**CHEMISTRY PAPER 1**

**NAME:**………………………………………………**Centre/Index No.** ………. / ………

**545/ 1**

**CHEMISTRY**

**PAPER 1**

1½ hours

***Uganda Certificate of Education***

**CHEMISTRY**

**Paper 1**

1 hour 30 minutes

**INSTRUCTIONS TO CANDIDATES:**

## This paper consists of **50** objective type questions.

*Attempt* ***ALL*** *the questions in this paper*

You are required to write the correct answer **A**, **B**, **C** or **D** in the box provided in the right hand side of each question.

*(H=1, C = 12, O = 16, Na= 23, Mg = 24, S = 32, Cl= 35.5, K = 39, Ca = 40, Fe =56,*

*Ag = 108,I= 127, 1mole of gas occupies 22.4dm3 at* ***S.T.P,*** *1 mole of a gas occupies 24dm3 at Room Temperature)*

|  |
| --- |
| **For Examiner’s Use Only** |
|  |
|  |

**Attempt all questions**

1. Which one of the following mixture does **NOT** contain copper?

1. Brass.
2. Bronze.
3. Solder.
4. Duralumin.

2. A mixture of methyl orange and phenolphthalein can be separated by making the best

use of:

1. separating funnel.
2. difference in boiling points.
3. difference in rate of movement over an absorbent material.
4. difference in their solubility at different temperatures.

3. Lead(II) chloride is best prepared in the laboratory by:

1. dissolving lead in concentrated hydrochloric acid.
2. dissolving lead(II) oxide in dilute hydrochloric acid
3. mixing cold lead(II) nitrate with sodium chloride.
4. titrating lead(II) hydroxide with dilute hydrochloric acid.

4. A mixture of 1.2dm3 of butane and excess oxygen burns to liberate 130KJ of heat energy. The molar enthalpy of combustion of butane at room temperature is

1. +2600 KJmol-1
2. -2600 KJmol-1
3. +103.3 KJmol-1
4. -156 KJmol-1

5. The table below shows some properties of substance **E**, **F**, **G** and **H**. Study it and answer the question that follows.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Substance | M.pt/ | B.pt/ | Electrical conductivity | |
| Solid | Liquid |
| **E** | 1723 | 2230 | Poor | Good |
| **F** | 993 | 1695 | Poor | Poor |
| **G** | -183 | -164 | Poor | Poor |
| **H** | 1083 | 2567 | Good | Good |

Which one of the substances would be decomposed into two simple substances by

passage of an electric current through its liquid?

1. H
2. G
3. F
4. E

6. Which one of the pair of the following organic substances cannot be easily distinguished by bubbling into or addition to bromine water.

1. C2H4 and C4H8
2. C2H4 and C2H6
3. C2H2 and C2H4
4. C2H5OH and C2H4

7. 250cm3of a gas weighs 0.495g at s.t.p. The molecular mass of the gas is given by:

(Density of hydrogen at s.t.p = 0.09gl-1)

1. 
2. 
3. 
4. 

8. When a metal was dissolved in dilute hydrochloric acid and sodium hydroxide added, a

green precipitate formed. The green precipitate is of:

1. iron(II) hydroxide
2. iron(II) chloride.
3. iron(III) hydroxide.
4. iron(III) chloride.

9. Which one of the following chlorides when heated will **NOT** sublime?

1. Ammonium chloride.
2. Aluminium chloride.
3. Magnesium chloride.
4. Iron(III) chloride.

10. A sample of pure dry ammonia was passed over red hot iron wire and was found to

break down into nitrogen and hydrogen according to the following equation:

2NH3 (g)

3H2 (g) + N2 (g)

If 60cm3 of ammonia was decomposed and the resulting gaseous mixture cooled to

room temperature, what is the volume of the gaseous mixture.

1. 40 cm3
2. 60 cm3
3. 120 cm3
4. 180 cm3

11. The separation of coloured dyes in a sample of coloured ink is known as:

1. distillation.
2. electrolysis.
3. crystallization.
4. chromatography.

12. The fountain experiment can be used to demonstrate the solubility of the following gases, except:

1. Ammonia.
2. Sulphur dioxide.
3. Carbon dioxide.
4. Hydrogen chloride.

13. The number of moles with respect to hydroxide ions contained in 10g of

calcium hydroxide, [Ca(OH]2 is

1. 0.135
2. 0.175
3. 0.270
4. 0.350

14. The atomic numbers of elements **X** and **Y** are 17 and 12 respectively. Which one of the

following properties is shown by the compound formed when **X** and **Y** combines?

