SCIENCE AND TECHNOLOGY PART 1

UNIT 1: SCIENTIFIC INVESTIGATION

1. Meaning of the following terms;
   a. Investigation
      - It is a way of getting information or knowledge

   b. Scientific investigation
      - It is a process of designing and carrying out experiments to obtain information or knowledge.

2. Six stages of scientific investigation
   i. Knowing the materials
   ii. Making a prediction
   iii. Planning the investigation
   iv. Carrying out the investigation
   v. Making meaning of the results
   vi. Making conclusions

3. Main stages of scientific investigation
   i. Planning stage
   ii. Implementation stage
   iii. Concluding stage

4. Meaning of the following terms
   a. Hypothesis
      - These are predicted (suggested) answers

   b. Variables
      - It is anything that can change or controlled

   c. Data analysis
      - These are procedures of organising information

5. Stages in scientific investigation where the following terms are used
   a. Hypothesis
      - Planning stage

   b. Variables
      Planning stage

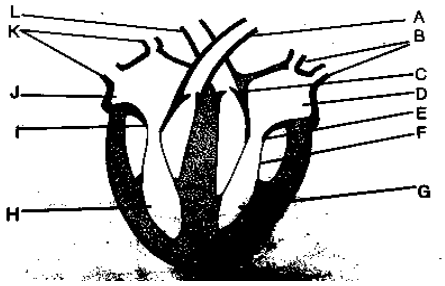
c. Data analysis
   - Implementation stage

d. Conclusion
   - Concluding stage

UNIT 2: THE HUMAN CIRCULATORY SYSTEM

1. Parts of the circulatory system
   i. Pulmonary veins
   ii. Vena cava
   iii. Pulmonary artery
   iv. Aorta
   v. Atriums
   vi. Ventricles

2. **Figure 1** is a diagram of human circulatory system



   a. Parts labeled **A** to **L**
      A. Pulmonary artery
      B. Pulmonary veins
      C. Semi-lunar valves
      D. Left atrium
      E. Bicuspid valve
      F. Tendons prevents flaps of valves turning inside out
      G. Left ventricle
      H. Right ventricle
      I. Tricuspid valve
      J. Right atrium
      K. Vena cavae
      L. Aorta

b. Functions of veins (in)
    i. Pulmonary vein
        - It brings oxygenated blood to the heart (right ventricle)

    ii. Vena cava
        - It brings deoxygenated blood to the heart

c. Functions of arteries (out)
    i. Pulmonary artery
        - It brings deoxygenated blood to the lungs

    ii. Aorta
        - It brings oxygenated blood to all part of the body

3. Function of lungs in the circulatory system
    - They help to supply oxygen to the blood

4. Why blood contains dark red colour when it comes from venacava
    i. It contain less oxygen
    ii. It contains waste products

5. Waste product that is excreted in the lungs
    - Carbon dioxide

6. Composition of blood
    i. Plasma
    ii. Red blood cells
    iii. White blood cells
    iv. Platelets

7. Function of blood in circulatory system
    i. It transport oxygen
    ii. It transport waste products
    iii. It transport food molecules
    iv. It help to fight against diseases

8. Waste products that are transported by blood
    i. Carbon dioxide
    ii. Urea

9. Functions of the liver in the circulatory system
    i. It regulates how much food should be transported by blood
    ii. It stores excess food

10. The role played by white blood cells on circulatory system
    i. They defend the body from diseases

11. Functions of red blood cells in circulatory system
    i. They transport oxygen

12. Importance of platelets in circulatory system
    i. They helps in the process of blood clotting

13. Meaning of the term “bleeding”
    - It is the loss of blood from the body

14. Causes of bleeding
    i. High blood pressure
    ii. Accidents
    iii. Cuts

15. Effects of bleeding
    i. It may lead to death
    ii. It can cause anaemia

16. Ways of controlling bleeding
    i. Applying direct pressure on the injured part
    ii. Raising the injured part
    iii. Blood clotting by the body on its own

