

**Let's pave the way for learning and  
Move Forward**

**Standard - 9  
Biology**



**State Council of Educational Research and Training (SCERT), Kerala  
2022**

Dear students,

The evaluation of the answer scripts of the First Terminal Examination 2022 and the classroom experiences shared by the teachers concerned, have brought to light the fact that our children have suffered some serious learning gap due to the non-availability of proper learning experiences as a result of the unprecedented situation created by the Covid Pandemic from 2019 to 2022. An activity book has been designed to assist children internalize the concepts which they ought to have mastered in the previous classes and with the intention to facilitate further learning. Necessary explanations and activities are included in the booklet to help children bridge the gap. It is hoped that this package will facilitate the learners for self-study or for studying with the help of their teachers and I wish them success in their endeavors to move forward with confidence.

**Director**  
SCERT, Kerala

# Class 9 - Biology

## Unit 1

### Protectors of the biosphere

#### Part 1

In this chapter, we will learn about the concepts of photosynthesis and the role of plants in the mitigation of natural disasters. Some questions based on what you have learned in class 7th and 8th related to these concepts are given below. Try to find out the answers to the following questions for yourself. Compare with answer key and assess your learning level by self.

#### Worksheet

1. Analyse the information given in the box and answer the questions.

Carbon dioxide, Oxygen, Chlorophyll, Water and salts, Sunlight

- Choose the components which are required for photosynthesis.
  - Which gas is absorbed by plants during photosynthesis?
2. Select the organelle in which photosynthesis takes place, from the following.  
(Mitochondria, chloroplasts, endoplasmic reticulum, Vacuole)
3. In which areas where soil erosion is most common.  
(Sloping areas, Heavily vegetated areas, Bare hills)

#### Evaluate your responses by using worksheet evaluation indicators

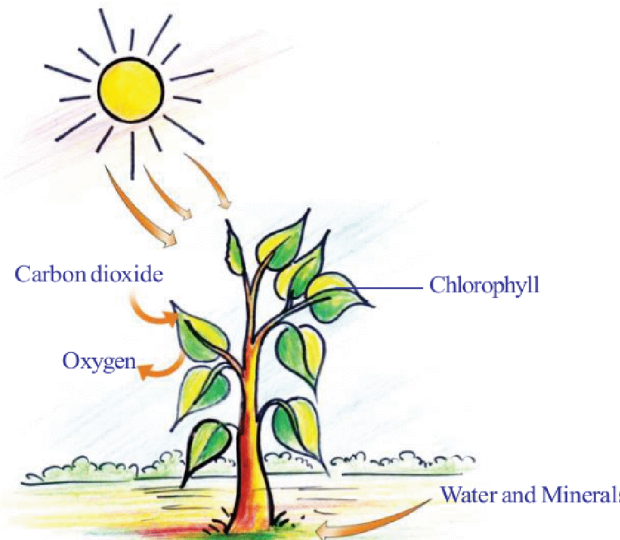
- Completed the worksheet satisfactory.
- Completed the worksheet partially.
- Need betterment.

#### Part 2

##### Activity 1

Analyse the illustration and explanation about the process of nutrition and answer the questions given below.

### Nutrition



Carbon dioxide

Oxygen

Water and Minerals

Chlorophyll

All living things need food. Food and the method of obtaining it is different in every living thing. Nutrition is the process by which organisms receive and utilize food. Plants are living things, don't they need food too?

You have previously learned about photosynthesis, the process by which plants produce food.

The figure shows the components required for this process and the component emitted by plants as a result of the process.

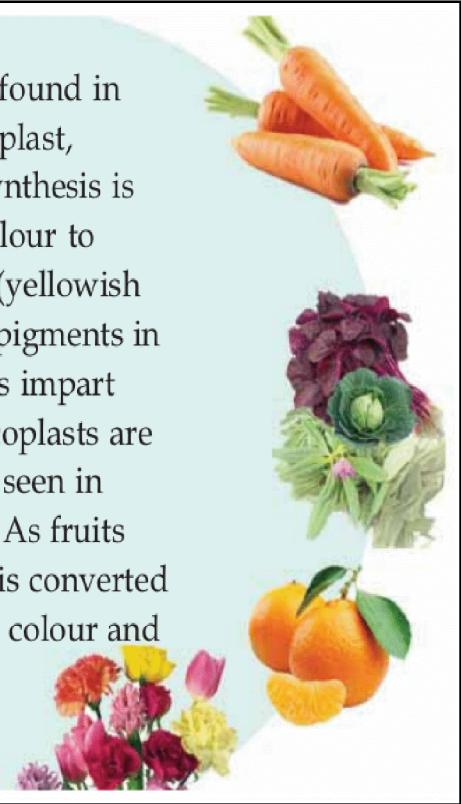
What is the role of plants in maintaining the level of oxygen and carbon dioxide in the atmosphere?

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**Activity 2**

Answer the given questions by analysing the article about plastids in plants.

Plastids are the cell organelles that are exclusively found in plant cells. They are of three kinds namely chromoplast, chloroplast and leucoplast. You know that photosynthesis is performed by chloroplast. Chromoplasts impart colour to flowers and fruits. Xanthophyll (yellow), carotene (yellowish orange), anthocyanin (red, purple) etc., are certain pigments in the chromoplasts. Various ranges of these pigments impart different colours to various parts of the plant. Leucoplasts are plastids having no specific colour. Leucoplasts are seen in plenty in the cells where food materials are stored. As fruits ripen, chloroplasts change to chromoplasts. Starch is converted to sugar. This is the secret behind the change in the colour and taste of fruits.



1) Which are the different types of plastids?

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2) Name the plastid in which photosynthesis takes place.

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3) What happens to the chloroplasts when the fruits ripen?

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4) Which are the pigments present in chromoplast?

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**Activity 2**

Analyse the note given below on soil conservation and answer the questions.

**Soil erosion**

Soil erosion occurs mostly during the monsoon season. The roots of trees prevent soil from being washed away. Soil erosion will be greater in places with no trees and plants. The possibility is greater in slope land as well.



1)What is the importance of plants in preventing soil erosion?

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**Worksheet evaluation indicators**

- 1. a) Carbon dioxide, Chlorophyll, Water and salts, Sunlight
- b) Carbon dioxide
- 2. Chloroplast
- 3. Sloping areas, Bare hills

**This is a self learning material**

NB: Seek the help of your teacher if you have any doubts. Completed worksheet should be submitted to the teacher after self-assessment.

