VIDYAJYOTHI

(2019 - 2020)

BIOLOGY

(Support Material for Teaching & Learning)

CLASS X

District Institute of Education and Training (DIET)

Thiruvananthapuram

Vidyajyothi

Biology

(Support Material for Teaching & Learning)

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Message

Dear students

Kerala has made many strides in the field of education. The foundation of our success in this field is that we are able to attain academic excellence along with school excellence. Local authorities and people's committees are very supportive for the development of the school. Meaningful interventions by the Kerala Government and the Department of Public Instruction have become critical in this field. The role of teachers in organizing activities according to new perspectives on learning is not a trivial one. The use of ICT has enabled the collection and dissemination of information and thus facilitated learning. All of you are preparing for a very crucial exam. Systematic study is required to approach the exam with confidence and achieve high success. Everyone is here to help you. Vidyajyothi, the study materials prepared by the District Panchayat, Thiruvananthapuram and DIET Thiruvananthapuram will no doubt be an effective tool to ensure your greater success. An updated book which includes the revised lessons is now in your hands. Make use of it, the maximum. Wishing you all the best.

With love

V.K.Madhu

President, District Panchayath,
Thiruvananthapuram

Dear children

The report by NITI Aayog, which states that Kerala is the number one in Education in India is a source of great excitement for the education sector. The perspectives and activities based on secular democratic principles helped us achieve this aim. The General Education Rejuvenation Mission is another exemplary Kerala model. Many of the initiatives proposed by the new National Education Policy under the leadership of Dr. Kasturirangan have been implemented in Kerala. The fact that Kerala is on a par with the educational standard of many developed countries is a visible manifestation of the will power of the Kerala community. You have made many strides in education by self learning, following the guidelines suggested by your teachers who are research oriented in their approach. Now it's time for you to prepare for the public examination. You need not be afraid of exams. Consider your exam as an opportunity to apply the knowledge and skills you have acquired in the classrooms. Remember to take necessary preparations to face the exam well. The Vidyajyothi study materials prepared by the District Panchayat Thiruvananthapuram and DIET Thiruvananthapuram serves as a real guide for you. Make use of the study materials to the extent possible. Wish you all the best.

Wishing you all success

C. Manojkumar
Deputy Director of Education,
Thiruvananthapuram

T.V.Gopakumar
Principal, DIET
Thiruvananthapuram

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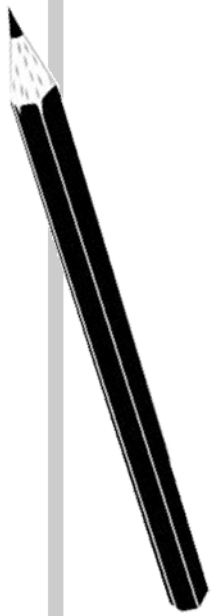


PREFACE

Dear friends

All the progress in the field of education in Kerala is the result of effective changes in the curriculum and activities and approaches undertaken and adopted in accordance with the ongoing changes in our modern world. Examples of these include the idea of organizing learning activities considering each child as a single unit, and awareness that there is always a social environment for learning. Similarly, Kerala has adopted a new humanitarian approach towards culture. The idea to value the cultural background of each student in the class and to provide a perspective that culture of each individual is lofty. These are assessed as stepping stones to development. So, we have taken the right and integrated approach encompassing the cultural diversity of each individual. There have been continuous effort in this sector to dismantle traditional notions of education and create a genuinely civic-minded generation. The District Panchayat, Thiruvananthapuram has implemented various exemplary models which are helpful for achieving this aim. The most important among these is the Vidyajyothi learning materials, prepared for six subjects, which are intended to increase the pass percentage of students in class 10 and help them to face the exams with more confidence. A lot of hard work is behind this venture. We express our sincere gratitude to the Honourable District Panchayat President V.K. Madhu, District Panchayat members, District Panchayat Secretary, Standing Committee Officers for their invaluable suggestions. We also thank the Principal, DIET Thiruvananthapuram, Faculty Members, Deputy Director of Education, Headmasters, Teachers, Teacher Organizations and PTA / SMC members for their wholehearted cooperation.

With love

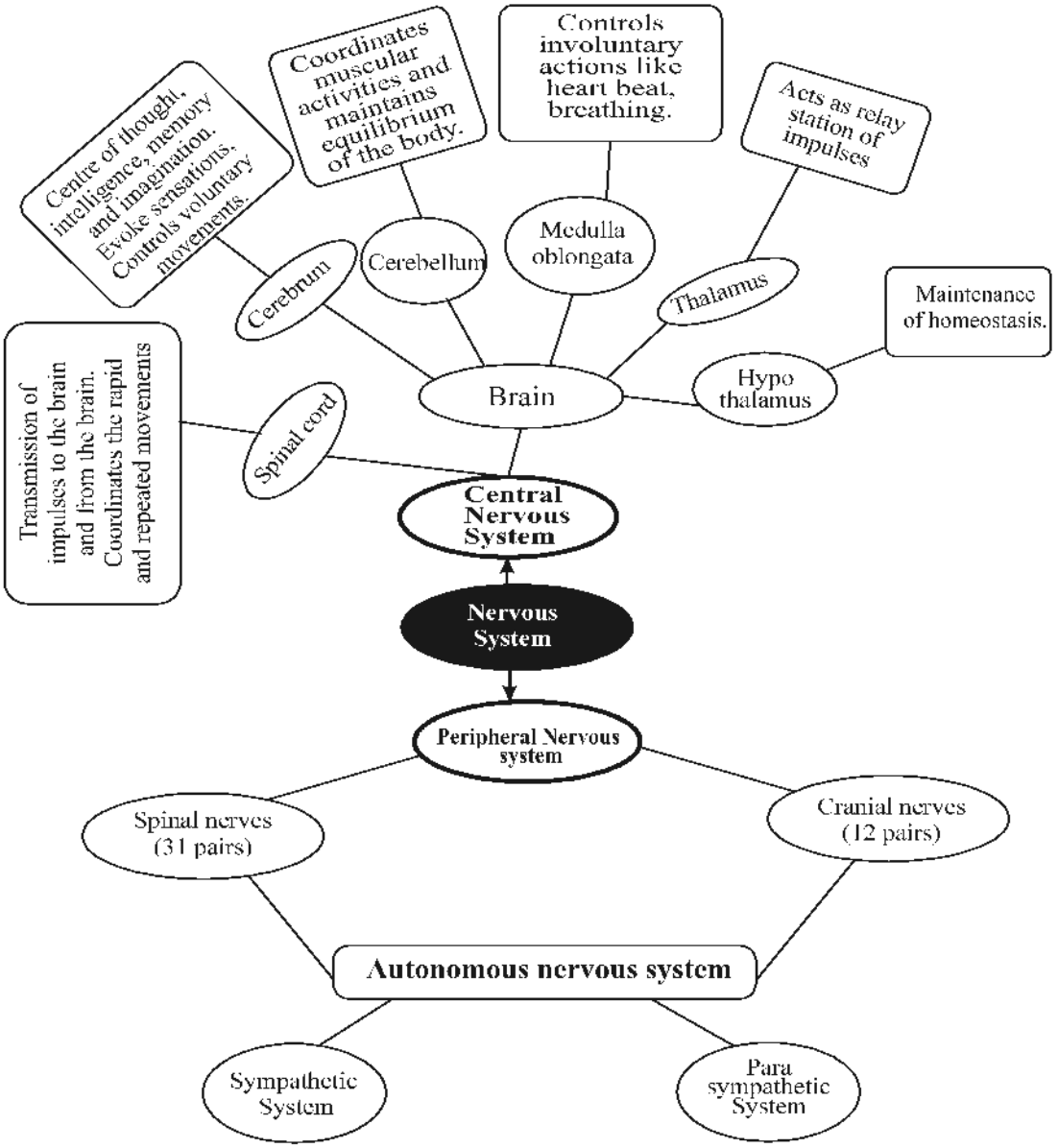
V. Renjith

Standing Committee Chairman –
Health and Education, District Panchayath,
Thiruvananthapuram

CONTENTS

Unit 1

SENSATIONS AND RESPONSES



Nervous System
- Concept map

Concepts

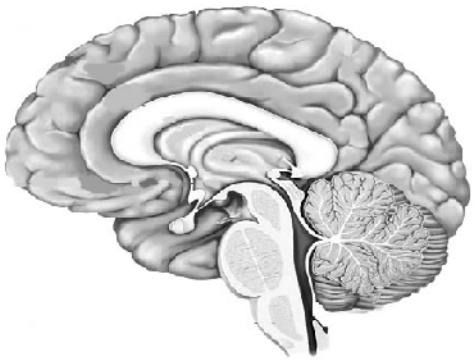
- Stimulus - Internal, External.
- Nervous system-Central nervous system, peripheral nervous system.
- Generation of impulses - transmission of impulses.
- Nerves-sensory nerve, motor nerve, mixed nerve.
- Brain-Structure, function.
- Spinal cord - structure, function.
- Reflex actions.
- Sympathetic system.
- Parasympathetic system.
- Diseases affecting the nervous system - Alzheimers, Parkinsons, Epilepsy.

Learning outcome

Recognizes and explains the major parts and functions of the central nervous system.

Activity

Redraw the figure.



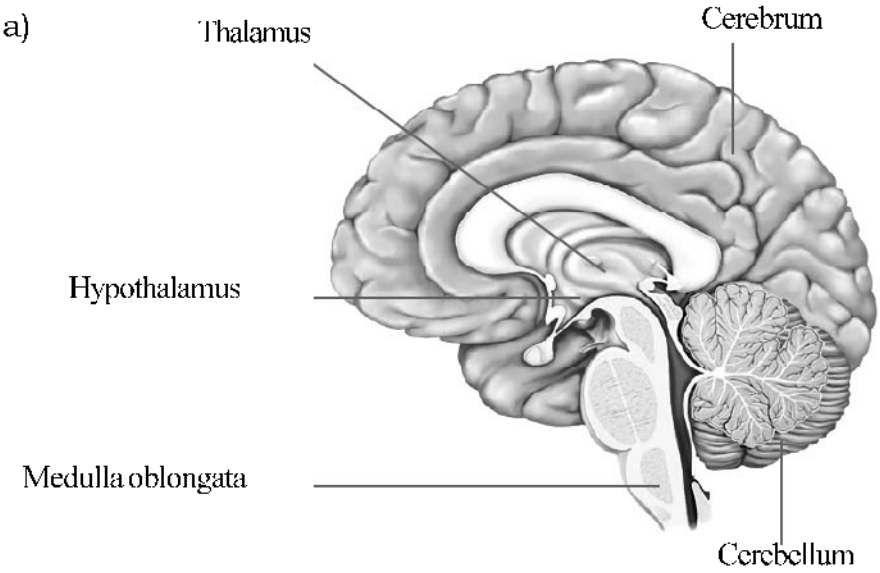
Thalamus, Maintenance of homeostasis, Controls heart beat, Medulla oblongata, Cerebellum, Evokes sensations, Hypothalamus, Coordinates muscular activities, Cerebrum, Relay station of impulses.

a. Identify the terms related to the parts of brain from the box and label them.

b. The parts of brain and their functions are given in the box, Use them and make suitable pairs.

Scoring indicator

a)



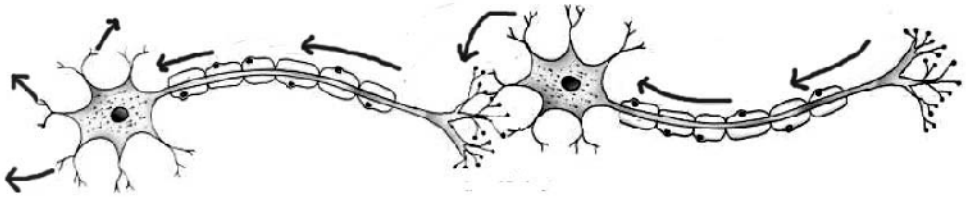
b. Cerebrum - Evokes sensations.
Cerebellum - Coordinates muscular activities.
Medulla oblongata - Controls heart beat.
Thalamus - Relay station of impulses.
Hypothalamus - Maintenance of homeostasis.

Learning outcome

Analyses the concept of synapse and the transmission of impulses through neurons and presents it.

Activity

The illustration by Syama, showing the transmission of impulse through synapse is given below.