17. Importance of donating blood in hospitals
    - It helps to save lives of patients

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EXERCISE 1

1. State four compartments of the human heart
   i. _____
   ii. _____
   iii. _____
   iv. _____

2. Explain what happens to the blood in the lungs
   _____

3. Which component of blood is responsible for transporting oxygen
   _____

4. State two waste products transported by blood in the human body
   i. _____
   ii. _____

5. Give two causes of bleeding
   i. _____
   ii. _____

6. Describe how the body can control blood on its own
   _____

7. Why is blood important in the body? Give three reasons.
   i. _____
   ii. _____
   iii. _____

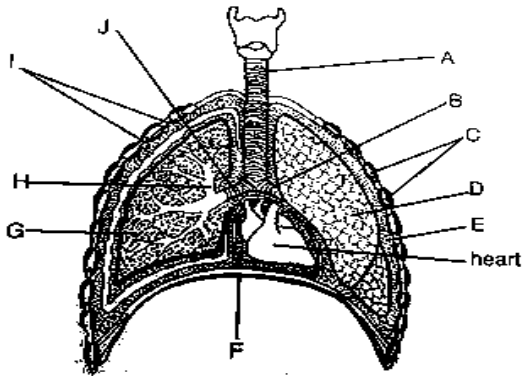
8. Mention two effects of bleeding
   i. _____
   ii. _____

9. Why blood contains dark red colour when it comes in left ventricle? Give two reasons.
   i. _____
   ii. _____

UNIT 3: THE HUMAN BREATHING SYSTEM

1. Define the term "breathing"
    - It is a process through which air is pushed in and out of the lungs

2. **Figure 1** shows parts of the human breathing system



i. Name the parts labeled **A** to **J**

A. Trachea
B. Left bronchus
C. Ribs
D. Left lung
E. Pleural sac (alveoli)
F. Diaphragm
G. Right lung
H. Bronchiole
I. Intercostal muscles
J. Right bronchus

ii. The **table** below shows functions of some parts of human breathing system

Part	Function
Trachea	Takes oxygen from the nostrils to the bronchus and lungs
Bronchus	Brings oxygen to the bronchioles
Lungs	Keeps alveoli for gas exchange
Pleural sac (alveoli)	It is where the gas exchange occur (oxygen and carbon dioxide)
Diaphragm	It helps to control breathing
Bronchioles	Brings oxygen to the alveoli Takes carbon dioxide to the bronchus

3. Two processes takes place during breathing

i. Inspiration (inhalation)
ii. Expiration (exhalation)

4. Meaning of the term “inspiration”
   - It is the process of breathing in air

5. **Table 2** shows what happens in the process of inspiration (inhalation)

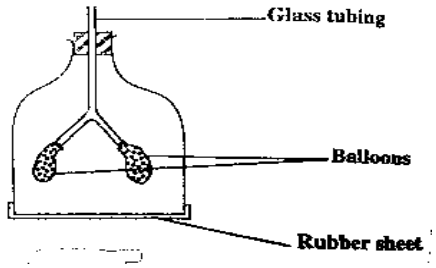
Diaphragm	Ribs	Intercostal muscle	Volume of chest cavity (thorax)
Contracts and becomes flat	Moves up and out	Contracts	Increases

6. Meaning of the term “expiration”
   - It is the process of breathing out air

7. **Table 3** below shows what happens during expiration (exhalation)

Diaphragm	Ribs	Intercostal muscles	Volume of chest cavity (thorax)
Relaxes and moves upwards	Moves downwards and inwards	Relaxes	Decreases

8. **Figure 3** shows a lung model



i. What does the following represent in **figure 3**

a. Balloons
- Lungs

b. Glass tube
- Trachea (wind pipe)

c. Rubber sheet
- Diaphragm

ii. What happens to the balloons when the rubber sheet is pulled down
- They expands due atmospheric air entering the grass tubes

9. Problems for the breathing system
   i. Smoking
   ii. Air pollution
   iii. Diseases
   iv. Suffocation
   v. Smothering

10. Meaning of the following terms
    a. Suffocation
       - It is a situation where by air cannot pass in and out of the lungs through choking or strangulation.

    b. Smothering
       - It is a situation where air cannot get into the mouth or nose through covering the face with something.

11. Diseases that can affect the breathing system
    i. Cancer
    ii. Asthma
    iii. Bronchitis
    iv. Tuberculosis

12. Ways of caring the human breathing system
    i. Avoid smoking
    ii. Avoid areas where the air is polluted
    iii. Eat balanced diet
    iv. Live in well ventilated places
    v. Avoid covering the face with plastic bags

13. The chemical found in tobacco which can affect the health
    - Nicotine

14. Importance of breathing system
    i. It helps the blood to be oxygenated
    ii. It helps carbon dioxide to move out of the body
    iii. It provides carbon dioxide to the plants

EXERCISE 2

1. Explain what happen to the following when breathing in:
   i. Diaphragm
   _____
   ii. Ribs
   _____
2. Where, in the lungs, does the exchange of oxygen and carbon dioxide take place?
   _____
3. State three problems of breathing system
   i. _____
   ii. _____
   iii. _____
4. How can you care for your breathing system? Give three ways.
   i. _____
   ii. _____
   iii. _____
5. Explain what happens to the diaphragm during inhalation and exhalation
   _____
6. What does balloons in the lung model represent
   _____
7. Explain two importance of breathing system
   i. _____
   ii. _____
8. What is different between suffocation and smothering
   _____
   _____
   _____