1. It is insoluble in water.
2. It is a non-electrolyte.
3. It is a gas at room temperature.
4. It has high melting and boiling points.

15. Dilute sulphuric acid reacted with potassium carbonate according to the following ionic equation:

2H+ (aq) + CO32- (aq)

H2O (l) + CO2 (g)

The volume of 0.05M sulphuric acid that will completely react with 20cm3 of a solution containing 3.0g of CO32- ions per dm3 is

1. 
2. 
3. 
4. 

16. Solutions **O**, **P**, **Q** and **S** have pH 10, 5, 7 and 14 respectively. Which solution could be

of ethanoic acid?

1. O
2. P
3. Q
4. R

17. A dilute solution of potassium iodide was electrolyzed. The product at the cathode is

likely to be:

1. iodine
2. potassium.
3. oxygen.
4. hydrogen.

18. 2.40g of magnesium react completely with excess hydrochloric acid according to the

following equation:

Mg (s) + 2HCl (aq)

MgCl2 (aq) + H2 (g)

What is the maximum decrease in mass due to the escape of hydrogen in this reaction?

1. 2.24g
2. 2.40g
3. 0.20g
4. 0.02g

19. The yield of ammonia in the reaction:

N2 (g) + 3H2 (g)

2NH3 (g)  may be increased by

1. raising the temperature.
2. increasing the pressure.
3. employing suitable catalyst.
4. adding inert gas.

20. Which of the following groups consists only of compounds?

1. Cl2, HCl, MgCl2 and C6H5Cl.
2. CaSO4, H2S, S8 and Na2S.
3. KMNO4, H2SO4, HNO3 and HCl.
4. MnO2, PH3, XF4 and O3.

21. Which one of the following is true about the compound formed when an alkali metal

combines with the oxygen to form the metal oxide?

1. It is a white solid.
2. It is insoluble in water.
3. The solid conducts electricity.
4. It has a low boiling point.

22. When steam is passed over heated magnesium, the mass of dry residue was 0.4g more

than that of magnesium. How many moles of steam molecules were decomposed?

1. 0.40
2. 0.25
3. 0.025
4. 0.022

23. Which one of the following is the best reason why zinc is able to displace copper from

solutions of copper salts?

1. Zinc is more electronegative than copper.
2. Zinc loses electrons more easily than copper.
3. Zinc is a stronger oxidizing agent than copper.
4. Zinc has few electrons than copper.

24. Dilute sulphuric acid reacts with magnesium metal according to the equation:

Mg (s) + H2SO4 (aq)

MgSO4 (aq) + H2 (g)

The mass of magnesium metal that could give 280cm3 of hydrogen at s.t.p is:

1. 30.0g
2. 3.0g
3. 0.3g
4. 0.03g

25. Which one of the following elements has the greatest number of outermost electrons?

1. Element with atomic number 20.
2. Element with atomic number 11.
3. Element with atomic number 9.
4. Element with atomic number 8.

26. The following statements concerning the characteristics of the halogens are true

except…

1. fluorine is the best oxidizing agent.
2. fluorine atoms have the smallest radii.
3. iodine liberates free bromine from a solution of bromide ion.
4. Fluorine is the most electronegative of the halogens.

27. Which one of the following substances consists of an ionic lattice?

1. High melting point, solid conducts electricity, insoluble in water.
2. Low melting point, solid doesn't conduct electricity, aqueous solution doesn't conduct electricity.
3. Low melting point, solid conducts electricity, insoluble in water.
4. High melting point, solid doesn't conduct electricity, aqueous solution conducts electricity.

28. 12.7g metal **Q**, reacts completely with 11.3g of oxygen to form an oxide. Which one of

the following is the formula of the oxide of **Q**? (**Q** = 27)

1. QO2
2. Q2O.
3. Q2O3
4. Q3O2

29. Fractional distillation can be used to separate:

1. hydrogen and carbon dioxide.
2. carbon dioxide and nitrogen.
3. oxygen and hydrogen.
4. oxygen and nitrogen.

30. To a green solution of iron(II) sulphate was added concentrated nitric acid followed by

sodium hydroxide solution. A reddish brown precipitate was formed. The role of the

acid in this experiment was to:

1. catalyse the formation of the reddish brown precipitate.
2. liberate nitrogen dioxide.
3. provide acidic conditions suitable for the formation of the reddish brown precipitate.
4. oxidize iron(II) ions to iron(III) ions.

