# SIR APOLLO KAGGWA SCHOOLS

## P.6 SCIENCE LEARNING MATERIAL

WEEK ONE

## BLOOD CIRCULATION

- Blood circulation is the movement of blood around the body.

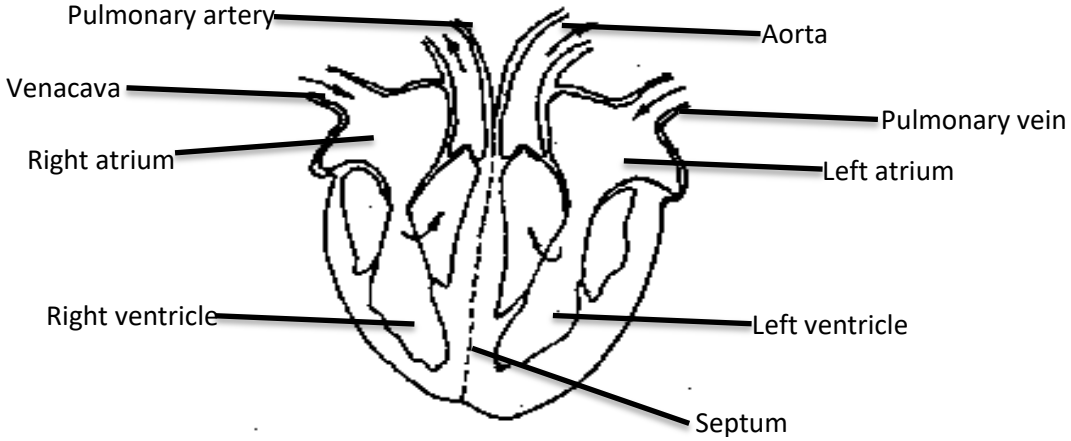
### COMPONENTS OF THE CIRCULATORY SYSTEM

- The heart
- Blood Vessels
- Blood

### THE HUMAN HEART

- The human heart pumps blood to all body parts.
- The human heart has four chambers.
- The human heart is made up of strong muscles called cardiac muscles.
- The heart is located in the chest cavity
- The heart is protected by the rib cages.
- The human heart is enclosed in a membrane called pericardium.

### STUCTURE OF THE HUMAN HEART




### FUNCTIONS OF SOME PARTS

(a) VENACAVA:

It carries deoxygenated blood from all body parts to the heart

(b) PULMONARY ARTERY:

It carries deoxygenated blood from the heart to the lungs to be oxygenated,

(c) PULMONARY VEIN:

It carries oxygenated blood from the lungs to the heart.

(d) AORTA:

It carries oxygenated blood from the heart to all body parts.

**REASONS WHY THE LEFT SIDE OF THE HEART IS THICK WALLED**

- It pumps blood at a high pressure.
- It pumps blood to longer distances.

**BLOOD VESSELS**

Blood vessels are tubes that carry blood to all body parts.

**TYPES OF BLOOD VESSELS**

- Arteries
- Veins
- Capillaries
-

**ARTERIES**

These are blood vessels which carry blood away from the heart.

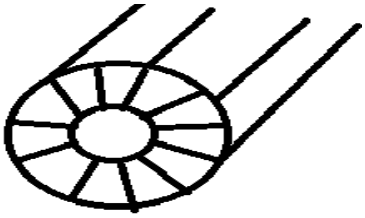
**CHARACTERISTICS OF ARTERIES**

- They are thick walled.
- They don't have valves.
- They have narrow lumen.

**WHY DO ARTERIES HAVE THICK WALLS?**

They carry blood with high pressure.

**STRUCTURE OF AN ARTERY**



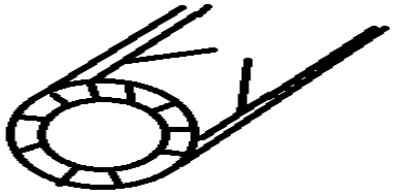
**EXAMPLES OF ARTERIES THAT ARE DIRECTLY CONNECTED TO THE HEART.**

- Aorta
- Pulmonary artery.