UNIT 4: IMPROVING THE NUTRITIONAL VALUE OF FOOD

1. Examples of nutrients found in food staffs
   i. Proteins
   ii. Fats
   iii. Vitamins
   iv. Carbohydrates

2. Ways of improving the nutritional value of food
   i. Combining several foods when cooking
   ii. Adding enriching food to dishes
   iii. Overcooking fish to soften the bones to be taken together with the flesh
   iv. Cooking some foods in their skins
   v. Using one pot meals

3. **Table 1** shows ways of improving nutritional value of food and their examples

Way of improving nutritional value of food	**Examples**
Combining several foods when cooking	- Cooking different vegetables together - Cooking meat together with green vegetables - Cooking meat together with beans - Cooking groundnuts together with beans
Adding enriching food to dishes	- Groundnut flour to sweet potatoes in *futali* - Eggs or milk added to *mgaiwa* porridge - Cooking oil to vegetables - Roasted nuts to salad - Butter or margarine to *nsima*
Cooking some food in their skins	- Potatoes - Pumpkins - Some fruits (*apples*)
Using one pot meals	- Sweet potatoes with fresh fish and vegetables - Green bananas with meat and beans - Beans with dried or pounded maize - Dry cassava (*makaka*) with peas

4. Factors to consider when cooking and serving dishes with improved nutritional value
   i. The method of cooking

ii. Colour, texture and flavor of food
iii. Season of the year

5. **Table 1** shows samples of meals with improved nutritional value for breakfast, lunch and supper

Breakfast	Lunch	Supper
- Mixed fruit salad - *Mgaiwa* porridge with groundnuts flour - Tea with milk	- Mixed vegetable soup - Beans and meat stew - Nsima or boiled rice - Mixed fruit salad	- One pot meal - *Mbalagha* (green bananas, meat or fish and vegetables)

6. Effects of poor nutritional value on the family, community and the nation
   i. It may lead to malnutrition diseases (*Kwashiorkor, Marasmus, Obesity*)
   ii. It promotes stunted growth in children
   iii. It leads to poor mental capacity
   iv. It increases risks of chronic illnesses
   v. It promote high mortality rate among children
   vi. It strain on the economy of the country
   vii. It leads to low standards of living

7. Effects of good nutritional value on the family, community and the nation
   i. It promotes healthy population
   ii. It improves proper growth in children
   iii. It leads to high productivity in everyday activities
   iv. It improves high standards of living
   v. It promotes nutritional status of the population

EXERCISE 3

1. Why is it important to improve the nutritional value of food? Give two reasons
   i. _____
   ii. _____

2. List any three ways of improving the nutritional value of food
   i. _____
   ii. _____
   iii. _____

3. Give three effects of the following on the family, community and nation
    a. Poor nutrition
        i. _____
        ii. _____
        iii. _____

    b. Good nutrition
        i. _____
        ii. _____
        iii. _____

UNIT 5: MEALS FOR INVALIDS, CONVALESCENT, VEGETARIANS AND ELDERLY PEOPLE

1. Groups of people depending on nutritional needs
    i. Invalids
    ii. Convalescents
    iii. Vegetarians
    iv. The elderly

2. Meaning of the above groups of people
    a. Invalids
        - Are people who are ill

    b. Convalescent
        - Are people recovering from an illness

    c. Vegetarians
        - Are people who do not eat meat, or animal products

    d. The elderly
        - Are people above the age of 65 years

3. Reasons why some people become vegetarians
    i. Religion
    ii. Health

iii. Animal welfare
iv. Allergy
v. Taste

4. Two types of vegetarians
   i. Lacto-vegetarians
   ii. Strict vegetarians

5. Descriptions of the following types of vegetarians
   a. Lacto- vegetarians
      - Are those who eat vegetables and animal products

   b. Strict vegetarians
      - Are those who eat vegetables only

6. Guidelines when planning meals for vegetarians
   i. Provide sufficient proteins from animal products
   ii. Use plenty of vegetable proteins (peas, beans and groundnuts)
   iii. Provide foods rich in oil and fats from plant sources
   iv. Use variety method of cooking to bring variety to vegetarian diet

7. Examples of meals for lacto-vegetarians

Breakfast	Lunch
Bananas Poached eggs Fresh bread with margarine Tea with milk	Stewed fish *Bonongwe* Nsima Orange drink Soul milk (*chambiko*) Eggs Cheese Yoghurt

