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DAS INNOVATIONS

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**BECE 2023 INTEGRATED  
SCIENCE PREDICTIONS**



**2023 BECE**

**DASLAND GHANA LIMITED –DAS EXAMINATIONS**

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**DUE TO TIME CONSTRAINT, WE HAVE SUMMARIZED THE PREDICTIONS. WE ENTREAT USERS TO TAKE THE AREAS SERIOUSLY AND CHECK THE DETAILS FOR THEIR FULL BENEFIT**

**INTEGRATED SCIENCE BECE SYLLABUS**

| ASPECT OF THE SYLLABUS | TOPICS   |
|------------------------|--|
| Physics                | <ol style="list-style-type: none"> <li>1. Measurement</li> <li>2. Heat energy</li> <li>3. Electrical energy</li> <li>4. Magnetic energy</li> <li>5. Light energy</li> <li>6. Basic electronics</li> <li>7. Force and Pressure</li> <li>8. Machine</li> <li>9. Weather and climate</li> <li>10. The solar system</li> </ol>   |
| Chemistry              | <ol style="list-style-type: none"> <li>1. Matter</li> <li>2. Hazards</li> <li>3. Mixtures</li> <li>4. Compounds</li> <li>5. Chemical and physical change</li> <li>6. Pollutants</li> <li>7. Water</li> <li>8. Metals</li> <li>9. Acids and bases</li> <li>10. Science related industries</li> </ol>  |
| Biology                | <ol style="list-style-type: none"> <li>1. Living and non-living things</li> <li>2. Reproduction in plants</li> <li>3. Respiratory system</li> <li>4. Carbon cycle</li> <li>5. Osmosis and diffusion</li> <li>6. Ecosystem</li> <li>7. Food and Nutrition</li> <li>8. Reproduction in humans</li> <li>9. Heredity</li> <li>10. Circulatory system</li> <li>11. Photosynthesis</li> <li>12. Diseases and infections</li> <li>13. Dentition</li> <li>14. Digestion</li> </ol> |
| Agriculture            | <ol style="list-style-type: none"> <li>1. Crop production</li> <li>2. Farm tools</li> <li>3. Soil</li> <li>4. Farming systems</li> <li>5. Pests and parasites</li> </ol>   |

**2023 BECE DETAILED PREDICTED TOPICS AND AREAS**

| ASPECT    | TOPICS           | DETAILS   | PRACTICAL  |
|-----------|------------------|---|--|
| Chemistry | Matter           | <ul style="list-style-type: none"> <li>• Matter</li> <li>• Change of states of matter</li> <li>• Atomic structure and configuration</li> <li>• Mixtures</li> <li>• Compounds</li> <li>• Metals</li> <li>• Alloys</li> <li>• Separation of mixtures</li> </ul>   | <ul style="list-style-type: none"> <li>• Arrangements of particles of matter</li> <li>• Atomic structure and configuration</li> <li>• Changes of states of matter</li> <li>• Chemical properties experiments of metals</li> <li>• Experiments on separation of mixtures</li> </ul> |
|           | Water            | <ul style="list-style-type: none"> <li>• Sources of water</li> <li>• Properties</li> <li>• Use</li> <li>• Types and importance</li> </ul>   | <ul style="list-style-type: none"> <li>• Experiment to purify water</li> </ul>   |
|           | Acids and bases  | <ul style="list-style-type: none"> <li>• Acids</li> <li>• Bases</li> <li>• Properties</li> <li>• Types</li> <li>• Acid base indicators</li> </ul>   | <ul style="list-style-type: none"> <li>• Reaction of acids and bases</li> <li>• Acids bases indicators practical readings</li> <li>• pH scale reading</li> </ul>   |
|           | water pollutants | <ul style="list-style-type: none"> <li>• Sources</li> <li>• Effects</li> <li>• Solutions</li> </ul>   |  |
| BIOLOGY   | Plant biology    | <ul style="list-style-type: none"> <li>• Reproduction in plants</li> <li>• Flowers</li> <li>• Pollination</li> <li>• Fertilization</li> <li>• Seeds and fruits formation</li> <li>• Seeds and fruits dispersal</li> <li>• Germination, types, conditions for germination and their importance</li> <li>• Photosynthesis; conditions, equations, importance, test for starch</li> <li>• Food and nutrition; mal-nutrition, food nutrients, test for food substances, balanced diets, types of feed,</li> </ul> | <ul style="list-style-type: none"> <li>• Diagram of types of germination</li> <li>• Experiment for conditions for germination</li> <li>• Food and nutrition-test for food substances</li> <li>• Conditions for photosynthesis</li> </ul>   |
|           | Animal Biology   | <ul style="list-style-type: none"> <li>• Reproduction in humans- male and female reproductive system, functions of the parts, processes of pregnancy and formation of embryo, teenage pregnancy,</li> <li>• Respiratory system-parts, types, disorders, importance</li> <li>• Heredity-definition, features</li> <li>• Osmosis/diffusion -definition, applications</li> <li>• Circulatory system-parts, functions, disorders,</li> </ul>  | <ul style="list-style-type: none"> <li>• Osmosis and diffusion</li> <li>• Male and female reproductive system</li> <li>• Digestive system</li> <li>• Dentition -types and structure</li> </ul>   |

|  |             |   |   |
|--|-------------|---|---|
|  |             | <ul style="list-style-type: none"> <li>• Digestion</li> <li>• Dentition</li> </ul>  |   |
|  | Environment | <ul style="list-style-type: none"> <li>• Ecosystem -terms, adaptation, food chain, food web</li> <li>• Carbon cycle</li> </ul>  | <ul style="list-style-type: none"> <li>• Diagram of the types of habitats</li> <li>• Balance of the ecosystem</li> </ul>  |
|  | Physics     | <ul style="list-style-type: none"> <li>• Measurement</li> <li>• Forces-types, uses, applications</li> <li>• Basic electronics-terms, transistors, components</li> <li>• Heat energy</li> <li>• Magnetism</li> <li>• Light energy</li> </ul> | <ul style="list-style-type: none"> <li>• Measurements</li> <li>• Pressure</li> <li>• Friction</li> <li>• Magnetism</li> <li>• Heat</li> <li>• Light</li> </ul>                      |
|  | Agric       | <ul style="list-style-type: none"> <li>• Soil</li> <li>• Farming systems</li> <li>• Crop production</li> <li>• Pest and parasite</li> </ul>   | <ul style="list-style-type: none"> <li>• Farming tools</li> <li>• Diagram of pest and parasites</li> <li>• Experiment for soil microorganism</li> <li>• Soils in general</li> </ul> |

## BIOLOGY PREDICTIONS

### Reproduction in plants

- Define reproduction
- Differentiate between the types of reproduction
- List the parts of a flower and state their functions
- Define pollination
- List and explain the types of pollination
- List four agents of pollination
- State three features of wind and insect pollinated flower
- what is fertilization
- Explain the processes of fertilization
- Mention four importance of fertilization
- what is germination of seed
- List three conditions necessary for germination
- differentiate between a seed and a fruit

## ECOSYSTEM

- Explain the following
  - I. Ecosystem
  - II. Habitat
  - III. Adaptation
- b (i) Differentiate between the types of habitat
- (ii) State three adaptations each of a fish, a bird, and a plant

- c (i) Differentiate between food chain and food web
- (ii) Design a food chain using; cassava, grasshopper, hen, man
- State four factors that can disrupt the balance of the ecosystem

### **Reproduction in humans**

- List the parts of female reproductive system in humans
- State the functions of the parts of the female reproductive system in humans
- State the functions of the parts of the male reproductive system
- what fertilization in humans
- Differentiate between embryo and zygote
- Explain how the fetus feed in the womb
- Explain the term indiscriminate sex
- State three effects of indiscriminate sex
- List three disorders associated with the human reproductive system

### HEREDITY

- Explain the term heredity.
- Mention five characteristics that can be inherited from parents.
- Diffusion and osmosis
- Explain the term diffusion.
- Demonstrate the process of diffusion.
- Explain the term osmosis.
- Demonstrate the process of osmosis.
- Distinguish between diffusion and osmosis.
- Give three practical applications of each of diffusion and osmosis
- Why is a plant likely to wilt if too much fertilizer is applied to it?

### **Circulatory system**

- Explain the meaning of the circulatory system
- List parts of the circulatory system and state their functions
- List the parts and function of the human heart
- State the composition and functions of the blood.
- Explain how high and low blood pressure develops in the circulatory system
- Mention three possible causes of high and low blood pressure
- State three ways of preventing high and low blood pressure
- Draw and label the longitudinal section of the heart.

## Photosynthesis

- a. Explain the term photosynthesis.
- b. State the factors necessary for photosynthesis and give the functions of each factor.
- c. State three importance of photosynthesis to plants and animals.
- d. Describe how to test for a starch in a green leaf

## Food and nutrition

- a. Classify food items based on their nutrients.
- b. State four importance of food nutrients.
- c. Describe how to test for sugar, and fats and oil
- d. Explain a balanced diet
- e. State four importance of a balanced diet
- f. Define mal-nutrition
- g. Mention four effects of mal-nutrition
- h. Differentiate between fats and oils

## Diseases and infections

- a. Explain the term infectious disease.
- a. Identify common infectious diseases.
- b. Describe the causes, mode of transmission, prevention, and control of some common diseases of humans, animals, and crops.

## CARBON CYCLE

- Describe how carbon is cycled in nature
- State four importance of the carbon cycle.
- Mention four ways the carbon cycle is disrupted.

## LIFE CYCLE OF MOSQUITO

- State the stages of the life cycle of a mosquito
- Sketch and label the life cycle of a mosquito
- State three causes of malaria
- Mention the methods of controlling mosquitoes
- State the advantages and the disadvantages of each of the methods of controlling mosquitoes

## RESPIRATORY SYSTEM

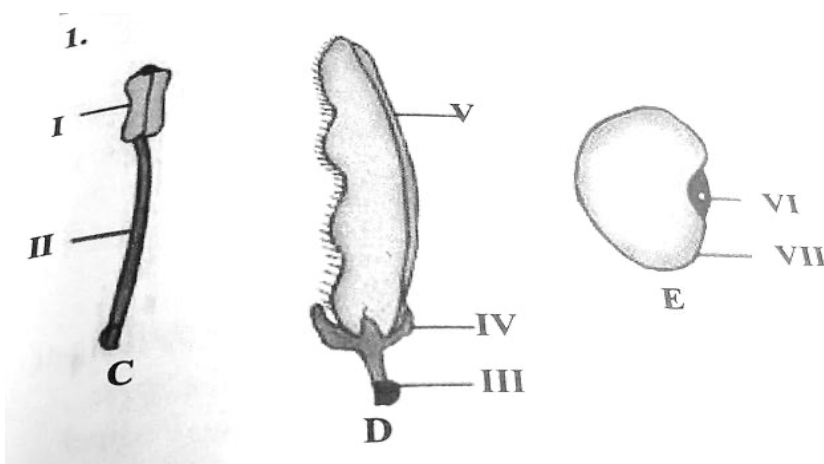
- Explain the term respiration
- State three importance of respiration
- State and explain the types of respiration
- List the parts of the respiratory system and state the functions of each of the parts
- Distinguish between the types of respiration
- State three differences between the types of respiration

## DENTITION AND DIGESTION

- List the parts of the teeth and provide their function
- List the types of the teeth and state their function
- State three causes of tooth decay and gum disease
- Describe how plaque is formed
- State four ways of preventing tooth decay
- State four ways of caring for the teeth

- List the parts of the digestive system of humans
- What is digestion
- State the function of the parts of the digestive system of humans
- Define an enzyme
- List the digestive enzymes, their site of secretion and function
- Provide the end products for the food substances
  - I. Carbohydrates
  - II. Protein
  - III. Fats and oils
- What is indigestion
- State three causes of indigestion
- State three effects of indigestion
- State three ways of preventing indigestion
- State the function of liver in digestion
- 

## BIOLOGY PRACTICAL



1. a. identify each of the structures C,D and E illustrated above
- b.name each of the parts labeled I, II,III,IV,V
- c. state one function each of the parts labeled I,II,VI and VII
- d. what is the relationship between the structures D and E?