**VEINS**

These are blood vessels which carry blood away from the heart.

**STRUCTURE OF A VEIN**



**CHARACTERISTICS OF VEINS**

- They carry blood towards the heart.
- They have thin walls.
- They have wide lumen
- They have valves.

- **WHY DO VEINS HAVE THIN LLS?**

  They carry blood with low pressure.

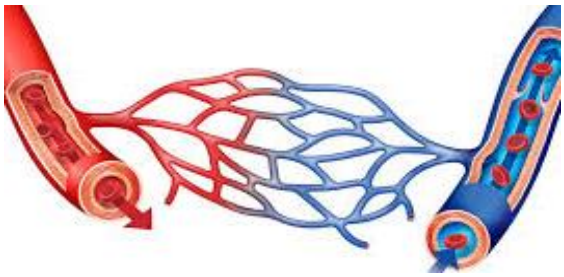
  **EXAMPLES OF VEINS THAT ARE DIRECTLY CONNECTED TO THE HEART**

- Venacava
- Pulmonary vein

**BLOOD CAPILLARIES**

They are the smallest blood vessels.

**STRUCTURE OF BLOOD CAPILLARIES**



**FUNCTIONS OF BLOOD CAPILLARIES**

- They join arteries to veins.
- They help in exchange of materials in the body.
- They transport waste materials from the body cells to the excretory organs.

**STRUCTURALDIFFERENCES BETWEEN ARTERIES AND VEINS**

| ARTERIES | VEINS |
|---|---|
| (i) Have narrow lumen | - Have wide lumen |
| (ii) Have thick walls | - Have thin walls |
| (iii) Have no valves | - Have valves |

**FUNCTIONAL DIFERRENCES BETWEEN ARTERIES AND VEINS**

| ARTERIES | VEINS |
|---|---|
| (i) They carry blood away from the heart. | - They carry blood towards the heart. |
| (ii) Most arteries carry oxygenated blood. | - Most veins carry deoxygenated blood |

**BLOOD**

Blood is the tissue fluid that moves around the body.

**WHY IS BLOOD CALLED A TISSUE?**

Blood is a group of cells.

**COMPONENTS OF BLOOD**

- Red blood cells

- White blood cells
- Blood plasma
- Blood platelets

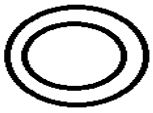
**RED BLOOD CELLS.**

- They contain a red pigment called **haemoglobin**
- They don't have nuclei
- They are made in red bone marrow.
- They are made from iron

**IMPORTANCE OF RED BLOOD CELLS**

They transport oxygen gas to all body parts.

**STRUCTURE OF A RED BLOOD CELL**



**ADAPTATIONS OF RED BLOOD CELLS**

- They have haemoglobin.
- They don't have nuclei

**DISEASES THAT AFFECFT RED BLOOD CELLS**

- Malaria
- Sickle cell
- Anaemia

**WHITE BLOOD CELLS**

They are made from yellow bone marrow of short bones and the spleen.

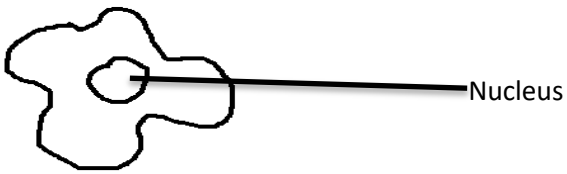
**FUNCTION OF WHITE BLOOD CELLS**

They fight disease causing germs in the body.

**HOW DO WHITE BLOOD CELLS FIGHT DISEASE CAUSING GERMS?**

- By engulfing and digesting germs.
- By producing antibodies.

**STRUCTURE OF WHITE BLOOD CELLS**




**ADAPTATIONS OF WHITE BLOOD CELLS TO THEIR FUNCTIONS**

- They have nuclei.
- They have irregular shapes for easy engulfing of germs.

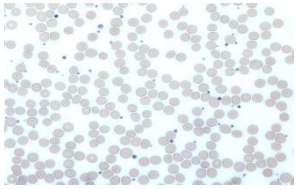
**DISEASES THAT AFFECT WHITE BLOOD CELLS**

- AIDS
- Leukemia/blood cancer.