31. Copper (II) sulphate reacts with sodium carbonate according to the following equation

CuSO4 (aq) + Na2CO3 (aq)

CuCO3 (s) + Na2SO4 (aq)

The mass of copper (II) carbonate that is formed when 200cm3 of a solution containing 5.3g of sodium carbonate per litre of solution was reacted completely with copper (II) sulphate is given by

1. 
2. 
3. 
4. 

32. The laboratory reagent used to soften hard water is

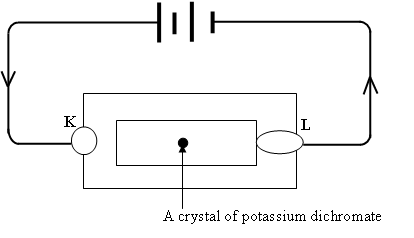
1. Na2CO3
2. CaCO3
3. (NH4)2CO3
4. Al(OH)3

33. When 79g of anhydrous salt **K** (RFM = 158) combines with 45g of water, a hydrated

salt of formula **K**.nH2O is formed. The value of n is:

1. 2.
2. 3.
3. 5.
4. 10.

34. Study the diagram below and answer the question that follows



A filter paper is soaked in saturated sodium sulphate solution and placed on a

microscope slide. A crystal of potassium dichromate is then placed of the paper. If the

current is allowed to flow to make a complete circuit, which one of the following will

**NOT** be true?

1. Potassium ions will move towards L
2. Chromate ion will move towards K
3. Sodium ions will move towards L
4. Sulphate ions will move towards L

35. Which one of the following hydroxides is soluble in both aqueous ammonia and

sodium hydroxide solution?

1. Al(OH)3
2. Zn(OH)2
3. Cu(OH)2
4. Fe(OH)2

36. Which of the following hydrocarbons will produce the least energy per mole on

complete combustion?

1. CH4
2. CH3CH3
3. CH3CH2CH3
4. CH3 CH2 CH2CH3

37. Which one of the following contains the same number of moles of hydrogen ions as the number of moles of sodium ions in 50cm3 of a 0.2M Na2SO4

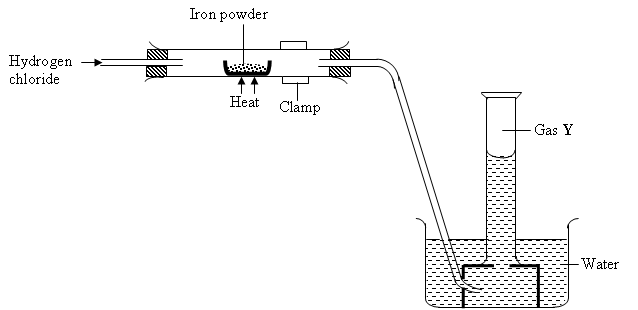
1. 1.83g of HCl
2. 0.73g of HCl
3. 100cm3 of 0.2M H2SO4
4. 100cm3 of 2M HCl

38. The atoms of graphite are connected together by strong covalent bonds. The reason why graphite feels slippery is because its

1. atoms form hexagonal rings.
2. layers are weakly bonded together.
3. atoms have delocalized electrons
4. atoms are not arranged in definite order

39. The diagram below shows setup apparatus to demonstrate how heated iron reacts with

hydrogen chloride gas. Study it and answer the question that follows.



The gas **Y** collected during the experiment is

1. oxygen.
2. chlorine.
3. hydrogen chloride.
4. hydrogen.

40. Which one of the following elements is extracted commercially by electrolysis of an

aqueous solution of one of its compounds?

1. Sodium.
2. Chlorine.
3. Copper.
4. Aluminium.

In each of the questions **41** to **45**, one or more answers given may be correct, read each question carefully and then indicate on your answer sheet according to the following:

1. If 1, 2, 3 only are correct
2. If 1, 3 only are correct
3. If 2, 4 only are correct
4. If 4 only is correct

|  |  |  |  |
| --- | --- | --- | --- |
| SUMMARY OF INSTRUCTIONS | | | |
| A | B | C | D |
| 1, 2, 3  Only correct | 1, 3  Only correct | 2, 4  Only correct | 4  Only correct |

41. Polyvinylchloride (P.V.C) is used to cover electric cables because

1. It is opaque.
2. It is a non-conductor of electricity.
3. It is flexible.
4. It waterproof.

42. Which of the following gas(es) constitute water gas?

1. Carbon dioxide.
2. Carbon monoxide.
3. Nitrogen.
4. Hydrogen.

43. During electrolysis of concentrated hydrochloric acid using carbon electrodes

1. oxygen is given off at the anode.
2. chlorine is given off at the anode
3. the ph of the acid decreases
4. hydrogen is given off at the cathode

44. Which of the following is/are characteristic(s) of metals low in the reactivity series?

1. The nitrate is decomposed by heat.
2. The carbonate is not decomposed by heat.
3. Not attacked by dilute mineral acids.
4. Are extracted from their ores by electrolysis.

