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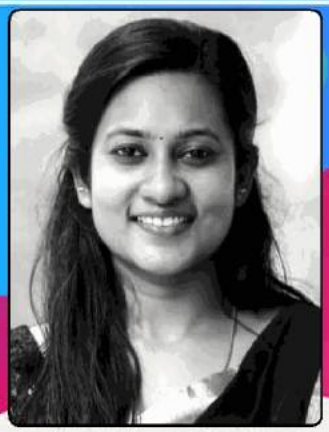
പ്രിയ വിദ്യാർത്ഥികളേ,

തിരുവനന്തപുരം നഗരസഭാ പരിധിയിലെ സ്കൂളുകളിൽ പഠിക്കുന്ന വിദ്യാർത്ഥികളുടെ പഠന നിലവാരം വർധിപ്പിക്കുന്നതിനായി നഗരസഭ നടപ്പിലാക്കുന്ന പദ്ധതിയാണ് 'പരിഹാരബോധനം'. മുൻ വർഷങ്ങളിൽ നടത്തിവന്നിരുന്ന പദ്ധതി ഈ വർഷവും വിപുലമായ നിലയിൽ നടപ്പിലാക്കുകയാണ്. പഠനത്തിൽ പിന്നാക്കം നിൽക്കുന്ന വിദ്യാർത്ഥികളെ കൂടുതൽ കരുതൽ നൽകി മുന്നിലേയ്ക്ക് ഉയർത്തുകയെന്നതാണ് നഗരസഭ ഈ പദ്ധതിയിലൂടെ ഉദ്ദേശിക്കുന്നത്. പൊതുവിദ്യാഭ്യാസ രംഗം കൂടുതൽ കരുത്താർജ്ജിച്ച് മുന്നേറുന്ന ഈ കാലഘട്ടത്തിൽ വിദ്യാർത്ഥികൾക്ക് ഗുണമേന്മയുള്ള വിദ്യാഭ്യാസം ഉറപ്പാക്കുന്നതിനും വിവിധ തലങ്ങളിൽ മികവ് തെളിയിക്കാനുള്ള അവസരമൊരുക്കുന്നതിനും സർക്കാരും നഗരസഭയും പ്രതിജ്ഞാബദ്ധമാണ്. അക്കാദമികവും ഭൗതികവുമായ സൗകര്യങ്ങൾ കൂടുതൽ മെച്ചപ്പെട്ട് കേരളത്തിലെ പൊതുവിദ്യാഭ്യാസ രംഗം ശ്രദ്ധേയമായ മാതൃകയായി മാറിയിരിക്കുകയാണ്. ഈ സന്ദർഭത്തിൽ നമ്മുടെ വിദ്യാർത്ഥികൾക്ക് ഉന്നത പഠനത്തിന് ഉപകരിക്കുന്ന തരത്തിൽ പഠന നിലവാരം മെച്ചപ്പെടുത്തുക എന്നതാണ് നാം ലക്ഷ്യമിടുന്നത്. മികച്ച അധ്യാപകരുടെ സഹായത്തോടെ പഠനം അസ്വാദ്യകരമാക്കി മാറ്റിക്കൊണ്ട് കുട്ടികളെ മികച്ച നിലാരത്തിലേയ്ക്ക് ഉയർത്തുകയെന്ന ലക്ഷ്യത്തിന്റെ സാധുകരണം കൂടിയാണ് പരിഹാരബോധനം എന്ന ബൃഹത് പദ്ധതി. ഈ പദ്ധതിയുടെ ഭാഗമാകുന്ന എല്ലാ പ്രിയപ്പെട്ട വിദ്യാർത്ഥികൾക്കും അഭിനന്ദനങ്ങൾ അറിയിക്കുന്നതോടൊപ്പം മികച്ച വിജയം ആശംസിക്കുന്നു.

സ്നേഹത്തോടെ

ആര്യ രാജേന്ദ്രൻ എസ്.
മേയർ
തിരുവനന്തപുരം നഗരസഭ



പ്രിയപ്പെട്ട കുട്ടികളേ,

തിരുവനന്തപുരം നഗരസഭാ പരിധിയിൽ വരുന്ന ഹൈസ്കൂൾ, ഹയർസെക്കന്ററി വിഭാഗം കുട്ടികളുടെ പഠനനിലവാരം ഉയർത്താനും പൊതുപരീക്ഷയിൽ ഉയർന്ന ഗ്രേഡ് കരസ്ഥമാക്കാനും ലക്ഷ്യമിട്ടുകൊണ്ട് മുൻവർഷങ്ങളെപ്പോലെ പരിഹാരബോധനം പദ്ധതി ഈ വർഷവും നടപ്പിലാക്കിവരുന്നതിൽ അതിയായ സന്തോഷവും അഭിമാനവും ഉണ്ട്. ഈ വർഷത്തെ പൊതുപരീക്ഷയ്ക്ക് നേരത്തെതന്നെ തയ്യാറെടുക്കുന്നതിനും എല്ലാ വിഷയങ്ങളിലെ പാഠഭാഗങ്ങളിലൂടെ ആവർത്തിച്ചുകടന്നുപോകാനും പരിചയപ്പെടാനും സാധിക്കട്ടെ എന്ന് ആശംസിക്കുന്നു.

ഡോ.നീന കെ.എസ്.
ചെയർപേഴ്സൺ
(വിദ്യാഭ്യാസ കായിക സ്റ്റാന്റിംഗ് കമ്മിറ്റി)
തിരുവനന്തപുരം കോർപ്പറേഷൻ

ശില്പശാലയിൽ പങ്കെടുത്തവർ

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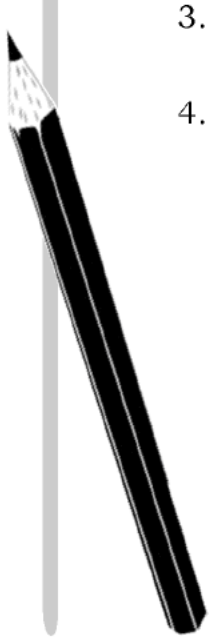

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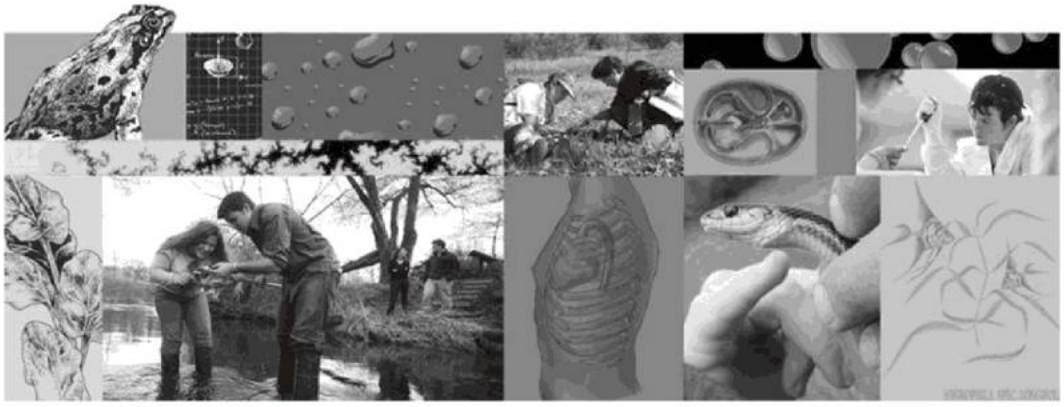


1 Sensations and Responses

At a glance

- The nervous system includes the brain, spinal cord, nerves and receptors.
- Neuron - The structural and functional unit of the nervous system.
- Myelin sheath - Axons of most of the neurons are covered by the myelin sheath, a membrane containing a lipid called myelin.
- Synapse - The junction between two neurons or a neuron and a muscle cell or a neuron and a glandular cell.
- Central nervous system - Consists of brain and the spinal cord.
- The major parts of brain - Cerebrum, Cerebellum, Medulla oblongata, Thalamus, Hypothalamus
- Reflex action - The accidental and involuntary responses towards stimuli.
- Reflex arc - Pathway of impulses in the reflex action.
- The sympathetic system and the parasympathetic system together form the autonomous nervous system.
- Diseases affecting the nervous system - Alzheimer's, Parkinsons, Epilepsy

Activity 1

A. Redraw the figure of neuron, identify and label the parts based on the peculiarities given below.

(a) The part that carries impulses from dendrites to the cell body.

(b) The part that secretes neurotransmitter.

(c) The part that carries impulses to the synaptic knob.

(d) The part that receives impulses from adjacent neuron.

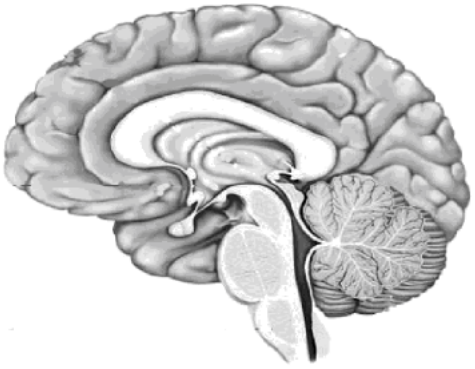
(e) The part that carries impulses from the cell body to outside.

B. Complete the flow chart of impulses passing from a neuron to another.

Stimulus → Dendrite → .....(i)..... → Cell body → ....(ii)..... → Axonite →.... (iii)..... → .... (iv)..... → Dendrite of adjacent neuron.

Activity 2

A. Redraw the figure of brain, identify and label the parts based on the functions given below.



(a) Controls involuntary actions.

(b) Maintains equilibrium of the body.

(c) Evokes sensations.

(d) Acts as relay station of impulses.

(e) Plays a major role in the maintenance of homeostasis.

B. Identify the parts of brain related to the following actions.

(a) Coordinates muscular activities.	
(b) Controls breathing.	
(c) Centre of thought, intelligence and memory.	
(d) Controls voluntary movements.	
(e) Controls heart beat.	

Activity 3

The parts in the pathway of impulse in a reflex action are given below. Arrange them in correct order.

(i) Interneuron - Generates quick responses according to the sensory impulses.

(ii) Related muscle - Withdraws the hand by the action of the muscles.

(iii) Receptor - Generates impulses.

(iv) Motor neuron - Carries the information from spinal cord to related muscles.

(v) Sensory neuron - Carries impulses to the spinal cord.

Activity 4

Arrange the statements related to the actions of autonomous nervous system in the table given below.