**BLOOD PLATELATES**

They help to stop bleeding by causing blood to clot around the wound.

## STRUCTURE OF BLOOD PLATELATES



## BLOOD PLASMA


Blood plasma is the liquid part of blood.

Function of blood plasma

- Blood plasma transports digested food to all body parts.
- Blood plasma removes waste materials from the body.

## COMPONENTS OF BLOOD PLASMA

- Water
- Oxygen gas
- Mineral salts.
- Digested food
- Carbon dioxide gas
- Urea

## STRUCTURAL DIFFERENCES BETWEEN RED BLOOD CELLS AND WHITE BLOOD CELLS

| Red blood cells | White blood cells |
|---|---|
| - They are disc shaped | - They are irregular shaped. |
| - They don't have nuclei | - They have nuclei. |

## FUNCTIONAL DIFFERENCES BETWEEN RED BLOOD CELLS AND WHITE BLOOD CELLS

| Red blood cells | White blood cells |
|---|---|
| - They transport oxygen gas in the body. | - They fight against disease causing germs in the body. |

## FUNCTIONS OF BLOOD IN THE BODY

- Blood transports materials in the body
- Blood helps in body defence.
- Blood regulates body temperature.

## WAYS OF INCREASING THE VOLUME OF BLOOD IN CIRCULATION

- Through blood transfusion
- By eating foods rich in iron e.g. green leafy vegetables.
- By drinking plenty of fluids.

## WAYS OF INCREASING THE SPEED OF BLOOD IN CIRCULATION

- Doing body exercises

## DISEASES OF THE CIRCULATORY SYSTEM

- AIDS
- Anaemia
- Sickle cell anaemia
- Leukemia(blood cancer)
- Malaria
- Heart failure
- Heart attack
- Heart stroke

**DISORDERS OF THE CIRCULATORY SYSTEM**

- Blockage of blood vessels
- Hardening of blood vessels

**CARE FOR THE CIRCULATORY SYSTEM**

- By eating a balanced diet.
- Doing regular body exercises.
- Avoid smoking tobacco.

**ACTIVITY**

1. Which part of the skeleton protects the heart?

   _____

2. Why is blood pumped to the lungs before going to all other body parts?

   _____

3. How is the pulmonary artery different from all other arteries?

   _____

4. Name the chamber of the heart that receives blood from the lungs.

   _____

5. State the main organ of the circulatory system.

   _____

6. What enables arteries to carry blood with high pressure?

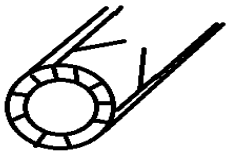
   _____

7. State one functional difference between arteries and veins.

   _____

   _____

8. Name the blood vessels below.



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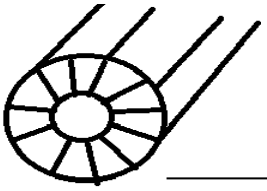


_____

9. Give one waste material carried by blood.

   _____

10. How does HIV/AIDS weaken body's immunity?

    _____

11. State any one adaptation of red blood cells to transportation of oxygen gas.

    _____

12. Name the blood cells affected by plasmodia germs.

_____

13. How is the skeletal system important to the circulatory system?

_____

14. Name any one hereditary disease that affects the circulatory system.

_____

15. Give one way of increasing the volume of blood in circulation.

_____

16. Outline two useful materials transported by blood.

(i)_____

(ii)_____

17. How do white blood cells fight disease causing germs in the body( give one way)

_____

## SEEDS

A seed is a fertilized ovule.

**TYPES OF SEEDS (GROUPS OF SEEDS)**

(a) Monocotyledonous seeds(monocot seeds)

(b) Dicotyledonous seeds( dicot seeds)

**(a) MONOCOTYLEDONOUS SEEDS**

These are seeds with one cotyledon.