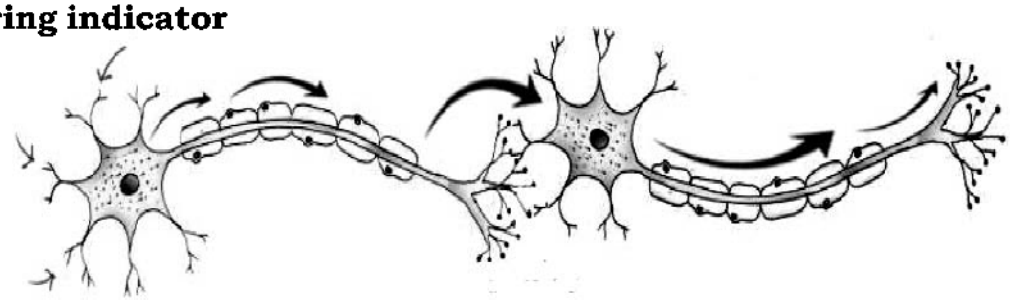
a. Redraw the given figure and correct the mistakes, if any.

b. Label synapse and synaptic knob.

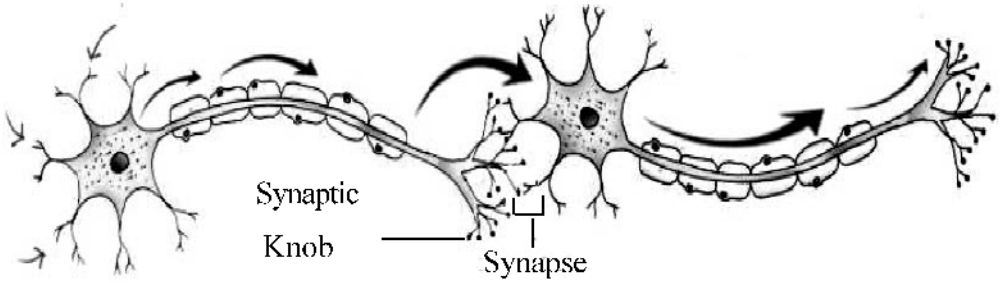
c. Prepare the flow chart showing the transmission of impulse through synapse.

Scoring indicator

a.



b.



c. Stimulus → Dendrite → Dendron → Cell body → Axon → Axonite → Synaptic knob → Synapse → Dendrite of adjacent neuron.

Learning outcome

Explains different types of diseases affecting the nervous system.

Activity

The causes of two diseases related with nervous system are given below.

A	B
Accumulation of an insoluble protein in the neural tissues of the brain.	Destruction of specialised ganglions in the brain.

a. Identify the diseases indicating A & B.

b. Write two symptoms of each disease.

Scoring indicator

a. A -Alzheimer's

B- Parkinsons

b. Alzheimer's-loss of memory, inability to recognise friends and

relatives, inability to do routine works. (any two)

Parkinsons - Loss of body balance, irregular movements of muscles, shivering of the body, profuse salivation. (any two)

Learning outcome

Analyses the concept of synapse and the transmission of impulses through neurons and presents it.

Activity

The statements related to the generation and transmission of nerve impulses are given below. Arrange them in their correct sequence.

a) The difference in the ionic charges in the plasma membrane stimulates the adjacent part and the part where impulse generated regains the original state.

b) Negative charge exists inside the plasma membrane and positive charge on the outside.

c) The momentary charge difference in the axon membrane proceeds transmission of impulses.

d) When stimulated, the ionic equilibrium in the particular part of the membrane changes and the outer surface becomes negatively charged and the inner surface becomes positively charged.

Scoring indicator

b, d, a, c

Learning outcome

Recognizes the actions of sympathetic and parasympathetic systems and explains their functions.

Activity

The activities related to the autonomous nervous systems are given below. Prepare a table using these statements and give appropriate tittle.

a. Pupil in the eye dilates.

b. Production of hormone increases.

c. Glycogen is converted to glucose.

d. Peristalsis in the intestine slows down.

e. Heart beat becomes normal.

f. Urinary bladder contracts.

g. Production of saliva increases.

h. Trachea dilates.

i. Peristalsis in the intestine becomes normal.

j. Gastric ativities slow down.

.....	.....

Scoring indicator

Sympathetic system	Parasympathetic system
a, b, c, d, h, j	e, f, g, i

ADDITIONAL QUESTIONS

1. Identify the word pair relationship and fill the missing word. Mention the relationship between word pairs.

   a. Cerebellum : Maintains equilibrium :: Hypothalamus : .....

   b. Spinal cord : Vertebral column :: Brain : .....

   c. Acts as relay station of impulses : Thalamus

      Controls voluntary movements : .....

   d. Nerve : Schwann cell :: Brain : .....

2. Symptoms of diseases affecting nervous system of three patients are given below. Analyse the cases, identify the diseases and write their causes.

Patient 1
Age 70
Symptoms
- Loss of memory
- Inability to do routine works

Disease.....(A)...
Causes .....(B).....

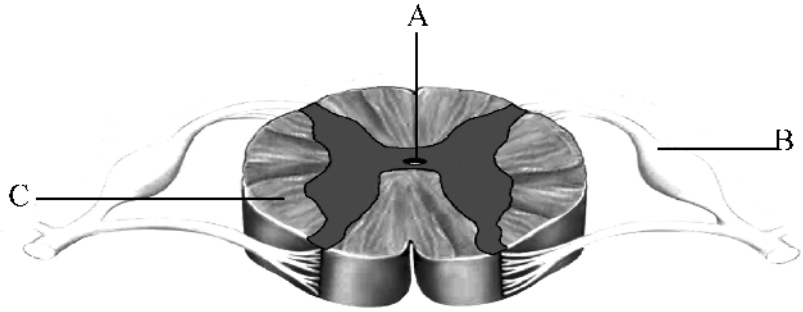
Patient 2
Age 47
Symptoms
- Shivering of the body
- Profuse salivation

Disease ...(C).....
Causes.....(D).....

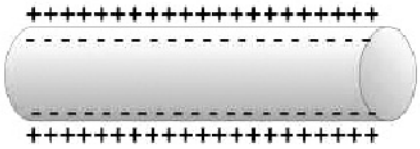
Patient 3
Age 17
Symptoms
- Continuous muscular contraction.
- Frothy discharge from the mouth.
- Unconsciousness

Disease ...(E).....
Causes ...(F).....

3. Sudden withdrawal of hand while touching a hot object.
   a) What is the process here?
   b) Which part of the nervous system controls this action?
   c) Name the pathway of impulse in this action. Write the parts of this pathway in sequential order.
4. Select the correct answer.
   A) Select the part which is not involved in the reflex arc.
   a) Receptors b) Dorsal root c) Ventral root d) Meninges
   B) Relay station of impulses in the brain.
   a) Hypothalamus b) Thalamus c) Cerebrum d) Cerebellum
5. Analyse the statements given below and choose the correct one.
   a) Cerebrum is the centre of thought and intelligence.
   b) Hypothalamus plays a major role in maintenance of homeostasis.
   c) Cerebellum controls heart beat.
   d) Thalamus controls respiration
   (i)both (a) and (b) are correct (ii) both (c) and (d) are correct
   (iii) both (a) and (c) are correct (iv) both (b) and (d) are correct
6. Observe the diagram of spinal cord and answer the following questions.



   a) Identify the parts labelled as A ,B and C.
   b) Name the fluid present in the part indicated as A.
   c) How is spinal cord protected?
7. In reflex action which part generates quick responses according to the sensory impulses? Where is this part located?
8. Observe the illustration showing the charge distribution on either side of the plasma membrane of the axon.

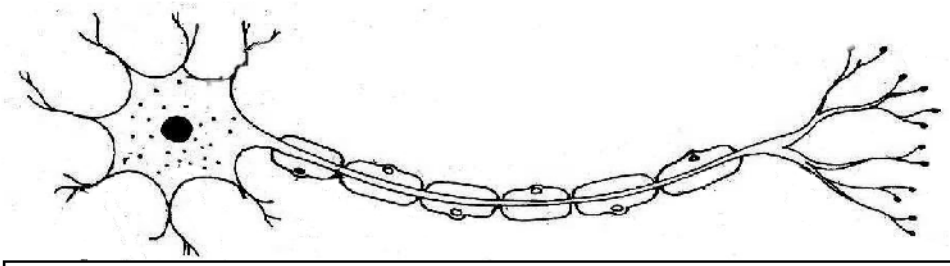


a) What is the reason for the difference in charge distribution on either side of the plasma membrane .

b) Make an illustration showing the charge difference in the plasma membrane of axon when it gets stimulated.

c) How do these charge differences get transmitted through the axon as impulses.

9. Observe the figure of neuron and answer the questions given below.



Dendrite, Axon, Myelin sheath, Axonite, Cerebrum, Central canal, Synaptic knob, Thalamus.

a) Copy the figure

b) Choose suitable words given in the box and label the parts of neuron.

c) Prepare a table showing the parts of neuron and their function.

d) How is myelin sheath related to grey matter and white matter?

10. Identify the word pair relationship and fill the missing word. Mention the relation between word pairs.

a) Motor nerves : Carries impulses from spinal cord to various parts of the body.

Sensory nerve : .....

b) Cortex : Grey matter.

..... : White matter.

c) Cerebrum : Thought.

Cerebellum:.....

d) Production of dopamine decreases: Parkinsons disease

Irregular flow of electrical charges in the brain: .....

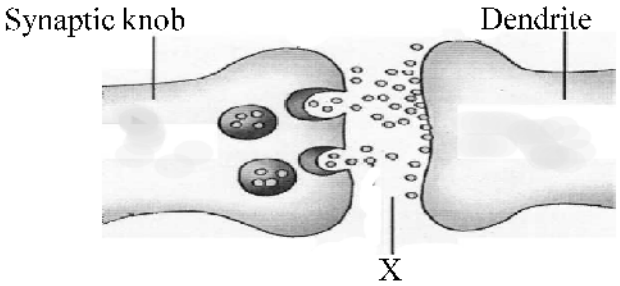
e) Dendrite : Receive impulses

..... : Carries impulses from the cell body to outside.

11. Identify the odd one. Mention the common feature of others:-

a) Axon, Dendron, Dopamine, Dendrite,

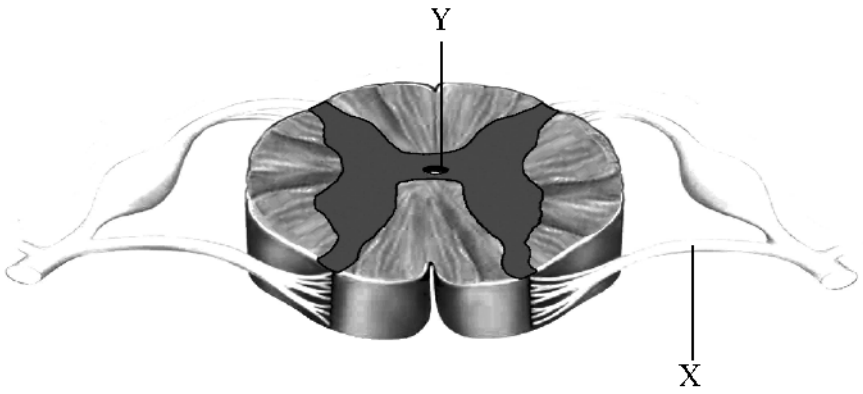
12. Observe the illustration and answer the questions given below.



a) Identify the part labelled as X.

b) How are impulses transmitted through the part labelled as X?

13. Observe the diagram and answer the questions given below.



a) Identify the diagram.

b) Name the parts labelled as X and Y in the diagram.

c) From where is the fluid in ' Y ' formed? What are the functions of this fluid?

14. A stray dog is chasing Shankar. This situation makes some changes in his bodily activities.Write the changes which happen in the following organs:-

a) Lungs	b) Heart	c) Eye
d) Urinary bladder	e) Liver	f) Stomach

15. The fluid seen in the ventricles of the brain is formed from blood and is reabsorbed into the blood.
    a) Do you agree with this statement ? Why?
    b) Which fluid is this? What are its functions?
    c) In which parts of the nervous system is this fluid present?
16. The functions of cerebrum, cerebellum and medulla oblongata are given below. Analyse them and complete the table.
    a. Co-ordinates muscular activities.
    b. Centre of intelligence.
    c. Maintains equilibrium of the body.
    d. Controls breathing.
    e. Controls heart beat.
    f. Evokes sensations.

