

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

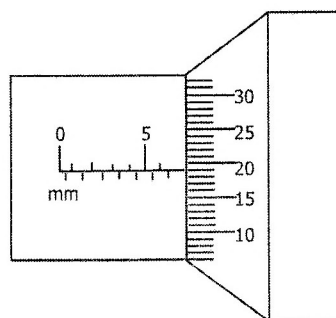
Each correct answer will score one mark. A mark will not be deducted for a wrong answer. Any rough working should be done in this question paper.

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

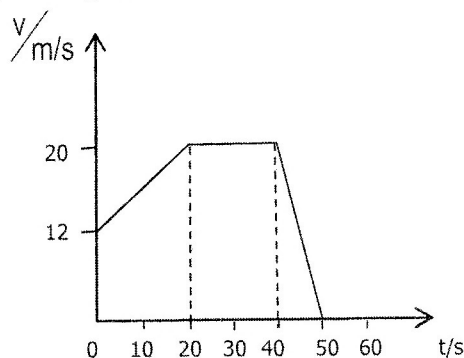
Cell phones are not allowed in the examination room.



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



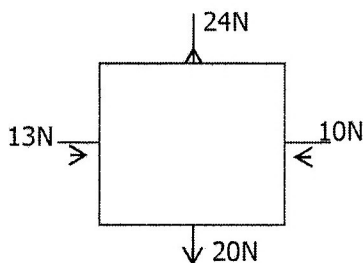
- A 6.69 mm
 B 6.86 mm
 C 6.68 cm
 D 5.68 mm
- 2 The velocity time graph for the motion of a trolley is shown below.



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

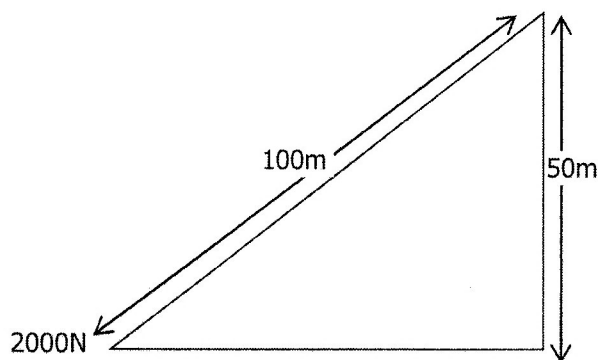
- A 200m
 B 320m
 C 400m
 D 520m
- 3 Which of the following quantities changes when a body is accelerating?
- A Mass of the body.
 B Weight of the body.
 C Velocity of the body.
 D The force acting on the body.
- 4 To find the density of a liquid, a pupil noticed that 90g of the liquid occupied the same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

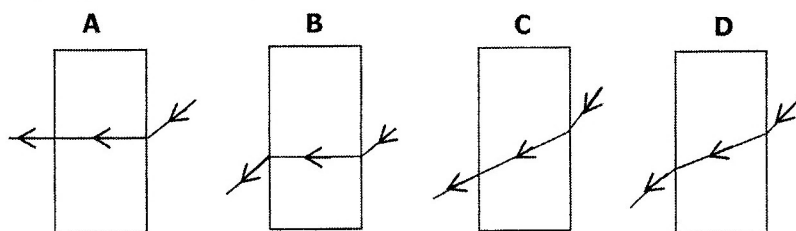
- A 0N
 - B 3N
 - C 5N
 - D 12N
- 6 A toy car of mass 600g moves through 6m in 2 seconds.
The average kinetic energy of the toy car is ...
- A 0.027J
 - B 0.27J
 - C 2.7J
 - D 66.67J
- 7 The diagram below shows an inclined plane used to lift a load of 2000N.