## Chapter 2

### Food through digestive tract

#### Part 1

In the chapter on “Food through digestive tract”, we will learn about the human digestive system. You must have learned about the digestive system as an organ system in class 8 and its parts in class 7. Based on these concepts, try to find out the answers to the following questions for yourself.

#### Worksheet

(1) Find out the organ system in which the parts given in the box belong to.

Esophagus, stomach, small intestine, large intestine

- Respiratory system
- Excretory system
- Digestive system
- Nervous system

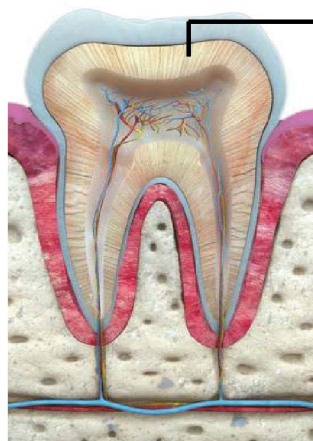
(2) Which of the following tooth helps in biting food?

- Canine
- Incisor
- Premolar
- Molar

(3) Peristalsis is;

- Wave like movement of the wall of esophagus.
- Process of absorption food
- Elimination of unwanted substances from the body
- First step in the process of nutrition

(4) Which part is marked as X in the following picture of a tooth?



(Dentine , Root , Enamel , Pulp)

5) Identify the area of absorption of water containing minerals.

Esophagus

Stomach

Large intestine

Small intestine

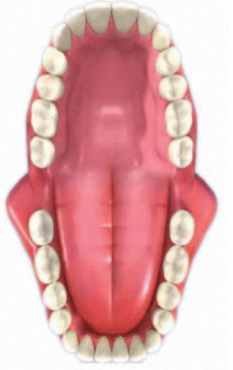
**Evaluate your responses by using worksheet evaluation indicators**

- Completed the worksheet satisfactory.
- Completed the worksheet partially.
- Need betterment.

**Part 2**

Let us go through this learn once again.  
Analyse the slides given below and complete the table.

**Slide 1**

<p><b>Incisor</b></p> <ul style="list-style-type: none"><li>• Eight teeth in the front-four above and four below.</li><li>• Helps to bite and cut.</li></ul>	<p><b>Premolar</b></p> <ul style="list-style-type: none"><li>• Eight teeth next to canines on both sides above and below.</li><li>• Helps to chew and grind.</li></ul>	
<p><b>Canine</b></p> <ul style="list-style-type: none"><li>• Four teeth near the incisors on both sides above and below.</li><li>• Helps to tear off foodstuff.</li></ul>	<p><b>Molar</b></p> <ul style="list-style-type: none"><li>• Twelve teeth next to premolars above and below.</li><li>• Helps to grind and crush.</li></ul>	

**Activity 1**

Complete the given table suitably.

Type of teeth	Functions
Incisor	
Canine	
Premolar	
Molar	



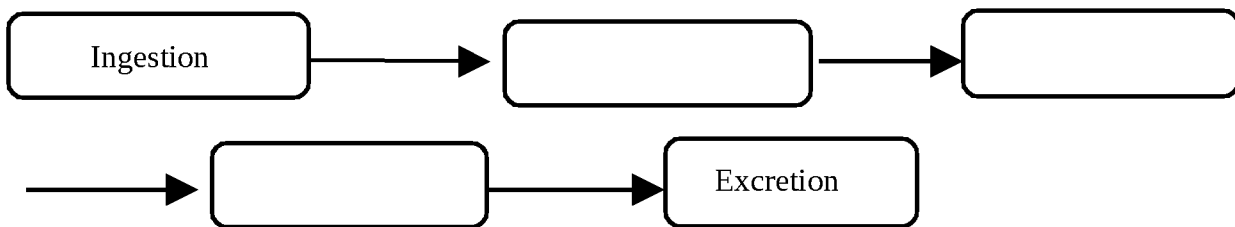
## Slide 2

### Stages in the process of nutrition

The first stage in the process of nutrition is ingestion. Digestion is the process in which the organic factors present in the food are broken down to simple components that can be absorbed by the body. The process of the digested food being received into the body is absorption. Assimilation is the process in which absorbed components become part of the body. The byproducts of metabolic reactions which are not useful to the body are eliminated through the process called excretion.

### Activity 2

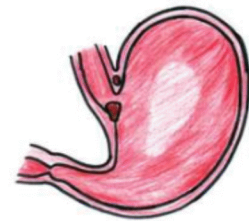
Complete the flowchart given below including the steps in the nutrition process.



## Slide 3

### Stomach

Food reaches the stomach from the mouth through the oesophagus. It is the wave-like movement of the oesophagus which enables this. This is called peristalsis. Due to the movement of the stomach wall, food is rendered paste-like inside the stomach. The digestive enzymes produced by the stomach digests food chemically too.

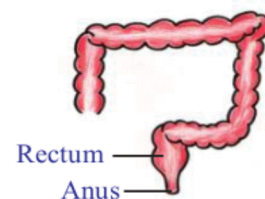


### Small intestine

Small intestine is about six metre long. Digestion of food is completed here. The nutrients in the digested food are absorbed into the blood.

### Large intestine

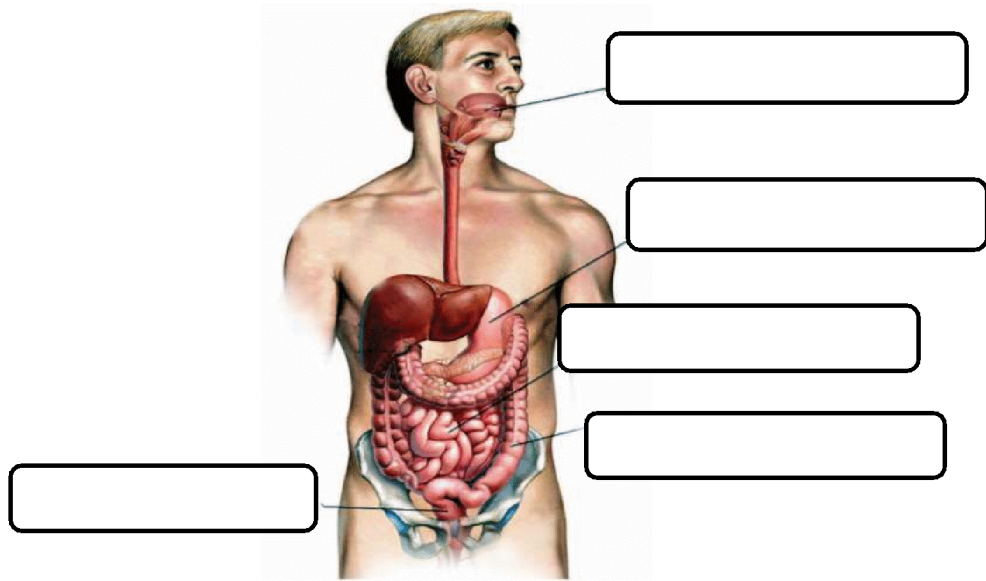
Large intestine is the broader intestine following small intestine and is about one and a half metre long. The absorption of water containing minerals and salts takes place here. What remains after that is the faeces. It is stored in the rectum and expelled through the anus.