Cerebellum (A)	Cerebrum(B)	Medulla oblongata (C)

17. Choose the correct words related with cerebrum from those given in the box.

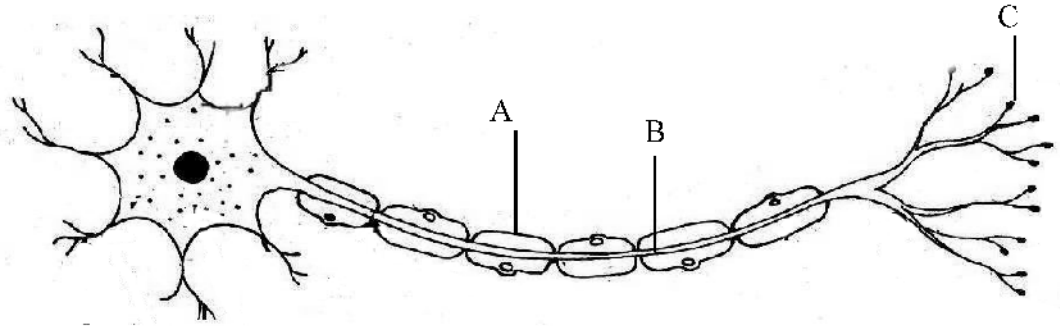
* Hearing *Heart beat * Homeostasis *Taste * Relay station of impulses * Thought *Imagination * Coordination of muscular activities * Memory *Evokes sensations. *Controls voluntary movements

18. Rearrange the following statements suitably in the given table.
    a. Grey matter is seen outside and white matter is seen inside.
    b. Coordinates rapid and repeated movements during walking, running, etc .
    c. Centre of thought and intelligence.
    d. White matter is seen outside and grey matter is seen inside.

Cerebrum	Spinal cord

19. The spinal cord is connected with different parts of the body through spinal nerves. Evaluate this statement.

20. Redraw the given diagram and answer the following questions:-

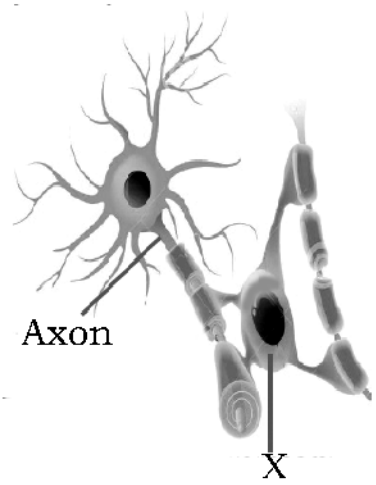


a. Name the parts labelled as A, B and C.

b. What is the function of the part labelled as A.

c. How does the part labelled as C help in the transmission of impulses?

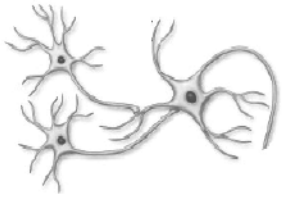
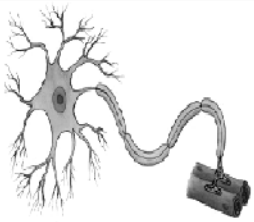
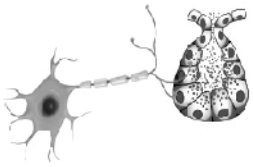
21. Observe the illustration and answer the questions given below.



(a) Identify the part indicated as X.

(b) In which parts of nervous system the part indicated as X is seen?

22. Arrange the data of column B inaccordance with the pictures given in column A.

A	B
1 	The junction between a neuron and a glandular cell.
2 	The junction between two neurons.
3 	The junction between a neuron and a muscle cell.

Scoring indicators

1. a. Maintenance of homeostasis, parts of brain and their functions.
   b. Skull, parts of nervous system and their protection.
   c. Cerebrum, parts of brain and its function.
   d. Oligodendrocyte, Formation of myelin sheath
2. A - Alzheimer's.
   B - Destruction of neurons due to the accumulation of an insoluble protein in the neural tissues of the brain.
   C - Parkinsons.
   D - Destruction of specialised ganglions in the brain. Reduces the production of dopamine a neurotransmitter .
   E - Epilepsy.
   F - Continuous and irregular flow of electric charges in the brain.

3. a. Reflex action.

   b. Spinal cord.

   c. Reflex arc.

   parts- a. receptor

   b. sensory nerve.

   c. interneuron.

   d. motor nerve.

   e. related muscle.

4. A - d

   B - b

5. (i) both a and b are correct

6. a. A- Central canal.

   B- Dorsal root.

   C- White matter.

   b. Cerebrospinal fluid.

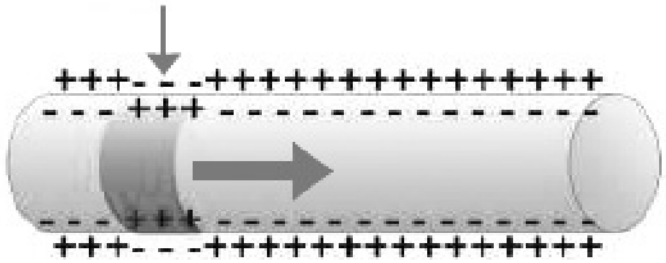
   c. inside the vertebral column, covered with meninges.

7. Interneuron

   In the spinal cord.

8. a. The difference in distribution of ions on either side of the plasma membrane makes outer side positive and inner side negative.

   b.



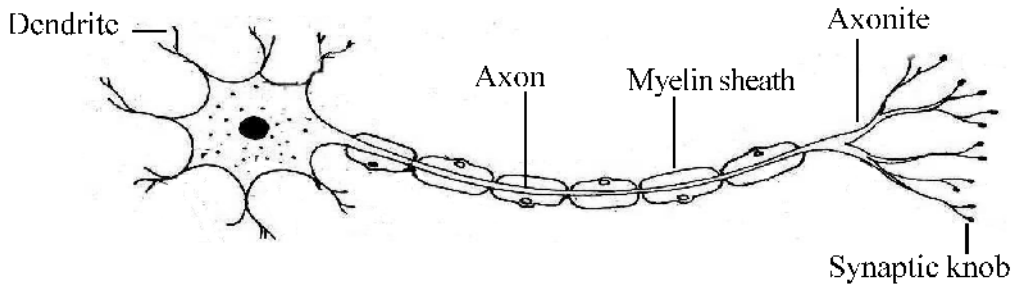
   c. When stimulated, inner side of plasma membrane becomes positively charged and outer side becomes negatively charged.

   - it stimulates the adjacent parts.

   -similar change occurs there.

   -this process continues.

9. a. b.



c.

Parts of neuron	Functions
Dendrite	Receive impulses.
Axon	Carries impulses from the cell body to outside
Axonite	Carries impulses to the synaptic knob.
Myelin sheath	Provides nutrients and oxygen, accelerate impulses,acts as an electric insulator, protects the axon.
Synaptic knob	Secrete neurotransmitter.

d. The part where myelinated nerve fibres are present is white in colour - white matter.

The part where non myelinated nerve fibres are present is grey in colour - grey matter.

10. a. - Carries impulses from various parts of the body to the brain and spinal cord.Nerves and their functions.

b. Medulla, Structural peculiarity of cerebrum.

c. Maintains equilibrium of the body/ coordinates muscular activities, parts of brain and their functions.

d. Epilepsy - diseases affecting the nervous system and their causes.

e. Axon - parts of neuron and their functions.

11. a. Dopamine - others are parts of neuron

12. a. Synapse / Synaptic cleft.

b. Electrical impulse →Reach the synaptic knob → Secrete neurotransmitters →Stimulate the adjacent dendrite →Generates new electric impulses.

13. a. Cross section of the spinal cord.

b. X - ventral root.

Y - central canal.

c. - from the blood.

-provides oxygen ad nutrients.

- protects the spinal cord.

14. a. trachea dilates.

b. heart beat increases.

c. pupil in the eye dilates.

d. retains normal state.

e. glycogen is converted to glucose.

f . Gastric activities slow down.

15. a. Yes, agree with the statement.

-formed from the blood in the brain

-reabsorbs into the blood.

b. Cerebro spinal fluid-

- provides oxygen and nutrients to the tissues of brain.

- regulates pressure inside the brain.

- protects the brain from injuries.

c. In the ventricles of brain,central canal of the spinal cord,between the membranes of meninges.

16. A - a,c

B - b,f

C - d,e

17. Hearing, thought, imagination, memory, taste, evoke sensations, controls voluntary movements.

18. Cerebrum - a,c

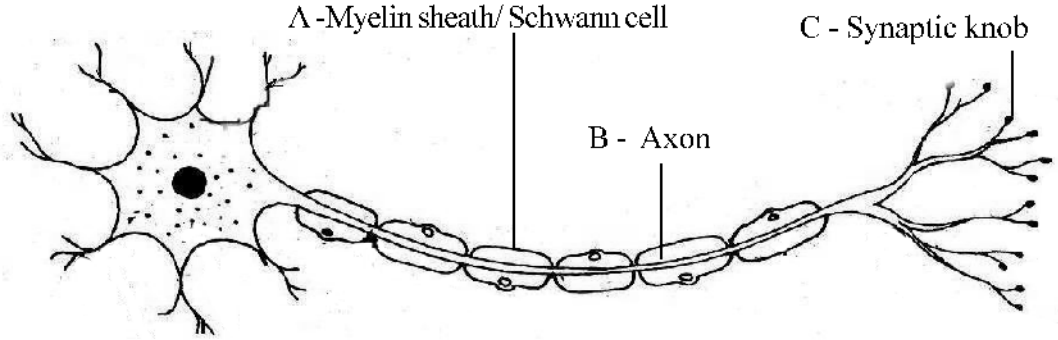
Spinal cord - b,d

19. The statement is true.

-spinal nerves - 31 pairs.

- each spinal nerve is connected with the spinal cord through dorsal root and ventral root.
- sensory impulses reach the spinal cord through the dorsal root.
- motor impulses go out of the spinal cord through the ventral root.

20) a.



b. A - Myelin sheath accelerates impulses ; acts as an electric insulator; protects the axon; provides nutrients and oxygen to the axon.

c. Secretes neurotransmitter-, it stimulates the adjacent dendrite and new electric impulses are formed.

21. (a) Oligodendrocytes.

(b) Brain and Spinal cord

22. 1. The junction between two neurons.

2. The junction between a neuron and a muscle cell.

3. The junction between a neuron and a glandular cell.

UNIT TEST

1. Sensations and Responses

Time : 40 Mts
Scors : 20

Answer all questions from 1 to 3. Each question carries 1 score (3 × 1 = 3 Score)

1. Identify the word pair relation and fill the missing word. Mention the relation between the pairs.

   Maintenance of homeostasis: Hypothalamus

   Maintains equilibrium of the body:.....

2. Identify the odd one, mention the common feature of others.

   Cerebrum, cerebellum, central canal, medulla oblongata

3. Examine the statements given below and rewrite if there is any mistakes.

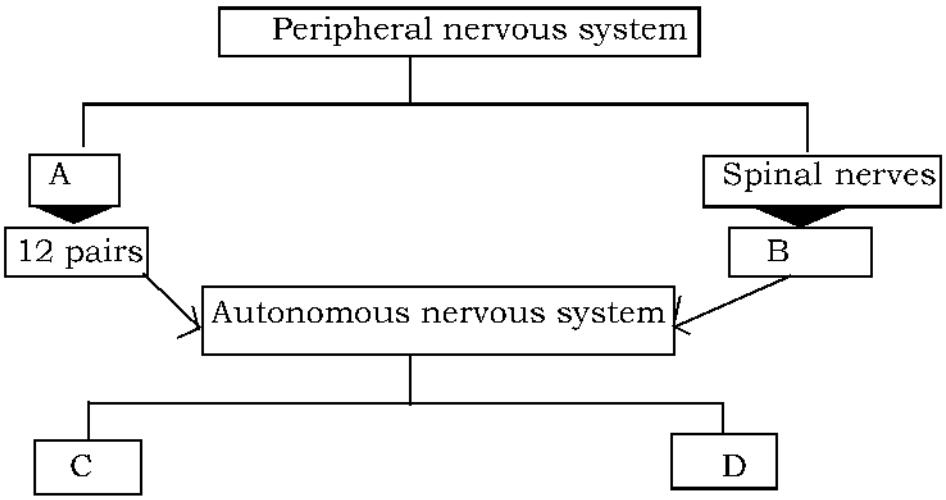
   a. The blinking of our eyes when light suddenly falls on it is a spinal reflex.

   b. The part where myelinated neurons are present in abundance is the grey matter.

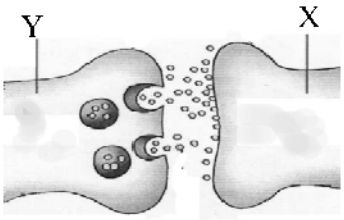
   c. The spinal cord coordinates the rapid and repeated movements during walking , running etc.

Answer any four questions from 4 to 8 . Each question carries 2 score (4 × 2 = 8 Score)

4. The given illustration shows the classification of a part of the nervous system. Complete the illustration suitably.



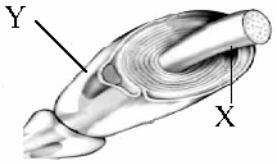
5. Observe the illustration and answer the questions given below.



a. Identify the illustration.
b. Name the parts labeled as X and Y
c. Which is the chemical secreted here?

6) Observe the figure and answer the questions given below

.



a. Identify the parts labeled as X and Y.
b.How is the part labeled as Y formed?

