EXAMINATIONS COUNCIL OF ZAMBIA
Joint Examination for the School Certificate
and General Certificate of Education Ordinary Level

SCIENCE
(CHEMISTRY, PHYSICS)
PAPER 1  Multiple Choice

Thursday  29 OCTOBER 2009  1 hour

Additional materials:
  Mathematical tables (No calculators)
  Multiple Choice answer sheet
  Soft clean eraser
  Soft pencil (types B or HB is recommended)

INSTRUCTIONS TO CANDIDATES

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

Write your name, centre number and candidate number on the answer sheet in the spaces provided unless this has already been done for you.

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 booklet.

A copy of the Periodic Table is on page 10.

Cell phones are not allowed in the Examination Room.

This question paper consists of 12 printed pages.
1 All measurable features or properties of objects are called ... 
   A SI units. 
   B measurements. 
   C physical quantities. 
   D images. 

2 Which of the following numbers has four significant figures? 
   A 0.0002 
   B 0.0020 
   C 0.0200 
   D 0.2000 

3 A motorist travels 320km at 80km/h and then 320km at 100km/h. What is the average 
   speed of the motorist for the entire trip? 
   A 84km/h 
   B 89km/h 
   C 90km/h 
   D 91km/h 

4 A stone of mass 400g is lowered into a measuring cylinder containing water. The 
   water level rises from 300cm³ to 500cm³. What is the density of the stone? 
   A 0.50g/cm³ 
   B 0.80g/cm³ 
   C 1.33g/cm³ 
   D 2.00g/cm³ 

5 A force acts on a mass of 1kg producing an acceleration of 1m/s². This force is called ... 
   A tension (T) 
   B Newton (N) 
   C weight (W) 
   D friction (F) 

6 A uniform plank of length 10cm is in equilibrium as shown in the figure below. 

A force of 100N is applied at point A in the direction shown. What is the weight of the 
   plank? 
   A 50N 
   B 100N 
   C 150N 
   D 200N
7 A ball of mass 5kg moves vertically upwards from ground level till it reaches a maximum height of 4m. What is its Kinetic energy when it is half way up? Assume \( g = 10\text{m/s}^2 \).

A  5J  
B  50J  
C  100J  
D  200J  

8 The Kelvin temperature of a liquid is 300K. Its temperature in °C is ...

A  27  
B  57  
C  100  
D  273  

9 An experiment is arranged as shown below.

\[ \text{X is a radiation entering the thermopile. If the galvanometer needle shows a deflection,} \]

A  X has a shorter wavelength than X-rays.  
B  X has a longer wavelength than X-rays.  
C  X has a lower frequency than Radio waves.  
D  X has the same frequency as light.  

\[ \text{Galvanometer} \]
The diagram shows a ray of red light passing from air into glass.

Which ratio gives the refractive index for red light?

A \( \frac{\sin p}{\sin x} \)

B \( \frac{\sin p}{\sin y} \)

C \( \frac{\sin q}{\sin x} \)

D \( \frac{\sin q}{\sin y} \)

A loud sound is made in front of a tall building. An echo is heard 4 seconds after the sound is produced. If the speed of sound in air is 320m/s, how far away is the building?

A 80m
B 160m
C 640m
D 1280m
12 The figure below shows the magnetic field lines on two pieces of permanent magnets.

The field pattern is produced by 

A two north poles  
B two south poles  
C a north pole and a south pole  
D a south pole and an unmagnetized iron bar.

13 The figure below shows a negatively charged polythene rod getting closer to a metal sphere which is on an insulator. A copper wire connects the sphere to the Earth.

Which of the following is true?

A Current flows from the Earth to the sphere  
B Current flows from the sphere to the Earth  
C The sphere is negatively charged  
D The Earth is at a positive potential
The figure below shows part of a circuit in which current is flowing.

If the p.d between N and M is 3V, the current is ...
A  1A  
B  3A  
C  6A  
D  12A  

A heater used on a 250V mains circuit has a 5A fuse in its plug. Which is the highest power rating for this heater?
A  50W  
B  1000W  
C  1250W  
D  2000W  

Induced current is such that it opposes the change which is causing it. This is ...
A  Ohm’s law  
B  Snell’s law  
C  Faraday’s law  
D  Lenz’s law  

Which of the following may not help to minimize the energy losses in a transformer?
A  Using thicker copper wire  
B  Using thinner copper wire  
C  Using a laminated iron core  
D  Ensuring an efficient core design  

Which of the following is not a correct statement about cathode rays?
A  They have a positive charge  
B  They travel in straight lines  
C  They are streams of electrons  
D  They are deflected by magnetic and electric fields
19 The radium nucleus, $^{226}_{86}\text{Ra}$ decays to Radon (Rn) as shown below

$^{226}_{88}\text{Ra} \rightarrow X + ^{222}_{86}\text{Rn}$

X is...
A  an X-ray
B  a gamma-ray
C  a Beta particle
D  an alpha particle

20 Compared to the charge and mass of a proton, an electron has...
A  the same charge and a smaller mass
B  the same charge and the same mass
C  an opposite charge and a smaller mass
D  an opposite charge and the same mass

21 Which state(s) of matter exist(s) at the freezing point of a substance?
A  Solid only
B  Solid and liquid
C  Liquid only
D  Liquid and gas

22 A measuring cylinder below is used to measure the volume of a liquid.

What is the volume of the liquid contained in the cylinder?