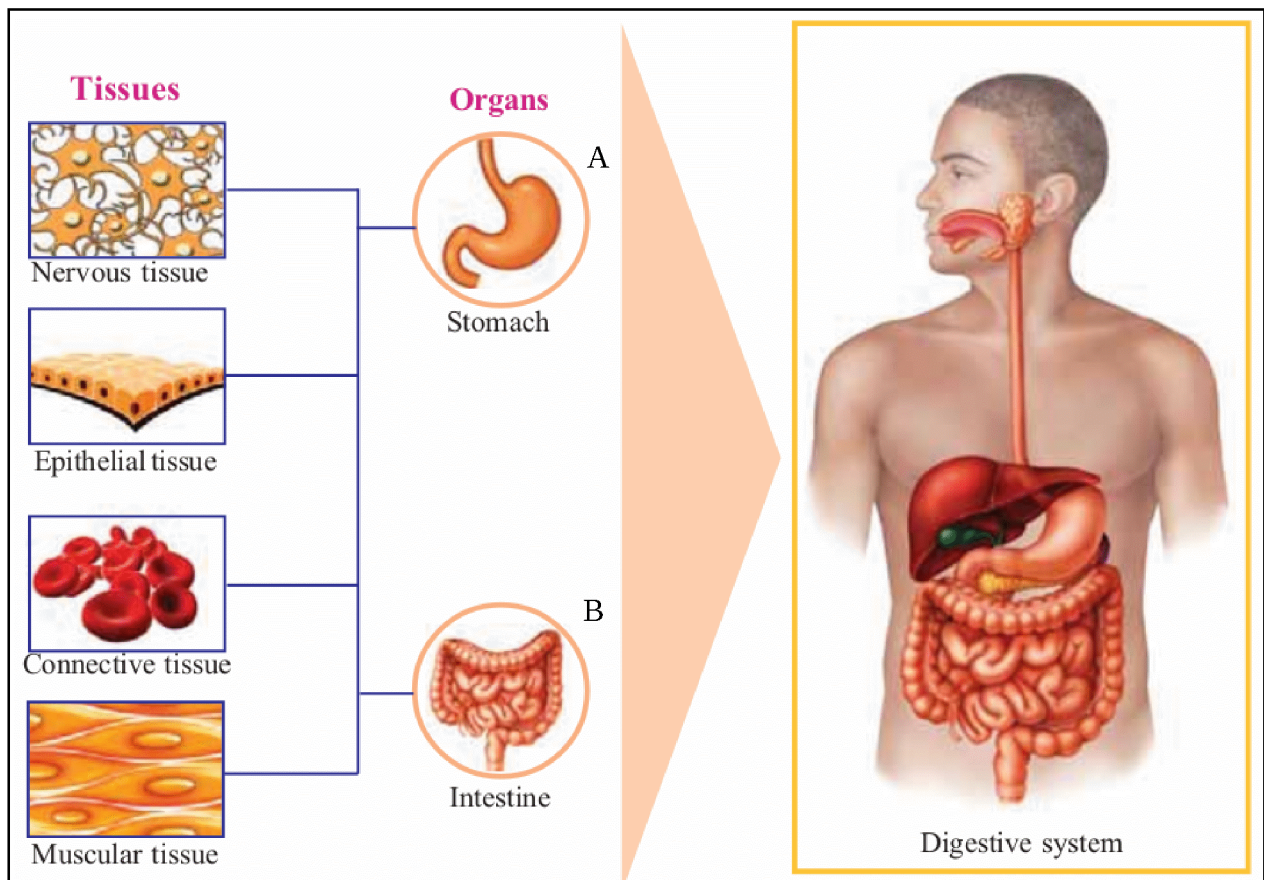
### Activity 3

Label the parts of human digestive system suitably in the diagram given below.



### Activity 4

Analyse the illustration given below based on the indicators and record your conclusions.



1. Prepare a note on digestive system.

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2. What is the function of the organs mentioned as A & B in the illustration of the digestive system?

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**Worksheet evaluation indicators**

- (1) Digestive system
- (2) Canine
- (3) Wave like movement of the wall of esophagus
- (4) Enamel
- (5) Large intestine

**This is a self learning material**

NB: Seek the help of your teacher if you have any doubts. Completed worksheet should be submitted to the teacher after self-assessment.

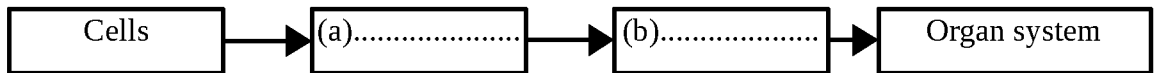
**Class 9**  
**Unit 3**  
**Simple nutrients Nutrients into cells**

**Activity 1**

We need to learn about the circulatory system. You have understood the parts and functions of the human circulatory system. Some questions related to this concept are given below. Try to find the answers by self.