7. Central nervous system is covered and protected by a layer of membranes.
a. Name the membrane.
b. Which is the fluid present in between the layers of the membrane?
c. What are the functions of this fluid?

8. Suppose you are selected to present a topic on Alzheimer's disease in a seminar. What facts would you present in the seminar?

Answer any three questions from 9 to 12 . Each question carries 3 score (3 × 3 =9 Score)

9. The facts related with reflex action are given in the box. Prepare a flow chart using these facts.

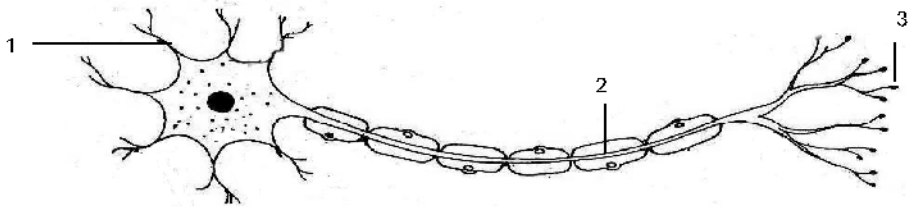
Motor nerve, Generate quick responses, Receptor, Related muscle , Interneuron, Sensory nerve, Generate impulses, Carries information from the spinal cord to the muscles in the hand, Carries impulses to the spinal cord.

10. a. When frightened which part of the nervous system gets stimulated?
b. How does this system act in the following organs
(i) Liver (ii) Heart
c. Name the organ system which helps to prolong the bodily activities stimulated by the nervous system.

11. Arrange column B and C in accordance with the data in column A

A	B	C
(i) Plays a major role in the maintenance of homeostasis.	(a) Cerebrum	(1) Seen behind the cerebrum as two flaps.
(ii) Maintain equilibrium of the body.	(b) Medulla oblongata	(2) The largest part of the brain.
(iii) Evokes sensations.	(c) Hypothalamus	(3)The rod shaped part seen below the cerebrum.
	(d) Cerebellum	(4) Situated just below the thalamus.

12 Redraw the figure and answer the questions.



a. Name the parts indicated as 1 and 3

b. Which is the part indicated as 2 and what is its function?

ANSWER KEY

Qn.No.	Scoring indicators	Score
1	Cerebellum, part of brain and function.	1
2	Central canal. Others are parts of brain.	1
3	(a) cerebral reflex.	1
	(b) white matter.	
4	(A) Cranial nerves.	½
	(B) 31 pairs	½
	(C) Sympathetic system	½
	(D) Parasympathetic system	½
5	(a) synapse	½
	(b) Y- synaptic knob .	½
	X- dendrite.	½
	(c) acetyl choline/neurotransmitter	½
6	(a) X - axon.	½
	Y-myelin sheath.	½
	(b) Schwann cells repeatedly encircle the axon	1
7	(a) Meninges	½
	(b) Cerebro spinal fluid.	½
	(c) Provides oxygen and nutrients to the tissues of brain/regulate pressure in the brain, protect the brain from injuries.	1
8	Causes - Accumulation of an insoluble protein in the neural tissues of the brain. Neurons get destroyed.	1
	Symptoms- Loss of memory, inability to recognize friends and relatives, inability to do routine works.	1
9	Receptor- generate impulses → Sensory neuron-carries impulses to the spinal cord → Inter neuron-connects the sensory neuron and the motor neuron, generate quick responses according to the sensory impulses → Motor nerve – carries the information from spinal cord to related muscles → Related muscle–withdraws the hand by the action of the muscles.	3
10	a) sympathetic system/ autonomous nervous system	½
	b) (i) Liver- convert glycogen to glucose	2
	(ii) Heart- increases heart beat	
	c.Endocrine system	½
11	(i) - c - 4	1
	(ii) - d - 1	1
	(iii) - a - 2	1
12	a. 1 - dendron.	½
	3 - synaptic knob.	½
	b. 2 - axon	
	Carries impulses from the cell body to outside.	2

Unit 2

WINDOWS OF KNOWLEDGE

Concepts

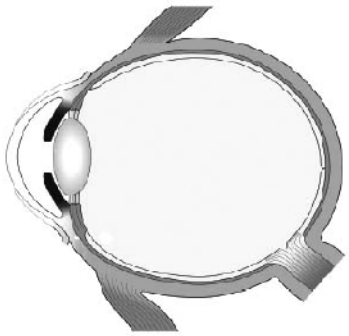
- Sense organs of human being.
- Protective measures of eye.
- Structure of the eye.
- Photo receptors in the eye and its functions.
- Sense of vision.
- Food habits and health of the eye.
- Eye-defects and diseases.
- Sense of hearing.
- Structure of the ear.
- Ear and body balancing.
- Sense of taste.
- Sense of smell.
- Sense through skin.
- Various receptors and sense organs of certain organisms.

Learning Outcomes

Explains the structure of sense organs of human beings.

Activity

Copy the figure. Identify the parts, according to the hints and label them.



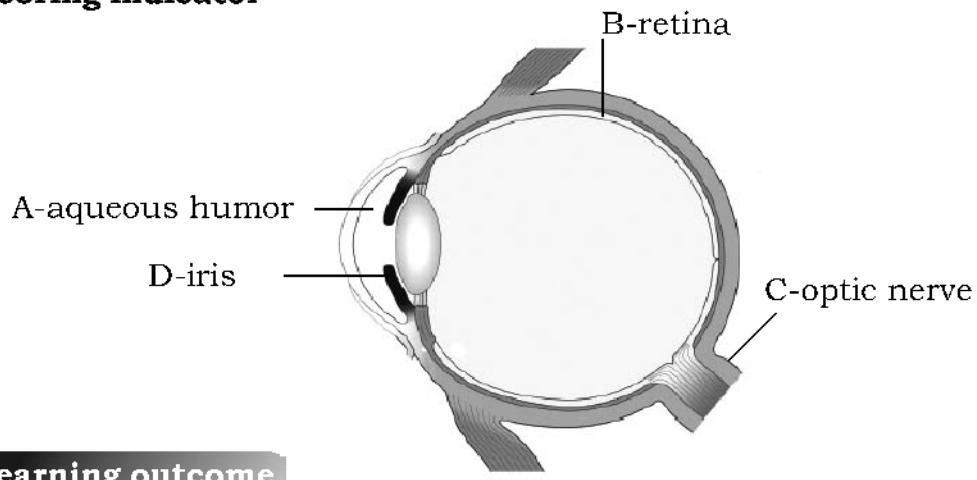
A - Fluid that nourishes the tissues of the eye.

B - The layer which has photoreceptors.

C - Transmits impulses from photoreceptors to the visual centre of the brain.

D - Part of the choroid seen behind the cornea.

Scoring indicator



Learning outcome

Describes various stimuli we feel through the skin.

Activity

Skin,the largest sense organ of our body contains various receptors to receive stimuli.

a) Do you agree with this statement?

b) State the response.

Scoring indicators

a) I agree.

b) Skin is the largest sense organ of our body. It covers the whole body. Various receptors are present in the skin. The stimuli like touch,cold,pressure,temperature,pain etc. are received by the skin. Each stimulus has its own receptor. More receptors are present at the tip of the fingers,cheek etc, to receive impulses like touch,temperature, cold etc.

Learning outcome

Explains the process of hearing.

Activity

The flow chart related to hearing is given below. Observe it and answer the following questions:-

Auditory canal → **A** → Malleus → Incus → **B** → Oval window → **C** → Impulses → Auditory nerve → **D**

a) Fill in the blanks A,B,C, and D

b) How does the vibration of tympanum reach the cochlea?

c) How does the sense of hearing effected by the formation of impulses?

Scoring indicators

a) A- tympanum B - stapes C - cochlea D- cerebrum

b) The vibration of the tympanum is transmitted to the ear ossicles, which causes the vibration of the membrane in the oval window. This vibration causes the movement of fluid inside the cochlea.

c) As a result of the movement of fluid inside the cochlea,the sensory hair cells of the organ of corti of the cochlea are stimulated and impulses are generated. These impulses reach the cerebrum through the auditory nerve and hearing is effected.

Learning outcome

Prepares notes and presents the various defects and diseases of the eye.

Activity

Some indicators of eye defects are given below:-

X	Y
• causes due to the deficiency of vitamin • low vision in dim light	• lens become opaque • gradual loss of vision

A) Which are the defects indicated by X and Y?

B) How can we rectify these defects?

Scoring indicators

A) X - Night blindness.

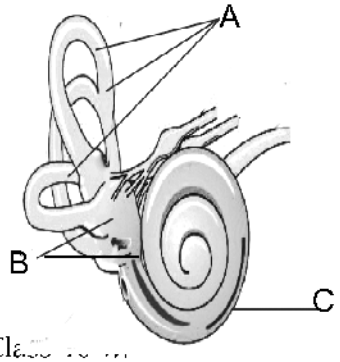
Y - Cataract.

B) Night Blindness - Eat food containing vitamin A.

Cataract – Replace the lens through surgery.

ADDITIONAL QUESTIONS

1. Identify the odd one. Mention the common feature of others.
   a) Oval window, Endolymph, Cochlea, Papilla.
   b) Malleus, Eustachian tube, Perilymph, Cornea.
2. Identify the photoreceptors from the following:-
   a) hair cells, papillae b) rod cells, cone cells
   c) chemoreceptors, papillae d) olfactory receptors, hair cells
3. Rectify the mistake and rearrange the following flowchart:-
   Light → cornea → vitreous humor → lens → pupil → aqueous humor → impulse → retina
4. Observe the figure and answer the questions given below :-



a) Identify the figure.

b) Identify the parts indicated as A,B and C.

c) What is the function of A and B?

5. "We can't recognize the smell of an object easily when we have common cold" It is the response of Manu in a class discussion related to the topic "olfactory receptors". Give a scientific explanation to it.

6. Tabulate the following statements suitably

(1) Ciliary muscles relax.

(2) Curvature of lens decreases.

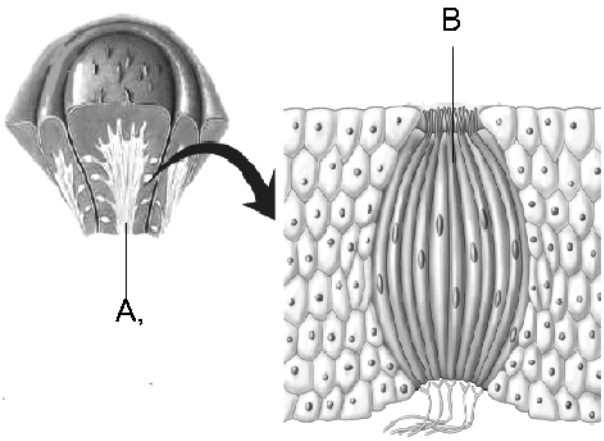
(3) Focal length decreases.

(4) Ligaments relax.

While viewing distant objects.	While viewing near objects.

7. Heavy blow to the ear affects hearing. What is your opinion about this statement ?

8. Observe the figure related to the receptors of tongue and answer the questions given below:-



(i) Identify A & B.

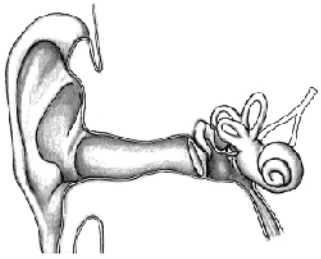
(ii) Mention the function of B.

9. Identify the word pair relationship and fill the missing word. Mention the relation between the pairs.

   Rod cells : Rhodopsin

   Cone cells: _____

10. Redraw the diagram showing the structure of the ear, and label the following parts.

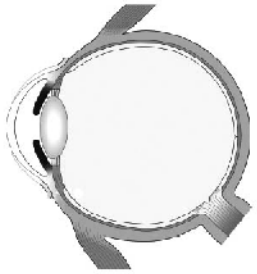


   a) Smallest bone in the middle ear.

   b) The tube which connects middle ear and pharynx.

   c) The membrane which separates middle ear and external ear.

11. Redraw the diagram of eye and label the parts based on the indicators given below.

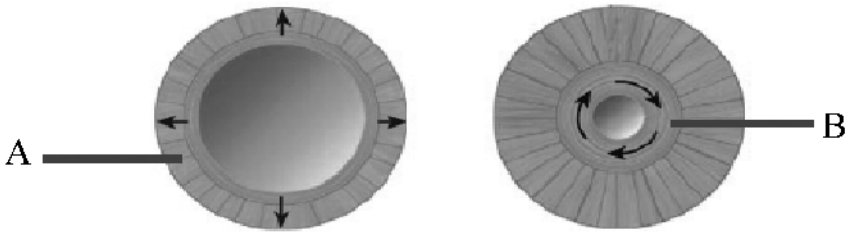


   a) The fluid in between lens and retina.

   b) The part of the retina where photoreceptors are absent.

   c) Transparent anterior part of sclera.

