covalent compound of formula  $XY_2$ .
  - C Ionic compound of formula  $XY_2$ .
  - D Ionic compound of formula  $X_2Y$ .

- 24 Which one of the following contains a set of three elements?
- A Argon, Lime, Water.
  - B Potassium, Graphite, Nitrogen.
  - C Silica, Oxygen, Hydrogen
  - D Copper, Petrol, Alcohol .

- 25 How many atoms are there in 6.0g of carbon atoms?
- A  $3 \times 10^{23}$
  - B  $6 \times 10^{23}$
  - C  $1.2 \times 10^{24}$
  - D  $6 \times 10^{24}$

- 26 Calcium carbonate,  $CaCO_3$  decomposes according to the following equation;



What volume of carbon dioxide, measured at room temperature and pressure is produced when 50.0g calcium carbonate is decomposed?

- A 12.0dm<sup>3</sup>
  - B 24.0dm<sup>3</sup>
  - C 48.0dm<sup>3</sup>
  - D 120dm<sup>3</sup>
- 27 Ethane  $C_2H_6$  burns in oxygen completely according to the balanced equation below.



Which of the following sets of coefficients balances the equation correctly?

- |   | a | b   | c | d |
|---|---|-----|---|---|
| A | 1 | 3.5 | 2 | 3 |
| B | 1 | 7   | 4 | 5 |
| C | 2 | 7   | 4 | 6 |
| D | 2 | 3.5 | 4 | 6 |

28 In the Periodic Table hydrogen (H) is not placed in any of the Groups. Which of the following is the best explanation for its position? It ...

- A has no neutrons.
- B is the lightest of all the elements.
- C has properties of both Group I and Group VII elements.
- D has only one electron in its only single energy level.

29 One physical property of all metals is that they are all ...

- A hard with high melting points.
- B reactants forming coloured compounds.
- C never found native.
- D good electrical conductors.

30 Which pair suits the metal and its ore from which it is extracted?

	Metal	Ore
A	copper	haematite
B	aluminium	haematite
C	iron	bauxite
D	iron	haematite

31 Which ions form the net ionic equation when aqueous solutions of ethanoic acid and sodium hydroxide react together?

- A Ethanoate ions and sodium ions.
- B Ethanoate ions and hydroxide ions.
- C Hydrogen ions and hydroxide ions.
- D Hydrogen ions and sodium ions.

32 A solution of pH less than 7 is ...

- A acidic.
- B amphoteric.
- C basic.
- D neutral.

33 Which one of the following salts can be suitably prepared by precipitation method?

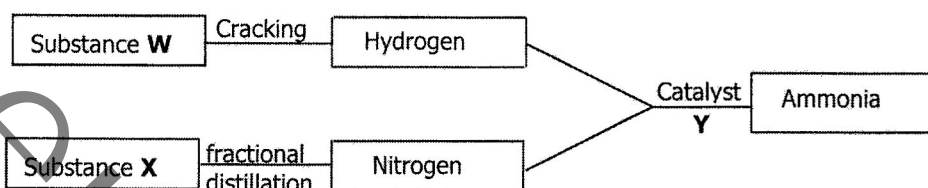
- A  $\text{BaSO}_4$
- B  $\text{BaCl}_2$
- C  $\text{Ba}(\text{NO}_3)_2$
- D  $\text{Pb}(\text{NO}_3)_2$



34 Which one of the following compounds contains two elements essential to plant growth?

- A Ammonium nitrate
- B Potassium nitrate
- C Potassium sulphate
- D Sodium phosphate

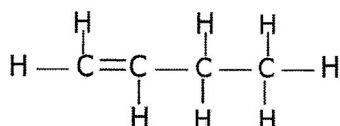
35 The diagram below shows processes that lead to manufacturing of ammonia.



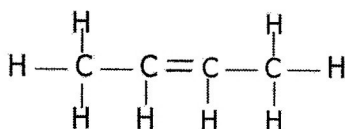
Which of the following identifies **W**, **X** and **Y**?

- |          | <b>W</b> | <b>X</b> | <b>Y</b>           |
|----------|----------|----------|--------------------|
| <b>A</b> | Oil      | Air      | Vanadium (V) oxide |
| <b>B</b> | Oil      | Air      | Iron               |
| <b>C</b> | Air      | Oil      | Iron               |
| <b>D</b> | Air      | Oil      | Vanadium (V) oxide |

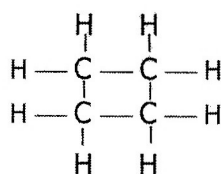
36 Consider the three structures labelled **I**, **II** and **III**.