**Worksheet**

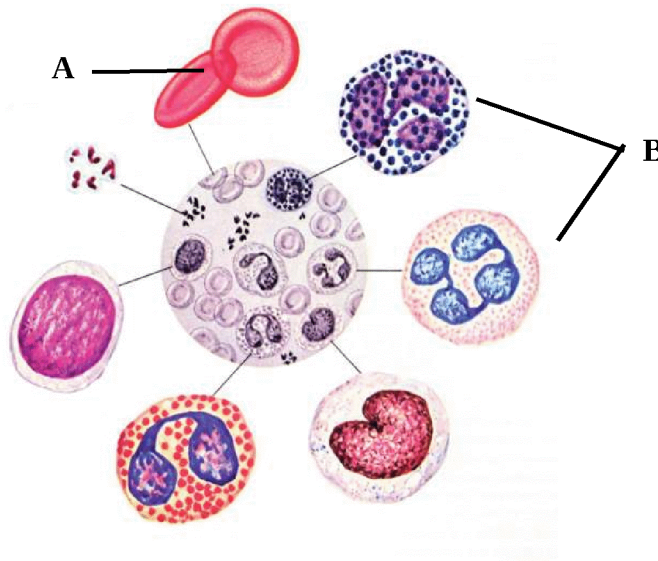
1. Complete the illustration related to the level of organization of an organism suitably.



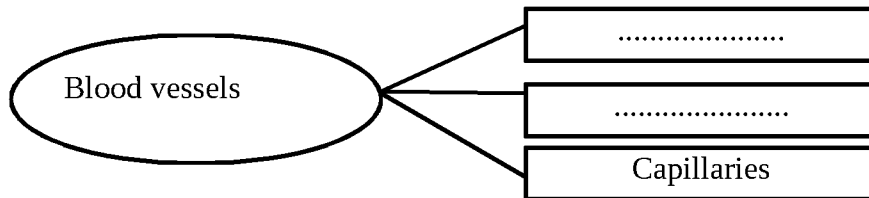
2. Which organ system includes the following?

- Blood
- Heart
- Blood vessels

3. Identify A and B blood cells.



4. Complete the illustration suitably.



5. Choose the correct statements related to human heart.

- Located in the abdomen
- Covered with a double layered membrane called pericardium
- Contains four chambers
- Kidneys on sides

**Evaluate your responses by using worksheet evaluation indicators**

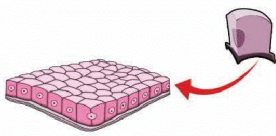
- Completed the worksheet satisfactory.
- Completed the worksheet partially.
- Need betterment.

**Part 2**

Some of the slides shown in the classes related to the levels of organisation and circulatory system are given below. where the structure of organisms was analyzed. Analyse them and answer the questions.

**Tissue**

Tissues are groups of similar cells that have a common origin and perform specific functions.

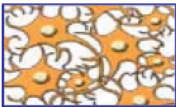


**Cells**    $\longrightarrow$    **Tissue**


**Organ , Organ system**

Various tissues form an organ and several organs form an organ system.


**Tissues**




Nervous tissue



Epithelial tissue




Connective tissue




Muscular tissue

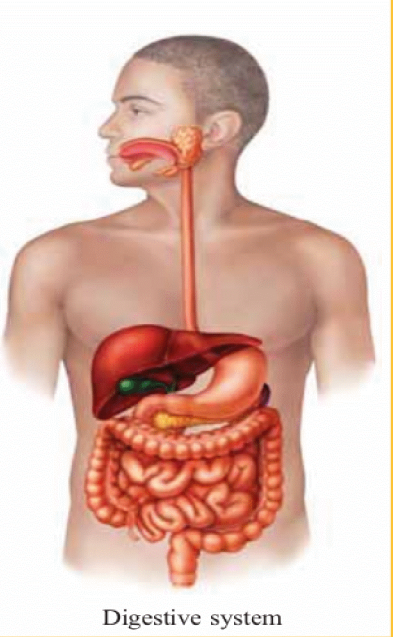
**Organs**



Stomach

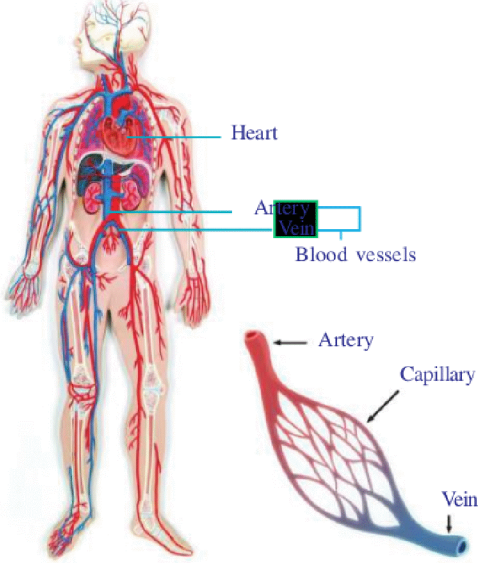


Intestine



Digestive system

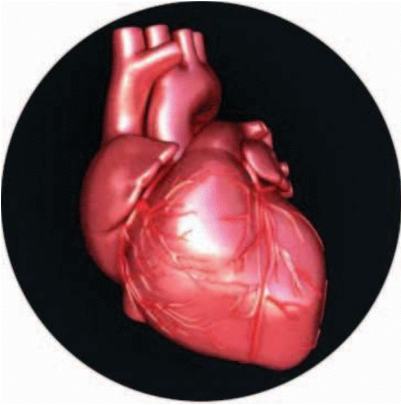
**Tissues -----> Organs -----> Organ system**



**Blood circulatory system**

The parts of the circulatory system are the heart, blood vessels, and blood.

Different types of blood vessels are arteries, veins, and capillaries.



**Characteristics of the human heart**

- size of one's fist
- protected inside the thorax by ribs
- lungs on either sides
- covered with a double membrane called pericardium
- contains four chambers

1. Write note on tissues, organs and organ systems.

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2. Which are the Parts of the circulatory system?

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3. Which are the different types of blood vessels?

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4. Write the characteristics of the human heart.

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**Worksheet evaluation indicators**

1. Tissues
2. a) Tissues b) Organs
3. A. Platelets B. White blood cells
4. Artery and vein
5. Covered with a double layered membrane called pericardium  
Contains four chambers

**This is a self learning material**

NB: Seek the help of your teacher if you have any doubts. Completed worksheet should be submitted to the teacher after self-assessment.