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

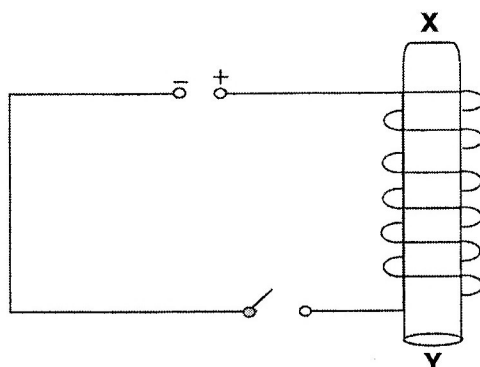
- A 40.0
 - B 20.0
 - C 2.0
 - D 0.5
- 8 Which of the following processes shows that particles of matter are in a random motion?
- A A small drop of oil spreads into a large circular patch on water.
 - B Particles of smoke are seen to move haphazardly.
 - C Bromine gas spreads slowly into a vacuum.
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

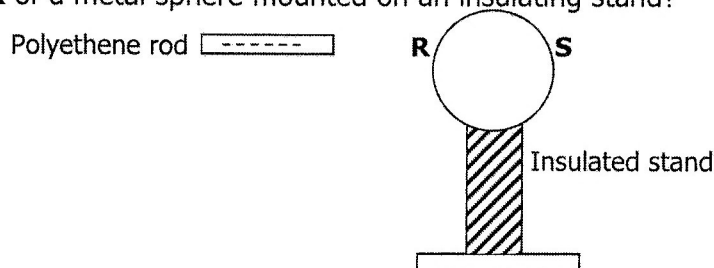
- 13 The diagram below shows a soft iron rod placed inside a solenoid connected to a d.c supply. The ends of the soft iron rod are marked **X** and **Y**.



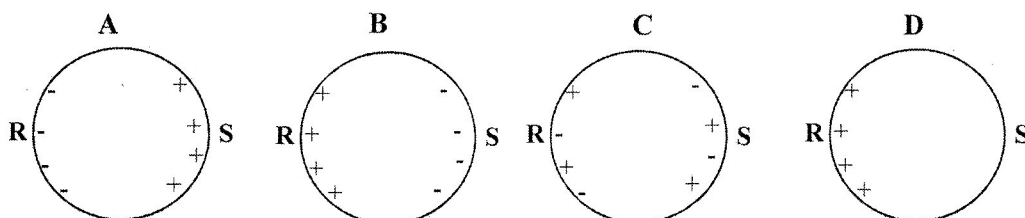
When current is switched on which of the following occurs?

- 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.

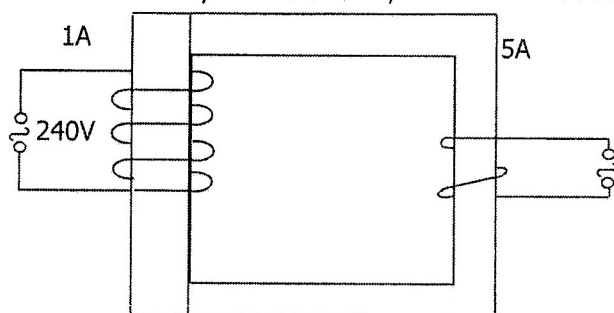
- 14** The diagram below shows a charged polyethene rod which is moved near to end **R** of a metal sphere mounted on an insulating stand?



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



- 15** A battery moves a charge of 60C 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 10Ω , 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?

	X-Plates	Y-Plates
A	Deflecting electrons horizontally	Deflecting electrons vertically
B	Deflecting electrons vertically	Deflecting electrons horizontally
C	Accelerating electrons	Deflecting electrons vertically
D	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 $^{90}_{38}\text{Sr}$ strontium undergoes beta decay.

Which of the following is the correct nuclear equation?

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

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

	Separation of particles	Energy of particles	Attractive force between particles
A	decreases	increases	decreases
B	decreases	decreases	increases
C	increases	increases	decreases
D	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** 3×10^{23}
B 6×10^{23}
C 1.2×10^{24}
D 6×10^{24}
- 26** Calcium carbonate, $CaCO_3$ decomposes according to the following equation;
- $$CaCO_{3(s)} \xrightarrow{\text{heat}} CaO_{(s)} + CO_{2(g)}$$
- What volume of carbon dioxide, measured at room temperature and pressure is produced when 50.0g calcium carbonate is decomposed?
- A** 12.0dm³
B 24.0dm³
C 48.0dm³
D 120dm³
- 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.