### ANSWER

- a. C---stamen  
    D---fruit  
    E---seed
- b. I---anther  
    II---filament  
    III---stalk

IV---sepal

V----fruit wall

VI-----micropyle

c. I—contains pollen grains

II—holds anther in position

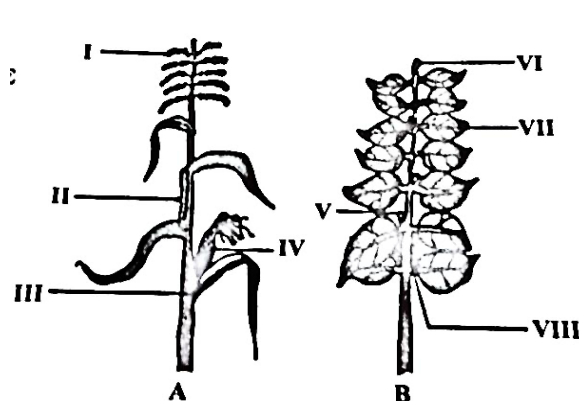
V---protects seeds

VI--- water absorbed through during germination

VII—protects embryo

d. D protects E

2. Study carefully shoot A and Bin the illustration below



a) Identify each of the shoot A and B without reasons

b) Name each of the parts labeled I,II,III,IV ,V,VI,VII and VIII

c) State the level of organization of each of the parts labeled I and II

d) Give the functions of each of the parts labeled I,III,V,VI and VIII

### ANSWERS

a) Shoot A---Monocotyledon

Shoot B---dicotyledonous

b) I—inflorescence of male flower

II—internode

III—leaf sheath

IV—inflorescence of female flower

V----axillary bud

VI----terminal bud



VII---leaf

VIII---leaf stalk or petiole

c) I---organ

II—organ

d) I –for reproduction

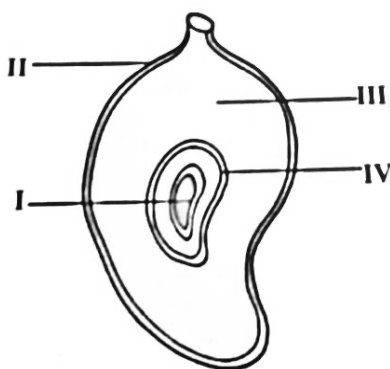
III—hold leaf blade to stem

V—develops into lateral shoots or flowers

VI---develops into flowers

VIII---holds the leaf in position

3.The diagram below is an illustration of longitudinal sections of a fruit. Study the diagram carefully and answer the questions that follow.



a) Name one fruit which has its parts similar to the illustrated

b) Name the parts I,II,III and IV

c)

C) i. state the type of fruit illustrated

ii.support your answer with one reason

d) state the mode by which the fruit can be dispersed

### ANSWER

a) mango or coconut or oil palm

b) I---seed

II---epicarp or exocarp

III---mesocarp

IV—Edocarp

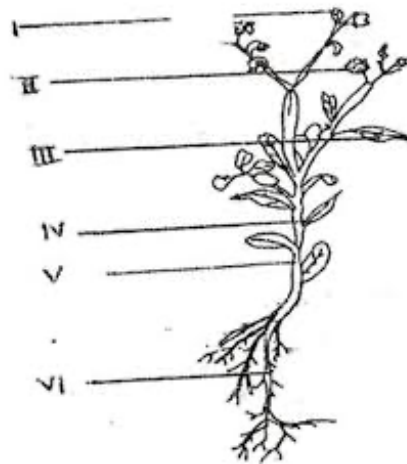
c) i. drupe

ii.

1. presence of hard or stony endocarp
2. mesocarp is fleshy

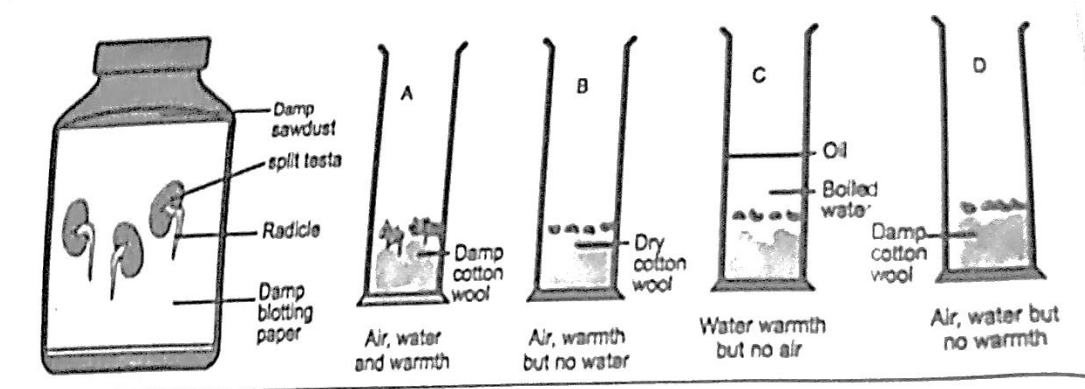
d) Animal and water

The diagram below represent external part of a flowering plant. Study it carefully and answer the questions on it



- I. Name the parts I to VI
- II. State two main parts of the flowering plants
- III. List the life cycle flowering plants

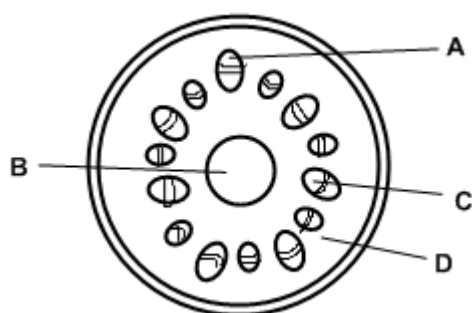
4) study the experimental set-up below carefully and answer the questions that follow.



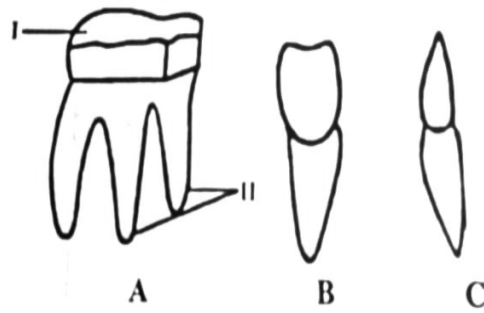
- State the aim of the experiment set-up
- What observation is made in each of test A, B,C and D after 7days?
- State the reason why the test tubes were not covered
- What was the role of layer of oil in test tube C
- State what could have been observed in each of the test tubes if cowpea seeds were put in warm water for some minutes before they were used for the experiment
- State two precautions to be taken in the experiment.

### ANSWER

- To demonstrate the conditions necessary for germination of a seed
- Germination occurs in test tube A  
No germination occurs in test tubes B,C and D
- Test tubes were not covered in order to make oxygen available for the seeds
- To prevent oxygen or air from dissolving back into the water
- There would be no germination in all the four test tubes
- Available seeds are used.
  - Seeds used be equal in number in all the four test tubes
  - All the four test tubes should have the same diameter
  - Study the diagram and answer the questions on it



- What is does the diagram represent
- Name the parts A to D
- State the function of the parts A to D

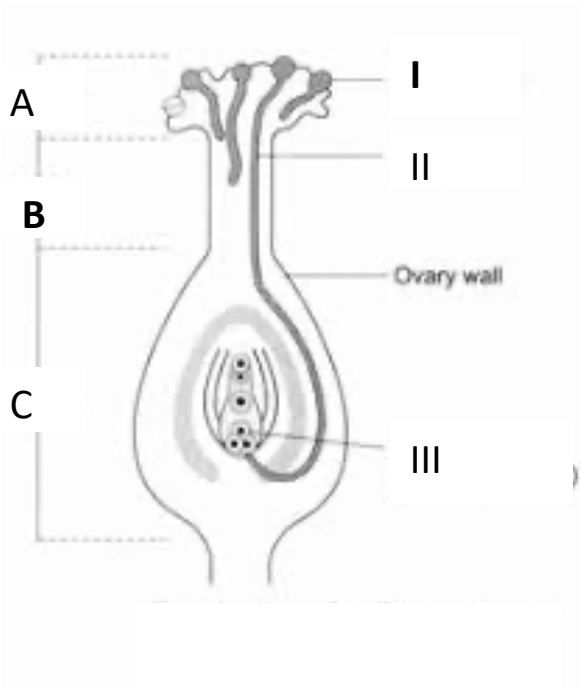


- Identify A, B, and C and describe the shape
- Name the parts labeled I and II in A.
- State the functions of A,B and C in relation to diet or food
- Mention two diseases that affect the tooth

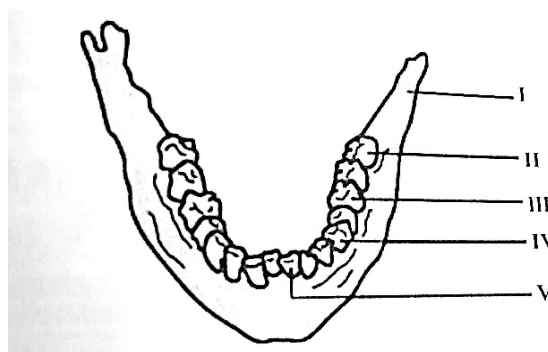
### ANSWER

- A—pre-molar, molar; flattened with projections on their surface
  - B—incisor ; chisel shape
  - C—canine ; conical or pointed
- I—crown II- roots
- pre-molar are used for tearing and grinding of food
  - incisor are used for cutting food
  - canines are used for tearing flesh
- Gum disease and tooth decay

Study the diagram and answer the questions on it



- I. What does the diagram represent
  - II. Name the parts I to III
  - III. State the functions of I, II and III
  - IV. What are the names of parts A, B and C
- Study the diagram below carefully



- a) Identify the parts labeled I,II,III,IV and V
- b) State briefly the structural adaptation each of III, IV and V

### ANSWER

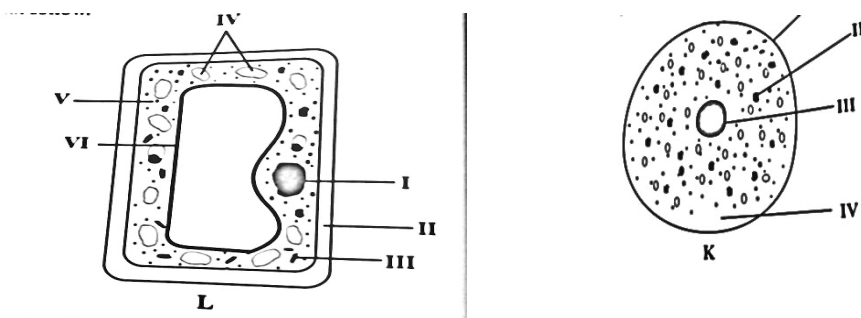
- a) I –jaw bone or gum
- II—molar
- III—premolar
- IV—canine
- V—incisor

b) III—the crown has a large surface area for grinding and crushing food

IV--- the crown is pointed and it is used for stabbing and tearing of flesh

V---the crown is chisel-shaped and it is used for cutting, tearing and holding of hold.