## Chapter 4

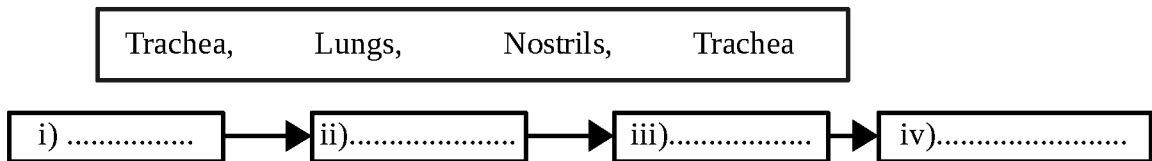
### Breathing for energy

#### Activity 1

In this chapter we will learn about the respiratory system. You have understood the parts and functions of human respiratory system. Some questions related to these concepts are given below. Try to find the answers by self.

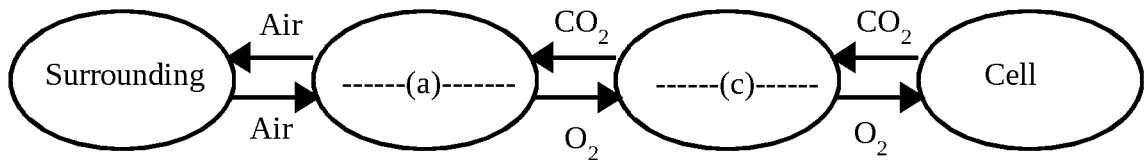
#### Worksheet

1. Complete the given flowchart of the path of atmospheric air, suitably using the information given in the box.



2. Which of the following parts help in the contraction and relaxation of the lungs?
- Trachea
  - Diaphragm
  - Ribs
  - Muscles seen attached to the ribs

3. Fill the illustration suitably.



4. Why are earthworms always found in moist soil?

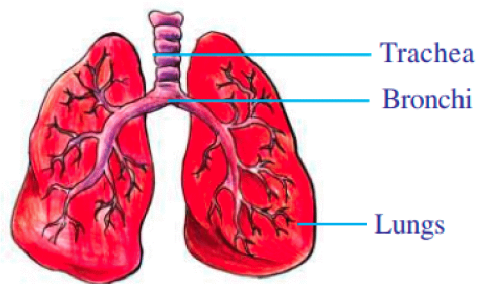
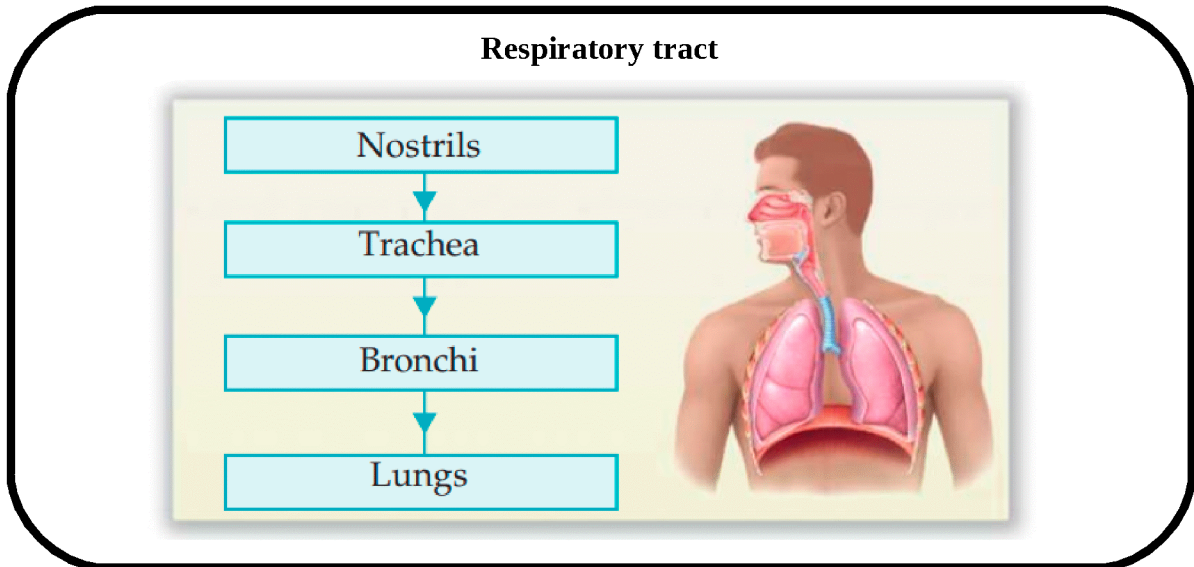
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#### Evaluate your responses by using worksheet evaluation indicators

- Completed the worksheet satisfactory.
- Completed the worksheet partially.
- Need betterment.

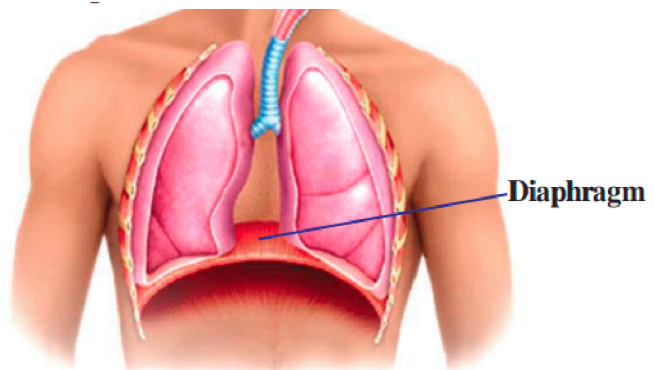
## Part 2 Activity 1

Slides shown in a class on the respiratory system are given below. Analyse it and answer the questions.



The nose, trachea, bronchi and lungs are parts of the human respiratory system. The trachea is like a long pipe. Bronchi are the branches of the trachea. The wall of the trachea is strengthened by C-shaped rings of cartilage. Lungs are like sponge. There are many air sacs in them. The right lung is slightly larger than the left lung.

*The expansion and contraction of the lungs is made possible by a layer of muscles at the base of the thorax called diaphragm and by the muscles attached to the ribs.*



1. Which are the major parts of human respiratory system?

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2. Which are the parts included in the respiratory tract?

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3. How the contraction and relaxation of lungs are made possible?