A. The pupil in the eye dilates.

B. Urinary bladder contracts.

C. Glucose is converted to glycogen.

D. Gastric acivities slow down.

E. The pupil constricts.

F. Gastric activities become normal.

G. Production of saliva decreases.

H. Glycogen is converted to glucose.

I. Production of saliva increases.

J. Urinary bladder retains to normal state.

Sympathetic System	Parasympathetic System
•	•
•	•
•	•
•	•
•	•

Activity 5

Arrange the following statements based on the hint given below.

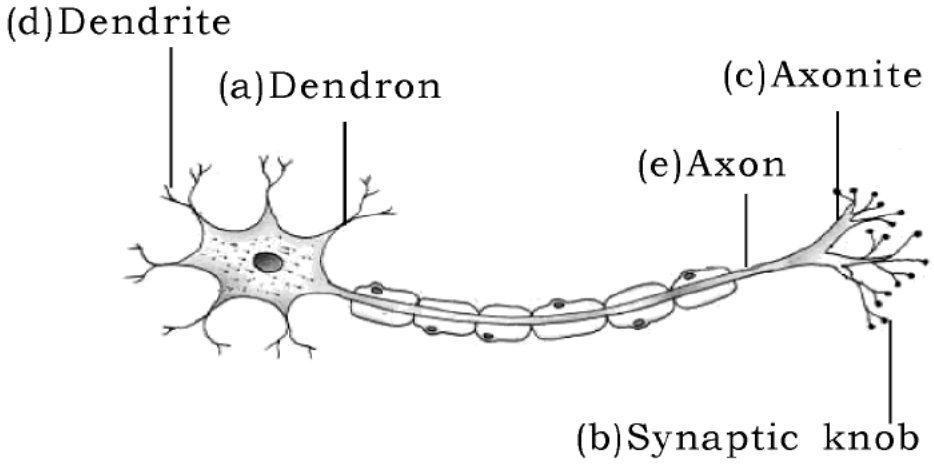
Hint : Disease - Causes - Symptoms

- Accumulation of an insoluble protein in the neural tissues of the brain. Neurons get destroyed.
- Alzheimer's
- Destruction of specialised ganglions in the brain. Production of dopamine, a neurotransmitter in the brain gets reduced.
- Epilepsy
- Loss of memory, inability to recognize friends and relatives, in ability to do routine works.
- Continuous and irregular flow of electric charges in the brain.
- Loss of body balance, irregular movement of muscles, shivering of the body, profuse salivation.
- Parkinsons
- Fits due to continuous muscular contraction, frothy discharge from the mouth, clenching of the teeth following which the patient falls unconscious.

Scoring indicators

Activity 1

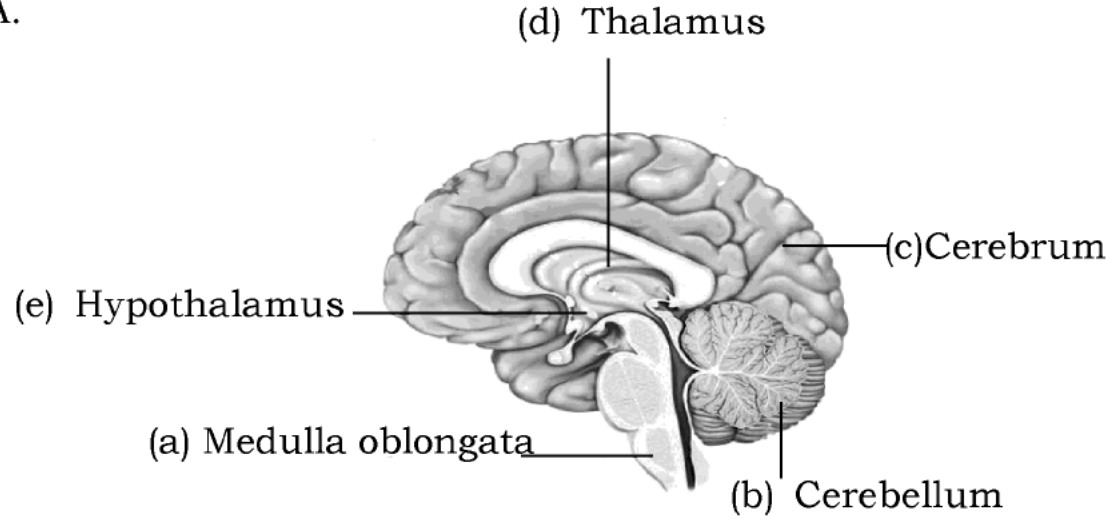
A.



B. (i) Dendron (ii) Axon (iii) Synaptic knob (iv) Synapse/ Synaptic cleft

Activity 2

A.



B. (a) Cerebellum (b) Medulla oblongata (c) Cerebrum (d) Cerebrum (e) Medulla oblongata

Activity 3

(iii) Receptor - Generates impulses. (v) Sensory neuron - Carries impulses to the spinal cord. (i) Interneuron - Generates quick responses according to the sensory impulses. (iv) Motor neuron - Carries the information from spinal cord to related muscles. (ii) Related muscle - Withdraws the hand by the action of the muscles.

Activity 4

Sympathetic System - A, D, G, H, J

Parasympathetic System - B, C, E, F, I

Activity 5

• Alzheimer's - Accumulation of an insoluble protein in the neural tissues of the brain. Neurons get destroyed. - Loss of memory, inability to recognize friends and relatives, inability to do routine works.

• Parkinsons - Destruction of specialised ganglions in the brain. Production of dopamine, a neurotransmitter in the brain gets reduced.- Loss of body balance, irregular movement of muscles, shivering of the body, profuse salivation.

• Epilepsy - Continuous and irregular flow of electric charges in the brain. - Fits due to continuous muscular contraction, frothy discharge from the mouth, clenching of the teeth following which the patient falls unconscious.

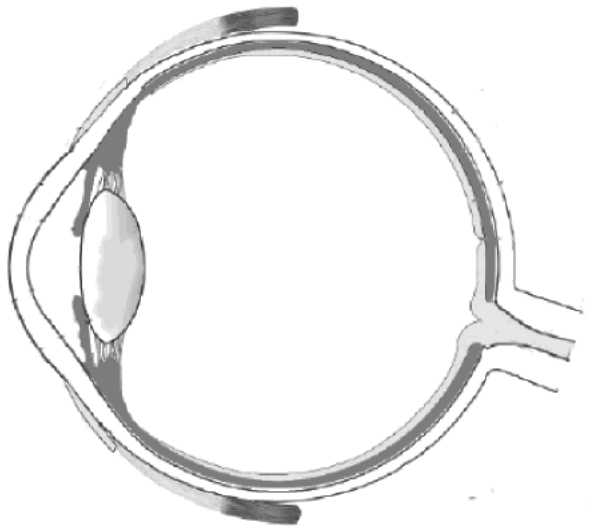
2 Windows of Knowledge

At a glance

- Lysozyme, the enzyme present in tears, destroys germs that enter the eyes.
- Layers of the eye- Sclera, Choroid, Retina
- Parts of eye - Cornea, Conjunctiva, Iris, Pupil, Lens, Ciliary muscles, Yellow spot, Blind spot, Optic nerve.
- Fluids in the eye - Aqueous humor, Vitreous humor.
- The size of the pupil is regulated by the action of circular muscles and radial muscles seen in the iris.
- Rod cells and cone cells are the photoreceptors present in the retina.
- Rod cells contain the visual pigment called rhodopsin and cone cells contain the visual pigment called photopsin (iodopsin).
- Eye defects and diseases - Night blindness, Xerophthalmia, Colour blindness, Glaucoma, Cataract, Conjunctivitis.
- The ear not only help us in hearing, but also in maintaining the balance of the body.
- The main parts of ear - External ear, Middle ear, Inner ear.
- The basilar membrane and sensory hair cells together constitute the Organ of Corti.
- The parts seen on the papillae that detect taste are the taste buds.
- We have taste buds that are stimulated by tastes like sweet, salt, sour, bitter, umami etc.

Activity 1

Redraw the figure of eye, identify and label the parts based on the peculiarities given below.



(a) The projected transparent anterior part of sclera.

(b) The aperture seen at the centre of iris.

(c) Part which helps to alter the curvature of lens

(d) The point of maximum visual clarity.

(e) The part which is filled with a fluid that helps in maintaining the shape of the eye.

(f) The fluid that provides nutrients and oxygen to the tissues of the eye.

(g) The part that transmits impulses from photoreceptors to the visual centre in the brain.

Activity 2

Rearrange the flowchart related to sense of vision.

Light → Lens → Pupil → Vitreous humor → Aqueous humor → Optic nerve → Retina → Cerebrum → Cornea → Impulse → Sense of vision.

Activity 3

The statements related to the distance of object from the eye is given below. Arrange the statements suitably below the picture. Give heading to the figure also.

(a) Ciliary muscles relax.

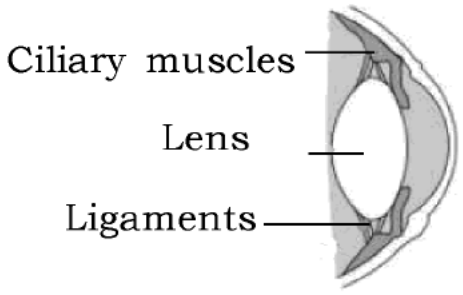
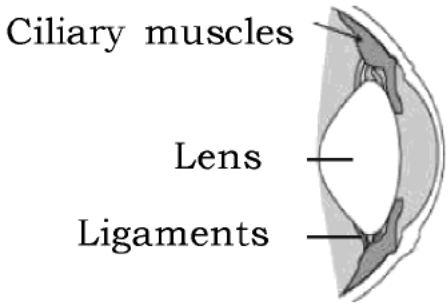
(b) Ligaments relax.

(c) Focal length decreases.

(d) Curvature of lens decreases.

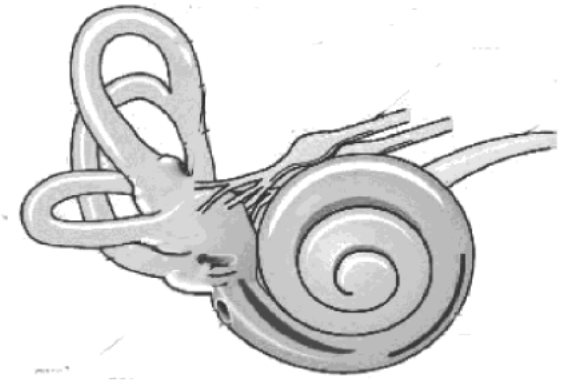
(e) Ligaments stretch.