1. Study the diagrams below and answer the questions that follow



- Identify K and L
- Name the parts labeled I to IV in K
- Name parts labeled I to IV in L
- State the function of I and III in K
- State the function of parts labeled V and VI in L
- State two differences between K and L
- State two similarities between K and L

### ANSWERS

- K is animal cell L is plant cell
- I---cell membrane  
II---mitochondrion  
III—nucleus  
IV ---cytoplasm
- I----nucleus  
II---cellulose cell wall  
III---mitochondrion  
IV—chloroplast  
V---cytoplasm  
VI--- vacuole

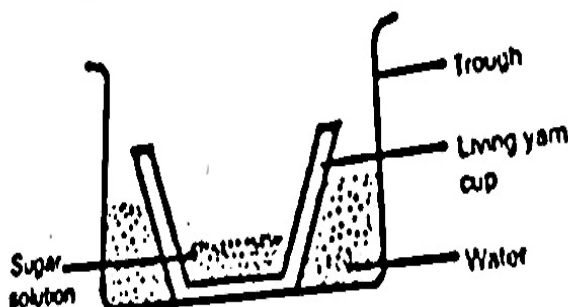
- d) Cell membrane protects the internal structure of the cell  
Nucleus controls the life activities of the cell
- e) Cytoplasm gets rid of waste materials through the cell membrane  
Vacuole stores food substances such as sugar for the cell
- f) Differences

|                         |                            |
|-------------------------|----------------------------|
| Plant cell              | Animal cell                |
| Has cellulose cell wall | Has no cellulose cell wall |
| Has chloroplasts        | Has no chloroplasts        |

- g) Similarities

|               |               |
|---------------|---------------|
| Plant cell    | Animal cell   |
| Has nucleus   | Has nucleus   |
| Has cytoplasm | Has cytoplasm |

2. The figure below represents the beginning of an experiment to demonstrate osmosis in a living cell using yam tissue.

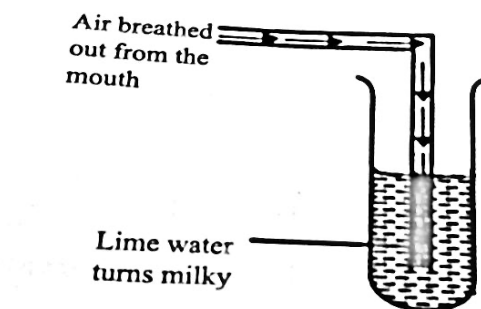


- a) Draw and label a diagram to illustrate what would be observed if the set-up is allowed to stand for 24 hours
- b) What does the yam represent?
- c) Explain the principle involved in the experiment
- d) How would you set-up a control of the experiment above?
- e) Give one example of the osmotic process in each of the following living things
  - i) flowering plants
  - ii) humans

## ANSWER

- a)
- b) A semi-permeable membrane
- c) Water moves across the living yam by osmosis into the strong sugar solution that has a high osmotic potential until equilibrium is reached when the concentration of the diluted sugar solution and water are the same
- d) A trough is filled with distilled water and a living yam cup is placed in it. The yam is then filled with the distilled water used in filling the trough. Since the concentration on both sides of the yam are the same, there will be no movement of water molecules
- e) i) absorption of water into the root hair  
ii) water absorption in the proximal convoluted tubule of a nephron

3. The set-up below shows air being breathed out through the mouth into test-tube containing lime water.



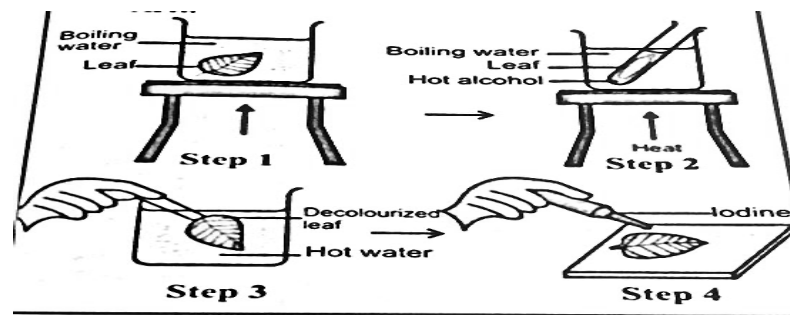
- a) Why does the lime water turn milky?
- b) Identify the milky substance produced
- c) Write a balanced chemical equation for the reaction
- d) Name two other substances present in breathed-out air
- e) What is the aim of the experiment?

## ANSWER

- a) Because of presence of carbon dioxide in the expired air
- b) Calcium carbonate or  $CaCO_3$
- c)  $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$
- d) Nitrogen, water vapour or water, rare gases,
- e) To show that carbon dioxide is a by-product of respiration



4. The diagram below represents a scientific experiment. Study it and answer the questions that follow.

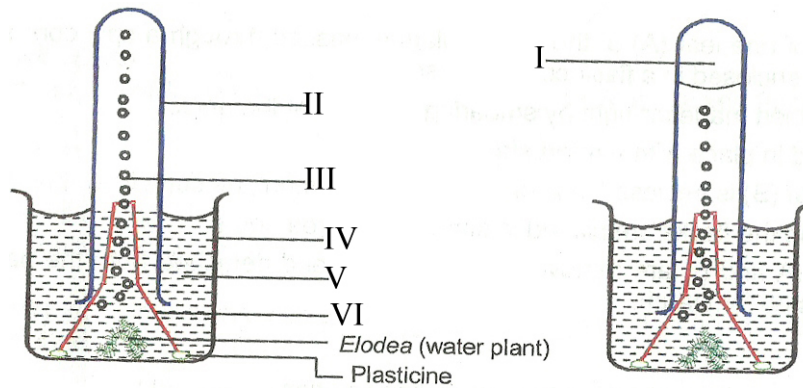


- What is the aim of experiment?
- State each of steps in step 1, 2, and 4
- Give the reason why the leaf is dip in boiled water
- State reason for step 2
- State the observation in the last step of the experiment (step 4)

### ANSWER

- To demonstrate that starch is a product of photosynthesis or test for starch in a leaf
- Step1. Boil a leaf in water  
Step 2. Dip the in warm alcohol  
Step 3. Dip the leaf in boiling water  
Step 4. Place the leaf on a white porcelain plate and pour few drops solution on it
- To kill living cells
- To remove chlorophyll
- The leaf will turn blue-black indicating presence of starch in the leaf

The experiment below represents a test for a phenomenon in a laboratory. Study it carefully and answer the questions below.



- i. State the aim of the experiment
  - ii. Name I to VI in the set-up
  - iii. Why was II in the experiment inverted
  - iv. How will you test for the gas produced
  - v. Why is the set-up placed in sunlight but not a dark room
5. A student performed test on food substances A, B and C and made the following observations.

| Food substance | Test  | observation                                      |
|----------------|---|--|
| A              | Few drops of iodine solution was added to A               | The iodine solution in turns blue-black          |
| B              | A drop of B was applied to a white sheet of paper         | A translucent patch was seen on the paper        |
| C              | Benedict's solution was added to C and the mixture boiled | Benedict's solution turns from blue to brich-red |

- a) Identify food substances A, B and C
- b) Give the products of digestion of A,B,and C
- c) In which parts of the alimentary canal does the digestion of each of food substances A, B, and C start?
- d) In which part of the alimentary canal is food substance C absorbed after digestion?

### ANSWERS

- a) A—starch

B—fat and oil

C—glucose or reducing sugar

b) starch ---glucose or fructose

fat and oil----fatty acids or glycerol

glucose ---remains glucose

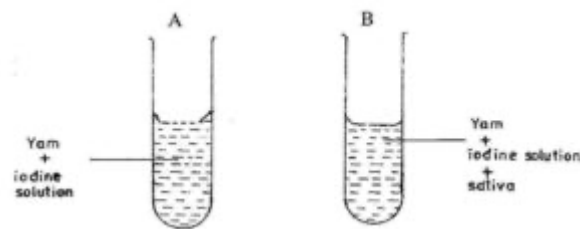
c) Starch –mouth

Oil ----small intestine or duodenum

Glucose –pass through the system

d) Glucose is absorbed in the small intestine.

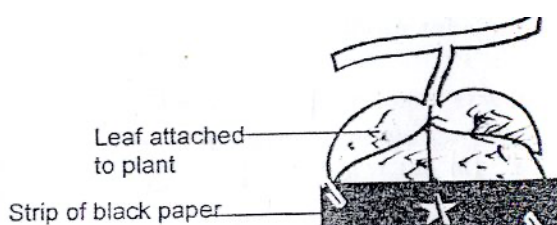
6. In an experiment, yam pap is put into two test tubes A and B containing iodine solution. The test tubes are warmed slightly to a temperature of  $37^{\circ}\text{C}$  and saliva is put into test tube B



- State the colour of the content of test tube A
- State the colour changes of the contents in test tube B after about 3 minutes.
- Fehling's solution is added to the contents of test tube B after the 3 minutes and it turns brick-red. What food substance is present? Give two functions of saliva in eating.
- Why was it necessary to warm the contents of the test tubes to about  $37^{\circ}\text{C}$ ?
- Give two aims of the experiment.

9. An experiment was carried out on a fresh green leaf attached to a plant. The middle portions of the surface of the leaf were covered with strips of black paper as shown in diagram A below

Diagram A: Start of Experiment

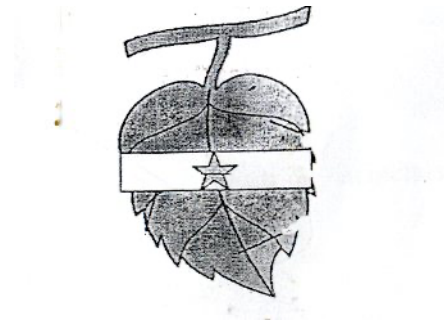


After 6 hours the black strips were removed, the leaf plucked off and the following activities were carried out on it:

- (A) dipped in boiling water for a minute;
- (B) dipped in warm alcohol;
- (C) washed in cold water;
- (D) dipped in iodine

Some portions of the leaf turned blue-black after dipping in iodine solution. After the activities the observations made were as shown in diagram B below

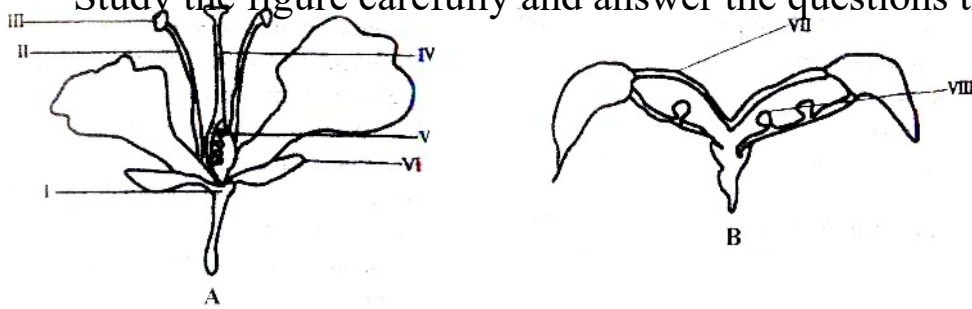
Diagram B: End of Experiment



Use the information provided above to answer the following questions.