45. Which of the following gas(es) cannot be dried using concentrated sulphuric acid?

1. Chlorine.
2. Ammonia.
3. Sulphur dioxide.
4. Hydrogen sulphide.

***Each of questions 46-50 consists of assertion (statement) on the left-hand side and a reason on the right-hand side,***

***Select:***

1. If both assertion and reason are true statements and the reason is a correct explanation of the assertion.
2. If both assertion and reason are true statements but the reason is not a correct explanation of the assertion.
3. If the assertion is true but the reason is an incorrect statement.
4. If the assertion is incorrect but the reason is a true statement.

|  |  |  |
| --- | --- | --- |
|  | SUMMARY OF INSTRUCTIONS | |
|  | Assertion | Reason |
| A. | True | True (reason is a correct explanation) |
| B. | True | True (reason is not a correct explanation) |
| C. | True | Incorrect |
| D. | Incorrect | True |

|  |  |  |  |
| --- | --- | --- | --- |
| 46. | Copper (II) hydroxide dissolves in excess aqueous ammonia | *Because* | copper (II) ions forms a complex ion with ammonia. |
| 47. | More carbon dioxide is evolved when calcium carbonate is reacted with 2M HCl than 1M HCl | *Because* | increasing concentration increases the rate of reaction. |
| 48. | When a copper coin is dropped into concentrated nitric acid, reddish brown fumes are evolved | *Because* | copper reduces concentrated nitric to nitrogen monoxide. |
| 49. | 32g of oxygen gas and 28g of nitrogen occupy the same volume at s.t.p | *Because* | they contain the same number of molecules. |
| 50. | Iron is used is used as cathode in electrolysis of fused sodium chloride industry | *Because* | sodium is more electropositive  than iron. |

**PHYSICS THEORY PAPER**

**Candidate’s Name:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Random No.** | | | | | | **Personal No.** | | |
|  |  |  |  |  |  |  |  |  |

**…………………………………………………….**

**Signature:………………………………………...**

**Uganda Certificate of Education**

PHYSICS

**Paper 1**

2 hours 15 minutes

**INSTRUCTIONS TO CANDIDATES:**

*Section* ***A*** *contains* ***40*** *objective type questions. You are required to write the correct answer* ***A****,* ***B****,* ***C*** *or* ***D*** *against each question in the box on the right hand side.*

*Section* ***B*** *contains* ***10*** *structured questions. Answers are to be written in the spaces provided on the question paper.*

*Mathematical tables and silent non-programmable calculators maybe used.*

*Acceleration due gravity, g = 10 m s -2*

*Specific heat capacity of water = 4200 J kg -1 K -1*

*Velocity of light in air, c = 3.0 x 10 8 m s -1*

*Density of water = 1000 kg m -3*

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|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Q.41** | **Q.42** | **Q.43** | **Q.44** | **Q.45** | **Q.46** | **Q.47** | **Q.48** | **Q.49** | **Q.50** | **MCQs** | **Total** |
|  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |

**SECTION A (40 MARKS)**

*Answer* **all** *questions in this section.*

1. The following are effects of force on a body except;

A. shape B. mass

C. speed D. direction of motion

2. Which of the following are reasons why water is not a good thermometric liquid?

(i) it expands irregularly

(ii) it is a poor conductor of heat

(iii) it wets glass

A. (i), (ii) and (iii) B. (ii) and (iii) only

C. (i) and (iii) only D. (i) and (ii) only

3. Find the cost of using an electrical appliance marked 240V, 500W for 48 hours is the cost of one unit of electricity is 800sh.

A. 30sh B. 768sh

C. 19200sh D. 76800sh

4. Which one of the following substances would be strongly attracted by a magnet?

A. Aluminium B. Magnesium

C. Copper D. Nickel

5. Find the total energy input of an electric motor of efficiency 80% if it’s useful energy output is 200J.

A. 400J B. 350J

C. 250J D. 200J

6.