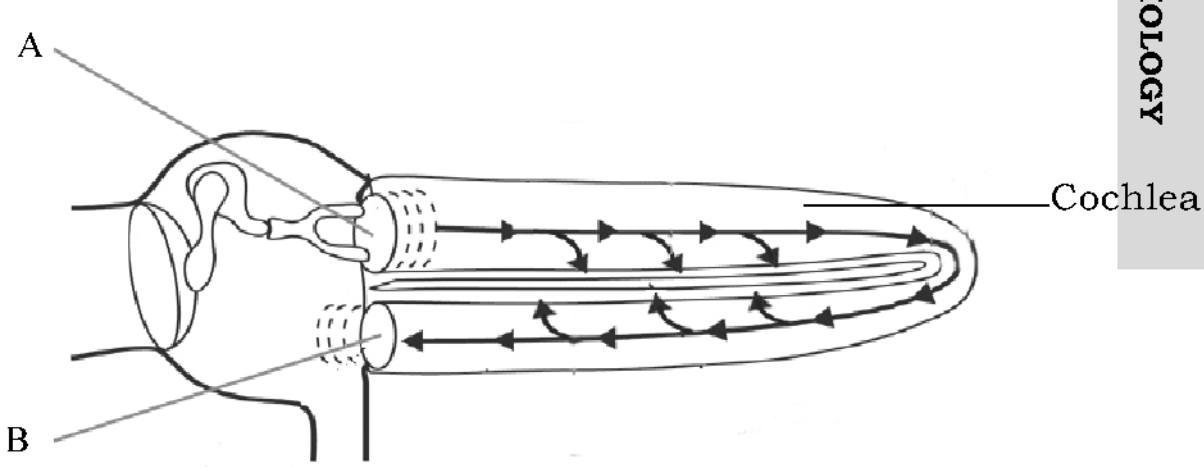
12. Observe the figure related to the regulation of the amount of light falling on the eyes and answer the questions given below.



   (a) Identify the muscles indicated as A,B?

(b) What is the role of muscles indicated as A,B in regulating the size of eyes ?

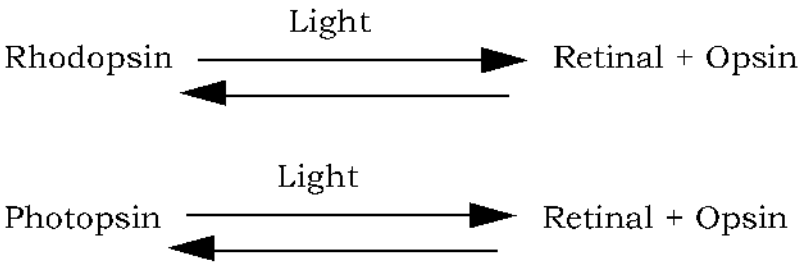
13. Observe the illustration and answer the questions given below.



(a) Identify the parts indicated as A,B?

(b) Write the functions of the parts indicated as A,B?

14. Observe the illustration given below.



(a) Identify the illustration.

(b) How this process related to vision?

Scoring indicators

1. a) Papilla – Others are parts of the ear.

   b) Cornea – Other are parts of the ear.

2. b) Rod cells, cone cells.

3. Light → cornea → aqueous humor → pupil → lens → vitreous humor → retina → impulses.

4. a) Internal ear.

b) (A) Semi circular canal (B) Vestibule (C) Cochlea

c) Body balancing.

5. More mucus is produced inside the nose when we have common cold. Smell particles cannot stimulate the olfactory receptors.

6.

While viewing distant objects	While viewing near objects
Ciliary muscles relax	Focal length decreases
Curvature of lens decreases	Ligaments relax

7. Tympanum is a thin circular membrane which vibrate in resonance with sound waves. The heavy blow to the ear results in the damage of the tympanum. It results in auditory problems and infections of the ear.

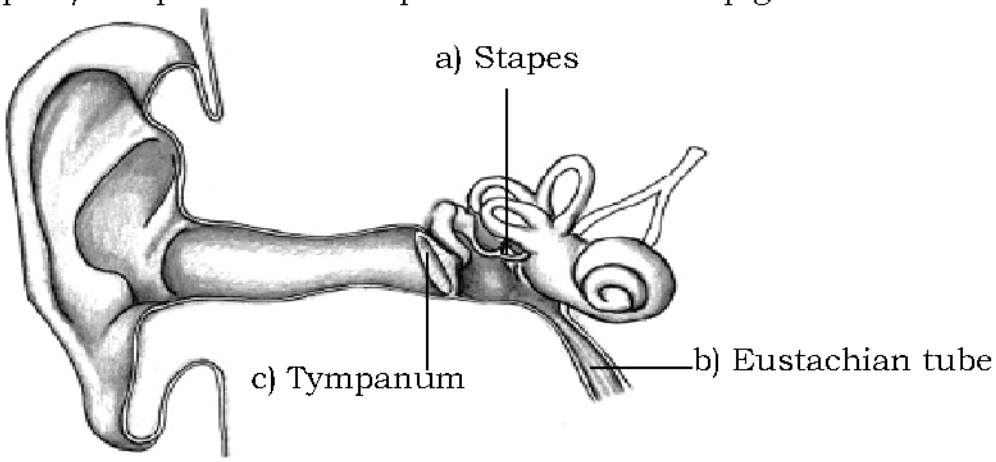
8. (i) A-Papilla

B-Taste buds

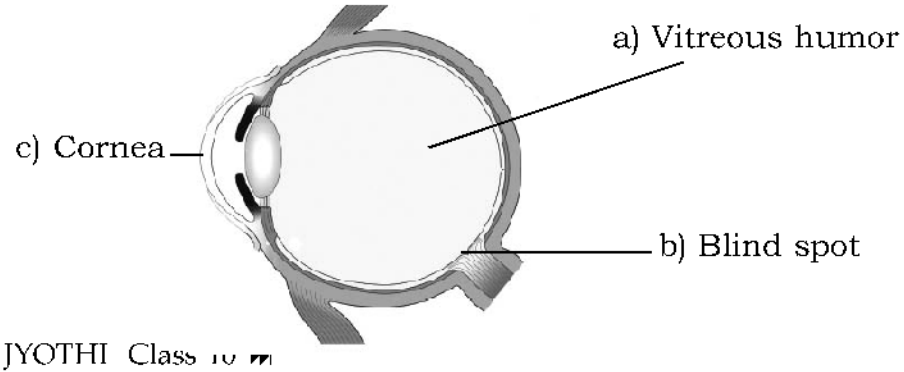
(ii) Taste buds are the chemoreceptors seen in the papilla. Substances which dissolve in saliva stimulate the taste buds and generate impulses. These impulses reach the brain and we experience taste.

9. Photopsin/Iodopsin- Photoreceptors and its visual pigments.

10.



11.



12. (a) A- Radial muscles B- Circular muscles
    (b) The size of the pupil is regulated by the action of circular muscles and radial muscles. When the radial muscles contract in dim light, the size of the pupil increases. When the circular muscles contract in intense light, the size of the pupil decreases. Thus the amount of light falling on the lens is regulated according to the intensity of light.
13. (a) A- Oval window B - Round window
    (b) Oval window - Spreads the vibration of ear ossicles to the inner ear.
    Round window - Helps in the movement of fluid inside the cochlea.
14. (a) The dissociation of visual pigments in photoreceptors.
    (b) In the presence of light, the pigments present in the photoreceptors , dissociate. This chemical change leads to the formation of impulses.

UNIT TEST

2. Windows of Knowledge

Time : 40 Mts.
Score : 20

Answer all questions from 1 to 3.Each question carries 1 score.
(3×1= 3 Score)

1. Identify the odd one. Mention the common feature of others.
   Cornea, Retina, Lens, Lysozyme
2. Select the correct answer.
   While viewing distant objects.
   A) Curvature of lens decreases.
   B) Ligaments relax.
   C) Focal length decreases.
   D) Ciliary muscles contract.
3. Identify the photoreceptor mentioned in the figure. Write its visual pigment.

Answer any four questions from 4 to 8. Each question carries 2 score. **(4 × 2 = 8 Score)**

4. Different stages of body balancing is given below. Arrange them appropriately.
   a) Impulses are transmitted by the nerves to the cerebellum.
   b) Body movements create movement of endolymph inside the vestibule and semicircular canals.
   c) Movements of the sensory hair cells generate impulses.
   d) Enables muscular movements and maintain the equilibrium of the body.
5. Illustrate the activities related to the sense of smell in a flow chart.
6. Sekhar was admitted in the hospital due to a serious accident. His last words were "I would like to donate my eyes".
   a) How will you respond to this statement?
   b) List out some of the awareness programmes that you can adopt for eye donation.
7. Receptors of certain organisms and their peculiarities are given below. Rearrange the table :-

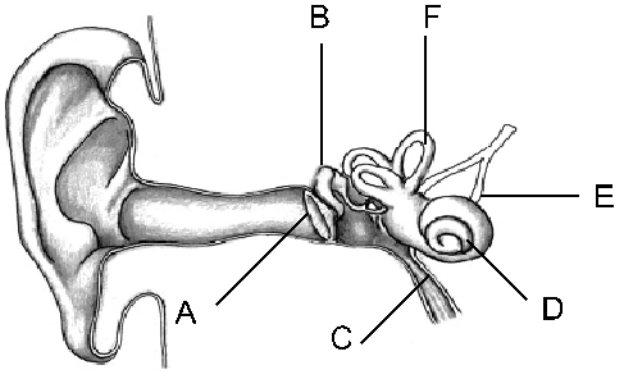
Organism	Receptors	Response system
Planaria	Jacobson's organ	Cluster of photo receptors that help in vision
Snake	Eye spot	Seen on the roof of the mouth cavity. Helps to detect the sense of smell.
	Lateral line	To detect light

8. Due to colour blindness, I may not be entrusted with the jobs like locopilot, driver etc – Manu.

How will you justify Manu's doubt?

Answer any three questions from 9 to 12. Each question carries 3 score. (3 × 3 = 9 Score)

9. Observe the figure showing the structure of ear and answer the questions given below.



a) Name the parts labeled A, B, C and D.

b) Write the name and functions of E and F.

10. Aqueous humor and vitreous humor are the fluids present in the eye. Tabulate its peculiarities and functions.

11. The table containing diseases related to eye, their reason and remedy are given below. Fill in the blanks.

Diseases	Reason	Remedy
Xerophthalmia	.....(a).....	Eat food containing vitamin A.
Glaucoma	Increase in the pressure inside the eyes due to hindrance of the reabsorption of aqueous homor.	.....(b).....
.....(c).....	Lens of the eyes become opaque.	Replacement of lens.

12. i) Can see objects in dim light.

ii) Cone cells provide us with colour vision.

a) Justify the above statements.

b) Is it necessary to include the food containing Vitamin A in our diet? Write down your opinion.

ANSWER KEY

<table>
<tr><th>Qn No.</th><th>Scoring indicator</th><th>Score</th></tr>
<tr><td>1.</td><td>Lysozyme, others are parts of the eye.</td><td>1</td></tr>
<tr><td>2.</td><td>Curvature of lens decreases.</td><td>1</td></tr>
<tr><td>3.</td><td>Cone cells, Photopsin/ Iodopsin</td><td>1</td></tr>
<tr><td>4.</td><td>b, c, a, d</td><td>2</td></tr>
<tr><td>5.</td><td>The smell of various substance enter the nostrils along with the inhaled air – The aromatic particles dissolve in the mucus inside the nostrils – Stimulate olfactory receptors and generate impulses – Impulses reach the cerebrum and smell is detected.</td><td>2</td></tr>
<tr><td>6.</td><td>a) Eye donation is the greatest thing that one can do. It gives light to the life of another person.
b) Conduct awareness classes about the eye donation through NCC, Scouts and Guides, Student Police Cadets etc. Prepare consent letter for eye donation. Utilize the services of doctors</td><td>1</td></tr>
<tr><td>7.</td><td><table><tr><th>Organism</th><th>Receptors</th><th>Response system</th></tr><tr><td>Planaria</td><td>Eye spot</td><td>To detect light</td></tr><tr><td>Snake</td><td>Jacobson's organ</td><td>Seen on the roof of the mouth cavity. Helps to detect the sense of smell.</td></tr></table></td><td>2</td></tr>
<tr><td>8.</td><td>Colour blindness is caused due to the defect of cone cells in retina. Persons with this defect cannot distinguish green and red colour. Accidental risk increases because they cannot detect the sign board and traffic signals, properly.</td><td>2</td></tr>
<tr><td>9.</td><td>a. A. Tympanum
B. Ear ossicles /Malleus
C. Eustachian tube
D. Cochlea
b. E. Auditory nerve – Bring impulses to cerebrum and hearing is effected.
F. Semi circular canals – maintains body balance</td><td>3</td></tr>
<tr><td>10</td><td><table><tr><th>Aqueous humor</th><th>Vitreous humor</th></tr><tr><td>It is the fluid filled in the aqueous chamber between the lens and the cornea. It is formed from blood and is reabsorbed into the blood. Nourishes the tissues of the eye.</td><td>It is a jelly like substance seen in the vitreous chamber between the retina and the lens. Helps in maintaining the shape of the eye.</td></tr></table></td><td>3</td></tr>
</table>