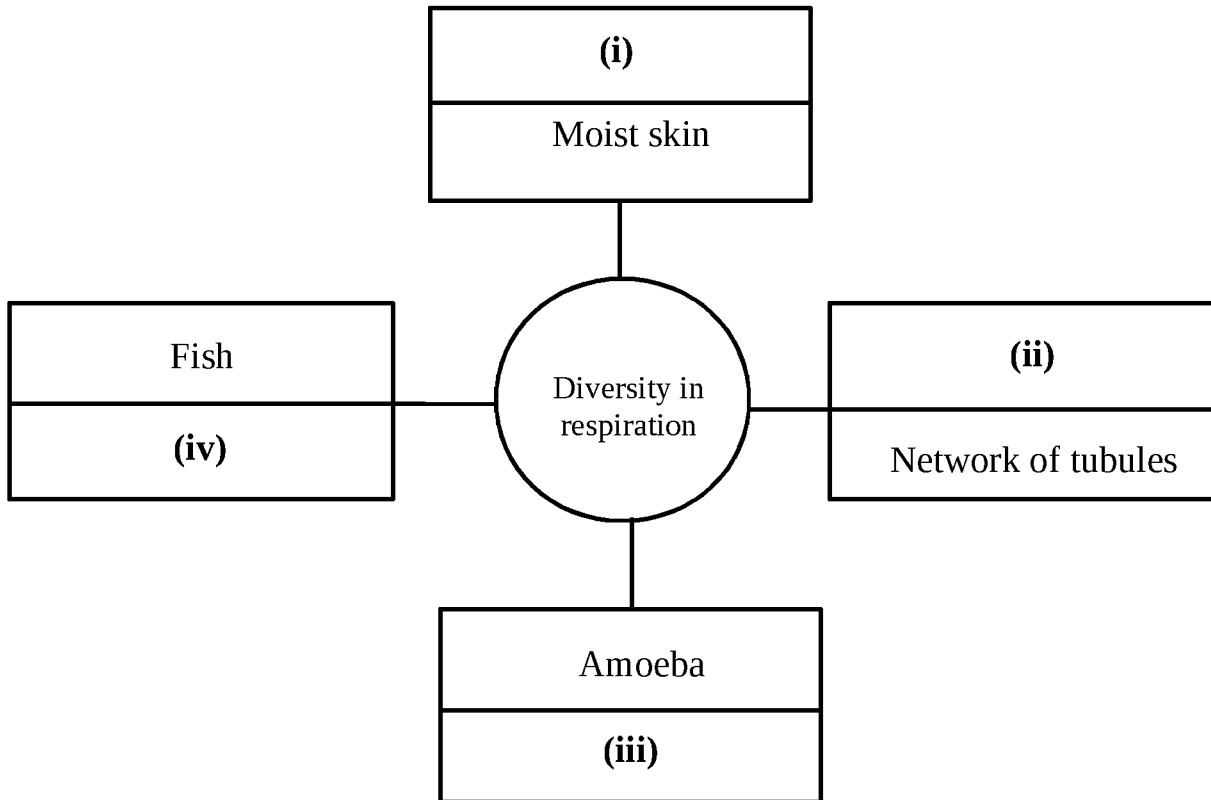
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## Activity 2

Analyse the given table about the diversity of respiration in the living world and write the answers to the questions.

<b>Diversity in respiration</b>	
Amoeba	There is no specific respiratory organ in amoeba which is a unicellular organism. Air diffuses in and out through its cell membrane.
Insects	Rows of small openings can be seen on the sides of the body of all insects. A network of tubules seen attached to them is the respiratory organ in insects.
Earthworm	The respiratory organ of the earthworm is its moist skin. This is why earthworms are always seen in moist soil alone
Fish	Gills are the respiratory organ of fish. When water is taken into the mouth which passes through the gills, the oxygen in the water gets transferred into the blood.
Amphibian	They can respire through lungs when they are on land and through skin when they are in water

1. Complete the illustration suitably.



**Worksheet evaluation indicators**

1. i) Nasal cavity ii) Trachea iii) Trachea iv) Lungs
2. Diaphragm, Muscles seen attached to the ribs
3. a) Lungs c) Blood
4. Moist skin is the respiratory organ of the earthworm.

**This is a self learning material**

NB: Seek the help of your teacher if you have any doubts. Completed worksheet should be submitted to the teacher after self-assessment.

## Chapter 5

### Excretion for homeostasis

#### Part 1

We have to study about excretory system in the chapter on Excretion. In class 7, you have learned about the various organs that help remove waste from the body. Try to find answers to the following questions in this regard.

#### Worksheet

(1) Find the organ that filter urea, excess water, and salts from the blood.

- Lungs
- Kidney
- Stomach
- Pancreas

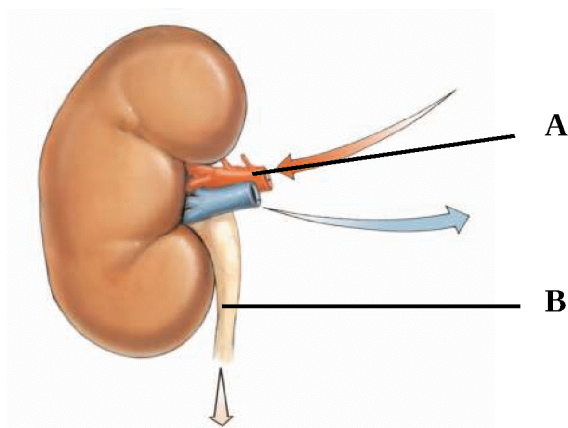
(2) In which organ is urea produced in our body?

- Kidney
- Lungs
- Liver
- Stomach

(3) Which of the following are excretory organs?

- Lungs
- Heart
- Skin
- Stomach

(4) Identify the parts marked A, B in the figure? Write their functions?



Evaluate your responses by using worksheet evaluation indicators

- Completed the worksheet satisfactory.
- Completed the worksheet partially.
- Need betterment.