(f) Curvature of lens increases.

.....(i).....	.....(ii).....
	
.....	.....
.....	.....
.....	.....

Activity 4

Redraw the figure of internal ear, identify and label the parts based on the functions given below.



(a) Part helps in hearing.

(b) Transmit impulses related to body balance maintaining to the cerebellum.

(c) Transmit impulses related to hearing to the cerebrum.

Activity 5

The stages related to the experience of smell is given below. Arrange them in sequential order.

(a) Impulses are generated.

(b) Aromatic particles dissolve in the mucus inside the nostrils.

(c) Olfactory receptors stimulated.

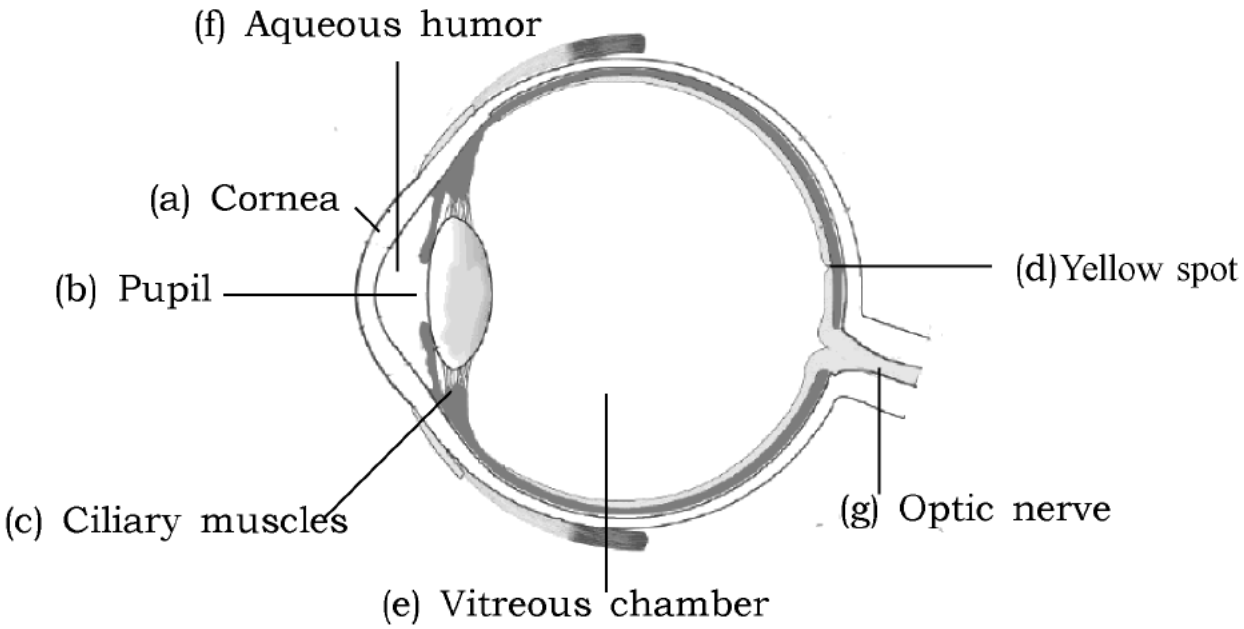
(d) We experience smell.

(e) Aromatic particles diffuse in the air and enter the nostrils.

(f) Impulses are transmitted to the cerebrum through the olfactory nerve.

Scoring indicators

Activity 1



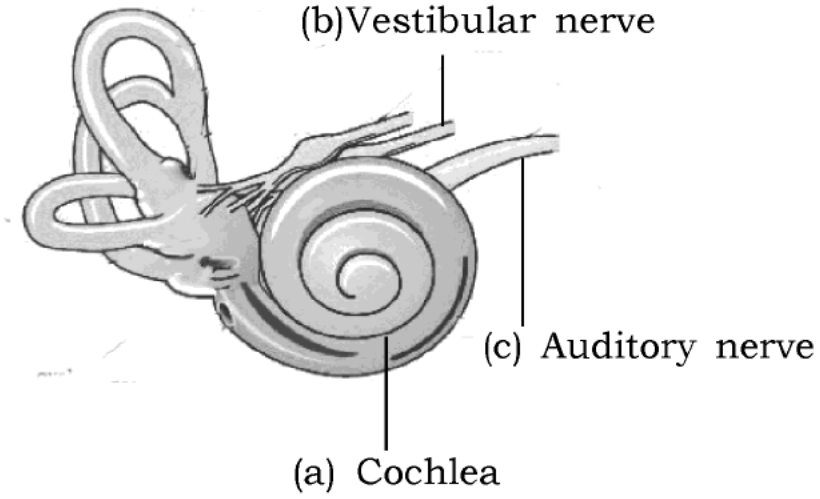
Activity 2

Light - Cornea - Aqueous humor - Pupil - Lens - Vitreous humor - Retina - Impulse - Optic nerve - Cerebrum - Sense of vision.

Activity 3

(i) While viewing distant objects	.(ii) While viewing nearby objects
(a) Ciliary muscles relax. (d) Curvature of lens decreases. (e) Ligaments stretch.	(b) Ligaments relax. (c) Focal length decreases. (f) Curvature of lens increases.

Activity 4



Activity 5

(e) Aromatic particles diffuse in the air and enter the nostrils.

(b) Aromatic particles dissolve in the mucus inside the nostrils.

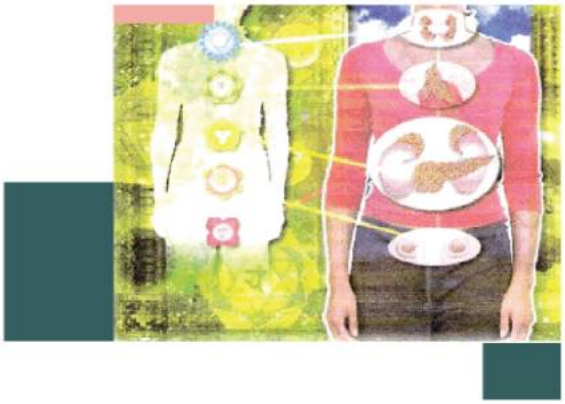
(c) Olfactory receptors stimulated.

(a) Impulses are generated.

(f) Impulses are transmitted to the cerebrum through the olfactory nerve.

(d) We experience smell.

3 Chemical Messages for Homeostasis



At a glance

Gland	Hormone
Hypothalamus	Oxytocin, Vasopressin (ADH), Releasing Hormone, Inhibitory Hormone
Pancreas (Alpha cells)	Glucagon
Pancreas (Beta cells)	Insulin
Thyroid	Thyroxine, Calcitonin
Parathyroid	Parathormone
Adrenal gland (Cortex)	Cortisol, Aldosterone, Sex hormones
Adrenal gland (Medulla)	Epinephrine, Norepinephrine
Pineal (Biological Clock)	Melatonin
Thymus	Thymosin (Youth hormone)
Pituitary	Tropic hormones, Prolactin, Growth Hormone (Somatotropin)
Testis (in males)	Testosterone
Ovary(in females)	Estrogen, Progesterone

- The normal level of glucose in blood is 70 -110 mg/100ml.
- The level of glucose in blood is maintained by the combined action of insulin and glucagon.
- Diabetes is clinically referred to as a condition when the level of glucose before breakfast is above 126mg/100ml of blood.
- The normal level of calcium in blood is 9 -11 mg/100ml.
- The level of calcium in blood is maintained by the combined action of calcitonin and parathormone.
- The anterior lobe of the pituitary gland produces hormones which regulate the functions of other endocrine glands.
- When the production of vasopressin decreases, the reabsorption of water in the kidney is decreased and excess amount of

urine is eliminated. This condition is known as diabetes insipidus.

♦ The chemical substances that are secreted by certain animals to the surroundings to facilitate communication are called pheromones.

♦ Plant hormones - Auxin, Cytokinin, Gibberellin, Abscisic acid, Ethylene.

♦ Artificial plant hormones - Auxins, Gibberellins, Ethylene (Ethyphon), Abscisic acid

Activity 1

Arrange column B and C with the data of column A.

A **Gland**	B **Hormone**	C **Function**
a)Pancreas	Somatotropin	Reduces the excess calcium in blood.
b)Adrenal	Vasopressin	Helps in sperm production.
c)Pituitary	Epinephrine	Promotes growth of the body.
d)Thyroid	Testosterone	Converts glycogen into glucose.
e)Testes	Calcitonin	Slowsdown the action of defense cells.
f)Hypothalamus	Melatonin	Act during emergencies.
	Glucagon	Helps in reabsorption of water in kidneys.

Activity 2

Arrange the following statements suitably in the table given below.

(a) Cellular uptake of glucose molecules.

(b) The alpha cells in the Islets of Langerhans of Pancreas produce this hormone.

(c) Converts the glycogen stored in the liver to glucose.

(d) Synthesizes glucose from amino acids.