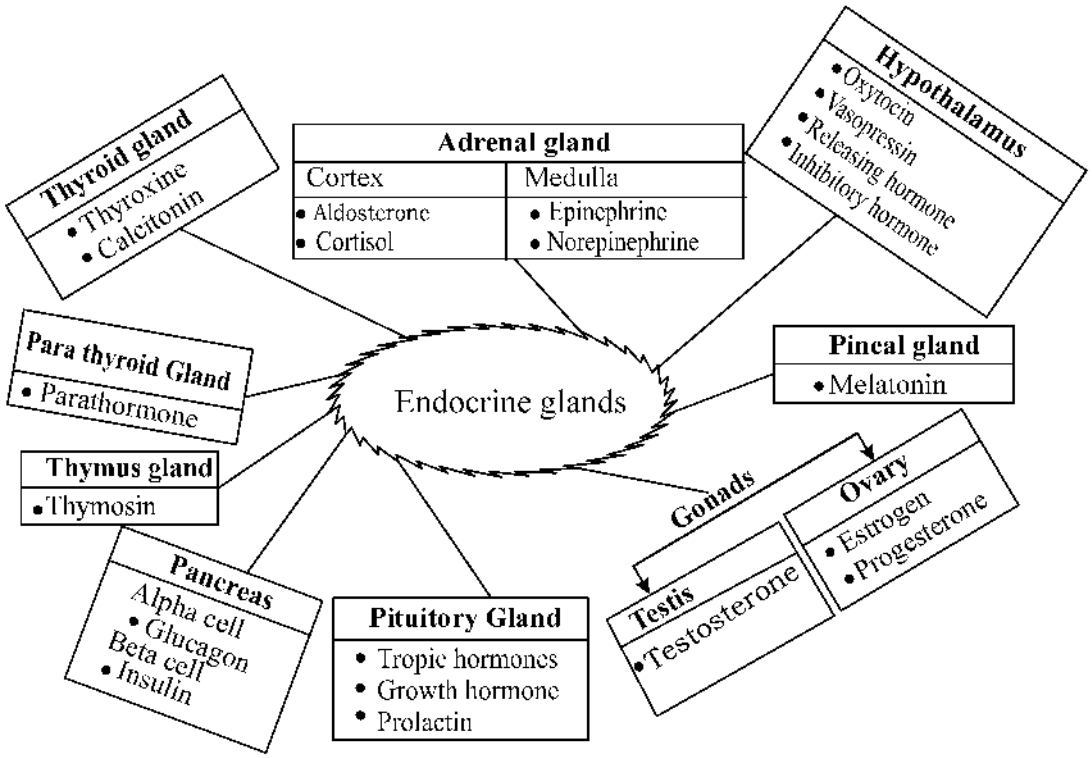
11.	a) Due to the prolonged deficiency of Vitamin A, the conjunctiva and cornea will become dry and opaque.	1
	b) Laser surgery.	1
	c) Cataract.	1
12.	a) Rod cells help us to see objects in dim light, Rhodopsin is the visual pigment in it. This pigment is formed from a protein named opsin and retinal which is a derivative of vitamin A. Photopsin in cone cells is also formed from opsin and retinal. Helps to detect colours of light – red, green and blue.	2
	b) Deficiency of Vitamin A results in low production of retinal. This creates deficiency of rhodopsin and the resynthesis of rhodopsin also gets blocked .This leads to night blindness, xerophthalmia and blindness.	1

Unit 3

CHEMICAL MESSAGES FOR HOMEOSTASIS

CONCEPTS

- Chemical messages for homeostasis takes place through hormones.
- Endocrine system includes endocrine glands and hormones.
- Each hormone has specific receptor.
- Homeostasis is maintained by the combined action of Nervous system and Endocrine system.
- Human Endocrine glands and Hormones.



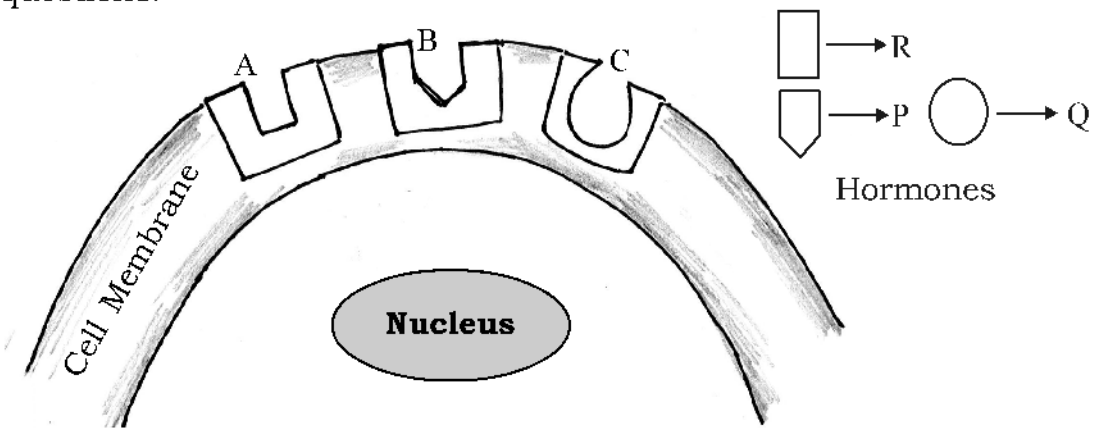
- Pheromones facilitate chemical communication.
- Plant hormones-Auxin, Cytokinin, Gibberellin, Ethylene, Abscisic acid.
- Artificial plant hormones- Auxins (NAA, IBA, 2,4-D) Gibberellins, Abscisic acid, Ethylene (Ethyphon).

Learning outcome

Explains hormone action through suitable examples.

Activity

Analyse the illustration with the help of hints and answer the following questions:-



A,B,C receptors, P Q R Hormones

Hints

P - Hormone is produced when the calcium level in the blood increases.

Q - Hormone is produced when the glucose level in the blood raises than the normal.

R - Hormone is produced when the calcium level decreases in the blood.

a) Name the hormones which combine with the receptors indicated as A,B.C to form hormone-receptor complex.

b) What are the hormones indicated as P, Q and R. Name their respective glands.

c) The receptor indicated as 'B' does not form hormone receptor complex with the hormone indicated as 'R' . Justify the statement.

d) How will the body be affected if the hormone indicated as 'Q' does not combine with receptor indicated as 'C'?

Scoring Indicator

a) A-R, B-P, C-Q (Each hormone has specific receptor)

b) P - Calcitonin-Thyroid gland.

Q - Insulin- Pancreas.

R - Parathormone- Parathyroid gland.

c) Each hormone act upon only those cells which have specific receptors. The cells which are acted upon by hormones are called Target cells. Only cells having specific receptors can receive a particular hormone.

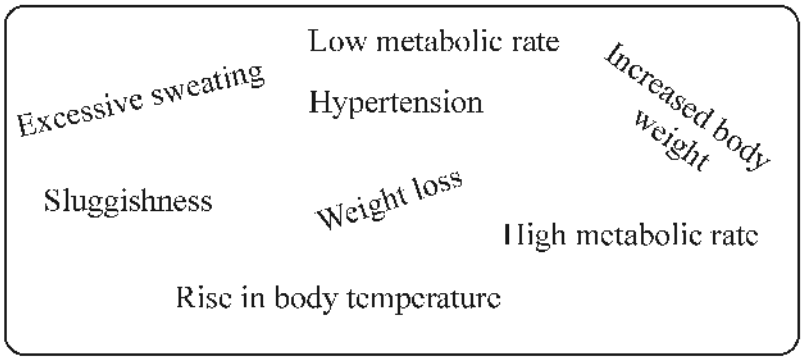
d) Diabetes Mellitus

Learning outcome

Analyses and presents the location of endocrine glands, hormones secreted by them and their functions.

Activity

The changes occur due to the oversecretion and undersecretion of thyroxine is given in the box. Arrange them in a table and give suitable title:-



Scoring indicator

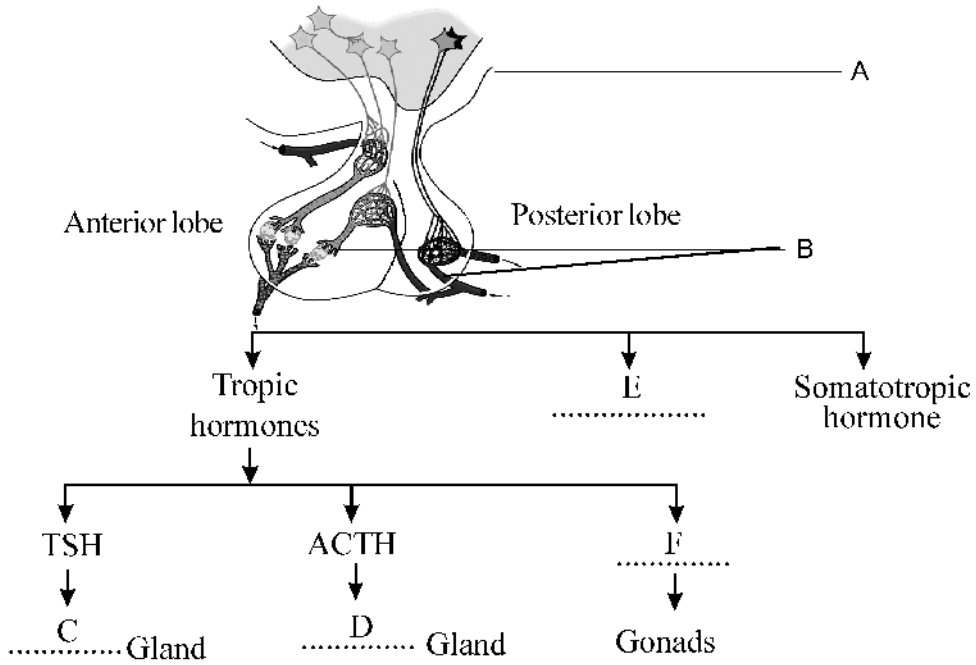
Hyperthyroidism (Thyroxine overseretion)	Hypothyroidism (Undersecretion of thyroxine)
High metabolic rate.	Low metabolic rate.
Rise in body temperature.	Sluggishness.
Excessive sweating.	Increased body weight.
Weight loss.	Hypertension.

Learning outcome

- Explains hormone action through suitable examples.
- Analyses and explains how hypothalamus plays a major role in maintaining homeostasis in humans.

Activity

Observe the illustration and answer the following questions:-



a) Identify the endocrine glands that are indicated as A,B,C and D.

b) Name the hormone indicated as 'F'.

c) Identify the hormone indicated as 'E', write its functions.

d) Write the name and functions of hormones secreted by the gland indicated as 'A' to the posterior lobe of the gland indicated as 'B'

Scoring indicator

a) A. Hypothalamus

B. Pituitary gland

C. Thyroid gland

D. Adrenal gland

b) GTH (Gonado tropic hormone)

c) Prolactin - Production of milk

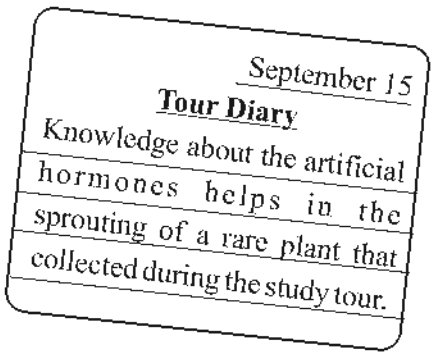
d) Oxytocin- Facilitates child birth by stimulating the contraction of smooth muscles in the uterine wall. Facilitates lactation

Vasopressin (Anti Diuretic Hormone -ADH)- Helps in the reabsorbtion of water in the kidneys.

Learning outcome

Analyses and explains how the use of artificial plant hormones helps in agricultural development.

Activity



News Report

Artificial hormones are used for increasing fruit size in grapes and apple and also for preventing ripening of fruits

a) Identify the hormones mentioned in the Tour diary and News report.

b) Information about two hormones used in the agricultural sector are given below. Mention the significance of these hormones.

1. Artificial hormones like abscisic acid contributed a lot to the progress of the agricultural sector	2.Ethyphon is used widely in rubber trees.

Scoring indicator

a) Tour diary - Auxin

News report- Artificial Gibberellins

b) 1. It is used for harvesting fruits at the same time.