**I**



**II**



**III**

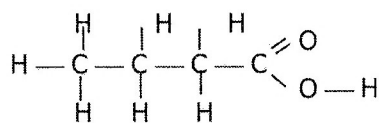
Which of the above structures are isomers?

- A I and II only
- B I and III only
- C II and III only
- D I, II and III

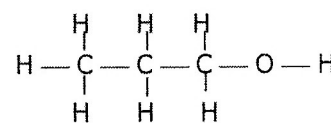
37 The test results on compound **Z** are shown below?

Test	Result
Addition of bromine solution	Bromine is rapidly decolourised
Addition of sodium carbonate	Carbon dioxide gas is produced

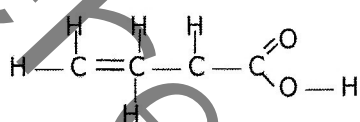
Which of the following compounds best fits the above descriptions?



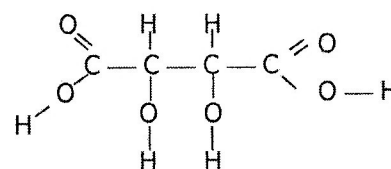
**A**



**B**

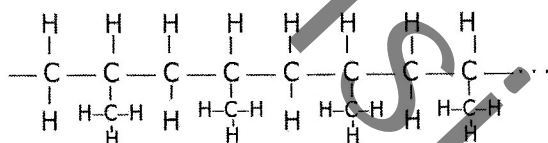


**C**



**D**

38 A polymer has the structure shown below



What is the molecular formula of the monomer?

- A** C<sub>2</sub>H<sub>4</sub>  
**B** C<sub>2</sub>H<sub>6</sub>  
**C** C<sub>3</sub>H<sub>6</sub>  
**D** C<sub>3</sub>H<sub>8</sub>

39 Which compound is formed by reacting ethene with steam in the presence of hot phosphoric acid catalyst?

- A** Ethane  
**B** Ethanol  
**C** Propane  
**D** Propanol

40 Which of the following processes involves formation of small molecules from large molecules?

- A** Formation of starch from glucose.  
**B** Polymerisation of ethene.  
**C** Hydrogenation of ethene.  
**D** Fermentation of sugar.

DATA SHEET

The Periodic Table of the Elements

Group		I	II	III										IV	V	VI	VII	0															
7 Li Lithium 3	9 Be Beryllium 4	1 H Hydrogen 1																2 He Helium															
23 Na Sodium 11	24 Mg Magnesium 12	11 B Boron 5	12 C Carbon 6	13 Al Aluminium 13	14 N Nitrogen 7	15 P Phosphorus 15	16 S Sulphur 16	17 Cl Chlorine 17	18 Ar Argon 18	19 F Fluorine 9	20 Ne Neon 10																						
39 K Potassium 19	40 Ca Calcium 20	27 Co Cobalt 27	28 Ni Nickel 28	29 Cu Copper 29	30 Zn Zinc 30	31 Ga Gallium 31	32 Ge Germanium 32	33 As Arsenic 33	34 Se Selenium 34	35 Br Bromine 35	36 Kr Krypton 36																						
85 Rb Rubidium 37	88 Sr Strontium 38	45 Sc Scandium 21	46 Ti Titanium 22	47 V Vanadium 23	48 Cr Chromium 24	49 Mn Manganese 25	50 Fe Iron 26	51 Co Cobalt 27	52 Ni Nickel 28	53 Cu Copper 29	54 Zn Zinc 30	55 Ga Gallium 31	56 Ge Germanium 32	57 As Arsenic 33	58 Se Selenium 34	59 Br Bromine 35	60 Kr Krypton 36																
133 Cs Caesium 55	137 Ba Barium 56	73 Tc Technetium 43	74 Ru Ruthenium 44	75 Rh Rhodium 45	76 Pd Palladium 46	77 Ag Silver 47	78 Au Gold 79	79 Hg Mercury 80	80 Tl Thallium 81	81 Pb Lead 82	82 Bi Bismuth 83	83 Po Polonium 84	84 At Astatine 85	85 Rn Radon 86																			
87 Fr Francium	226 Ra Radium 88	140 Ce Cerium 58	141 Pr Praseodymium 59	142 Nd Neodymium 60	143 Pm Promethium 61	144 Sm Samarium 62	145 Eu Europium 63	146 Gd Gadolinium 64	147 Tb Terbium 65	148 Dy Dysprosium 66	149 Ho Holmium 67	150 Er Erbium 68	151 Tm Thulium 69	152 Yb Ytterbium 70	153 Lu Lutetium 71	154 Lr Lawrencium 103																	
*58-71 Lanthanoid series																	+90-103 Actinoid series																
Key																	a = relative atomic mass																
X																	X = atomic symbol																
b																	b = proton (atomic) number																

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).