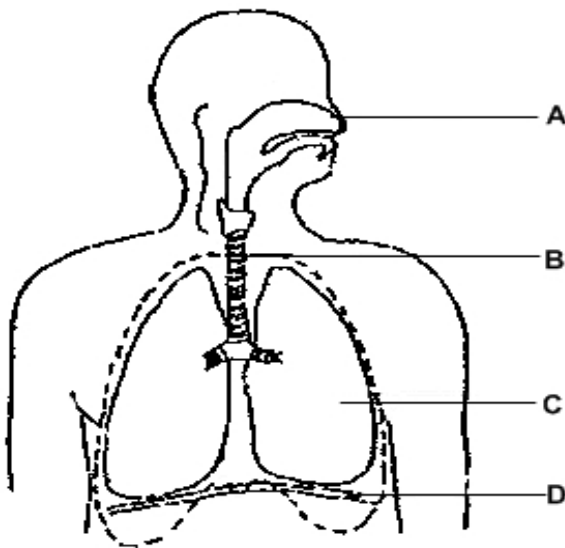
- Explain why each of the activities (A), (B), and (C) was carried out
- Which portions of the leaf turned blue-black? Give a reason for your answer
- What was the role of the strips of black paper in the experiment
- Suggest an aim for the experiment.

10. The fig. is an illustration of structures associated with plants. Study the figure carefully and answer the questions that follow.



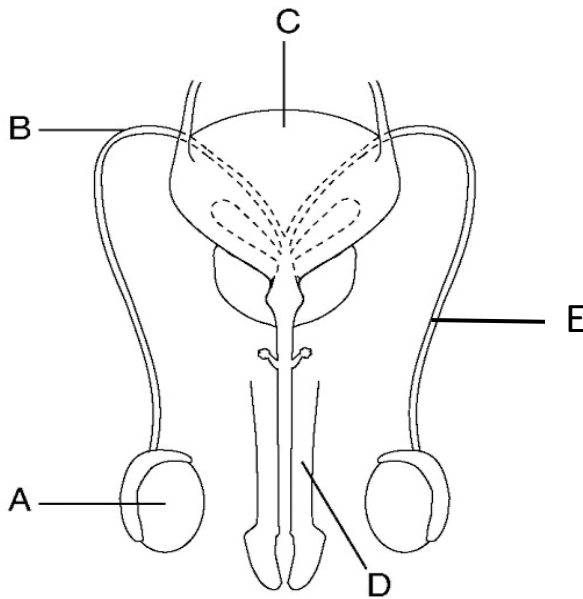
- Identify the structures **A** and **B**
  - (α) Name each of the parts labelled I, II, III, IV, V,
  - (β) State **one** function of **each** of the parts labelled II and IV
- State the mode of dispersal of the part labelled VIII

11. The diagram below represents a system of a living organism. Study it and answer the questions below.



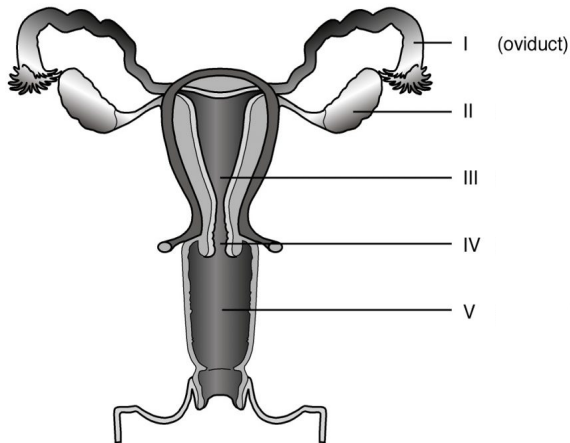
- a. Name the parts A to D
- b. State the main function of C
- c. What does the diagram represents
- d. List the two gas involved in the processes

12. The diagram below represents a system of an organism. Study it and answer the questions on it.



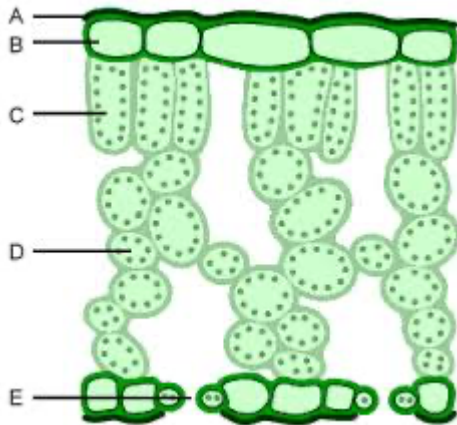
- I.
- III. State the functions of A to E

13. The diagram represents a system. Study it and answer the questions on it.



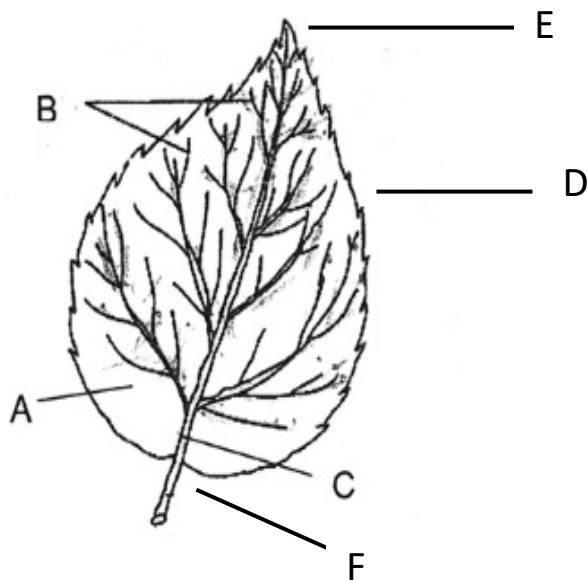
- I. What does the diagram represent
- II. Name the parts I to v
- III. State the functions of I to v

14. The diagram represents a biological phenomenon.



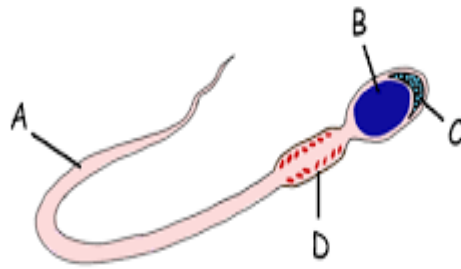
- I. What does the diagram represents
- II. Name the parts A to E
- III. State the function of parts A to E

15. The diagram represents parts of a leaf. Study it and answer the questions on it.



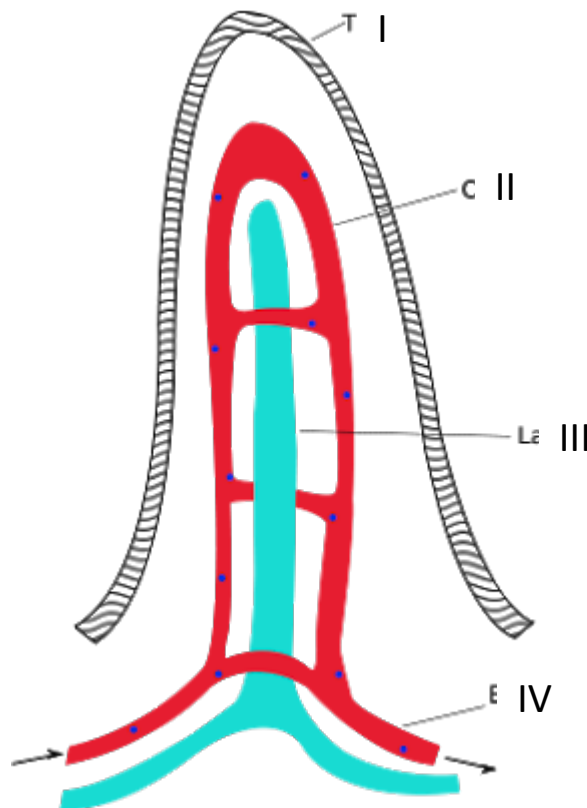
- I. Name the parts A to F
- II. State the functions of the parts A to F
- III. What is the main function of the diagram
- IV. How does the diagram prepare its food
- V. What group of organisms does the diagram belongs to
- VI. What role does the diagram play in the carbon cycle

16. The diagram represents a biological cell of an organism



- I. What is the name of the diagram
- II. Name the parts A to D
- III. State the functions of parts A to D
- IV. How does the diagram becomes active

17. The diagram represents part of a system. Study it and answer the questions on it.



- I. What does the diagram represent?
- II. Name the parts I to IV
- III. State two adaptive features of the diagram
- IV. State the function of the diagram



# LEARN OSMOSIS AND DIFFUSION IN INTEGRATED SCIENCE IN SCOPE

## DETAILED PREDICTIONS -PHYSICS

### Magnetism

- Define the following
  - I. Magnetism
  - II. Magnetic field
  - III. Magnetic materials
  - IV. Non-magnetic materials
- List three examples of magnetic and non- magnetic materials
- C. Mention four uses of a magnet
- State three properties of a bar magnet
- State the law of a magnet
- State the three and explain the three ways of making a magnet
- Differentiate between permanent and temporary magnet

### Forces and pressure

#### **PRESSURE, FRICTION, CALCULATION**

- Define the following
  - I. Force
  - II. Pressure
  - III. Friction
  - IV. Force of gravity
- State four effects of a force
- State three effects of frictional force
- Mention three ways of reducing friction
- Mention four applications of pressure in liquids
- A cement block with the surface area  $100\text{cm}^2$  and force  $10\text{N}$ , Calculate the pressure of the block

## Electrical energy

- Define the following
  - I. Electrical energy
  - II. Potential difference
  - III. Electromotive force
  - IV. Current
  - V. Resistance
- Mention four sources of electricity
- State three ways of conserving electricity
- State three effects of illegal electrical connection
- What is a fuse
- State three uses of a fuse
- Draw and label a simple electrical circuit
- Mention three advantages and disadvantages of parallel and series electrical connection

## Heat energy

- Define the following
  - I. Heat
  - II. Temperature
    - State three difference between heat and temperature
    - List and explain the modes of heat transfer
    - Mention three applications each of
      - I. Radiation
      - ii. Convection
      - ii. Conduction
        - Differentiate between poor and good conductors of heat
        - Explain the reasons why handles of cooking utensils are made with poor conductors of heat

## Machines

- Define the following
  - I. Machine
  - II. Lever
  - III. Mechanical advantage
  - IV. Velocity ratio
  - V. Complex machine
- State the types of simple machine
- Give three examples each of the types of lever
- Explain why the efficiency of a machine is less than one
- Give three examples of complex machines
- State three ways of caring for a machines

## Light energy

- Define the following
  - Light
  - Opaque object
  - Transparent object
  - Shadow
  - Eclipse
  - Image
  - Refraction of light
  - Reflection of light
  - Dispersion of light
- List four sources of light
- Differentiate between opaque object and transparent object
- Mention three examples of opaque objects
- Briefly describe the pinhole camera
- Sketch the pinhole camera
- State four properties of images formed by a pinhole camera
- Mention four uses of a plane mirror
- Draw a diagram to represent reflection, refraction and dispersion of light