**EXAMPLES OF MONOCOTYLEDONOUS SEEDS**

- Maize
- Millet rice sorghum
- Oats
- Rice
- Barley
- Wheat

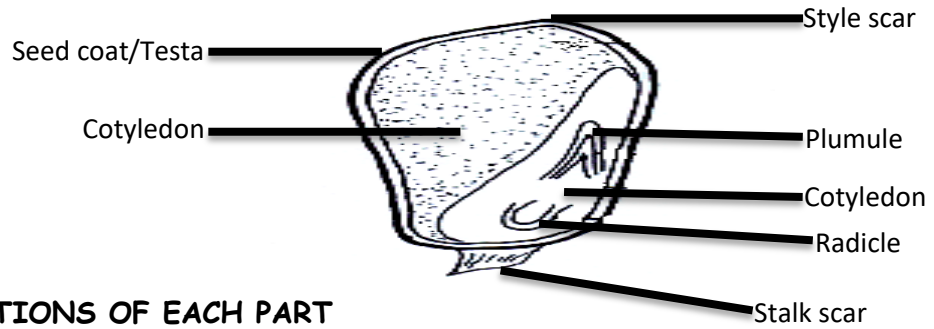
**CHARACTERISTICS OF MONOCOTYLEDONOUS** SEEDS

- They have one cotyledon.
- They undergo hypogeal germination.
- They store food in the endosperm.

**NOTE:**

A maize grain is called a fruit because it has two scars. I.e. Style scar and the stalk scar.

**DIAGRAM SHOWING A MONOCOT SEED (MAIZE GRAIN)**




**FUNCTIONS OF EACH PART**

**(a) TESTA(SEED COAT)**

It protects the inner parts of a seeds.

**(b) RADICLE**

It grows into a root system.

**(c) PLUMULE**

It grows into a shoot system

**(d) ENDOSPERM**

It stores food for an embryo.

**(e) COTYLEDON**

It absorbs and supplies food from the endosperm and supplies it to an embryo.

**NOTE**

1. The collective name given to plumule and radicle is embryo.
2. An embryo grows into a new plant.

**DICOTYLEDONOUS SEEDS**

These are seeds with two cotyledons.

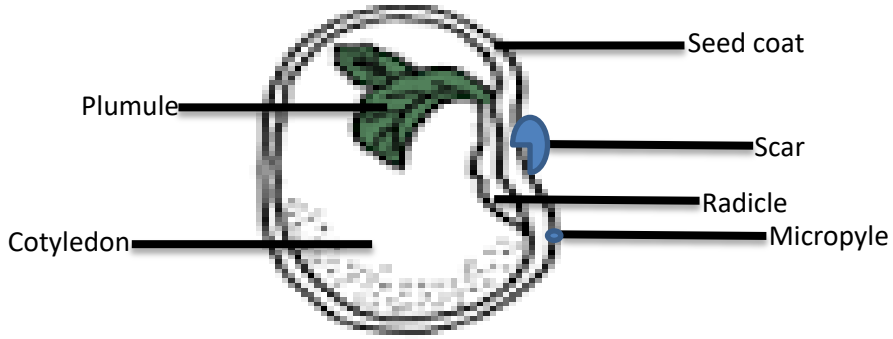
**EXAMPLES OF DICOTYLEDONOUS SEEDS**

- Beans
- Soya beans
- Cow peas
- Bambara nuts
- Ground nuts

**CHARACTERISTICS OF DICOTYLEDONOUS SEEDS**

- They have two cotyledons
- They undergo epigeal germination
- They store food in cotyledon.

**DIAGRAM SHOWING DICOT SEED**




**FUNCTIONS OF EACH PART OF A DICOT SEED**

**(a) MICROPYLE**

It allows water and air into a germinating seed.

**(b) SCAR/HILUM**

It attaches a seed to a pod.

**(c) COTYLEDON**

It stores food for an embryo.

**(d) PLUMULE**

It grows into a shoot system.

**(e) RADICLE**

It grows into a root system.

**SEED GERMINATION**

Seed germination is the growing of a seed embryo into a seedling.