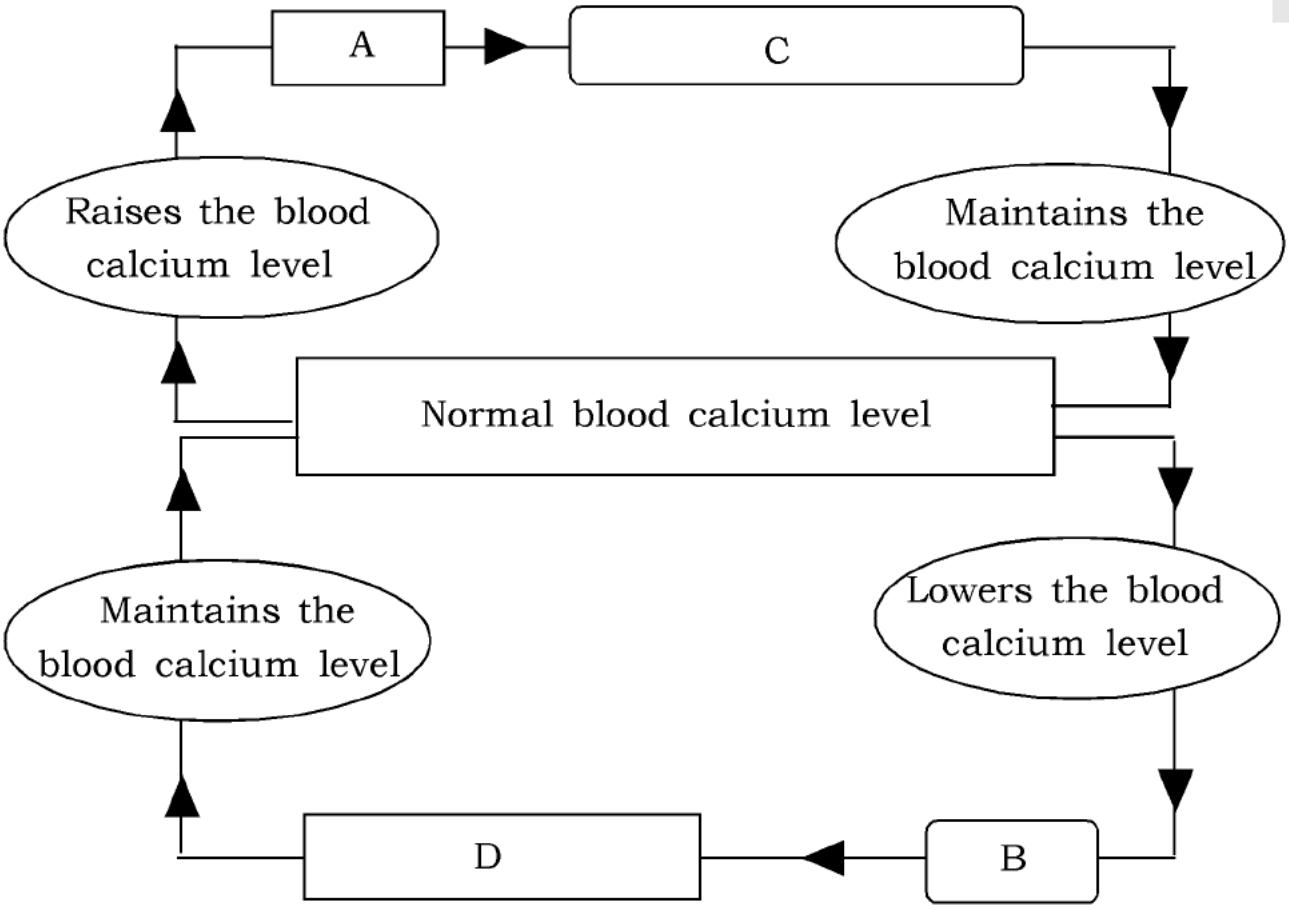
(e) Converts glucose into glycogen in the liver and muscles.

(f) The beta cells in Islets of Langerhans of Pancreas produce this hormone.

Insulin	Glucagon

Activity 3

Observe the illustration and answer the following questions.



(a) What is the normal level of calcium in blood ?

(b) Name the glands indicated as A and B.

(c) Name the hormones indicated as C and D.

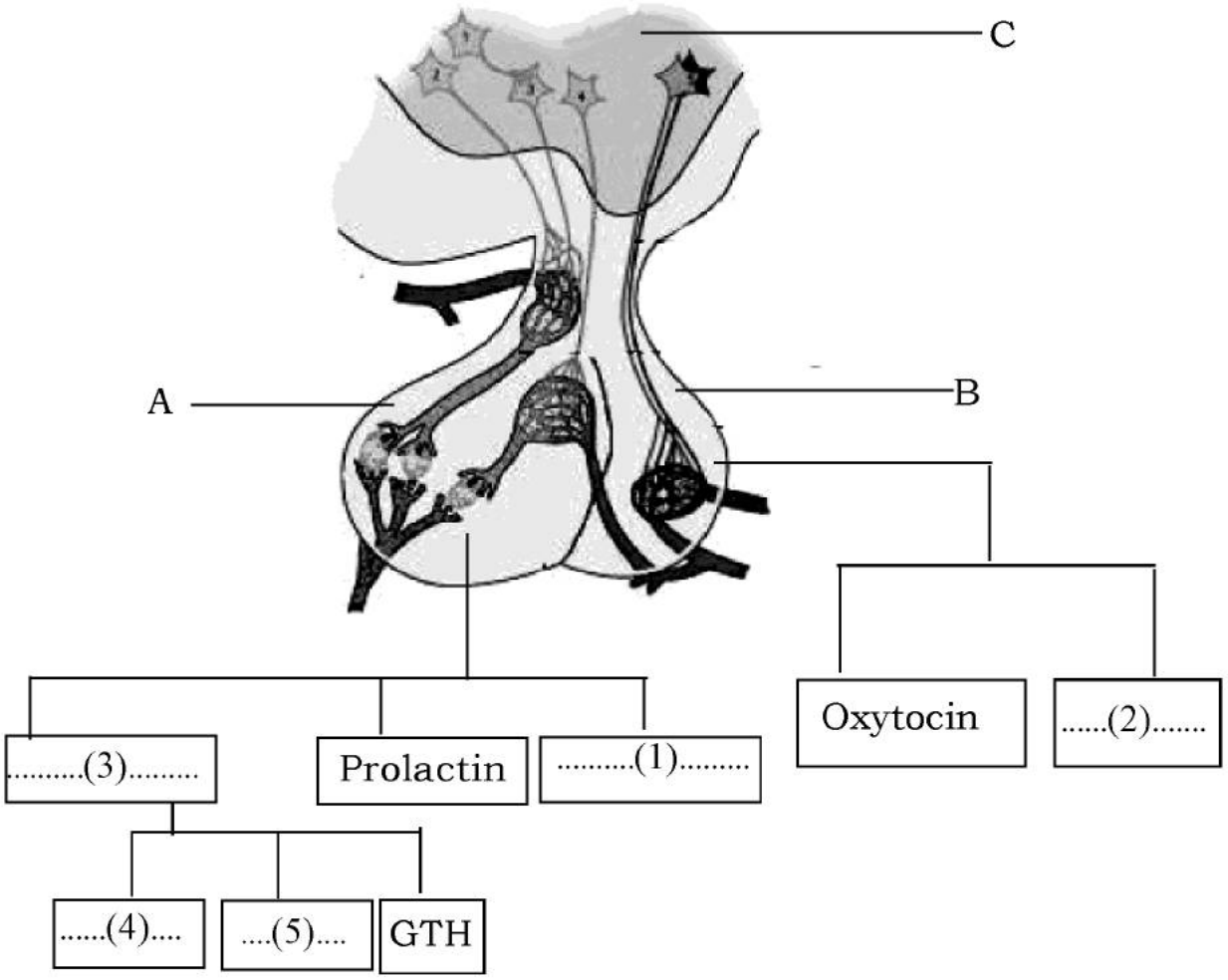
Activity 4

Make suitable pairs by using the words given in the box.

• Cortisol • Acts along with the sympathetic nervous system during emergency. • Norepinephrine • Sex hormones • Maintains the salt-water level by acting in kidneys. • The synthesis of glucose from protein and fat. • Epinephrine • Controls the development and functions of sex organs. • Acts along with epinephrine. • Aldosterone

Activity 5

Observe the illustration and answer the questions given below.



a) Identify the parts marked as A , B and C ?

b) Name the hormones indicated as 1,2,3,4 and 5?

c) What are the functions of the hormones Oxytocin and Prolactin ?

d) What are the abnormalities caused by the difference in the rate of production of the hormone indicated as 1 ?

Activity 6

Bees and termites are maintaining the colony life by using some chemical substances as chemical messages.

(a) What are these chemical substances ?

(b) Write the other uses of these chemical substances?

(b) Give other examples for these chemical substances?

Scoring indicators

Activity 1

a) Pancreas - Glucagon - Converts glycogen into glucose.

b) Adrenal -Epinephrine - Act during emergencies.

c) Pituitary - Somatotropin - Promotes growth of the body.

d) Thyroid - Calcitonin - Reduces the excess calcium in blood.

e) Testes - Testosterone - Helps in sperm production.

f) Hypothalamus - Vasopressin - Helps in reabsorption of water in kidneys.

Activity 2

Insulin

(a) Cellular uptake of glucose molecules.(e) Converts glucose into glycogen in the liver and muscles. (f) The beta cells in Islets of Langerhans of Pancreas produce this hormone.

Glucagon

(b) The alpha cells in the Islets of Langerhans of Pancreas produce this hormone. (c) Converts the glycogen stored in the liver to glucose.(d) Synthesizes glucose from amino acids.

Activity 3

(a) The normal level of calcium in blood is 9-11 mg/100ml.

(b) A - Thyroid gland B - Parathyroid gland

(c) C - Calcitonin D - Parathormone

Activity 4

Cortisol - The synthesis of glucose from protein and fat.

Epinephrine - Acts along with the sympathetic nervous system during emergency.

Norepinephrine - Acts along with epinephrine.

Aldosterone - Maintains the salt- water level by acting in kidneys.
Sex hormones - Controls the development and functions of sex organs.

Activity 5

(a) A - Anterior lobe of pituitary B - Posterior lobe of pituitary

C - Hypothalamus

(b) 1 - Growth hormone (GH) /Somatotropin/Somato Tropic Hormone (STH)

2 - Vasopressin/Anti Diuretic Hormone (ADH)

3 - Tropic hormones

4 - ACTH (Adreno Cortico Tropic Hormone)

5 - TSH (Thyroid Stimulating Hormone)

(c) Oxytocin - Facilitates child birth by stimulating the

contraction of smooth muscles in the uterine wall. Facilitates lactation.

Vasopressin - Helps in the reabsorption of water in the kidney.

(d) Gigantism, Dwarfism, Acromegaly

Activity 6

(a) Pheromones

(b) Helps in attracting mates, informing the availability of food, determining the path of travel, signalling dangers.

(c) The muscone in the musk deer, the civeton in the civet cat, bombykol in the female silk worm moth

4 Keeping Diseases Away

At a glance

- Diphtheria, Rat fever (Leptospirosis) and Tuberculosis are the diseases caused by bacteria.
- Nipah, AIDS and Hepatitis are the diseases caused by virus.
- Ringworm, Athletes' foot diseases are caused by fungus.
- Malaria and Filariasis are spread by mosquitoes.
- Heamophilia, Sickle cell anaemia are genetic diseases.
- Cancer is caused by the uncontrolled division of cells.
- Diabetes, Fatty liver, Stroke, Hypertension, Heart attack are lifestyle diseases.
- Animal diseases
  - Bacteria - Anthrax, Inflammation in the udder.
  - Virus - Foot and mouth disease.
- Plant diseases
  - Bacteria- Blight disease in paddy, Wilt disease in brinjal.
  - Virus- Mosaic disease in peas and tapioca, Bunchy top of banana
  - Fungus- Quick wilt in pepper, Bud rot of coconut.

Activity 1

Complete the following table using the terms that are given in the box.