2. Increases latex in rubber trees.

Learning outcome

Identifies and presents the plant growth regulators and their actions.

Activity

Complete the table using the hints related to plant hormones and their functions.

Hints

Controls the dormancy of embryo in seed, stimulates the breakup of stored food, helps in ripening of fruits, cytokinin, promotes the growth of terminal buds, Abscisic acid

.

Hormone	Function
.....A.....	Cell division/ cell differentiation
Gibberellins	.....B.....
Auxin	.....C.....
.....D.....	.....E.....
Ethylene	..... F.....

Scoring indicator

A - Cytokinin

B - Stimulates the breakup of stored food.

C - Promotes the growth of terminal buds.

D - Abscisic acid

E - Controls the dormancy of embryo in seed.

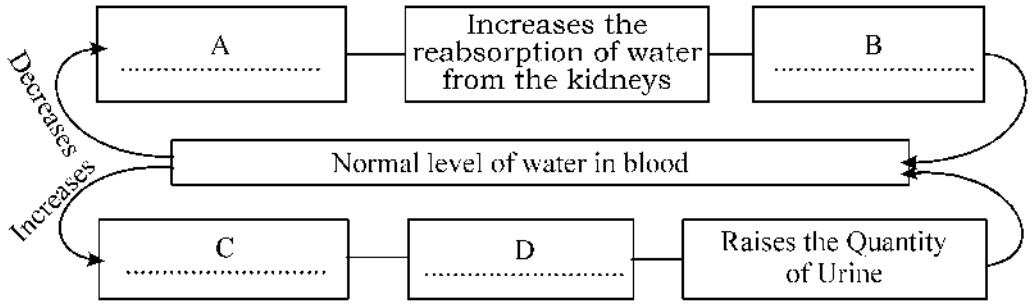
F - Helps in ripening of fruits.

Learning outcome

Analyses and explains how hypothalamus plays a major role in maintaining homeostasis in humans.

Activity

Complete the following illustration suitably.



Hints: Vasopressin production increases, Lowers the quantity of urine, Decreases the reabsorption of water from the kidneys, Vasopressin production decreases

Scoring indicators

A - Vasopressin production increases.

B - Lowers the quantity of urine.

C - Vasopressin production decreases.

D - Decreases the reabsorption of water from the kidneys.

Learning outcome

- Explains hormone action through suitable examples.
- Analyses and presents the location of endocrine glands, hormones secreted by them and their function.

Activity

Answer the following statements by using the terms given in the box:-

1. The gland known as Biological clock is seen in the centre of the brain.
2. A gland which is situated just below the sternum is very active during infancy.
3. Hormone that raises the rate of metabolism.
4. The chemical substances which help honeybees and help termites

to live in colonies.

5. The hormone that helps in the implantation of embryo in the uterus.
6. The hormone which promotes the growth of the body.

Thymus gland, Progesterone, Somatotropin, Pheromones, Pineal gland, Thyroxine

Scoring indicator

1. Pineal gland
2. Thymus gland
3. Thyroxine
4. Pheromones
5. Progesterone
6. Somatotropin

ADDITIONAL QUESTIONS

Find the odd one. Write the common features of the others.

1. Tropic hormone, Somatotropin, Prolactin, Vasopressin.
2. Civeton, Musk, Ethyphon, Bombycol.
3. Cretinism, Myxoedema, Hyperthyroidism, Acromegaly

Select the correct Answer.

4. The hormone that helps to face an emergency situation:-

   a) Cortisol b) Epinephrine c) Thyroxine d) Aldosterone

5. Normal calcium level in the blood:-

   a) 80 - 120 mg/100ml b) 13-15mg/100ml c) 9-11 mg/100ml
   d) 4.5 - 12 mg/100ml

6. Complete the table by using the suitable terms given in the box.

Throxine, Kidneystone, Goitre, Reabsorption of water, Insulin, Dwarfism, Vasopressin, Regulate the metabolism, Glucose is converted to glycogen, Promotes the growth of the body, Diabetes insipidus, Diabetes mellitus, Growth hormone.

Hormone	function	Related disease

7. The different stages in the growth of a plant is illustrated below. Identify the hormone that acts in each stage.

A. Breaking up of stored food to facilitate germination

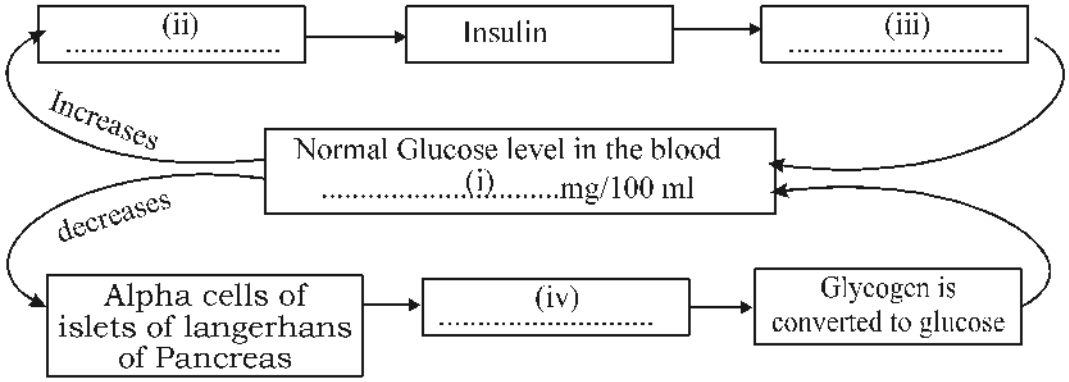
B. Cell division and cell differentiation

C. Growth of terminal bud

D. Fruit ripening

E. Dropping of leaves and fruits

8. Illustration showing the maintanance of blood glucose level is given below. Analyse the illustration and answer the questions that follow:-



a) Complete i, ii, iii and iv.

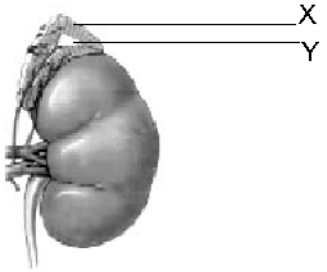
b) How does the deficiency of insulin affect the body?

9. Correct the mistakes if any in the underlined words of the given statements.

   (a) Lack of thyroxine in adults leads to Cretinism.

   (b) Aldosterone is the hormone which controls inflammation and allergy.

10. Observe the figure and answer the following questions:-



   a) Which endocrine gland is mentioned in the figure. Identify the parts indicated as X,Y.

   b) Name the hormones secreted by 'X' .Give its functions.

   c) Name the hormones secreted by 'Y'. How do these hormones enable to overcome emergency situations?

11. "The excessive production of this hormone after growth phase, leads to the grwoth of bones in the face, jaws, and fingers"

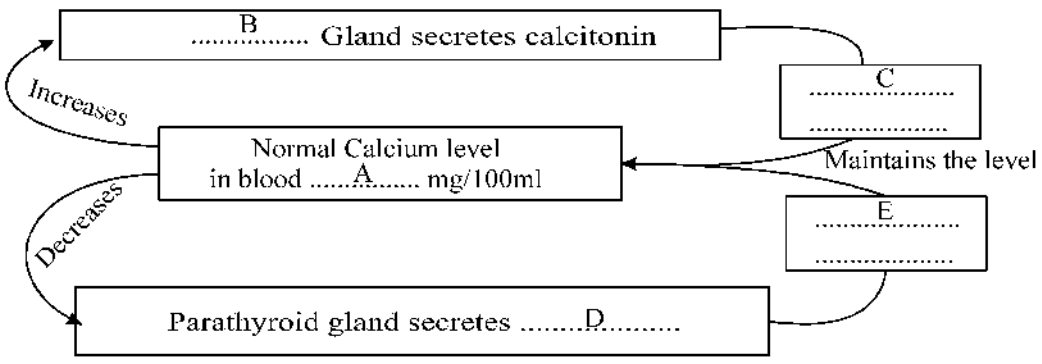
   a) Name the hormone.

   b) Name the condition.

   c) Which endocrine gland produces this hormone?

12. Complete the illustration by selecting most suitable hints given below.

..... B.... Gland secretes calcitonin.



Hints

- Parathormone
- Thyroid
- 9 - 11 mg/100ml
- 80 - 120 mg/100ml
- Deposit excess calcium from blood to the bones.
- Reabsorb calcium to the blood from kidneys.

Scoring Indicator

1. Vasopressin- others are produced from anterior lobe of pituitory gland.
2. Ethyphon- others are pheromones.
3. Acromegaly- others are related to thyroid gland/ diseases due to variation in the production of thyroxine.
4. b) Epinephrine
5. c) 9 - 11 mg/100ml
6. Thyroxine- Regulate the metabolism- Goitre.

   Vasopressin- Reabsorption of water- Diabetes insipidus.

   Insulin- Glucose is converted to Glycogen- Diabetes mellitus.

   Growth hormone- Promotes the growth of the body- Dwarfism.
7. A) Gibberellins B) Cytokinin C) Auxin

   D) Ethylene E) Abscisic acid
8. a) i) 70 - 110 mg/100ml

   ii) Beta cells in Islets of Langerhans of pancreas.

   iii) Glucose is converted to glycogen/ enhances the cellular uptake of glucose.

   iv) Glucagon

   b) Diabetes mellitus- glucose level in the blood increases.
9. (a) Lack of thyroxine in adult leads to myxoedema.

   (b) Cortisol is the hormone which controls inflammation and allergy.

10. a) Adrenal gland X - Cortex Y - Medulla

    b) i) Cortisol- synthesis of glucose from protein and fat, slows down the action of defense cells, control inflammation and allergy.

    ii) Aldosterone: Maintain the salt-water level, maintains blood pressure.

    iii) Sex hormones: Helps in the development of sex organs.

    c) (i) Epinephrine (Adrenaline), Norepinephrine (Noradrenaline)

    (ii) Epinephrine act along with the sympathetic system during emergencies. This help to resist or withdraw from such situations. Norepinephrine acts along with epinephrine.

11. a) Growth hormone (Somato Tropic hormone).

    b) Acromegaly.

    c) Anterior lobe of pituitary gland.

12. A. 9 - 11 mg/100ml.

    B. Thyroid gland.

    C. Deposit excess calcium from the blood to the bones.

    D. Parathormone.

    E. Reabsorb calcium to the blood from the kidneys.

UNIT TEST

3. Chemical Messages For Homeostasis

Time : 40 Mts.
Score : 20

Answer all the questions from 1 to 3. Each question carries one score (3 × 1 = 3 Score)

1. Identify the word relation in the first pair and complete the second pair. Mention how they are related.

   Youth hormone: Thymosin :: Emergency hormone : .....

2. Find out the odd one and give the common feature of the others.

   TSH, ACTH, ADH, GTH

3. Select the correct answer.

   The hormone which enhances cellular uptake of glucose moelcules is.

   (A) Glucagon (B)Insulin (C) Cortisol (D) Adrenalin

Answer any four questions from 4 to 8. Each question carries 2 score. (4 × 2 =8 Score)

4 Complete the blanks with suitable words.

When the level of calcium in the blood decreases .....(i)..... gland secretes ....(ii)..... hormone, which helps in the reabsorption of calcium to the blood from kidneys.

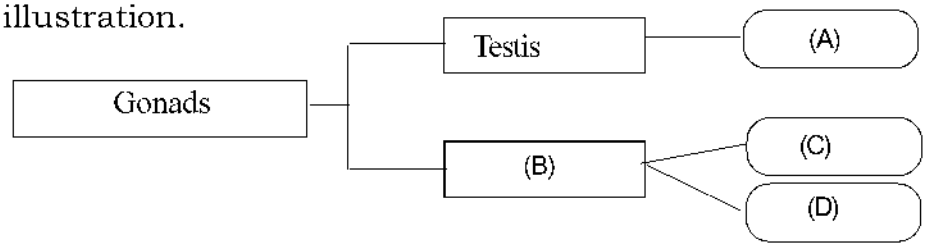
5 "Hypothalamus is a part of brain. Then how is it considered as an endocrine gland?". What is your opinion about this doubt?

6. The rhythm of our daily activities is maintained by a hormone.

   (a) Which is the hormone?

   (b) Name the gland which produces this hormone.

7. The illustration which shows the relation of reproductive organs and their respective hormones, is given below. Complete the illustration.



8. Iodine is necessary for the metabolic activities. Justify this statement.

Answer any three questions from 9 to 12. Each question carries 3 score. (3 × 3 = 9 Score)

9. The level of glucose in the blood of a person before breakfast is 140mg/100ml.

   a. Identify the disease.

   b. Mention the causes for this condition.

   c. What are the major symptoms?