*2 cm 3*

*1 cm 3*

*Lead*

*Iron*

Fig. **1**

**1**

*40 cm*

*40 cm*

Figure 1 shows 1cm3 blocks of iron and lead placed on a beam which is pivoted at its midpoint. The density of iron is 8gcm-3 and that of lead is 12gm-3. Which one of the following should be done in order to balance the beam?

A. Move the pivot to the right

B. Move the iron to the right

C. Move the lead to the left

D. Add 1cm3 cube of lead on top of what is there.

2

7. A girder under compression is called

A. strut B. tie

C. beam D. pillar

8. Short sightedness

A. is due to short eye balls

B. is when one has clear view of distance objects

C. can be corrected using a convex lens

D. can be corrected using a concave lens

9. A transverse wave of wavelength 0.5m and frequency 4H2 is sent down a slinky spring of length 4m. Find the time taken for the wave to move across the slinky.

A. 1 second B. 2 seconds

C. 4 seconds D. 16 seconds

A

B

*Metal ball*

*Metal ball*

*Insulating cotton threads*

Fig. **2**

10.

The diagram in figure **2** shows two metal balls A and B suspended an insulating cotton threads. State what is observed when a positively charged rod is brought close to A.

A. The metal balls A and B move towards each other.

B. A moves towards the rod which B moves away from the rod.

C. A moves towards the rod and B moves towards A.

D. A is attracted towards the rod but B is not affected.

11. A solid of dimensions 4m by 3m by 2m weighs 240*kN.* Find the pressure exerted when it rests on a horizontal surface with its smallest surface.

A. 10 *kPa* B. 20 *kPa*

C. 40 *kPa* D. 1240 *kPa*

12. Which one of the following graphs is the correct representation of current against potential difference of a filament lamp?

*I(A)*

*V(V)*

*I(A)*

*V(V)*

*I(A)*

*V(V)*

*I(A)*

*V(V)*

A. B.

C. D.

13. An ideal gas occupies a volume of 250cm3 at a pressure of 1 atmosphere and temperature of 200C. What will be the volume of the gas at a temperature of -100C and pressure of 1.5 atmospheres?

A.  B. 

C.  D. 

14. The critical angle of a medium is 400. A ray of light travelling from this medium to air will be totally reflected back into the medium if the angle of

A. reflraction is greater than 900. B. Incidence is greater than 400.

C. Refraction is 900. D. Incidence is 400.

15. Which one of the following is a basic unit?

A. newton B. second

C. joule D. watt

16. A vessel of negligible heat capacity contains 750g of water at 200C. Find the quantity of heat required to raise the temperature to 800C.

A.  B. 

C.  D. 

17. The process by which electrons are emitted from a metal by applying ultraviolet light is known as

A. Photoe;ectric emission B. Electromagnetic emission

C. Thermionic emission D. Electrostatic emission

18. A grid of height 106m lifts a 20 litre jerrycan full of water from the ground to her head. Neglecting the mass of empty jerrycan. Find the work done.

A. 32J B. 230J

C. 320J D. 2300J

19.

L

Fig. **3**

4

What is the velocity ratio of the pulley system in figure 3?

A. 6 B. 5

C. 4 D. 3

20. Identify the particle represented by in the radioactive equation below



A. An alpha particle B. A beta particle

C. A neutron D. A proton

21. Which one of the following is a device in which mechanical energy is converted to electrical energy?

A. An electrical cooker B. An electric train

C. A generator D. A motor

22.

*Final reading*

*Initial reading*

*Solid*

*66 cm -3*

*50 cm -3*

Fig. **4**

Figure 4 shows levels of water in a measuring cylinder before and after immersing a solid Y of mass 40g. Find the density of Y in kgm-3.

A. 4000 B. 2500

C. 24000 D. 1400

23. When a radioactive nuclide by mission of a beta particle, what happens to the mass number and atomic number?

|  |  |  |
| --- | --- | --- |
|  | **Mass number** | **Atomic number** |
| A | unchanged | increases by one |
| B | increases by one | unchanged |
| C | decrease by one | unchanged |
| D | uncharged | decreases by one |

24. Which one of the following diagrams represents the magnetic field pattern when two small magnets are placed close together?

S

N

N

S

S

N

S

N

A. B.

C. D.

25. An observer at distance of 165m from a high wall makes a loud sound and hears an echo after one second. Find the speed of sound in air

A. 825ms-1 B. 165ms-1

C. 300ms-1 D. 330ms-1

2Ω

2Ω

2Ω

Fig. **5**

26.