The control system of cell division fails, Rupture of blood vessels in the brain, Forms an ash coloured thick coating in the throat, Dark yellow colour to the mucus membrane, white portion of the eyes and the nails.

Diphtheria	Hepatitis	Cancer	Stroke

Activity 2

Select correct statements.

a) Leptospira is the bacteria that causes rat fever.

b) Diabetes is caused by the fungus.

c) Diphtheria is a virus disease.

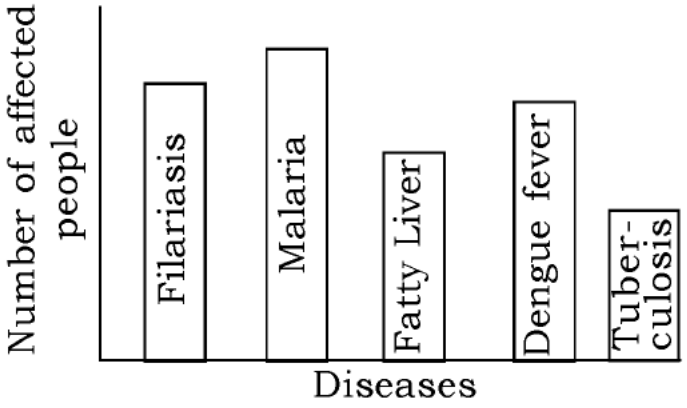
d) Ring worm is caused by fungus.

e) Wilt disease in brinjal is caused by fungus.

f) Bunchy top of banana is caused by virus.

Activity 3

A study of health department on human diseases in an area is given below as a graph. Analyse the graph and answer the following questions.



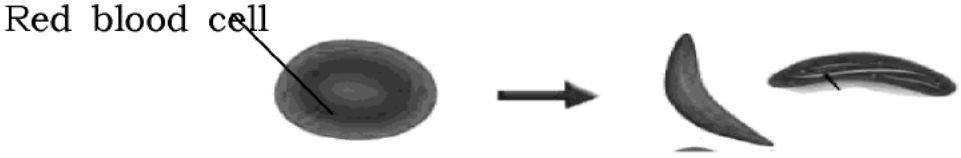
a) Which is the mostly affected disease? Name the causative organism?

b) What is the cause of Fatty liver?

c) Give possible suggestions to eliminate the diseases that mostly affected in this area.

Activity 4

The change in the structure of Red blood cells due to a genetic disease is illustrated below. Observe the illustration and answer the questions given below.



a) Which genetic disease is represented by this illustration?

b) How does the deformity of red blood cells in these patients affect their body?

Activity 5

Symptoms of a disease is given below. Analyse and answer the following questions.

"Loss of body weight, fatigue, persistent cough."

a) Identify the disease.

b) Name the pathogen that cause this disease.

c) How this disease is transmitted?

d) Name the vaccine used against this disease.

Scoring indicators

Activity 1

Diphtheria	Hepatitis	Cancer	Stroke
Forms an ash coloured thick coating in the throat	Dark yellow colour to the mucus membrane, white portion of the eyes and the nails.	The control system of cell division fails	Rupture of blood vessels in the brain

Activity 2

a) Leptospira is the bacteria that causes rat fever.

d) Ring worm is caused by fungus

f) Bunchy top of banana is caused by virus.

Activity 3

a) Malaria, Plasmodium/Protozoa

b) Deposition of excess fat in the liver.

c) Avoid situations that lead to the multiplication of mosquitoes, keep the surroundings clean.

Activity 4

a) Sickle cell anaemia

b) The oxygen carrying capacity of red blood cells decreases. The sickle shaped RBCs get collected in the blood vessels and block the flow of blood in them.

Activity 5

a) Tuberculosis

b) *Mycobacterium tuberculosis* / Bacteria

c) When the patient speaks, coughs or sneezes, the pathogens spread into the air and thereby to others.

d) BCG

5 Soldiers of Defense

At a glance

- Defense mechanisms in our body.
  - Body coverings and secretions - Skin, mucous membrane, mucous, saliva, tear
  - Body fluids - Blood and lymph.
- Neutrophil, Basophil, Eosinophil, Monocyte, Lymphocyte are the White blood cells .
- Inflammatory response, Phagocytosis, blood clotting, Healing of wounds, Fever are defense actions.
- Vaccines are the substances used for artificial immunization.
- Sthethescope, sphigmomanometer, Electro Encephalo Gram(EEG), Electro Cardio Gram(ECG), Ultra Sound Scanner, C.T. Scanner, MRI Scanner are diagnostic tools.
- Medicines that are extracted from microorganisms like bacteria, fungi, etc. and used to destroy bacteria are called antibiotics.
- The basis of blood grouping is the presence of antigen A and antigen B in red blood cells.

Activity 1

Select correct statements from the following.

a) Neutrophil helps to dilate the blood vessels.

b) Basophil engulfs bacteria.

c) Monocyte engulfs and destroys germs.

d) Lymphocyte synthesizes chemicals that destroy bacteria.

e) Neutrophil engulfs bacteria.

f) Eosinophil synthesizes chemicals required for the inflammatory responses.

Activity 2

Observe the following statements and answer the following questions

(i) Prothrombin in plasma changed into Thrombin in with the help of thromboplastin

(ii) Tissues and platelets at the site of wound degenerate to form the enzyme called thromboplastin.

(iii) The red blood cells and platelets get entangled in the network of fibrin fibres to form the blood clot.

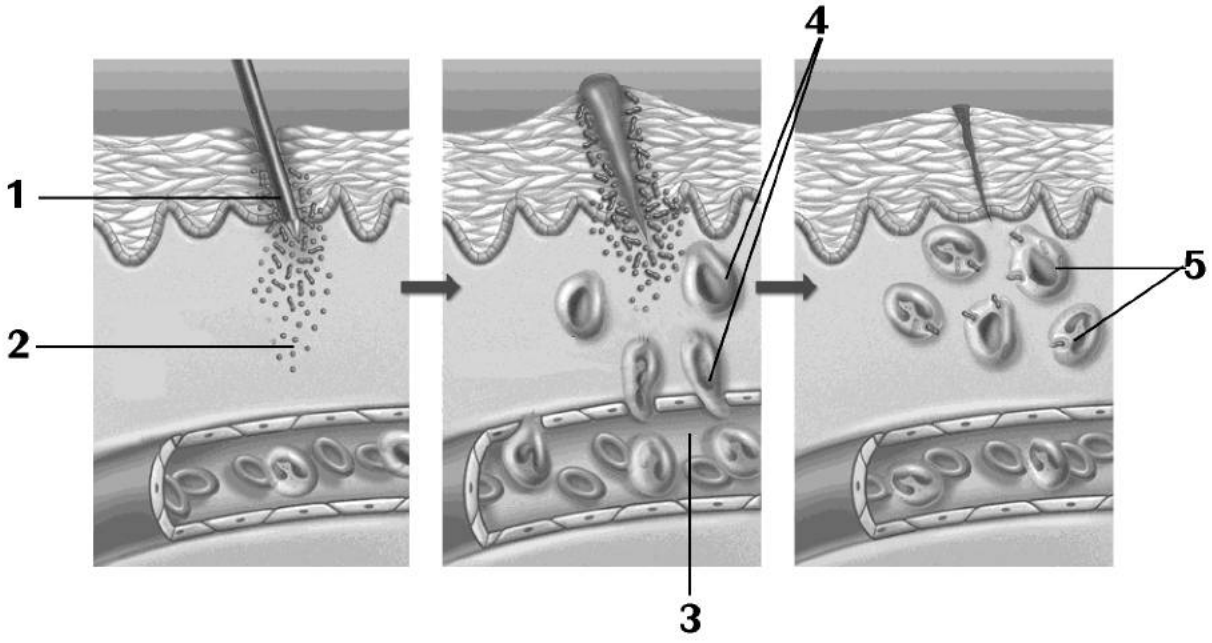
(iv) Fibrinogen in presence of Thrombin forms fibrin fibres.

a) Arrange the steps of blood clotting in the correct order.

b) Name the vitamin and mineral involved in the process of blood clotting.

Activity 3

Observe the illustration and answer the following questions.



a)Which defense mechanism is mentioned in the illustration?

b) Write down the steps of the mechanism that represented by 1, 2, 3, 4, and 5

c)Name the process of engulfing and destroying of germs.

Activity 4

Analyse the table and answer the following questions.

Blood group	Antigen	Antibody
A	.....(i).....	b
.....(ii).....	B	.....(iii).....
AB	.....(iv).....	Nil
O	.....(v).....	.....(vi).....

a) Complete the table suitably.

b) How the blood group is write if Rh factor is seen the blood group A.

Activity 5

Arrange the B and C columns in accordance with A column.

A	B	C
Alexander Fleming	Vaccines	Destroy cancer cells.
Edward Jenner	First aid	Destroy bacteria
	Antibiotics	Helps in artificial immunization.

Activity 6

Select suitable terms from the box for the following statements

B Lymphocytes, Cardiology, Oncology , T Lymphocytes, Cellwall ,Cuticle

a)The defense cells that destroy the cells affected by virus.

b) The defense cells that Produce antibodies.

c)Specialization area for the treatment of heart.

d) Specialization area for the treatment of cancer

e) Prevents the entry of germs through leaves.

f) Well equipped resistant coat in the plant cell.

Scoring indicators

Activity 1

c) Monocyte engulfs and destroys germs.

e) Neutrophil engulfs bacteria.

f) Eosinophil synthesizes chemicals required for the inflammatory responses.

Activity 2

a) (ii) Tissues and platelets at the site of wound degenerate to form the enzyme called thromboplastin.

(i) Prothrombin in plasma changed into Thrombin in the presence of thromboplastin

(iv) Fibrinogen in presence of Thrombin forms fibrin fibres.

(iii) The red blood cells and platelets get entangled in the network of fibrin fibres to form the blood clot.

b) Calcium, Vitamin K.

Activity 3

a) Inflammatory responses

b) 1. Germs enter through wounds.

2. Chemicals are produced.

3. Blood capillaries dilates

4. White blood cells reach the wound site through the walls of the capillaries.

5. Neutrophils and monocytes engulf and destroy germs.

c) Phagocytosis

Activity 4

a) (i) A (ii) B (iii) a (iv) A, B (v) Nil (vi) a,b

b) A^+

Activity 5

Alexander Fleming - Antibiotics - Destroy bacteria

Edward Jenner - Vaccines - Helps in artificial immunization.