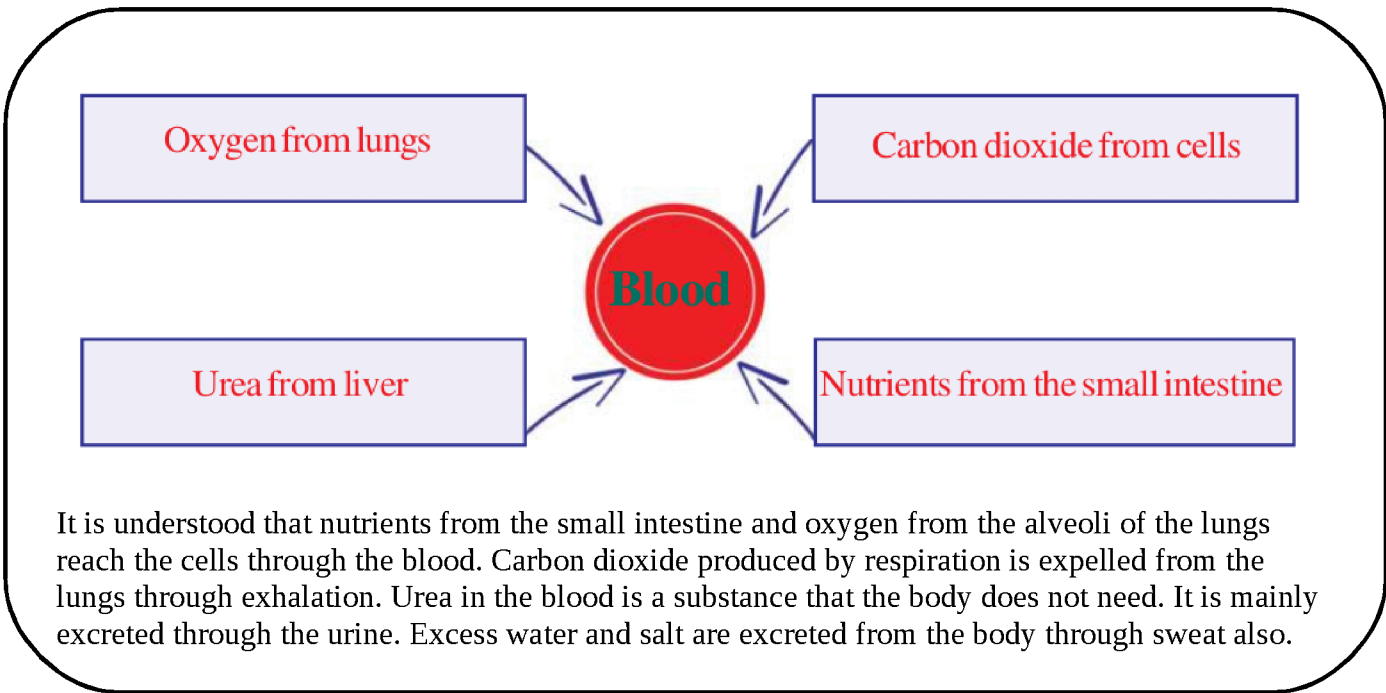
**Part 2**

Let us go through the chapter once again.

**Activity 1**

Do you know that blood plays a major role in transporting substances in the body?

Analyse the illustration and description given below and answer the questions.



a) Which are the components reaching blood?

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b) Which among these are required for the body

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c) How are the unwanted substances eliminated?

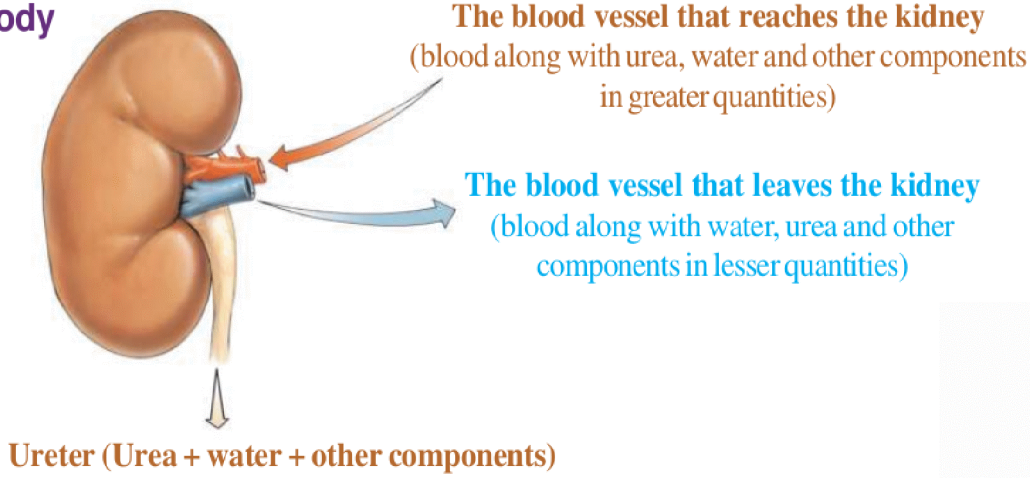
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## Activity 2

Analyze the illustration and description given below about kidney which is the main excretory organ of the body and answer the questions.

**Filters in the body**



**The blood vessel that reaches the kidney**  
(blood along with urea, water and other components in greater quantities)

**The blood vessel that leaves the kidney**  
(blood along with water, urea and other components in lesser quantities)

**Ureter (Urea + water + other components)**

**Kidney**

Kidney is the major excretory organ in the body. Excess urea, water and salts in the blood are filtered and expelled in the form of urine. In order to facilitate this process, children should drink at least one and a half litre and adults should drink three litre of water daily. Urine contains 96% water. Not passing urine when required, not drinking enough water, not maintaining hygiene etc. will cause urinary diseases.

a) What is the function of kidneys?

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b) Which are the blood vessels associated with kidney? Write their functions.

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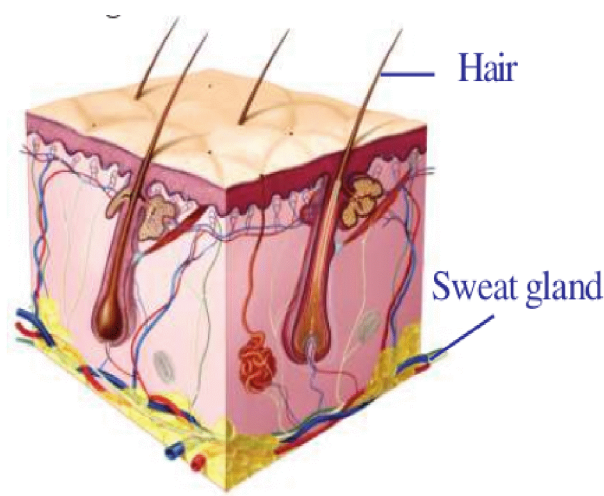
c) Why is it said to urinate on time?

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### Activity 3



**Skin is an excretory organ**

Sweat is produced by sweat glands in the skin. Excess water and salts in the body are eliminated through sweat. Sweating helps to regulate and maintain our body temperature. The condition of excessive loss of water and salts from the body is called dehydration.