Figure **5** shows an arrangement of three 2 resistors in a circuit. Find a single resistor which might be used to replace all the three resistors.

A. 4 Ω B. 6 Ω

C. 8 Ω D. 12 Ω

27. Which of the following statements is true about sound waves?

(i) They are longitudinal

(ii) They are transverse

(iii) They cannot travel through empty space

A. (i) and (ii) only B. (i) and (iii) only

C. (ii) and (iii) only D. (i), (ii) and (iii) only

28. The following statements are true about cathode rays except

A. the originate from the nucleus of an atom

B. they are deflected by magnetic and electric fields

C. they are negatively charged particles

D. they can travel though vacuum.

29. Which one of the following graphs shows a rectifying of alternating current using a single diode?

*Time*

*Out put*

*Time*

*Out put*

*Time*

*Out put*

A. B.

*Out put*

*Time*

C. D.

30. A piece of metal of mass 120g and specific heat capacity 150JKg-1K-1 is allowed to cool from 800C to 200C the heat given out is

A. 360 J B. 520 J

C. 900 J D. 1080 J

6

31. A ray light moving from air enters a medium at an angle of incidence 500. If the angle of refraction in the medium is 320, calculate its refractive index.

A. 1.450 B. 1.320

C. 0.692 C. 0.640

32.

Fig. **6**

*X*

*Y*

Figure **6** shows a steel bar *XY* inside a solenoid. Current flows through the wire in the direction indicated. When the current is switched off and the bar is tested for polarity, it is found that

|  |  |  |
| --- | --- | --- |
|  | *X* | *Y* |
| A | south pole | north pole |
| B | north pole | south pole |
| C | south pole | south pole |
| D | south pole | north pole |

33. Which one of the following is true about a cathode ray oscilloscope?

A. The cathode rays are produced by photo electric emission

B. The grid controls the number of electrins passing through the central hole

C. The X plates deflect the beam horizontally while the X-plates deflect it vertically

D. The anodes being at high positive potential retard the cathode beam

34. The most suitable instrument for measuring the dimensions of a football field is

A. Micrometer screw guage B. Measuring tape

C. Vernier caliper D. Metre rule

35. The colour of an object depends on

(i) the colour it transmits or reflects

(ii) the texture of the object

(iii) the colour of light falling on it

A. (i) only B. (i) and (ii) only

C. (i) and (iii) only D. (i), (ii) and (iii)

36. Which one of the following is the correct order of operation of the four stroke petrol engine?

A. Compression – power – exhaust – inlet

B. Inlet – power – compresson – exhaust

C. Compression – inlet – exhaust – power

D. Inlet – compression – power – exhaust.

37.

*Radioactive*

*source*

*Thin paper*

*Thin paper*

*Radioactive*

*source*

Fig. **7**

Figure 7 shows an arrangement where two sheets and a photographic film are placed infront of a radioactive source. Give a reason if the photographic film is formed to be darkened.

A. High penetrating gamma rays pass through the thin paper and

alumimium sheet.

B. The massive alpha particle pass through the thin paper and

aluminium sheet.

C. The high energy beta particles pass through the thin papers and aluminium sheet.

D. All the three radiations pass through the thin paper and thin aluminium sheets.

38. A force of 2 N produces an extension on a spring of 3cm. Find the weight of a stone that produces an extension of 18cm.

A. 3 N B. 6 N

C. 12 N D. 108 N

39. An alternative unit that could be used for resistance is

A. Coulomb per second B. Volt per ampere

C. Joule per coulomb D. Joule per second

40. A force of 12 N acts on a stationary body of mass 4kg for 8 seconds. What is the final velocity of the body?

A. 4 ms-1 B. 12 ms-1

C. 16 ms-1 D. 24 ms-1

**SECTION B (40 MARKS)**

*Answer* **all** *questions in this section. All working must be shown clearly in the spaces provided.*

41. (a) What is meant by **average velocity**? *(01mark)*

……………………………………………………………………………………..

……………………………………………………………………………………..

……………………………………………………………………………………..

8

(b) An athlete takes 27 minutes and 51 seconds to complete a 10,000m race.

Find his average speed. *(02 marks)*

……………………………………………………………………………………..

……………………………………………………………………………………..

……………………………………………………………………………………..

……………………………………………………………………………………..

(c) Sketch a velocity – time graph of a body moving with uniform retardation.