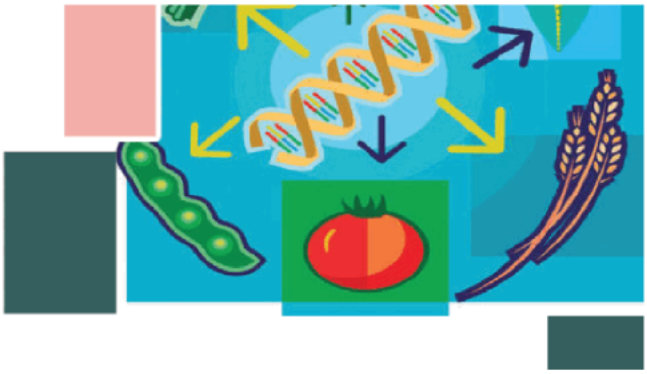
Activity 6

a) T Lymphocytes b) B Lymphocytes

c) Cardiology d) Oncology

e) Cuticle f) Cell wall

6 Unravelling Genetic Mysteries



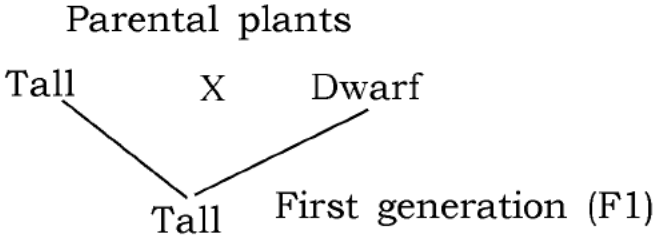
At a glance

- The transmission of features of parents to offsprings is termed as heredity.
- The features seen in offsprings that are different from their parents are called variations.
- Genetics. - The branch of science that deals with heredity and variations.
- Gregor Johann Mendel is considered as the Father of Genetics.
- A gene that controls a character has different forms. They are called alleles.
- When plants that differ in a pair of contrasting traits are hybridized, only one trait is expressed while the other remains hidden in the offsprings of the first generation.
- During gamete formation the factors that determine a particular character segregate without getting mixed; that is why the traits that remian hidden in the first generation appear inthe second generation.
- Mendel explained that the appearance of variations in offsprings is due to the independent assortment of each character.
- Two scientists, James Watson and Francis Crick, presented the double helical model of DNA in 1953.
- DNA molecule is made up of units called nucleotides.
- A nucleotide contains a sugar molecule, a phosphate molecule and a nitrogen base.
- Nitrogen bases are molecules that contain nitrogen and are alkaline in nature.
- Since DNA has four kinds of nitrogen bases, namely adenine, thymine, guanine and cytosine, DNA has four kinds of nucleotides.

- In DNA, the nitrogen base, adenine pairs only with thymine and guanine pairs only with cytosine.
- RNA is another nucleic acid like DNA.
- Ribose sugar is present in RNA.
- In RNA, the nitrogen base uracil is seen instead of thymine in DNA.
- The activity of particular proteins (enzymes) controls metabolic activities and is responsible for specific characteristics.
- DNA does not participate directly in protein synthesis.
- Protein molecule is synthesized by the combined activities of mRNA, tRNA, rRNA and ribosome.
- There are 46 chromosomes in human beings. Of these, 44 are somatic chromosomes and two are sex chromosomes.
- Sex chromosomes are of two types. They are called X chromosome and Y chromosome.
- Females have two X chromosomes and males have one X chromosome and one Y chromosome.
- The genetic makeup of female is 44 + XX and that of male is 44 + XY.
- The X,Y chromosomes of the father determine whether the child is male or female.

Activity 1

A. The hybridization experiment conducted on the basis of two contrasting traits of the character, height, in pea plant is illustrated below. Observe the illustration and answer the questions given below.



(a) Name the dominant and recessive traits.

(b) What are the traits obtained in the second generation as a result of self pollination of the first generation plants? In which ratio?

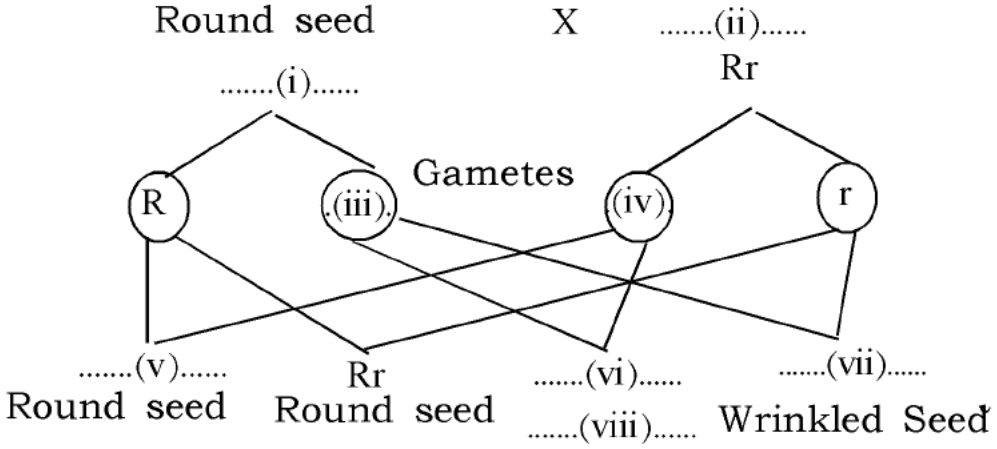
B. Illustrate the above experiment using symbols.

(Hint : Tall - TT, Dwarf - tt)

Activity 2

Complete the illustration showing the formation of the second generation by the self pollination of first generation plants.

Self pollination of first generation plant

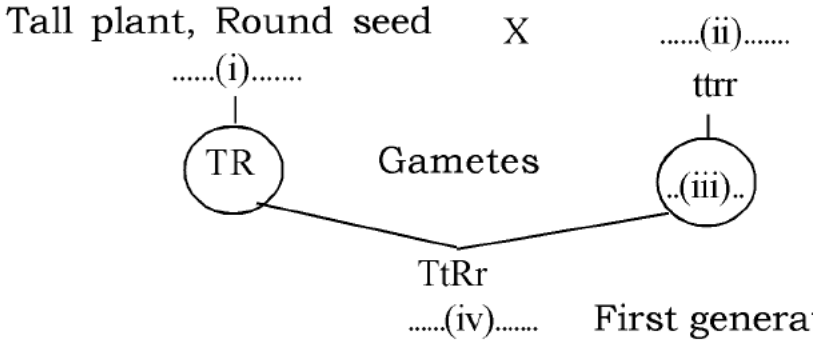


Second generation (F2)

Activity 3

The hybridization experiment conducted on the basis of two characters in pea plants is illustrated below. Observe the illustration and answer the questions given below.

Parental plants



(a) Complete the illustration.

(b) What are the traits obtained in the second generation as a result of the self pollination of first generation plants?

Activity 4

Arrange the following statements suitably in the table given below.

(a) Two stranded.

(b) Contains deoxyribose sugar.

(c) Has four kinds of nitrogen bases, namely adenine, uracil, guanine and cytosine.

(d) Deoxyribonucleic Acid

(e) Single stranded

(f) Has four kinds of nitrogen bases, namely adenine, thymine, guanine and cytosine.

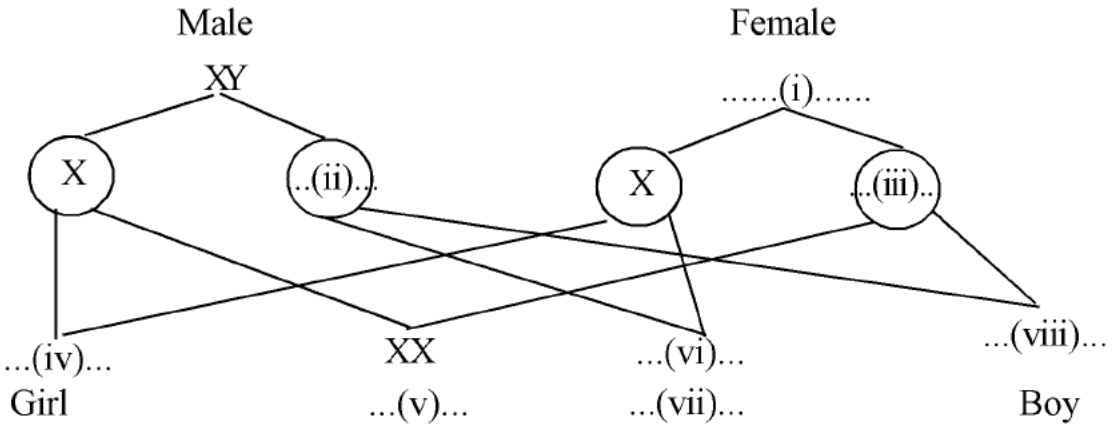
(g) Ribonucleic Acid

(h) Contains ribose sugar.

DNA	RNA
•	•
•	•
•	•
•	•

Activity 5

Observe the illustration and answer the questions given below.



(a Complete the illustration.

(b) What is the possibility for the birth of a male or a female child?

(c) It is not a fair practice to blame mothers for delivering girl child only. Substantiate your opinion with the help of the above illustration.

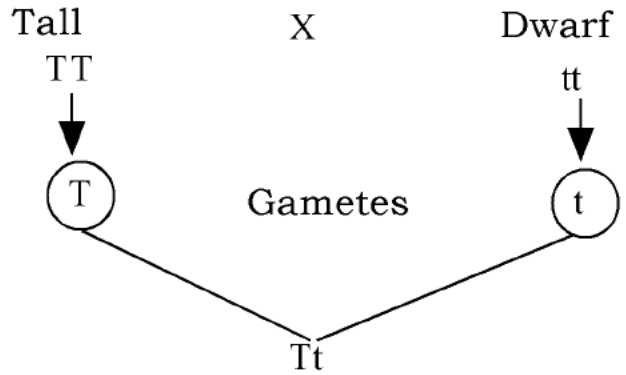
Scoring indicators

Activity 1

A. (a) Dominant trait - Tall Recessive trait - Dwarf

(b) Tall and dwarf in 3 :1 ratio

B . Parental plants



Activity 2

(i) Rr (ii) Round seed (iii) r (iv) R (v) RR (vi) Rr (vii) rr (viii) Round seed

Activity 3

(a) (i) TTRR (ii) Dwarf plant, Wrinkled Seed (iii) tr (iv) Tall plant, Round seed

(b) Tall plant, Round seed

Dwarf plant, Round seed

Tall plant, Wrinkled Seed

Dwarf plant, Wrinkled Seed

Activity 4

DNA - (a) Two stranded.(b) Contains deoxyribose sugar.(d) Deoxyribonucleic Acid. (f) Has four kinds of nitrogen bases, namely adenine, thymine, guanine and cytosine.