**CONDITIONS NECESSARY FOR A VIABLE SEED TO GERMINATE**

1. Oxygen gas
2. Water(moisture)
3. Warmth

**ROLES OF EACH CONDITION DURING SEED GERMINATION**

1. Oxygen gas : For respiration during germination.
2. Water (moisture): Softens the seed coat/ testa during seed germination.
3. Warmth : Provides optimum temperature to a seed during germination.

**STEPS THAT A VIABLE SEED UNDERGOES DURING GERMINATION**

(a) The seed absorbs water and oxygen gas(air) from the soil through the micropyle.
(b) The seed swells.
(c) The radicle comes out to begin absorbing water and mineral salts from the soil
(d) The plumule pushes itself out of the soil.

**TYPES OF SEED GERMINATION**

(a) Epigeal germination
(b) Hypogeal germination

**(a) EPIGEAL GERMINATION**

This is the type of germination where the cotyledons come out of the soil.

**EXAMPLES OF SEEDS THAT UNDERGO EPIGEAL GERMINATION**

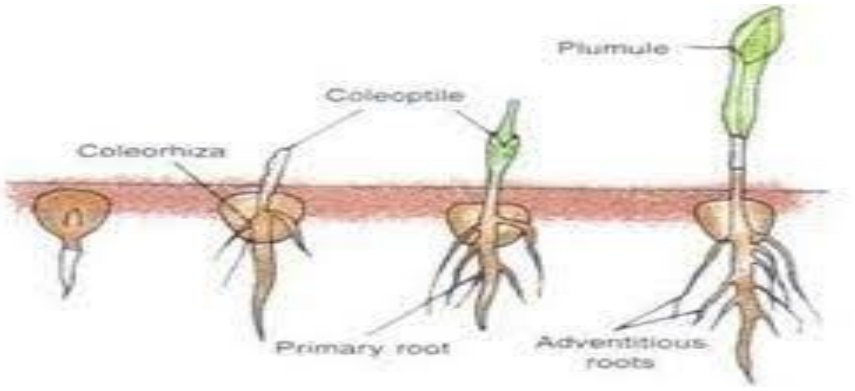
- Beans
- Ground nuts
- Bambara nuts
- Soya beans
- Cow peas
- Simsim

**DIAGRAM SHOWING EPIGEAL GERMINATION**

**(b) HYPOGEAL GERMINATION**

This is the type of germination where the cotyledon remains in the soil.

**DIAGRAM SHOWING HYPOGEAL GERMINATION**




**EXAMPLES OF CROPS THAT UNDERGO HYPOGEAL GERMINATION**

- Maize
- Rice
- Wheat
- Millet
- Oats
- Sorghum
- Barley

**NOTE 1.**

**SEED VIABILITY**

This is the ability of a seed to germinate under favourable conditions.

**SEED DORMANCY**

This is the inability of a seed to germinate under favourable conditions.

**FACTORS THAT FAIL A VIABLE SEED TO GERMINATE.**

- If the seed is very old
- If the seed is pre mature.
- If the seed is damaged
- If the seed has a very had seed coat.

**ACTIVITY**

1. Name the structures that keep seeds of groundnuts.

   _____

2. What do we call a fertilized developed ovule?

   _____

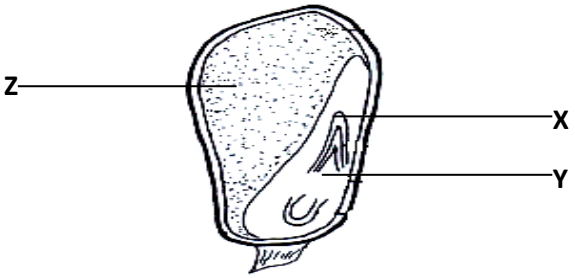
3. Give the importance of a micropyle to a bean seed.

   _____

4. What are dicotyledonous seeds?

   _____

5. **Below is a maize grain. Study it carefully and answer questions that follow.**



**(a)** Name parts marked X and Y.

X_____Y_____

**(b)** State the importance of part marked Z.

_____

**(c)** What type of germination does the above seed undergo?

_____

**6.** State the importance of water during seed germination.

_____

**7.** Outline any two factors that can stop fail a seed to germinate.

_____