- State the laws of refraction and reflection
- State four uses of a periscope

### **Basic electronics**

- Explain the term electronic
- List five examples of electronic devices
- List and state the function of the components of an electronic circuit
- Draw an electronic circuit and label it
- Explain the terms forward bias and reverse bias
- What is a transistor
- List and state the functions of the components of a transistor
- Draw and label the symbols for the types of transistors
- State three characteristics of transistors
- Mention four uses of a transistors

### **Solar system**

- State the composition of the solar system
- Explain the following
  - A star
  - A planet
- List the planets in order of the distance from the sun
- Explain the meaning of a satellite
- Differentiate between the two types of a satellite
- State four uses of artificial satellite

### **Elements of weather**

- Explain the following
  - Weather
  - Climate
  - Season
- List the elements of weather/climate and the instruments used to measure each one of them

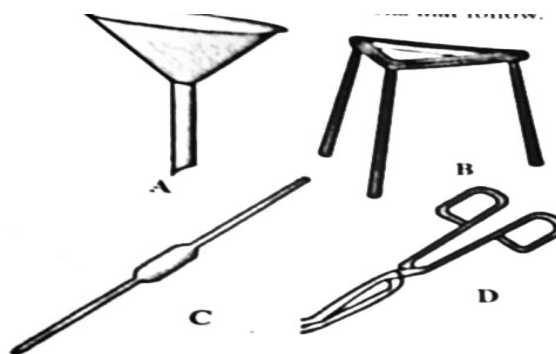
## MEASUREMENT

- Describe how to determine the volume of;
  - I. Regular object
  - II. Irregular object
- Describe how to determine the density of irregular object
- Explain why objects sink or float
- Calculate density of a block with dimension 20cm by 10cm by 5cm and mass 50kg.
- Find the density of a substance of initial volume of  $50\text{cm}^3$  and final volume of  $100\text{cm}^3$  and mass 25kg.

## PRACTICAL -PHYSICS

### Detailed predictions

1. Study carefully the laboratory devices illustrated in the diagrams and use them to answer the questions that follow.



- a) Identify each of the devices A, B, C and D
- b) i) state one use of each of the devices A,C and  
ii) Describe how each of the devices C and D is use

### ANSWER

- a) A—funnel  
B—Tripod stand  
C---pipette  
D—a pair of tongs
- b) i) A---for transferring liquid from one container into another

C---for drawing specific volume of liquids

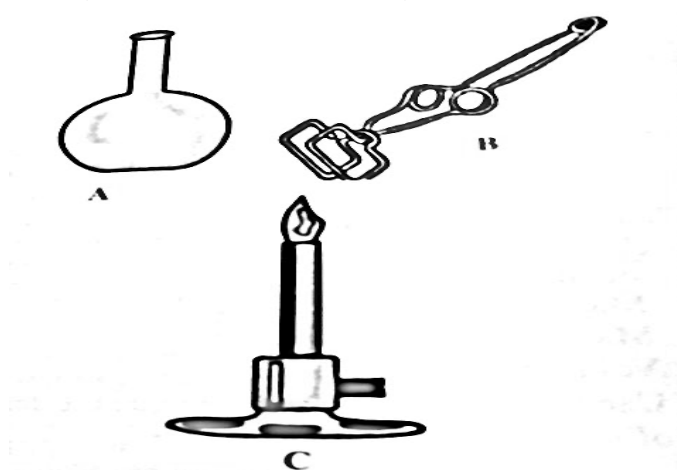
D---to hold hot objects

ii) how device C is used

1. The pointer end of the device is immersed into the solution
2. The mouth is put at the blunt end and sucked from it
3. The liquid level is allowed to rise above the mark and the thumb used to seal the end where the mouth was put
4. The thumb is partially removed to drain some solution
5. The thumb is completely removed and allows solution into appropriate container.

How device D is used

- a. The thumb is placed in one of the cavities/holes of the handle and another finger placed in the other cavity
  - b. To open up the device
  - c. The open end is used to hold the (hot) object
2. The following diagrams are illustrations of laboratory apparatus  
Study them carefully and answer the questions that follow.



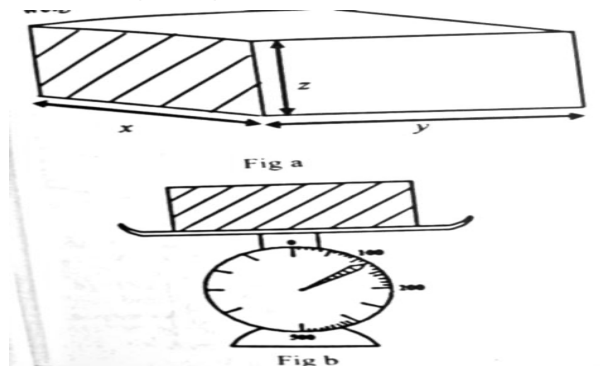
- a) Identify each of the apparatus A,B and C
- b) State one use each of the apparatus

**ANSWER**

- a) A---Flat bottom flask  
B---test tube holder  
C---Bunsen burner
- b) A---for carrying out reactions or storing solution  
B---for holding test tube during heating

C –for heating substances

3. To determine the density of a piece of wood a cuboid of the wood was used. The mass and volume of the cuboid were then determined. Figure a shows the dimensions X, Y and Z of the cuboid while figure b shows the cuboid on weighing scale with full reading of 1000g.



- a) i) measure and record the lengths x,y and z in centimetres  
ii) calculate the volume of the cuboid
- b) read and record the mass, m of the cuboid
- c) calculate the density of the piece of wood in  $gm^{-3}$

### ANSWER

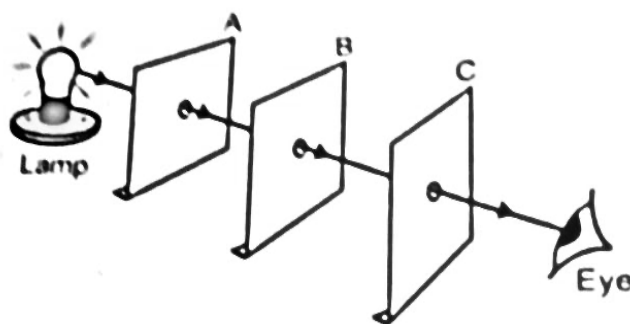
a) i)  $x= 3.0cm$ ;  $y= 4.0cm$ ;  $z= 2.0cm$

ii)  $volume = x \times y \times z = 3 \times 4 \times 2 = 24.0cm^3$

b) mass of wood  $m = 120g$

c) density of wood  $= \frac{120g}{24cm^3} = 5.0gm^{-3}$

4. use the diagram below to answer the questions that follow

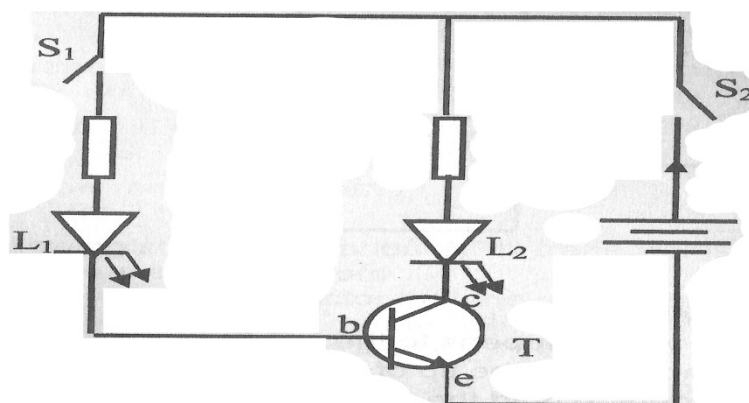


- what would the observer see from the position shown?
- What happens when cardboard B is shifted?
- Explain the observation made (b) above
- What would be observed when the cardboard B is brought back to its original position?
- What does the experiment demonstrate?
- Mention two devices that work on the property of light demonstrated
- Mention two natural occurrences that could be explained by the property of light demonstrated

### ANSWER

- The observer will see light or rays through the three holes
- Light can no longer be seen through the holes
- Light travels in a straight line and because cardboard B is shifted out of the straight line, the light is not seen again
- The observer will again see light through the three holes
- The experiment demonstrates that light travels in a straight line
- Pinhole camera, torch light and periscope
- Formation of shadows and eclipse

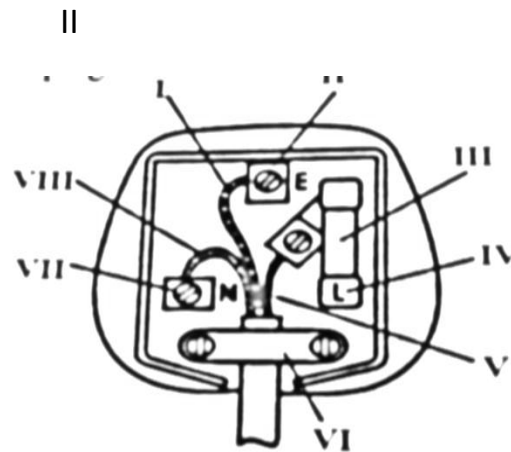
b. The set-up below represents an electronic circuit with some components. Study it carefully and answer the questions below.



- Name the parts labeled S1, L1, b, c, and e
- What is the name given to T(b, c, e) in the diagram
- Explain what will happen to L1 and L2 if S1 and S2 are closed



- iv. What will happen to L1 and L2 if S1 is open and S2 is close
5. The figure below shows the inside of 13A main plug

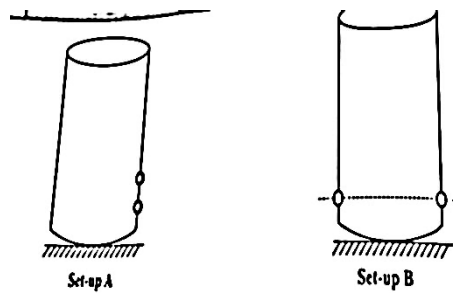


- Which of parts labeled is the earth wire?
- What colour is used to represent the earth wire?
- Which of the part labeled is the neutral wire?
- What colour is used to represent the neutral wire?
- Which of the part labeled is live wire?
- What colour is used to represent the live wire?
- State the role of part labeled I
- Identify parts II, III, IV, VI and VII

#### ANSWER

- I represent earth wire
- Green or yellow
- VIII represents neutral wire
- Blue
- V represents live wire
- Brown
- The earth wire prevents an electrical shock
- II—earth pin  
III---fuse  
IV---live pin  
VI--- cable grip  
VII---neutral pin

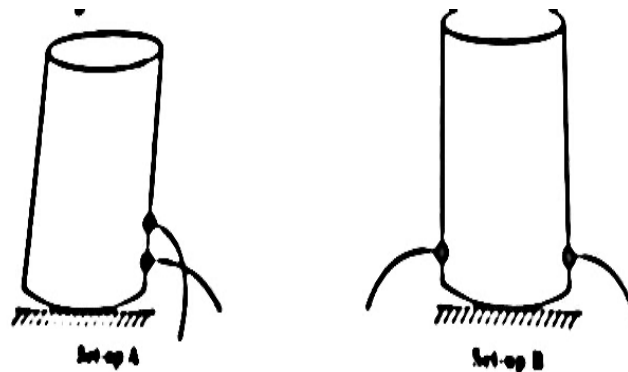
6. In a experiment, a pupil took two empty milo tins and made holes in their sides as shown in the diagram above. The pupil then filled the milo tins with water



- Draw and label the diagrams to show what the pupil will observe in set-up A and set-up B
- Explain the observations in set set-up A and set-up B
- What is the aim of set-up A?
- What is the aim of set-up B?