RNA - (c) Has four kinds of nitrogen bases, namely adenine, uracil, guanine and cytosine.(e) Single stranded. (g) Ribonucleic Acid (h) Contains ribose sugar.

Activity 5

(a) (i) XX (ii) Y (iii) X (iv) XX (v) Girl (vi) XY (vii) Boy (viii) XY

(b) Equal. 1Boy : 1 Girl

(c) I agree with this statement. The XY chromosomes of the father determine whether the child is male or female. Child with XX sex chromosomes is female and one with XY sex chromosomes is male.

7 Genetics of the Future

At a glance

- Genetic engineering is the technology of controlling traits of organisms by bringing about desirable changes in the genetic constitution of organisms.
- The enzyme restriction endonuclease (genetic scissors) is used to cut genes.
- The enzyme ligase (genetic glue) is used for joining the genes.
- A gene from one cell is transferred to another cell by suitable vectors.
- Scope of genetic engineering - Gene therapy, Genetically modified animals and crop, Forensic test.
- Gene therapy is a method of treatment in which genes that are responsible for diseases are removed and normal functional genes are inserted in their place.
- The secrets of human genome were revealed through Human Genome Project.
- Many proteins like Interferons, Insulin, Endorphin, Somatotropin which are used for the treatment of diseases in humans, are produced through genetic engineering.
- The technology of testing the arrangement of nucleotides is DNA profiling / DNA fingerprinting.

Activity 1

Observe the picture and answer the following questions.

a) Which project is related with this logo?

b) What is the aim of this project?

Activity 2

Match the following table suitably.

Protein required for treatment	Disease/Symptom
Interferon	Growth disorders
Insulin	Pain
Endorphin	Viral disease
Somatotropin	Diabetes

Activity 3

Observe the statement and answer the following questions.

"One of the future promises of genetic engineering is pharm animals"

a) How the animals are transform into pharm animals?

b) How medicines are extracted from the pharm animals?

Activity 4

Steps related with the production of insulin is given below. Complete the Stages suitably

(i) Isolation of plasmid.

(ii) Cutting of insulin gene.

(iii) .....

(iv) .....

(v) .....

(vi) Active insulin is produced from this.

Hints

- Plasmid with ligated insulin gene is inserted into the bacterial cell.
- Bacteria that multiply in the culture medium produce inactive insulin.
- Joining insulin gene with plasmid.

Activity 5

Which of the following statements are not related with DNA finger printing.

a) The technology of testing the arrangement of nucleotides is DNA profiling.

b) The scientist related with DNA fingerprinting is Gregor Mendel

c) Just like the difference in the fingerprint of each person, the arrangement of nucleotides in each person also differs.

d) The arrangement of nucleotides among close relatives are different.

Scoring indicators

Activity 1

a) Human Genome Project

b) The secrets of human genome were revealed through Human Genome Project.

Activity 2

Protein required for treatment	Disease/Symptom
Interferons	Viral diseases
Insulin	Diabetes
Endorphin	Pain
Somatotropin	Growth disorders

Activity 3

a) Genes responsible for the production of insulin and growth hormones required for humans are inserted into animals like cow, pig etc, transforming them into pharm animals.

b) Medicines can be extracted from the blood or milk of genetically modified animals.

Activity 4

(iii) Joining insulin gene with plasmid. (iv) Plasmid with ligated insulin gene is inserted in to bacterial cell. (v) Bacteria that multiply in the culture medium produce inactive insulin.

Activity 5

b) The scientist related with DNA fingerprinting is Gregor Mendel

d) The arrangement of nucleotides among close relatives are different.

8 The Paths Traversed by Life

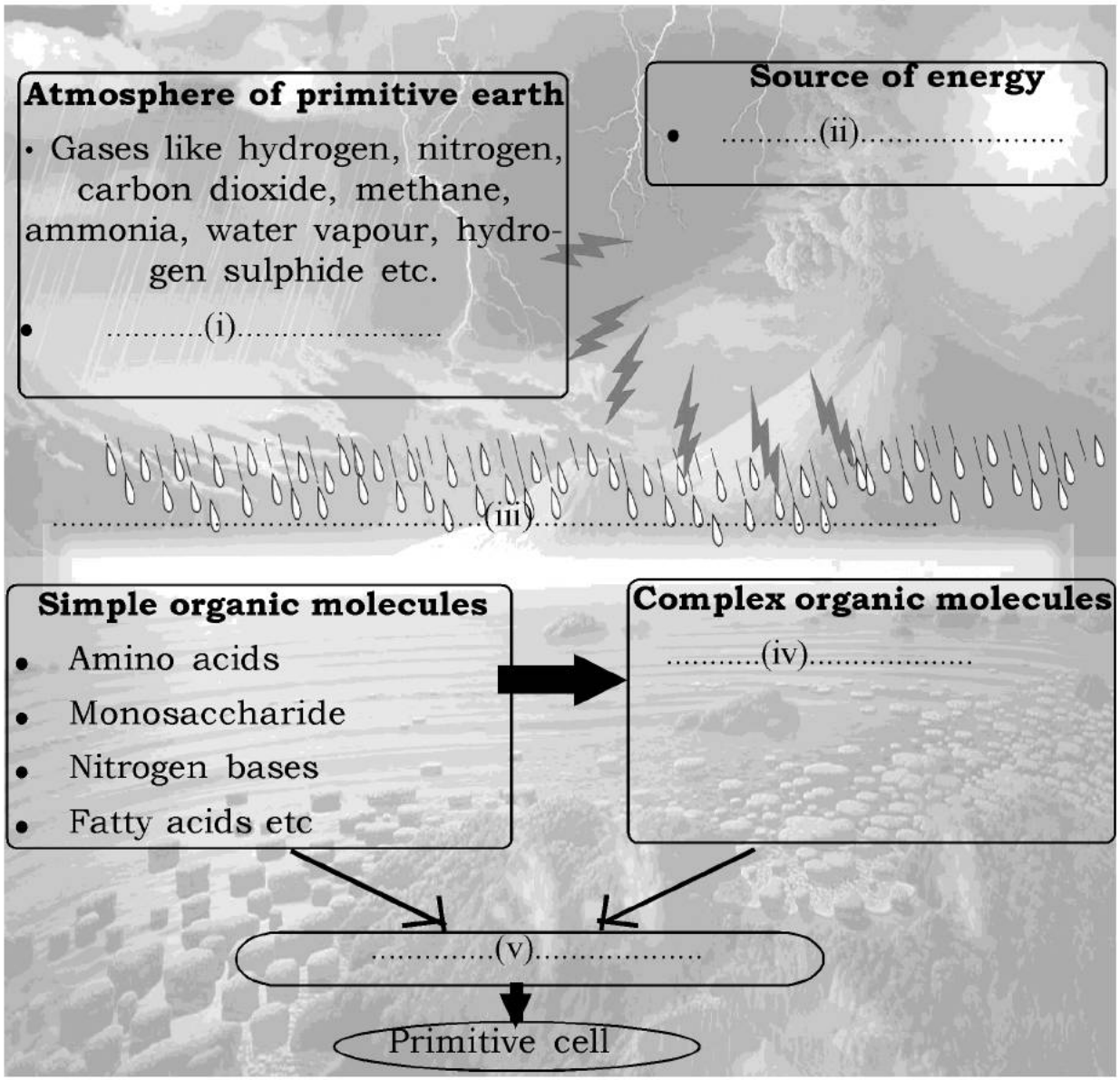
At a glance

- The more predominant theories, on the origin of life on earth - Chemical evolution theory and the Panspermia hypothesis.
- The Russian scientist A.I. Oparin (1924) and the British scientist J.B.S.Haldane (1929) are the proponents of Chemical evolution theory.
- Urey and Miller conducted their experiment by artificially recreating the atmosphere of primitive earth that contained methane, ammonia, hydrogen and water vapour.
- The characters developed during the life time of organisms are called acquired characters.
- Lamarck explained that acquired characters accumulate through generations and lead to the formation of new species.
- A logical scientific theory on evolution was first put forward by Charles Robert Darwin, an English naturalist on the basis of the studies conducted on finches in Galapagos Islands.
- Charles Robert Darwin presented his theory (The theory of Natural selection) in the renowned text *Origin of Species by Means of Natural Selection.*
- Mutation theory was formulated by a Dutch scientist, Hugo deVries.
- Paleontology, comparative morphology, physiology and modern molecular biology provide evidences to validate evolution.
- Humans, chimpanzee, gorilla, orangutan, gibbon and monkeys areincluded in the category Anthropoidea.
- Cercopithecoidea - The group of animals having small brain and long tail.

- Monkeys belong to Cercopithecoidea group.
- Hominoidea - The group of animals having developed brain and freely movable hands.
- Ardipithecus ramidus - The most primitive member of the human race.
- Homo neanderthalensis - Contemporary to modern man.
- Homo sapiens - Modern man.

Activity 1

Observe the illustration related to chemical evolution and answer the questions given below.



(a) Complete the illustration.

(b) Who are the proponents of this theory?

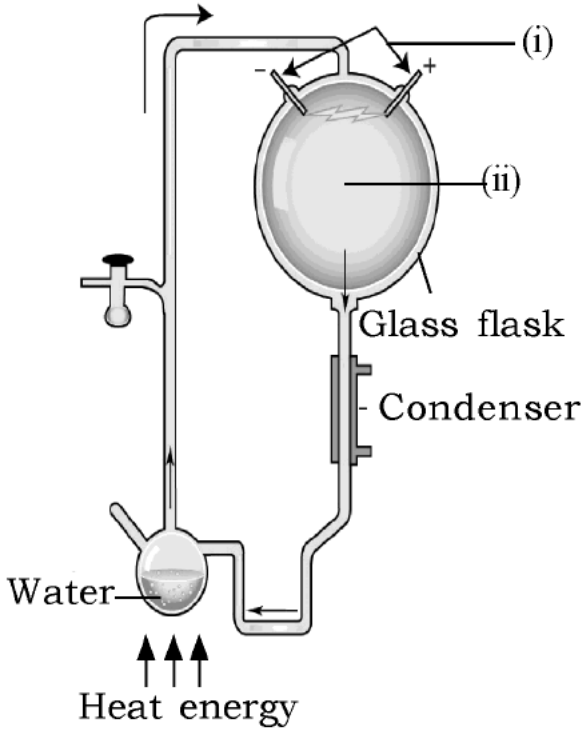
Activity 2

An experimental set up to prove chemical evolution theory is illustrated below. Observe the illustration and answer the questions given below.

