

PHYSICS
SECTION A (15 MARKS)

Answer all questions

1. Match section A with responses from section B, one responses from section B can be used more than once

	List A		List B
i.	Refractive index	A.	Apparent weight
ii.	Relative density	B.	Real weight
iii.	Weight of the body in air	C.	Weight in liquid
iv.	Upthrust	D.	Archimede's principle
v.	$\frac{360}{Q} - 1$	E.	Number of images
		F.	Upward force
		G.	Has no unit

Answer all questions

2. a) (i) Define Refraction of light _____
(ii) State snell's law _____
(iii) Calculate the refractive index of the given material if the incidence angle is 30° while the angle of refraction is 60° .
- b) Calculate the Real depth if the Apparent depth when the object appeared in water of Refractive index $\frac{4}{3}$ is 12cm
3. a) What is a lens _____
b) Define the following terms as used in lenses
(i) Centre of curvature
(ii) Principal axis
c) The lens has focal length of 20cm.
If the lens is convex and the object is placed 10cm from the centre of curvature whose height is 2cm, then calculate
(i) The image distance
(ii) The image height
(iii) The magnification
(iv) Is the image real or virtual
4. a) What is a colour as light concerned.
b) Distinguish between primary and secondary colours by giving three examples of each
c) Draw the diagram describing primary and secondary colours mixing
5. a) Define the following terms
(i) Heat
(ii) Temperature
(iii) Linear expansivity
b) The rectangular block has dimensions of 30cm x 18cm x 10cm. calculate the new dimensions when the temperature Changes from 25°C to 85°C while the linear expansivity is $2.1 \times 10^{-5}\text{K}^{-1}$
6. a) What is a velocity – time graph
b) What is the meaning of the area under the velvety time graph.
c) The car is moving with velvety of 20m/s and then increase its velvety to 120m/s after accelerating with an acceleration of 10m/s^2 . The car maintain the speed reached for

- 20seconds before applying brake to rest after 40seconds.
- (i) Draw velocity time graph
 - (ii) What is the distance covered
 - (iii) What is an average velocity of the car?
 - (iv) Calculate the deceleration
 - (v) What is the total time?
7. a) Define (i) Mechanical Advantage
(ii) Velocity ratio
(iii) Efficiency of the machine
- b) A simple machine applied the effort of 200N to lift the load of 800N. If the distance moved by load is 6cm while that of effort is 3cm calculate
(i) Mechanical advantage
(ii) Velocity ratio
(iii) Efficiency of the machine
8. a) Distinguish scalars and vectors giving one example from each
- b) i) State triangle law of vectors
 - ii) Two forces of magnitude 40N and 60N make an angle of 30° between them. By using triangle law of victory calculate its resultant.
 - c) i) State parallelogram law of vectors
 - ii) Two forces are acting from the same point at an angle of 60° . If the magnitude of forces are 50N and 70N then calculate resultant force by using parallelogram law of vectors.
9. a)(i) Define friction
(ii) State 4 laws of friction
- b) i) What is the coefficient of friction?
 - ii) What is the SI unit of limiting friction?
- c) The body in an inclined plane make and angle of 60° . Calculate its coefficient of friction, leaving your answer in surd form
- d) Calculate the friction force of the car moving on the surface whose the coefficient of friction is 0.85 if the mass of the car is 3000kg and acceleration due to gravity is $g= 10\text{m/s}^2$
10. a) Define the following terms as they are used in curved mirrors
(i) Focal length
(ii) Radius of curvature
(iii) Magnification
- b) Sketch the diagram for the image formed on a convex mirror
 - c) The object of height 5cm is placed 20cm from the concave mirror whose radius of curvature is 80cm. Calculate
(i) The image distance
(ii) The image height
(iii) The magnification
(iv) Comment if the image formed is real or virtual.

CHEMISTRY
SECTION A (30 MARKS)

1. For this question having item **i** to **xx**, choose the best answer and fill its letter in the table drawn after the last item of this question
 - i. The process of distillation involves