Sweat and other wastes are expelled through the minute pores of the skin. They accumulate on the skin. Hence the skin has to be cleaned.  
Do you now understand the importance of carefully cleaning all body parts while bathing?

a) Which elements are expelled from the body through sweat?

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b) Which gland in the skin produces sweat?

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c) What are the benefits of sweating?

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#### Worksheet evaluation indicators

- (1) Kidney
- (2) Liver
- (3) Lungs, skin
- (4) i) Renal artery ii) Renal vein

#### This is a self learning material

NB: In case of doubts, the help of the teacher should be sought.  
The completed worksheet should be shown to the teacher after self-evaluation.

## Chapter 7

# Division for Growth and Development

### Part 1

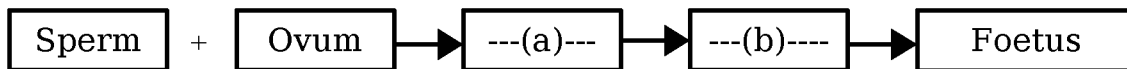
In the chapter, Division for Growth and Reproduction, we will learn about the stages of cell division. In connection with this, you must have learned about the centrosome, which plays an important role in cell division, in the chapter "Life's mysteries in little chambers". In class 8 you were familiarized with cell structure (Chapter 1), cell differentiation (Chapter 2) and various stages of development. Based on these concepts, try to find out the answers to the following questions for yourself.

### Worksheet

1. A cell organelle that is seen only in animal cells and plays an important role in cell division.

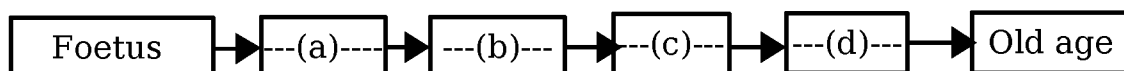
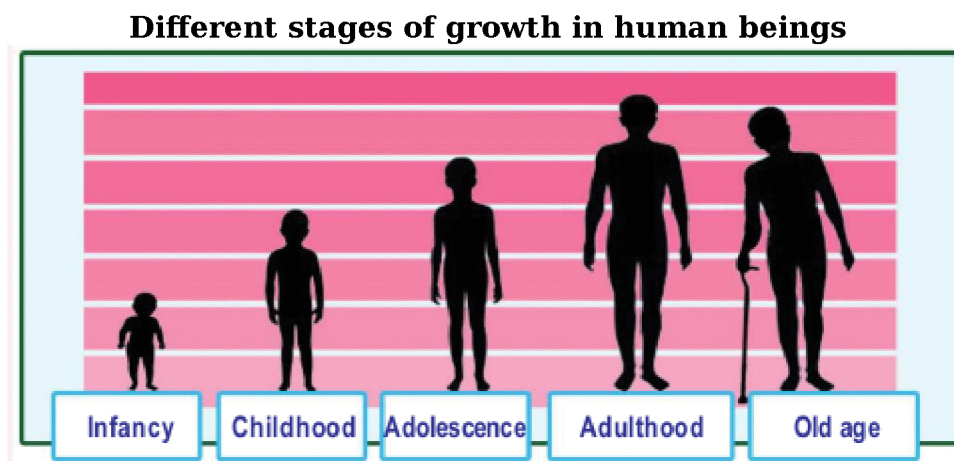
- ◆ Mitochondrion
- ◆ Golgi complex
- ◆ Centrosome
- ◆ Endoplasmic reticulum

2. Complete the illustration suitably.



3. The process in which the Foetal cells gradually attain change in structure and function is called .....

4. Complete the flow chart showing different stages of growth in human beings suitably.

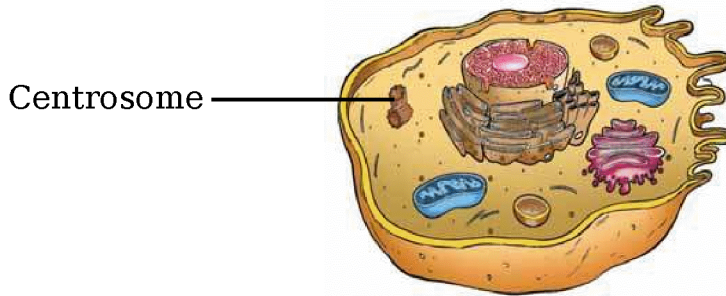


**Evaluate your responses by using worksheet evaluation indicators**

- Completed the worksheet satisfactory.
- Completed the worksheet partially.
- Need betterment.

**Part 2**

Analyze the given figures and notes and complete the given activities.

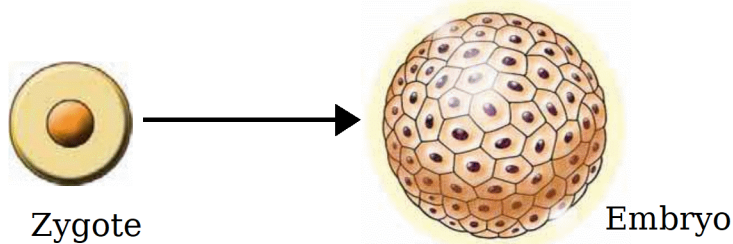


**Centrosome**

Centrosome is the cell organelle that is found only in animal cells. The centrioles that play major role in cell division are seen in the centrosome.

**From a single cell !**

Sperm fuses with the ovum and forms zygote. Our body is developed from a single cell called zygote. The zygote undergoes continuous divisions and forms the foetus consisting cells of different shape, size and content. Foetal cells gradually attain change in structure and function. This process is known as cell differentiation.



**Activity 1**

What is the peculiarity of the cell organelle Centrosome?

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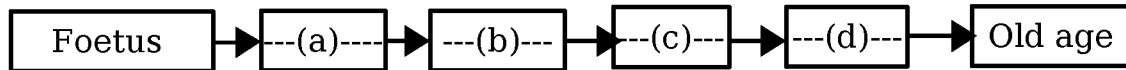
**Activity 2**

What is Cell differentiation?

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.....  
.....

**Activity 3**

Complete the flow chart showing different stages of growth in human beings suitably.



**Worksheet evaluation indicators**

1. Centrosome.
2. a) Zygote            b) Embryo
3. Cell differentiation
4. a) Infancy            b) Childhood            c) Adolescence            d) Adulthood

**This is a self learning material**

NB: Seek the help of your teacher if you have any doubts. Completed worksheet should be submitted to the teacher after self-assessment.

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