A  6.3cm$^3$
B  6.4cm$^3$
C  6.6cm$^3$
D  7.2cm$^3$
23 The best and suitable method of collecting pure water from a solution of ink is ... 
   A chromatography.  
   B distillation 
   C crystallisation  
   D filtration

24 Which of the following is true about isotopes?  
   A Two or more elements belonging to the same Group of the Periodic Table. 
   B They have the same chemical properties.  
   C They have the same number of nucleons. 
   D They have the same physical properties.

25 Which of the following sets contain particles with the same number of electrons? 
   A Sodium, potassium and lithium ion 
   B Sodium ion, neon and oxide ion 
   C Helium, neon and argon 
   D Magnesium, calcium and beryllium

26 Limestone, CaCO₃ decomposes into lime, CaO according to the equation, 
   \[ \text{CaCO}_3(s) \rightarrow \text{CaO(s)} + \text{CO}_2(g) \]  
   What mass of limestone would produce 11.2g of lime?  
   A \[ \frac{100 \times 11.2}{56} \text{ g} \]  
   B \[ \frac{100 \times 56}{11.2} \text{ g} \]  
   C \[ \frac{100 \times 56}{100} \text{ g} \]  
   D \[ 11.2 \times 56 \times 100 \text{g} \]

27 Below is a chemical equation.  
   \[ a \text{C}_2\text{H}_6 + b\text{O}_2 \rightarrow c \text{CO}_2 + d \text{H}_2\text{O} \]  
   What are the correct values of a, b, c and d? 
   A a  2  b  7  c  4  d  6  
   B a  1  b  7  c  2  d  3  
   C a  1  b  5  c  4  d  6  
   D a  2  b  5  c  4  d  6

28 Which of the following is true about an exothermic reaction?  
   A Temperature of the surrounding decreases 
   B The enthalpy change, \( \Delta H \) is positive. 
   C Bonds formed are relatively stronger than bonds broken. 
   D Heat is absorbed from the surroundings.
29 Silver oxide and hydrogen peroxide react as follows:
\[ \text{Ag}_2\text{O} + \text{H}_2\text{O}_2(\text{f}) \rightarrow 2\text{Ag} + \text{H}_2\text{O} + \text{O}_2 \]
In this reaction hydrogen peroxide acts as...
A a catalyst
B a base
C a reducing agent
D an oxidizing agent

30 Which of the following salts can be crystallized from an aqueous solution?
A Barium sulphate
B Lead (II) sulphate
C Silver chloride
D Ammonium sulphate

31 Solution R forms a white precipitate with little amount of aqueous ammonia. The precipitate dissolves in excess aqueous ammonia to form a colourless solution. Which cation is present in R?
A \( \text{Ca}^{2+} \)
B \( \text{Al}^{3+} \)
C \( \text{NH}_4^+ \)
D \( \text{Zn}^{2+} \)

32 Thermal stability of a metal nitrate depends on the reactivity of the metal. Which of the following represents the change when potassium nitrate is heated?
A \( 4\text{KNO}_3 \rightarrow 2\text{K}_2\text{O} + 4\text{NO}_2 + \text{O}_2 \)
B \( 2\text{KNO}_3 \rightarrow 2\text{KNO}_2 + \text{O}_2 \)
C \( \text{KNO}_3 \rightarrow \text{No change} \)
D \( 2\text{KNO}_3 \rightarrow \text{K}_2\text{O}_2 + 2\text{NO} + \text{O}_2 \)

33 Which of the following is true about chlorine, bromine and iodine?
A They are good conductors of electricity.
B When in the gas phase, they have no smell.
C They are all coloured.
D They are non poisonous.

34 When hydrogen is fitted into the reactivity series of metals, it comes immediately after...
A copper
B silver
C lead
D iron
35 Which of the following is used in the manufacturing of margarine?
A Oxygen
B Nitrogen
C Propane
D Hydrogen

36 Three similar test tubes containing the gases K, L and M are inserted as shown in the figure below.

![Diagram of test tubes](image)

The gases K, L, and M could be ...

<table>
<thead>
<tr>
<th></th>
<th>K</th>
<th>L</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CO</td>
<td>CO₂</td>
<td>NH₃</td>
</tr>
<tr>
<td>B</td>
<td>CO₂</td>
<td>NH₃</td>
<td>CO₂</td>
</tr>
<tr>
<td>C</td>
<td>CO₂</td>
<td>CO</td>
<td>NH₃</td>
</tr>
<tr>
<td>D</td>
<td>NH₃</td>
<td>CO₂</td>
<td>CO</td>
</tr>
</tbody>
</table>

37 A sample of air of volume 200cm³ is enclosed in a tube containing moist iron filings. After the iron has stopped rusting, what volume of air would be remaining?
A 40cm³
B 200cm³
C 160cm³
D 200cm³

38 Cyclobutane has the structure ...

![Cyclobutane structure](image)

Which of the following is true about cyclobutane?
A It is alkene
B It is a saturated hydrocarbon
C Its empirical formula is the same as that of all alkanes
D It decolourizes bromine solution rapidly.
What is the reaction product when ethene is treated with steam using phosphoric acid as catalyst at 300°C?

A ethyl phosphate  
B ethanol  
C ethanoic acid  
D ethyl ethanoate

A compound, P, has the molecular structure as shown.

```
C - O
C
C
C
```

How can P be described?

A Both as an alkane and as an acid.  
B Both as an alkene and as an acid.  
C Both as an alkane and as an alcohol.  
D Both as an alkene and as an alcohol.
The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).
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