- A. Condensation and decantation
 B. Decantation and filtration
 C. Filtration and evaporation
 D. Evaporation and evaporation
- ii. The particles ${}^y_x\text{M}$ and ${}^y_n\text{M}$ are expressed as
 A. Allotropes
 B. Isotopes
 C. Amorphous
 D. Isomorphous
- iii. The weight of oxygen in 90g of water is
 A. 90g
 B. 80
 C. 70
 D. 60
- iv. To balance the equation
 $\text{Pb}_3\text{O}_4 + \text{HNO}_3 \longrightarrow \text{Pb}(\text{NO}_3)_2 + \text{PbO} + \text{H}_2\text{O}$, what number should come before HNO_3 ?
 A. 2
 B. 4
 C. 6
 D. 8
- v. Cement is made from
 A. Sand and limestone
 B. Limestone and clay
 C. Gypsum and clay
 D. Limestone and gypsum
- vi. A detergent is a substance which
 A. Removes permanent hardness from water
 B. Hinders a chemical reaction
 C. Is used to purify town water supplies
 D. Assists water to remove dirty
- vii. A substance that becomes liquid on exposure to air is said to be
 A. Hygroscopic
 B. hydrolysed
 C. Deliquescent
 D. Efflorescent
- viii. When coral is dissolved in dilute HCl the equation for the reaction is
 $\text{CaCO}_3 + 2\text{HCl} \longrightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$
 The weight of calcium chloride when 10g of coral are dissolved in excess dilute HCl is
 A. 111g
 B. 100
 C. 11.1g
 D. 10.0g
- ix. Soap
 A. is sodium silicate

- B. is made from petroleum products
 - C. reacts with hard water to form soluble compounds
 - D. is a salt of fat acid
- x. A standard solution of sodium hydroxide contains
- A. One molecular weight of alkali per litre
 - B. One equivalent weight of alkali per litre
 - C. A known weight of alkali in a known volume
 - D. One equivalent weight of hydroxyl ions per litre

2. Match the items in LIST A with the responses in LIST B by writing the letter of the correct response beside the item number.

LIST A	LIST B
i) Temporary hardness of water ii) Combination iii) Indicator iv) Salts v) Bases	a) reaction between two elements to form single product b) reaction of two compound to form two products c) Hydrogen carbonate of calcium d) Hydrogen carbonate of sodium e) Show end point. f) Show initial point. g) sodium chloride and sodium hydroxide h) Sodium hydroxides and chlorides .i) Sodium hydroxide and Calcium Oxide. j) Sodium hydroxide and hydrochloric

3. Use chemical equations concept to answer this question

Carbon dioxide can be prepared by adding acid to calcium carbonate.

- i. Using a named acid, write a balanced chemical equation for the reaction.
 - ii. Name all the products formed in the above reaction.
4. a) Distinguish between
- i. Hard water and soft water
 - ii. A base and an acid
 - iii. Strong and weak acid.
 - iv. Permanent hardness and temporary hardness as they are used in water
- b) Give two advantages and disadvantages of hard water.

- 5 With the aid of chemical equations where necessary, explain two methods that can be employed in softening permanent hard water
- 6 A compound of relative molecular mass of 106 was found to be composed of 43.4% sodium, 11.3% carbon and the rest being oxygen.
- Determine it's
 - empirical formula
 - molecular formula
 - Give two uses of the compound you have got in 4. (a) ii above.
 - Write down the equation of reaction between the compound you have got in 5 (a) ii above with dilute hydrochloric acid.
- 7
- With the aid of chemical equations and diagrams, give the two common methods which are employed in laboratories for preparing oxygen gas.
 - Give four (4) uses of oxygen gas.
- 8 A certain element Q has the electronic configuration of 2:8:8:1
- Write the probable valence of the element Q
 - Write the electronic configuration of its ion.
 - Write the formula of its oxide, carbonate, nitrate and sulphate
9. Write the oxidation state of the following underlined letters:-
- ClO₄⁻
 - NO₂⁻
 - KCl
 - CO₃²⁻
- 10.a) Name the types of reaction represented by each of the following chemical reaction..
- $2\text{KClO}_3(\text{s}) \xrightarrow{\Delta \text{MnO}_2} 2\text{KCl}(\text{s}) + 3\text{O}_2(\text{g})$
 - $\text{Fe}(\text{s}) + \text{S}(\text{s}) \xrightarrow{\Delta} \text{FeS}(\text{s})$
 - $\text{AgNO}_3(\text{aq}) + \text{NaCl}(\text{aq}) \rightarrow \text{AgCl}(\text{s}) + \text{NaNO}_3(\text{aq})$
 - $\text{NH}_4\text{Cl}(\text{s}) \xrightarrow{\Delta} \text{NH}_3(\text{g}) + \text{HCl}(\text{g})$
- b) Define basicity of acid
11. Briefly describe four(4) methods of preparing soluble salts
12. a) Madam Stella's child was sick. When she took her to the hospital, she was prescribed some medicine including a bottle of syrup. The bottle was written:- "shake well before you use" what does this statement signify?
- b) In a solution of salt and water, identify a solvent and a solute. Justify your answer.
13. Explain application of neutralization in daily life. (six points)
14. a) What is Al chemistry.
- b) Explain the importance of studying chemistry (5 points).