### ANSWER

- a) Labeled diagrams



- Set-up A---the pressure of the water coming out of the lower hole is higher than the one at the top.  
Set-up B—the pressure of water coming out of holes are the same because they are at the same level

### AIM

- Set-up—to show that pressure increases with depth in a liquid
- Set-up—to show that pressure at the same point or level in a liquid is the same.

7. Fig. 1 shows the three dimensional faces of B, C, and D of a rectangular block of wood. The block is weighed using a spring balance as shown in fig.2. Use the diagrams to answer the questions which follow.

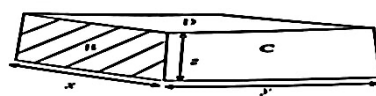


Fig. 1

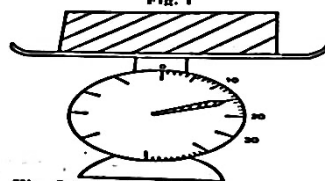


Fig. 2 Mass in kilograms (kg)

- a)
  - i. measure and record the length  $x$ ,  $y$  and  $z$  in centimetres(cm)
  - ii calculate the area B and C
- b)
  - i. read and record the mass,  $m$  of the wood in kilograms
  - ii.calculate the weight,  $W$  of the wood ( $g= 10\text{ms}^2$ )
- c) calculate the pressure exerted by the wood in  $\text{Ncm}^{-2}$  at the surface marked B and C.

### ANSWER

a) i)  $x = 3.0\text{cm}, y = 4.0\text{cm}, z = 2.0\text{cm}$

ii) *Area of surface B*  $= x \times z = 3 \times 2 = 6\text{cm}^2$

*Area of surface C*  $= z \times y = 2 \times 4 = 8\text{cm}^2$

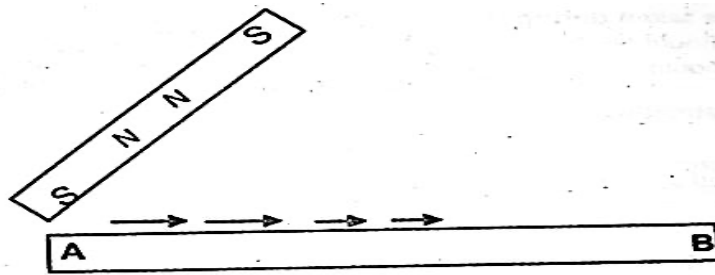
b) i) the mass of wood  $m = 15\text{kg}$

ii) weigh of wood  $= 15 \times 10 = 150\text{N}$

c) pressure at B  $= \frac{\text{Force or weight}}{\text{Area}} = \frac{150}{6} = 25\text{cm}^{-2}$

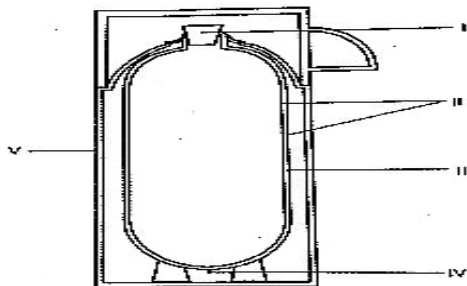
pressure at C  $= \frac{\text{Force or weight}}{\text{area}} = \frac{150}{8} = 18.75\text{Ncm}^{-2}$

In an experiment, an iron bar is magnetized by dragging a magnet over the surface of from A to end B several times as shown in the diagram below.



- Mention the method of magnetization
- Give the polarity of the ends A and B of the bar after magnetization
- Give other two methods of magnetization

The diagram below is an illustration of a thermos flask. Study and use it to answer the questions



- Name the parts I to v
- How does the device minimize heat loss or gain through
  - Conduction
  - Convection
  - Radiation
- State one use of the thermos flask

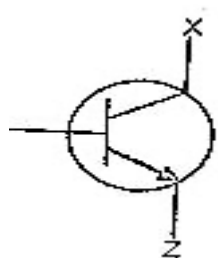


Figure 1

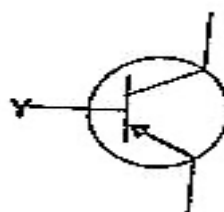
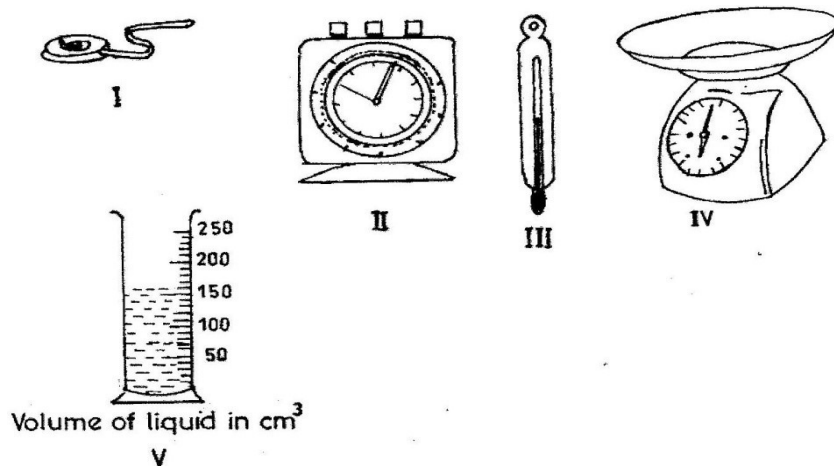


figure 2

- What does figure 1 and 2 represent
- Name parts labelled X and Y
- What is the role of Y
- Mention the material that can be used to make Y
- State two uses of the device in the diagram

The diagrams below show some instruments used in the laboratory. Study the diagrams carefully and answer the questions that follow



- Identify each of the instruments labeled I, II, III, IV and V
- State one use of each of the instruments labeled I, II, III and IV
- Read and record the volume of the liquid in the instrument labeled V

**NOTE: Learn also, vacuum flask, stroking, induction, thermometer, density**

## CHEMISTRY -THEORY

### Hazard

- Explain the term hazard
- Mention four hazards that may occur in science laboratory
- State four ways to prevent hazards in science laboratory
- Draw five warning and safety signs in the community and laboratory.
- State four safety precautions to prevent accidents in the home and school.

### Air pollution

- State the names and sources of common air pollutants.
- State four possible harmful effects of air pollutants.
- State three activities of man that can pollute the air

## Physical and chemical change

- a. Explain the following
  - i. Physical change
  - ii. Chemical change
- b. Differentiate between physical and chemical change
- c. Classify the following as chemical or physical change

Melting and freezing of ice

Crumpling a piece of paper

Boiling of egg/foodstuff

Rusting of iron

Stretching an elastic material

Inflating and deflating a bicycle tyre or football

Burning a paper

Lighting a match

## Elements, compound, mixtures

- a. Explain the following terms; element, compound and mixture.
- b. classify the following materials into elements, compounds and mixtures. Salt, water, iron fillings, sodium
- c. write the chemical symbols for the first twenty elements of the periodic table.
- d. Write the name and chemical formula for the following compounds
  - Hydrogen and chlorine
  - Magnesium and oxygen
  - Sulphur(IV) oxide
  - Carbon (IV) oxide
  - Iron(II) oxide
- e. Explain the following terms; solute, solvent, solution.
- f. Differentiate between homogeneous and heterogeneous solutions.
- g. Differentiate between a mixture and a compound.
- h. State three differences between a mixture and a compound
- i. List the methods of separating the following mixtures
  - A mixture of alcohol and water
  - Rice from water
  - Mixture of iron filling and sand

Mixture of sand and iodine crystals  
Salt from salt solution  
A mixture sand and water

### **Metals and non-metals**

- a. State four characteristics of;
  1. metals
  2. and non-metals.
- b. Mention three uses each of metals and non- metals
- c. What are metalloids
- d. State three properties of metalloids
- e. Mention three uses of metalloids
- f. List four reactive and non-reactive metals
- g. Explain why aluminum does not rust
- h. State three chemical properties of metals.
- i. State three causes of corrosion of metals.
- j. Mention three the effects of corrosion on metals.
- k. List four ways for preventing rusting

### **water**

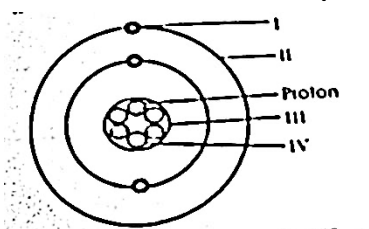
- a. State four properties of water.
- b. Explain the terms hard and soft water.
- c. Explain what causes of hardness of water.
- d. State four ways of softening hard water.
- e. Mention four health benefits of water to humans.
- f. State three uses of water in agriculture.
- g. Identify four ways of conserving water in the home.
- h. Define purification of water
- i. State four ways of purifying water
- j. State three ways by which purification of water is important

## PRACTICAL TREND CHEMISTRY

| Year | Topics   |
|------|--|
| 2010 | Acids and bases  |
| 2011 | Hazards  |
| 2012 | Apparatus  |
| 2013 | Metals (reactivity)  |
| 2014 | Separation of mixtures   |
| 2015 | Metals, separation of mixtures   |
| 2016 | Hazards  |
| 2017 | Separation of mixtures(June), metals(reactivity) private   |
| 2018 | Acids and bases  |
| 2019 | <b>1. Apparatus</b><br><b>2. Metals (reactivity, chemical properties, rusting)</b><br><b>3. Separation of mixtures</b><br><b>4. Water (purification)</b> |

### PREDICTED QUESTIONS CHEMISTRY PRACTICAL

1. the diagram below shows the structure of an atom. Study the diagram carefully and use it to answer the questions that follow.



- identify the parts labelled I, II, III and IV
- how many electrons are in the atom?
- state the atomic number of the atom
- state two differences between protons and electrons

### ANSWER

I)electron



II)shell

III)neutron

IV)nucleus

ii)number of electrons= 3

iii)the atomic number = 3

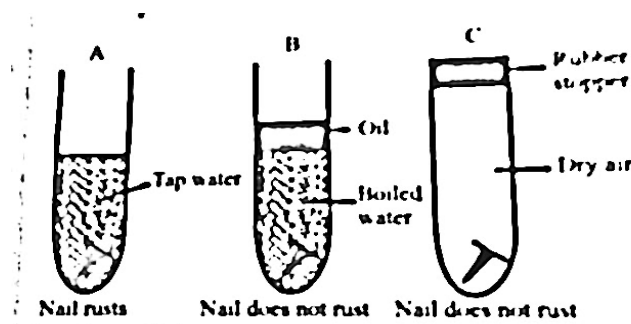
iv)proton has positive charge

proton has a mass of 1a.m.u

electron has a negative charge

electron has a negligible mass number

2. in an experiment, a student took three iron nails and cleaned their surfaces dry and placed them in three separate test tubes in the set-ups A, B and C shown in the following diagram. After three days the nail in set-up A was found to have rusted while the nails in the set-ups B and C did not.