8. Examples of meals for strict vegetarians

Break fast	**Lunch**
- Paw-paw salad -*Mgaiwa* porridge with groundnuts flour - Bread with tomato jam - tea	- Tomato soup - stewed beans and groundnuts - boiled rice - boiled rape mixed with fruit salad - guava juice

9. Guidelines when planning meals for invalids
    i. The meal should be easy to digest
    ii. Liquid diet should be given due to loss of appetite and water
    iii. Particular likes and dislikes for food should be taken into account
    iv. Left over food should should not be served to avoid contamination
    v. Food should be prepared away from the patient to avoid cooking smell reaching them

10. Examples of meals for invalids and convalescents
    i. Fresh fruit salad
    ii. Boiled egg
    iii. Fruit juice
    iv. Grilled juice
    v. Soft nsima
    vi. Boiled pumpkin leaves (*nkhwani*)

11. Method of cooking used when preparing meals for invalids
    i. Poaching
    ii. Boiling
    iii. Steaming
    iv. Steaming
    v. Grilling

12. Guidelines when planning meals for elderly people
    i. Food should be easy to eat due to unstrong teeth
    ii. Meals should contain more fruits, vegetable and less fat
    iii. Provide plenty of fluids in the form of water and other beverages
    iv. Iron is needed as elderly people may suffer from anaemia
    v. Meals should be served attractively

13. Examples of meals for elderly people
    i. Mixed fruit salad
    ii. Rice porridge
    iii. Tea with milk
    iv. Boiled egg
    v. Mixed vegetable soup
    vi. Boiled *mkhwani* with groundnut flour
    vii. Mashed potatoes or soft nsima
    viii. Mango juice

EXERCISE 4

1. Define the following terms:
   a. Invalids

      _____

   b. Vegetarians

      _____

2. Give any two reasons why some people may become vegetarians.
   i. _____
   ii. _____

3. Mention any three guidelines that should be followed when preparing meals for elderly people
   i. _____
   ii. _____
   iii. _____

4. Write a sample breakfast menu for a convalescent

   _____
   _____
   _____
   _____
   _____
   _____

5. What is the different between invalids and convalescents

   _____
   _____

6. Mention four foods for lacto-vegetarian
   i. _____
   ii. _____
   iii. _____
   iv. _____

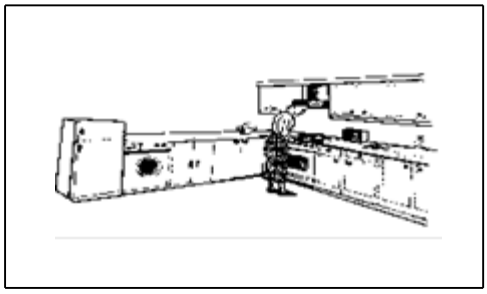
7. Why should invalid people be given liquid diet? Give two reasons
   i. _____
   ii. _____

UNIT 6 : IMPROVING A TRADITIONAL KITCHEN

1. Meaning of the term “kitchen”
    - It is a place where food is prepared and cooked

2. The two types of kitchens
    i. Modern kitchen
    ii. Traditional kitchen

3. **Figure 1** shows a type of kitchens



    a. Name the type of the kitchen
        - Modern kitchen

    b. Features of the kitchen
        i. Preparation centre made of working surface or a table
        ii. Cooking centre with electric or gas cooker
        iii. Storage centre made of shelves, cupboards and refrigerators
        iv. Washing centre made up of a sink with taps

4. **Figure 2** shows a type of kitchen

    a. Name the type of the kitchen

- Traditional kitchen

b. Features of the kitchen
   i. The storage centre found inside the main house with baskets as storage facilities
   ii. Preparation centre is not fixed
   iii. Cooking centre made up of three-stone fire place or charcoal cooker
   iv. Washing centre made of a drying rack with a soak pit

c. The two types of a kitchen mentioned in **4a**
   i. The open-air kitchen
   ii. An enclosed kitchen

d. What type does the traditional kitchen mentioned in **4a** belong
   - An enclosed traditional kitchen

5. The **table** below shows comparison of a modern and a traditional kitchen

Modern kitchen	Traditional kitchen
- Expensive to construct - Adequate ventilation and lighting - Enough space - Has working space - Expensive to maintain	- It is cheap and easy to construct - Sometimes there is little ventilation - Poor lighting - Sometimes there is limited space - No working surfaces - Easy to maintain

6. Advantages of a traditional kitchen over modern kitchen
   i. It is easy to construct
   ii. It is easy to maintain

7. Disadvantages of a traditional kitchen
   i. It produce a lot of smoke
   ii. The food can have a smoky flavor
   iii. There is wastage of fuel
   iv. It does not have a working surface