1. *mark)*

42. (a) What is meant by **rectilinear propagation of light**? *(01mark)*

……………………………………………………………………………………..

……………………………………………………………………………………..

(b) An object is placed 12cm infront of a pinhole camera of length 8cm.

(i) Draw a sketch diagram to show how the image is formed *(01 mark)*

(ii) State the nature of the image formed. *(01 mark)*

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(iii) Describe what happens when the pinhole is widened. *(01 mark)*

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43. (a) Define **magnetic induction**. *(01mark)*

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(b) Draw a diagram to show how a steal bar can be magnetized by single stroke method. *(01 mark)*

(c) Describe how a magnet is demagnetized by electrical method. *(02 marks)*

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44. (a) A person of mass 65 climbs up a ladder of height 8m in 10 seconds. Calculate

the;

1. work done *(01½ marks)*

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……………………………………………………………………………………..

……………………………………………………………………………………..

1. power developed *(01½ marks)*

……………………………………………………………………………………..

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(b) State **two** forms of energy received directly from the sun. *(02 marks)*

(i): ………………………………………………………………………………

(ii): ………………………………………………………………………………

10

45. (a) What is meant by **thermionic emission**? *(01 mark)*

……………………………………………………………………………………..

……………………………………………………………………………………..

(b)

***P***

***R***

***Q***

Fig. **8**

Figure **8** shows a diagram of a diode valve

(i) Name the parts labeled *(01½ marks)*

***P***: ……………………………………………………………………….

***Q***: ……………………………………………………………………….

***R***: ……………………………………………………………………….

(ii) Briefly describe the working of the diode valve *(01½ marks)*

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46. (a) State **two** properties of electromagnetic waves. *(02 marks)*

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(b) An observer standing 510 m from a tall cliff makes a sound and hears the echo after 3 seconds. Calculate the velocity of sound in air. *(02marks)*

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47. (a) What is a **neutral point** as related to an electric field? *(01mark)*

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(b) State **three** properties of electric field lines. *(01½ marks)*

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(c) Explain what happens when an ebonite rod is rubbed with fur. *(01½ marks)*

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48. (a) Distinguish between a **primary cell** and a **secondary cell**. *(02 marks)*

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(b) What are the defects of simple cell? *(01 mark)*

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(c) Draw a circuit diagram to show how a lead acid accumulator can be recharged.

*(01 mark)*

12

49. (a) What is **radioactivity**? *(01mark)*

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……………………………………………………………………………………..

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(b) A radioactive sample decays by three quarters after a period of 80 minutes.

Find the half life of the sample *(02 marks)*

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(c) State **two** medical uses of radioactivity *(01 mark)*

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50. (a) Define **specific heat capacity**. *(01 mark)*

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(b) An immersion heater rated 240 *V* ,1 *kW* is used to raise the temperature of 20 kg of water by 260C within 36 minutes. Calculate the specific heat capacity of water. *(02 marks)*

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(c) Explain why water is used in cooling systems. *(01 mark)*

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……………………………………………………………………………………..

MATHEMATICS PAPER 1

456/1

MATHEMATICS

Paper 1



Uganda Certificate of Education

MATHEMATICS

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

Answer ALL questions in Section A and not more than FIVE from section B.

Any additional question(s) answered will not be marked.

All necessary calculations must be shown and should be done on the same page

as the rest of the answer.

Mathematical tables and graph papers are provided.

Silent, non-programmable scientific calculators may be used.

SECTION A (40 MARKS)

Answer all questions in this section.

**Qn1.** Make the subject of the formula

T= (04 marks)

**Qn2.** The sum of two numbers is 8 and their difference is 2, find the difference

between the squares of the numbers. (04 marks)

**Qn3.** Factorise + completely (04 marks)

**Qn4.** If P= and S=

find (i) PS

(ii) (04 marks)

**Qn5.** In the figure below PQR is an isosceles triangle in which PQ=PR. PRT

and QRS are straight lines. Given that angle SRT=40, determine the

values of the angle marked and .

Q

P

R

T

S

*a0*

*b0*

*4a*

**Qn6.** Solve the inequality x - x + (04 marks)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Subject | English | S.S.T | Math | Science |
| Mark | 75 | 90 | 80 | 100 |

**Qn 7.** A pupil at Kansanga primary school scored the marks shown below.

Draw a bar chart to represent this information. (04 marks)

**Qn 8.** Use factorization method to solve the equation 3x2 – x – 4=0 (04 marks)

**Qn9.** The length of a rectangle is three times its width. The area of the rectangle

is 75cm2. Find its perimeter. (04 marks)

**Qn10.** An observer at a point A sees an object on a bearing of 100 Another

observer at point B sees the same object on a bearing of 150.