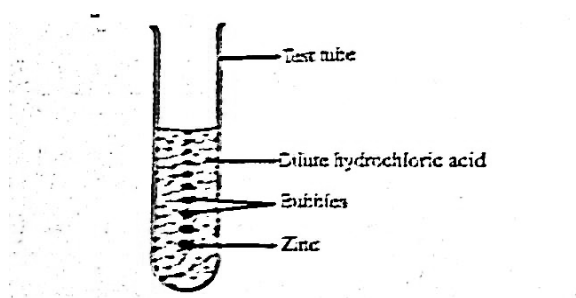
Answer the following

- why was the water in the set-up B boiled?
- Explain the function of the oil on top of the water in set-up B
- State the purpose of the rubber stopper in the set-up C
- Why did the nail in the set-up rust?
- Suggest an aim for the experiment

- f) Explain why oil or gease is applied on the surface of a metal to rusting

### ANSWER

- a) To remove air or oxygen
  - b) To prevent air or oxygen from dissolving back into the water
  - c) To prevent water or moisture from entering the test tube
  - d) Because oxygen or air and water were present
  - e) To show that air or oxygen and water are necessary for rusting
  - f) Oil prevents air from coming into contact with the metal for rusting
3. In an experiment to investigate the reactivity of zinc, a piece of the metal was dropped into a test tube coantaining dilute hydrochloric acid. The experimental set-up is illustrated below.

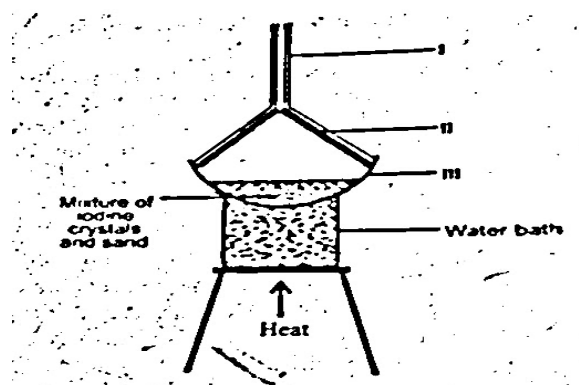


- a) Write a balanced chemical equation for the reaction that occurred in the experiment
- b) Name the gas involved
- c) List two metals which cannot react in a similar way as zinc
- d) List two metals which cannot react in similar way as the zinc
- e) Name two glass apparatus which could have been used instead of the test tub

### ANSWER

- a)  $Zn + 2HCl \rightarrow Zn + Cl_2 + H_2$
- b) Hydrogen gas
- c) Magnesium, sodium, lithium and iron
- d) Gold, platinum and silver
- e) Beaker, round bottled flask, conical flask

4. The set-up below was used by a student to separate a solid-solid mixture. Use it to answer the questions that follow.

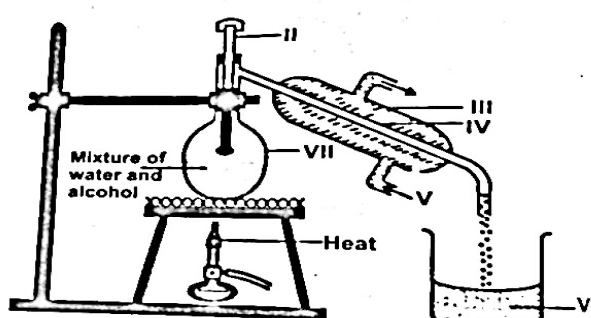


- Name the parts I, II and III
- What is the method of separation used by the student
- Mention two substances that can sublime
- Mention one mixture that can be separated by the method above
- State three factors that affect the rate at which a solute dissolves in a solvent.

ANSWER

- I inverted funnel  
II iodine crystal  
III evaporating dish
- Sublimation
- Iodine crystal, naphthalene
- I a mixture of sand and iodine crystal  
II a mixture of sand and naphthalene
- Particle size, temperature and stirring

5. The diagram below shows the set -up of how a mixture was separated in the laboratory. Use it to answer the questions that follow.

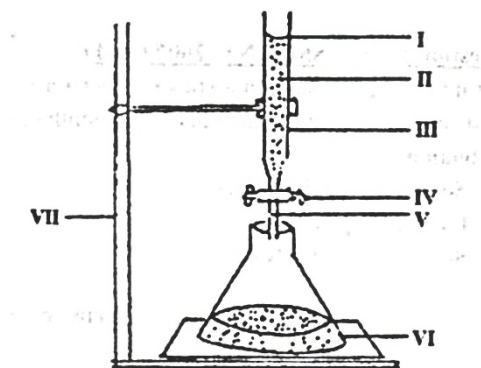


- a. Name parts I to VII
- b. What method of separation is used in the set-up?
- c. State the function of part III
- d. Which of the liquid in the mixture is separated first and why?
- e. State two applications of the above method of separation

**ANSWER**

- a. I thermometer  
II water outlet  
III water jacket  
IV water  
V water inlet  
VI liquid distillate  
VII distillation flask
- b. Distillation
- c. It cools the vapour and condenses it to liquid
- d. Alcohol, because it has a lower boiling point than water
- e. It used in water purification  
It is used in separating the components of crude oil

6. The diagram below shows the set-up of an experiment in which a student added some quantity of hydroxide solution of the same concentration.

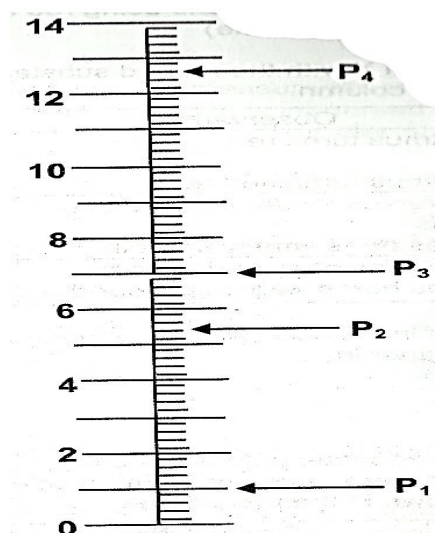


- Name the parts labeled I to VI
- Mention one instrument that could be used to transfer the sodium hydroxide solution into II
- What is the name of the reaction that occurred between dilute hydrochloric acid and sodium hydroxide solution?
- What is the name of the compound that would be left in an evaporating dish if the liquid mixture III is heated

### ANSWER

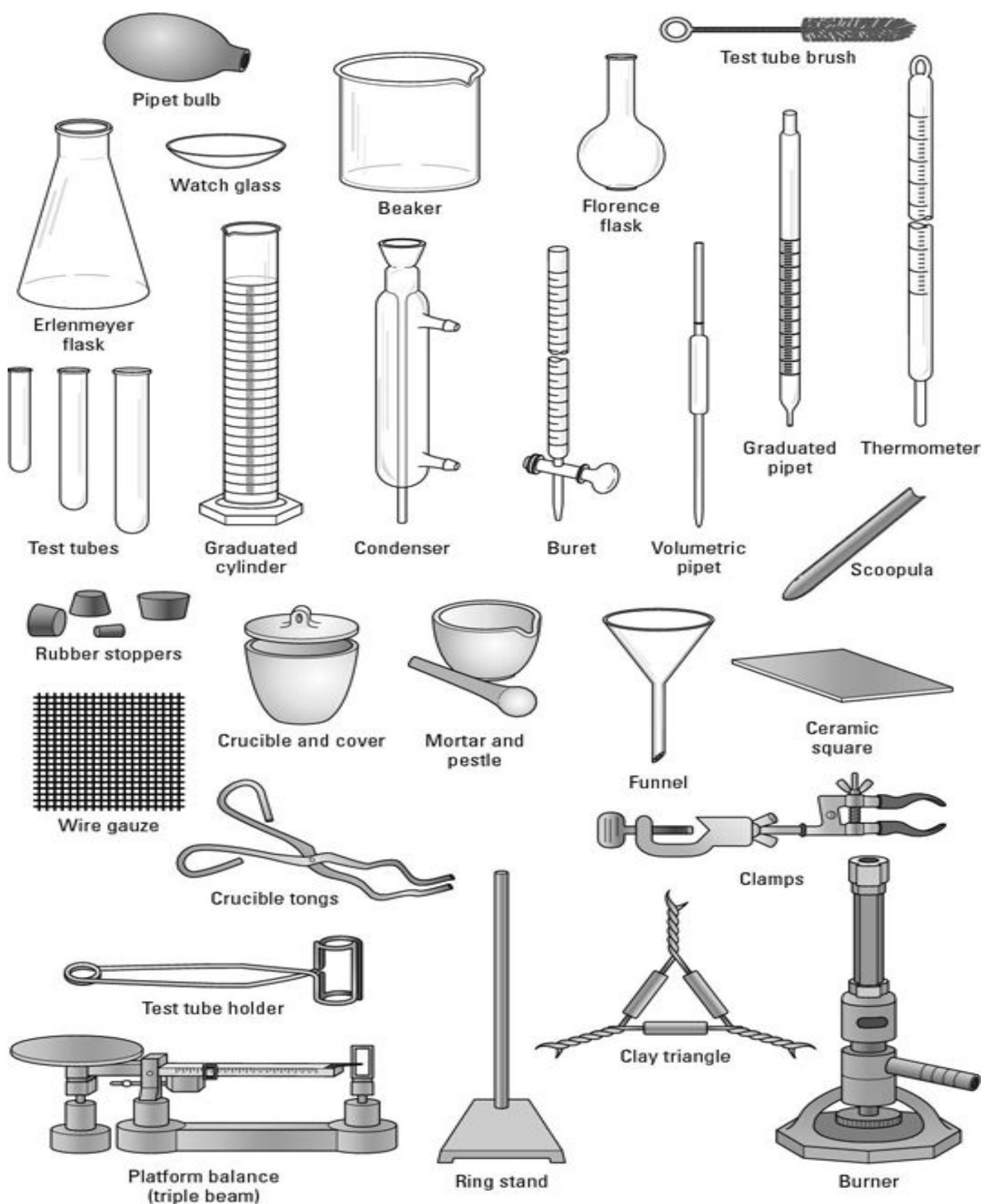
- I burette  
II conical flask  
III sodium hydroxide solution  
IV retort stand
- Measuring cylinder, pipette
- Neutralization reaction
- Sodium chloride(NaCl)

c) The graduated diagram below represent a pH scale. Answer the questions on it.



- i. Read and record each of the PH values; P1, P2,P3 and P4
- ii. What does pH; P1 and P2 indicate. Give two examples of such liquids
- iii. What does pH; P3 and P4 indicate. Give two examples of such liquids
- iv. Sate the observations red litmus and blue litmus paper are dipped in turns into each of the liquid

# LEARN THE APPARATUS AND THEIR USES



# AGRICULTURE-THEORY

## PREDICTED QUESTIONS

### Soil

- a. Define soil
- b. List and explain the components of soil.
- c. Mention five uses of soil.
- d. State three the physical properties each of the three types of soil.
- e. Explain the following
  - Soil texture
  - Soil structure

### Crop production

- a. Sate the principles in crop production.
- b. Explain the term vegetable crop.
- c. Mention four factors influencing vegetable crop production.
- d. List five cultural practices that can be carried in vegetable production
- e. State three reasons for each of the cultural practices
- f. State four uses of vegetable crops.