8. Ways of improving a traditional kitchen
   i. Making a kitchen with windows and chimney for ventilation
   ii. Fixing surfaces and shelves to an already existing kitchen
   iii. Making a dry rack outside for drying utensils
   iv. Constructing a mud stove as a cooking place

EXERCISE 5

1. Why is the kitchen important? Give three reasons.
   i. _____
   ii. _____
   iii. _____

2. Describe three differences between traditional and modern kitchen
   i. _____
   ii. _____
   iii. _____

3. How can the following problem areas of a traditional kitchen be improved
   a. Poor lighting
      _____
      _____
   b. Lack of storage facilities
      _____
      _____
   c. Poor ventilation
      _____
      _____

4. Explain three characteristics of a traditional kitchen
   i. _____
   ii. _____
   iii. _____

5. State three advantages of a traditional kitchen over a modern kitchen
   i. _____
   ii. _____
   iii. _____

6. Describe two disadvantages of traditional kitchen
   i. _____
   ii. _____

UNIT 7: IMPROVING THE QUALITY OF PRODUCTS

1. Examples of local products that can be marketed
   i. Wood carvings
   ii. Mats
   iii. Clay pots
   iv. Mortar
   v. Hoes handles

2. Ways of improving the quality of products
   i. Improving the smell
   ii. Improving the taste
   iii. Improving the colour
   iv. Improving the volume
   v. Improving the appearance
   vi. Decorating
   vii. Labelling

3. Materials used to improve quality of products
   i. Vanish
   ii. Paints
   iii. Crayons
   iv. Dyes

4. Importance of improving the quality of local products
   i. It promote sales at a better price
   ii. It helps the products to look attractive
   iii. It helps to build confidence in the consumer
   iv. It make products to be of high standard

5. Disadvantages of improving the quality of products
   i. Products become expensive and slow to sell
   ii. Materials used to improve the products are expensive

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EXERCISE 6

1. Give any five examples of local products
   i. _____
   ii. _____
   iii. _____
   iv. _____
   v. _____

2. Explain how you can improve the quality of one of the products mentioned above
   i. _____
   ii. _____
   iii. _____
   iv. _____
   v. _____

3. Why is it important to improve the quality of products? Give two reasons
   i. _____
   ii. _____

4. Draw and decorate a mortar and a clay pot

UNIT 8: FOOD PROCESSING

1. Meaning of the term "food processing"
    - These are methods that are used to change raw ingredients in food products for consumption

2. Two ways of processing food
    i. Primary processing
    ii. Secondary processing

3. Examples of primary processing methods
    i. Grinding grain into flour
    ii. Sorting and washing vegetables
    iii. Extracting oil from seeds and nuts
    iv. Soaking cassava
    v. Fermenting cereals
    vi. Soaking *mphala* to make flour
    vii. Pounding cereals

4. Examples of secondary processing methods
    i. Making margarine from oil
    ii. Making bread, cakes and biscuits from flour
    iii. Making jam from fruits
    iv. Making juice from fruits
    v. Making *thobwa* from chimera
    vi. Making *chambiko* from milk
    vii. Making peanut from groundnut

5. Reasons why foods are processed
    i. To improve flavour, texture and appearance of food
    ii. To preserve the food
    iii. To improve the quality of the food
    iv. To prevent wastage

6. Advantages of food processing
    i. It helps to improve the taste, flavor and appearance of food
    ii. It helps to preserve the food
    iii. It improves the quality of the food

7. Disadvantages of food processing

i. It leads to loss of nutrients during processing
ii. Some methods can lead to wastage
iii. Some methods are not hygienic
iv. It may lead to increase in the cost of food

8. Meaning of the following terms:
   a. Primary food processing
      - This involves changing raw ingredients for consumption and sell

   b. Secondary food processing
      - This involves turning basic processed food into new products

9. Examples of fruits used to make juice
   i. Bwemba
   ii. Masau
   iii. Malambe
   iv. Guava

10. Fruits that are used to make jam
    i. Tomatoes
    ii. Paw-paws
    iii. Mangoes

EXERCICE 7

1. Define the term “food processing”

   _____
   _____

2. Write the food products that can be made from the ingredients listed in the table that follows

Ingredients	Food products
Chimera	
Groundnuts	
Wheat flour	
Mangoes	
Tomatoes	
Mphale	

3. Why do people process food? Give four reasons.
   i. _____
   ii. _____
   iii. _____
   iv. _____

4. Describe four primary ways of processing food
   i. _____
   ii. _____
   iii. _____
   iv. _____

END OF PART 1

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