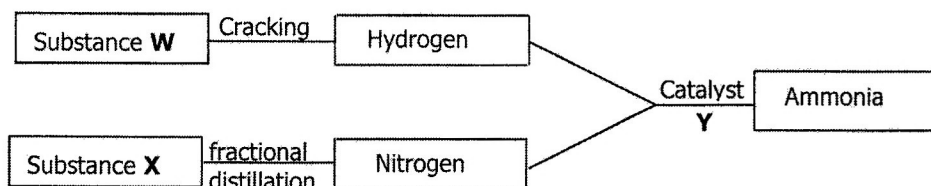
32 A solution of pH less than 7 is ...

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

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

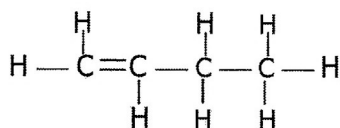
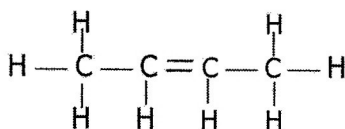
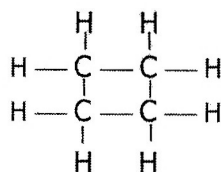
- A** BaSO_4
- B** BaCl_2
- C** $\text{Ba}(\text{NO}_3)_2$
- D** $\text{Pb}(\text{NO}_3)_2$

- 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**?

- | | W | X | Y |
|----------|----------|----------|--------------------|
| A | Oil | Air | Vanadium (V) oxide |
| B | Oil | Air | Iron |
| C | Air | Oil | Iron |
| D | Air | Oil | Vanadium (V) oxide |
- 36 Consider the three structures labelled **I**, **II** and **III**.

**I****II****III**

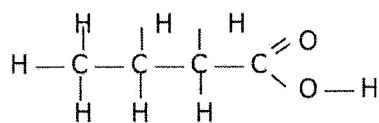
Which of the above structures are isomers?

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

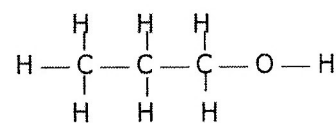
- 37 The test results on compound **Z** are shown below?

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

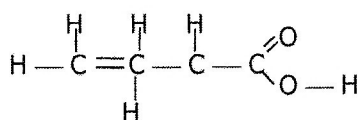
Which of the following compounds best fits the above descriptions?



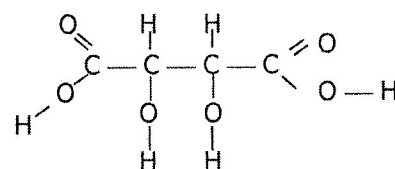
A



B

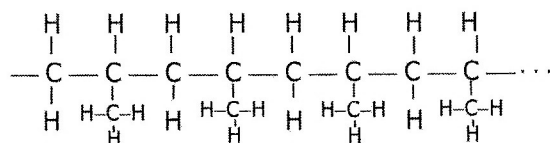


C



D

- 38 A polymer has the structure shown below



What is the molecular formula of the monomer?

- A** C_2H_4
B C_2H_6
C C_3H_6
D C_3H_8
- 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				
<div>1 H Hydrogen</div>														4 He Helium			
7 Li Lithium 3	9 Be Beryllium 4													2			
23 Na Sodium 11	24 Mg Magnesium 12													19 F Fluorine 9	20 Ne Neon 10		
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	98 Tc Technetium 43	104 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	210 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86
87 Fr Francium	88 Ra Radium	89 Ac Actinium															

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

Key

a

X

b

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

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	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	238 Pa Protactinium 91	238 U Uranium 92	238 Pu Plutonium 94	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Cf Californium 98	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102	238 Lr Lawrencium 103

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).