Given that the distances of the object from A and from B are equal, determine the bearing of A from B. (04 marks)

**SECTION B(60 marks)**

**Attempt any FIVE questions from this section.**

**Qn 11**. (a) A cinema hall has 400 seats. Ticket prices are shs 2000 for an adult and

Shs 1000 for a child. One evening 80% of the seats in the cinema hall

were occupied. Fourty of the people present are children. Calculate the

total amount of money collected from the sale of tickets. (05 marks)

1. In another evening, children were present and all the seats were

occupied. The amount realized was Shs 680,000.

1. Write down an equation in n.
2. Calculate the value of in equation (i) above (05 marks)
3. The amount collected from ticket sales in a certain week was

Shs 240,000. The sum was split into costs, wages and profit in the

ratio 5:4:3. Calculate the profit for the week. (02 marks)

**Qn12.** (a) A plane figure whose area is 12.6cm2 is mapped onto a figure

whose area is 75.6cm2 by a transformation given by the matrix,

T=

Find two possible values of p and hence write down two possible

matrices for T i.e T1 and T2 (08 marks)

1. Find the matrix M such that M=T1T2+T2T1 (04 marks)

**Qn 13.** A square ABCD has vertices A(3,0) B(6,0) C(6,3) and D(3,3).

The image of ABCD under the transformation whose matrix N=

is A’B’C’ and D’.

1. Find the coordinates of A’B’C’D’ (03 marks)
2. Plot ABCD and A’B’C’D’ on the same graph (03 marks)
3. Use the transformation matrix N to determine the area of A’B’C’D’ (06 marks)

**Qn14.** The lengths in metres of varies snakes in Congo were recorded in the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Length (*m*)** | **frequency** | **Mid length(*x*)** | ***fx*** |
| 1.5-1.9 | 10 | 1.7 | 17 |
| 2.0-2.4 | 16 | - | - |
| 2.5-2.9 | 31 | - | - |
| 3.0-3.4 | 40 | 3.2 | 128 |
| 3.5-3.9 | 27 | - | - |
| 4.0-4.4 | 14 | - | - |
| 4.5-4.9 | 12 | 4.7 | 56.4 |
|  | ∑f= |  | ∑ |

1. State the modal length and hence calculate the mode to 2 decimal places (04 marks)
2. Copy and complete the table above (04 marks)
3. Use the completed table to calculate the mean length of the snakes to

4 significant figures. (04 marks)

**Qn15.** (a) Copy and complete the following tables for the following equations

Table I y=6x-8

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *x* | -1 | 0 | 1 | 2 | 3 |
| *y* |  | -8 | -2 |  |  |
| *(x,y)* |  | (0, -8) | (1,-2) |  |  |

Table II

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *x* | -1 | 0 | 1 | 2 | 3 |
| *y* | 10 |  |  |  | 2 |
| *(x,y)* | (-1,10) |  |  |  | (3,2) |

(b) Using a scale of 1cm to represent 1 unit on both axes, draw the graphs of

(i) and

(ii) (04 marks)

(c) Use your graph to solve the following simultaneous equations

and (04 marks)

**Qn16.** (a) Using a ruler and compasses only construct a trapezium ABCD in which

AB is parallel to DC, AB=9cm, AD=5cm, angle DAB=45 and

angle ABC=60 (05 marks)

(b) Measure DC and angle BCD (02 marks)

(c) From D construct a perpendicular to meet AB at E (01 marks)

(d) Measure DE and hence calculate the area of the trapezium. (04 marks)

**Qn17.** At Jinja Progressive Academy, 150 workers are to be transported to work

everyday. The school has five coasters and six minibuses. There are eight

qualified drivers. Each coaster can carry a maximum of 24 workers and each

minibus can carry not more than 30 workers. If *x* is the number of coasters

used *y* is the number of minibuses used.

1. Write down six inequalities representing the above information.
2. Show graphically the region in which the above inequalities represent.

Use a scale of 1cm to represent 1 unit on both axes.

1. The coaster costs shs 150,000 and minibus costs shs180, 000 on

fuel to run each day. Find the number of coasters and minibuses

which will minimize the costs of fuel, hence the cost of fuel used per day.

(12 marks)