(a) Complete the illustration.

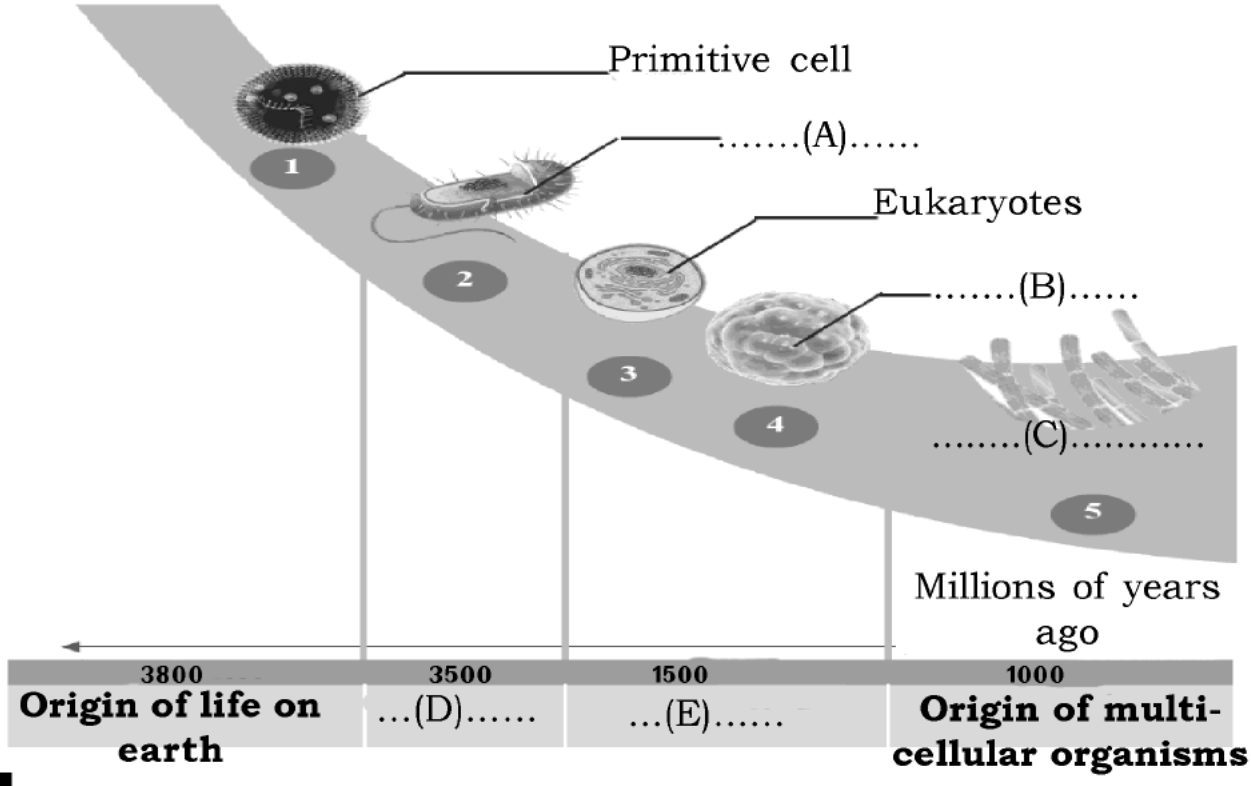
(b) Name the scientists who conducted this experiment?

(c) Name the organic molecules formed after this experiment.



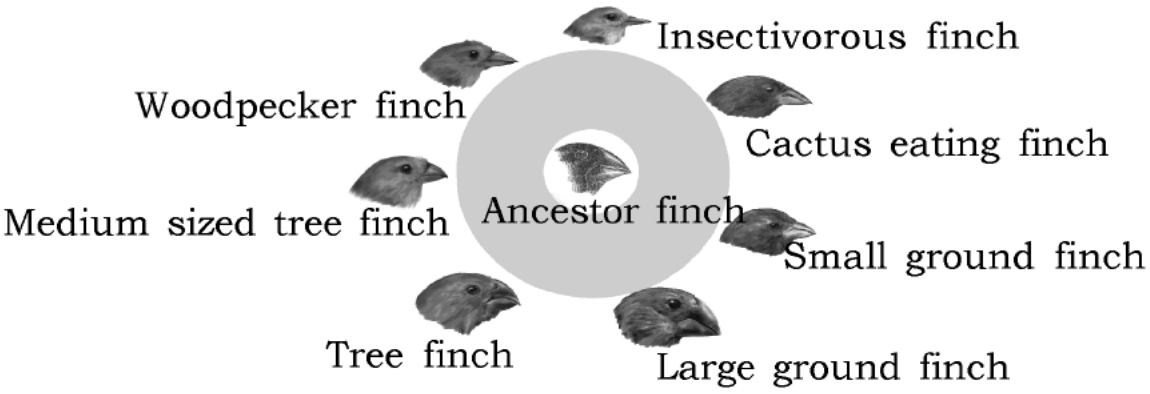
Activity 3

The major events related to the origin of life as illustrated in the geological time scale is given below. Arrange the major events related to the origin of life in the correct order.



Activity 4

Observe the illustration and answer the questions given below.



(a) Name the scientist who closely studied the peculiarity of beaks in finches?

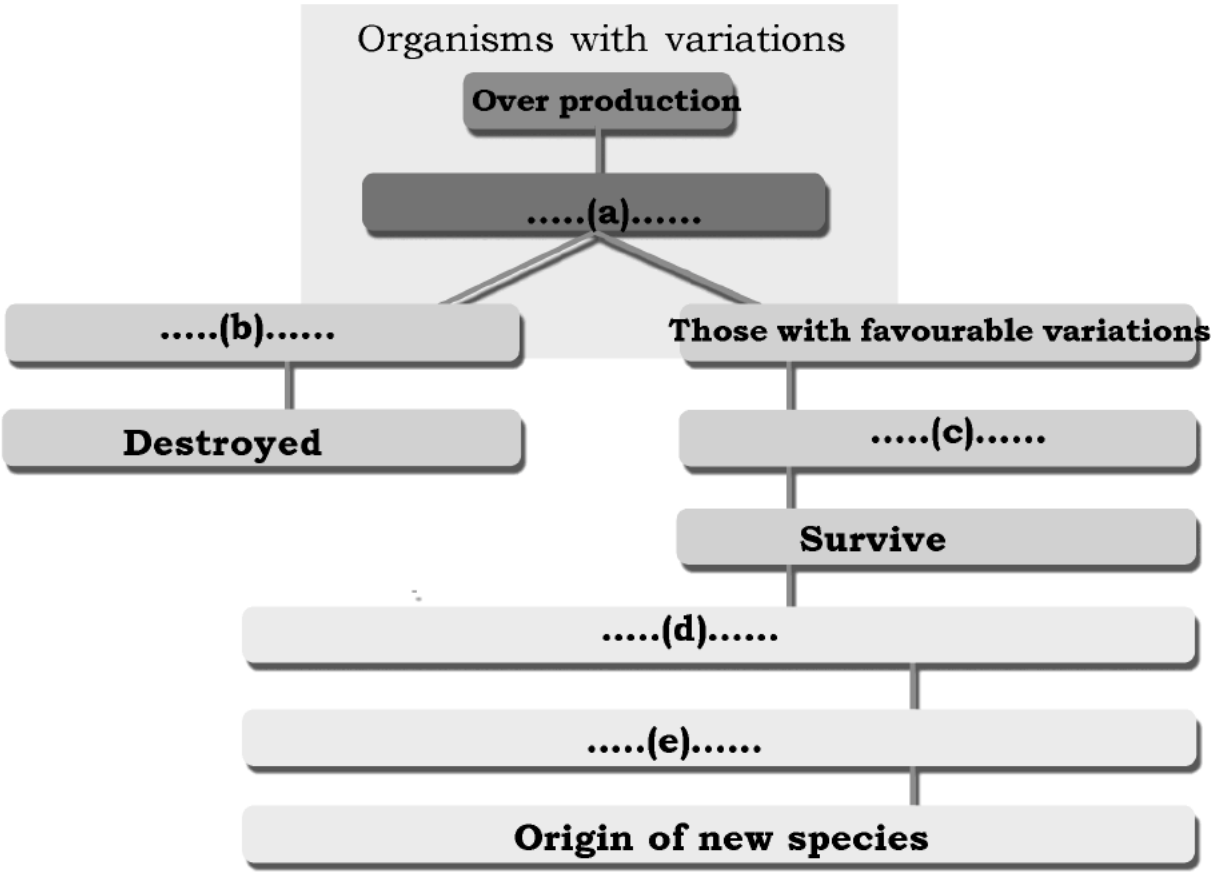
(b) In which island he conducted studies?

(c) Which peculiarity of the finches attracted him?

(b) How does the peculiarity of beaks help finches in their survival?

Activity 5

Complete the illustration showing the theory of Natural selection.



Scoring indicators

Activity 1

(a) (i) No free oxygen.

(ii) Thunder and lightning, Ultraviolet radiations, Volcanic eruptions.

(iii) Condensation of water vapour present in the atmosphere and the resulting incessant rain led to the formation of oceans.

(iv) Protein, Polysaccharide, Nucleotides, Lipids etc

(v) Nucleic acids, lipid layer.

(b) The Russian scientist A.I. Oparin (1924) and the British scientist J.B.S.Haldane (1929) are the proponents of this theory.

Activity 2

(a) (i) Electric energy (ii) Methane, ammonia, water vapour.

(b) Stanley Miller, Harold Urey

(c) Amino acids

Activity 3

(A) Prokaryotes (B) Colony of eukaryotes (C) Multicellular organisms (D) Origin of prokaryotes (E) Origin of eukaryotes

Activity 4

(a) Charles Darwin

(b) Galapagos Islands

(c) The differences in the beaks of these finches attracted Darwin.

(b) Insectivorous finches have small beaks and those that feed on cactus plants have long and sharp beaks. There were also woodpecker finches that used sharp beaks to pick small twigs for feeding on worms from the holes in tree trunks. The ground finches that feed on seeds with large beaks were also present.

Activity 5

(a) Struggle for existence

(b) Those with no favourable variations

(c) Natural selection

(d) Favourable variations are transferred to the next generation.

(e) Accumulation of variations inherited through generations.

UNIT TEST