### Farming systems

- a. List five farming system suitable for crop production.
- b. State three advantages and disadvantages of the farming systems above
- c. Define crop rotation
- d. State three importance of crop rotation
- e. draw a plan for a crop rotation programme.
- f. Distinguish between the following pairs of farming systems:
  - i. Mixed cropping and land rotation.
  - ii. Mixed farming and mixed cropping.
  - iii. Organic farming and crop rotation

### Pest And Parasite

- a. Differentiate between pests and parasites and give examples.
- b. State four methods of controlling pests and parasites.
- c. State **two** effects each of parasites and pest on humans.
- d. State at least **four** control methods of pests and parasites

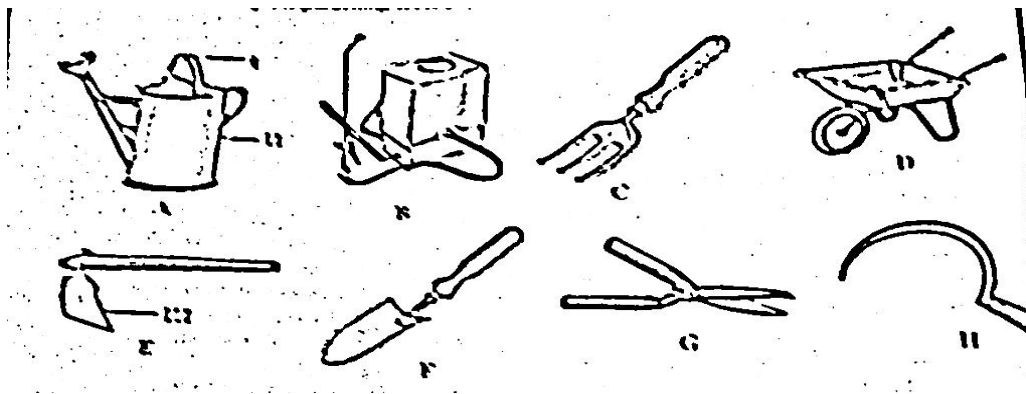


## Soil conservation

- a. Mention five factors, which lead to the depletion of soil resources.
- b. State four methods of restoring depleted soil.
- c. Explain the term water conservation.
- d. State four practices that destroy water bodies.
- e. Mention four methods for conserving water bodies.
- f. What are fertilizers
- g. Differentiate between the two types of fertilizers
- h. Give two examples each of the two types of fertilizer
- i. Explain the two types of chemical fertilizers
- j. Mention three effects of fertilizers
- k. State four methods of applying fertilizers to crops
- l. Define soil erosion
- m. Mention three ways to control soil erosion
- n. State three effects of soil erosion

# PRACTICAL -AGRIC

## PRACTICAL PREDICTED QUESTIONS



1.

- a. Identify each of the tools
- b. State one use each the tools
- c. Name the parts labeled I,II and III
- d. State three ways of maintaining tool E
- e. State three precautions that must be taken when using tool B

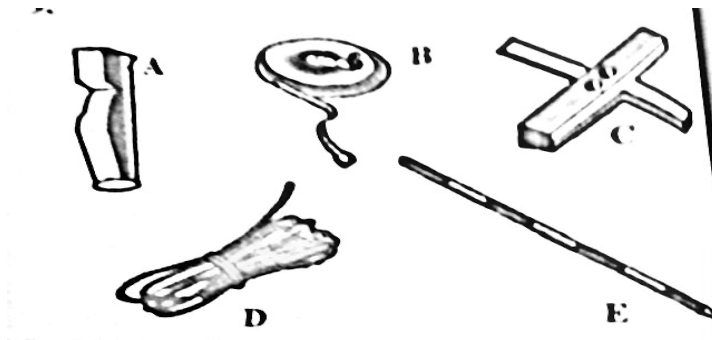
### ANSWER

- a. A watering can
- B knapsack sprayer
- C hand fork
- D wheel barrow
- E hoe
- F hand trowel
- G garden shears
- H sickle

b. Uses

| Tools | uses                                    |
|-------|---|
| A     | For watering crops                      |
| B     | For spraying chemicals on crops         |
| C     | For stirring the soil                   |
| D     | For transporting farm tools and produce |
| E     | For weeding                             |
| F     | For transplanting                       |
| G     | For trimming hedges                     |
| H     | For harvesting rice                     |

- c. I handle
  - II tank
  - III blade
- d. 1. Wash soil particles from food
  - 2. metal parts should be oiled
  - 3. blades should be sharpened when blunted
- e. 1 wear protective clothing
  - 2. do not spray in windy environment
  - 3. wear eye glasses and respirators



- a. Name each of the equipment labeled A, B, C, and E
- b. State one use of each of the tool above

**ANSWER**

- a. A garden peg
- B tape measure
- C cross-staff
- D garden line
- E ranging pole

- b. Uses

| Tool | Uses   |
|------|--|
| A    | Marking planting distances                   |
| B    | Measuring distances                          |
| C    | Constructing right angles at corners of plot |
| D    | Marking out plots                            |
| E    | Sighting survey stations                     |

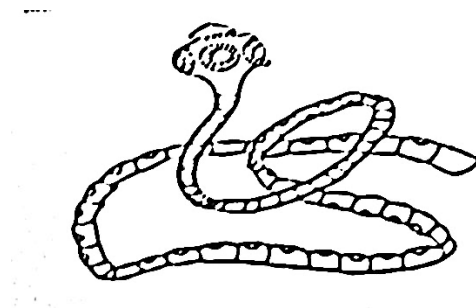
2. Below is a diagram of a crop pest. Use it to answer the questions that follow.



- Name the crop pest
- List four crops which are attacked by the crop pest
- State three methods of controlling the crop pest.

**ANSWER**

- Rat or mouse
  - Yam, cassava, maize, rice, groundnut
  - Weed control  
Early harvesting  
Rodenticides
3. Study the organism illustrated below, and answer the questions that follow



- Name the organism illustrated
- Name two farm animals that are affected by the organism
- In which part of the body of the farm animal is the organism found
- List two effects of the organism on farm animals

## ANSWER

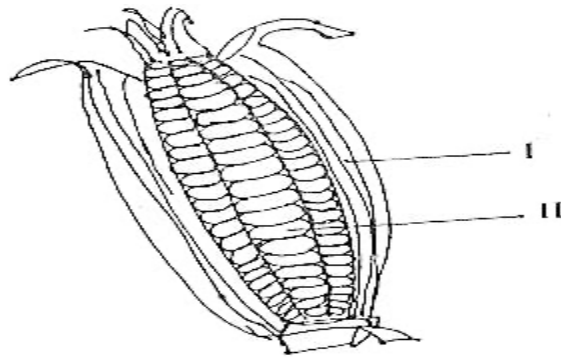
- a. Tape worm
- b. Pigs, goat, sheep, cattle, poultry
- c. Small intestine
- d. Leads to anaemia, diarrhoea

d) The table below represents a farm record. Study it carefully and answer the questions on it.

| Days | Bags of maize in stock | Sold | Remained in stock |
|------|------------------------|------|-------------------|
| 1    | 200                    | 10   | 190               |
| 2    | A                      | 20   | 170               |
| 3    | B                      | C    | 140               |
| 4    | 140                    | D    | 100               |
| 5    | E                      | 20   | 80                |
| 6    | F                      | G    | 40                |
| 7    | 40                     | 40   | H                 |

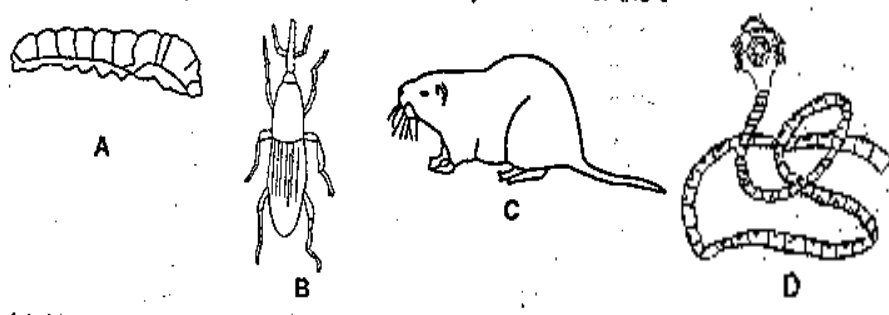
- i. Find the value of A, B, C, D, E, F, G and H
- ii. Which day(s) recorded the highest quantity of bags sold
- iii. Find range of bags of maize sold
- iv. Calculate the average bags of maize sold for the week

The diagram below is an illustration of a fruit. Study it carefully and answer the questions that follow.



- Identify the fruit
- Name each of the parts I and II
- Mention the term used for removing each of the parts labeled I and II
- Give two uses each of the parts I and II
- Name one insect pest and rodent pest that infest the fruit
- State two ways of controlling the pest

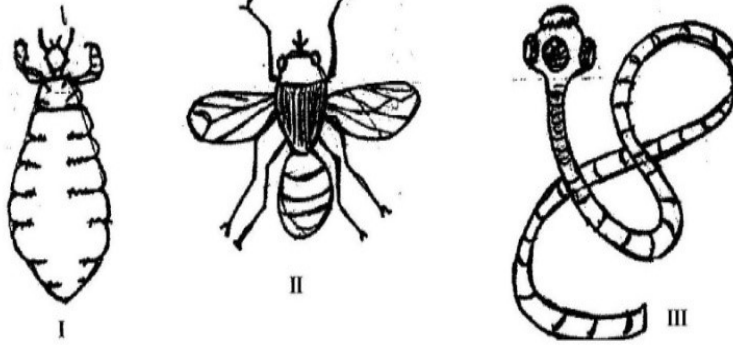
Study the organisms below and answer the questions



- Identify the organisms A, B, C, D
- List two foods each destroyed by organisms A, B, C, D
- State one way of controlling A, B, C, D
- List the groups by which organisms A, B, C, D belongs

The diagrams below are illustrations of three different organisms harmful to farm animals

*Study the diagrams carefully and answer the questions that follow*



- i. Identify **each** of the organisms labelled **I, II** and **III**
- ii. Which of the organisms is/are:

(α) parasite(s)

(β) pest(s)

- iii. State **one** effect **each** of the following organism on farm animals

(α) I;

(β) II;

(γ) III.

- iv. State **three** methods of controlling the organism labelled **III**

(17) The table below shows the arrangement of four crops cultivated in a farming system adopted by a school over a four-year period.

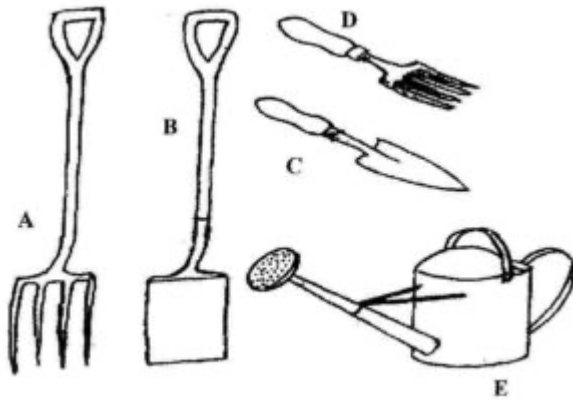
Study the table carefully and answer the questions that follow

| Plot<br>year | Year 2  | Year 2    | Year 3    | Year 4    |
|--------------|---------|-----------|-----------|-----------|
| Plot 1       | Maize   | Cassava   | Groundnut | Cabbage   |
| Plot 2       | I       | Groundnut | Cabbage   | II        |
| Plot 3       | III     | Cabbage   | IV        | Cassava   |
| Plot 4       | Cabbage | Maize     | V         | Groundnut |

- (i) What type of farming is illustrated in the table?
- (ii) Name each of the crops labeled I, II, III, IV and V
- (iii) List two diseases that attack the crop labeled II

- (iv) State two reasons for including groundnut in the farming system illustrated

Study them carefully and use them to answer the questions that follow:



- (i) Identify each of the tools labeled A, B, C, D and E.  
(ii) Mention one use of each of the tools labeled A, B, C, D and E.