10. Hormones help in the chemical communication inside the body but certain chemical substances are secreted to surroundings for communication.

    a. Name these chemical substances.

    b. Write any two functions of these.

    c. Write any two examples.

11. Functions of some plant hormones are given below. Find out the plant hormones.

    a. Cell growth, promoting the growth of terminal buds.

    b. Cell division, cell growth, cell differentiation.

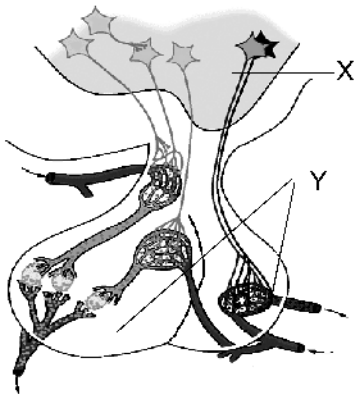
    c. Helps in dropping of ripened leaves and fruits.

12. Observe the figure and answer the following questions:-

    a. Identify the glands labelled as 'X', 'Y'

    b. Name the hormone which helps in the contraction of smooth muscles in the uterine wall, secreted by the part indicated as 'X'

    c. Name the hormone produced from the above gland which inhibits the production of tropic hormones.



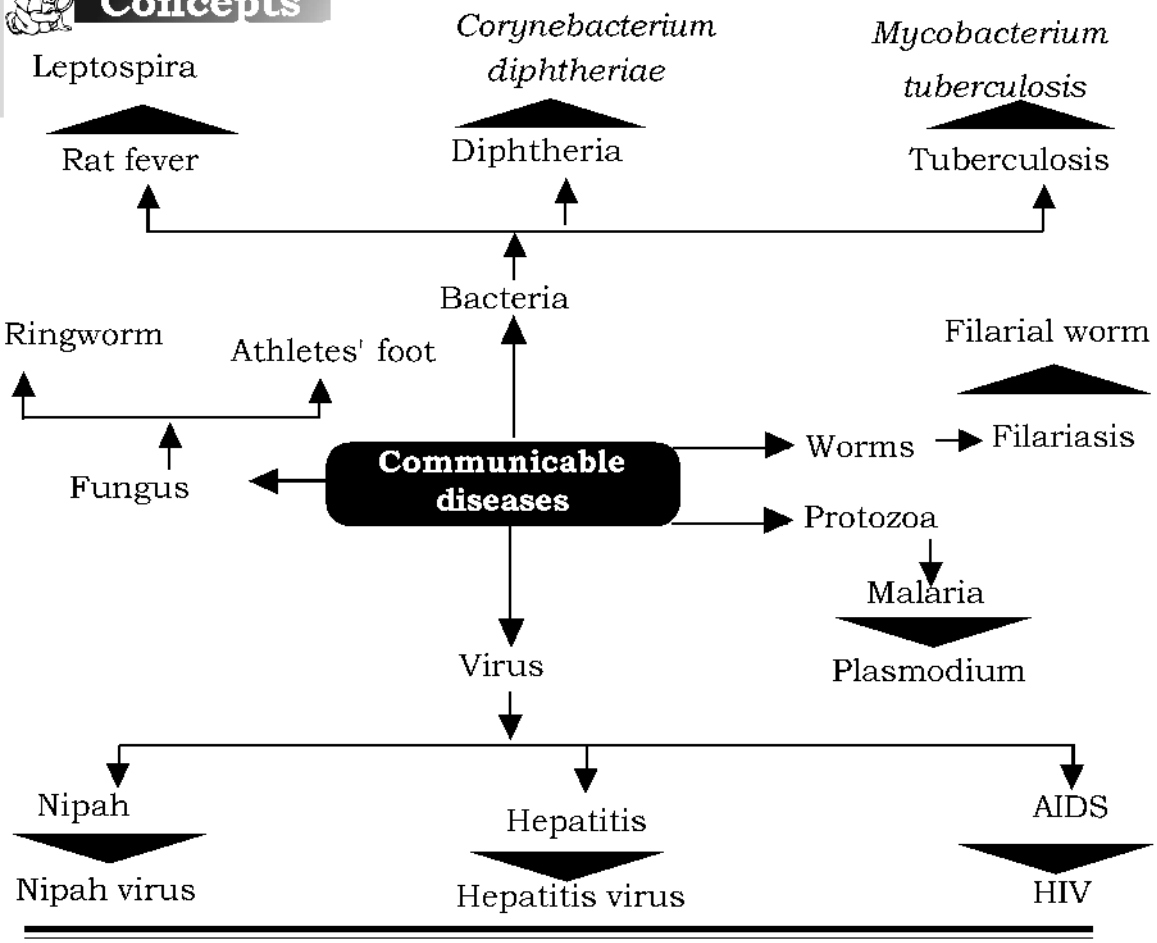
Answer key

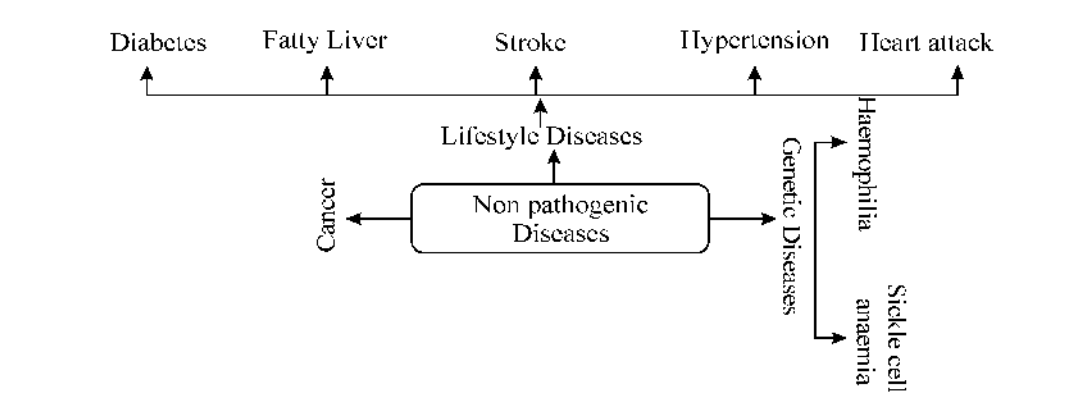
Qn.No.	Scoring indicators	Score
1.	Epinephrine (Adrenaline), Hormones and their common name.	1
2.	ADH, others are produced from anterior lobe of pituitory gland	1
3.	Insulin	1
4.	(i) Parathyroid gland (ii) Parathormone	2
5.	Hypothalamus secrete Oxytocin, Vasopressin, Releasing hormones and Inhibitory hormones. So it is an endocrine gland.	2
6.	a. Melatonin b. Pineal gland	2
7.	A. Testosterone B. Ovary C. Oestrogen D. Progesterone	2
8.	Iodine is essential for the production of thyroxine. The production of thyroxine is obstructed in the absence of iodine. It affects the metabolism.	2
9.	a. Diabetes mellitus	1
	b. Decreased production of Insulin or its malfuentioning.	1
	c. Increased appetite and thirst, frequent urination, traces of glucose in urine.	1
10.	a. Pheromones.	1
	b. Attracting mates, informing the availability of food, determining the path of travel, informing about dangers (any two).	1
	c. Musk, Civeton, Bombycol (anytwo)	1
11.	a. Auxin b. Cytokinin c. Abscisic acid	3
12.	a. X – Hypothalamus.	
	Y – Pituitary gland.	1
	b. Oxytocin c. Inhibitory hormone.	1+ 1

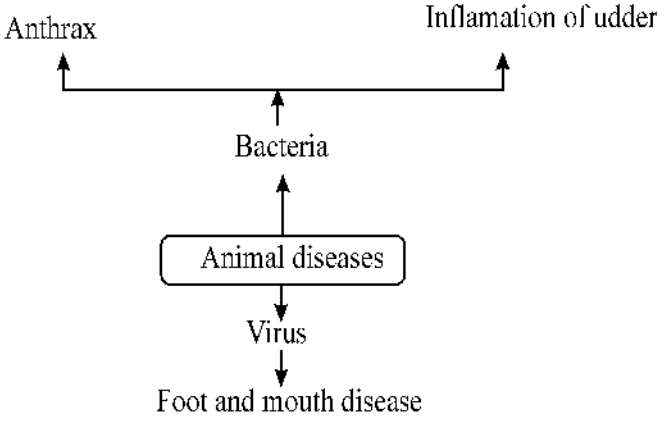
Unit 4

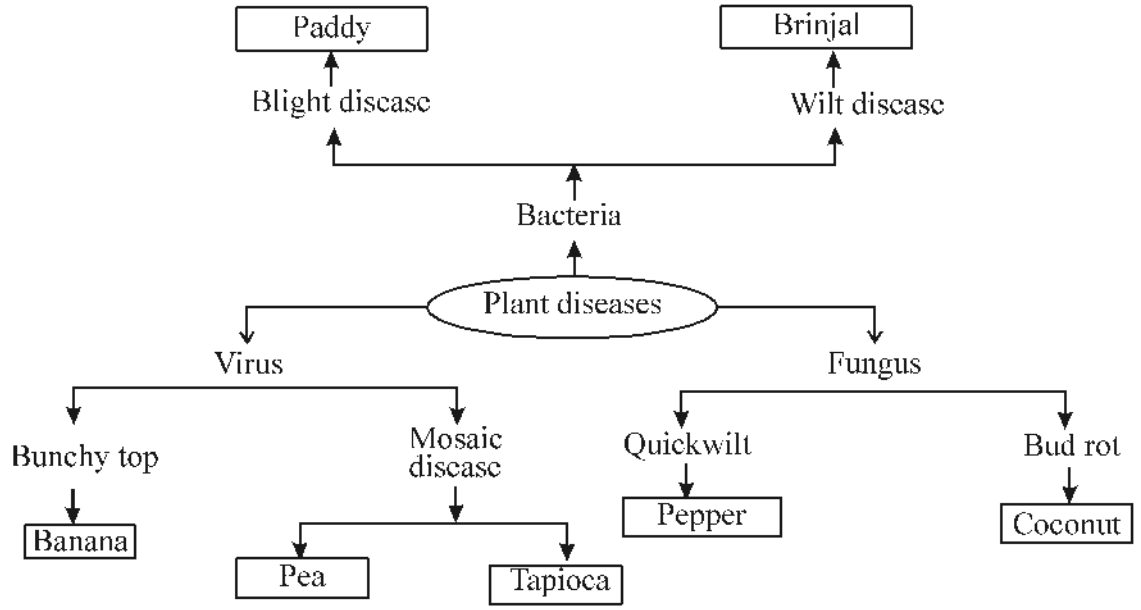
KEEPING DISEASES AWAY

Concepts









Concepts

- Situations for proliferation of diseases.
- Communicable diseases - Disease, Pathogen.
- Peculiarities of Bacteria, Virus etc.
- Communicable diseases - Mode of infection of pathogens.
- AIDS, Malaria, Tuberculosis, Athletes' foot, Ringworm, Filariasis, Nipah, Hepatitis, Diphtheria, Rat fever - Pathogen, symptom, mode of spreading.
- The Genetic diseases like Haemophilia, Sickle cell Anaemia and their symptoms.
- The causes and treatment of cancer.

- Various lifestyle diseases and their causes.
- Animal diseases - Anthrax, Inflamation of udder, Foot and mouth disease.
- Plant diseases - Blight disease, Wilt disease, Mosaic disease, Bunchy top, Quickwilt, Bud rot.

Learning outcome

- Explains about different pathogens by classifying them.
- Collects and presents information relating to situations that lead to various kinds of diseases.
- Explains the different diseases caused by bacteria.

Activity

The name of some communicable diseases are given in the box. By using the words in the box, answer the questions given below:-

Athletes' foot , Chikungunya, Nipah, Ring worm, AIDS, Filariasis, Tuberculosis, Rat fever, Malaria, Diphtheria, Dengue fever

a) Classify based on the mode of invasion into the human body.
b) Name the bacterial diseases.
c) The symptoms of a disease in the box above, are given below.

Loss of body weight, fatigue, persistent cough

(i) Identify the disease.
(ii) Name the pathogen.
(iii) How does this disease spread?

d) Identify the pathogens of the diseases from the box that are spread by mosquitoes?

Scoring indicators

(a)

through body fluids	through air	through mosquitoes.	through vectors	through contact
AIDS	Tuberculosis, Diphtheria.	Chikungunya, Filariasis, Malaria Dengue fever.	Rat fever, Nipah.	Athletes' foot, Ring worm.

(b) Diphtheria, Tuberculosis, Rat fever

(c) (i) Tuberculosis.

(ii) A bacterium namely Mycobacterium tuberculosis.

(iii) When the patient speaks, coughs or sneezes, the pathogens spread to air providing a chance to reach other people.

(d) Chikungunya - Virus, Filariasis - Filarial worm, Malaria - the protozoan plasmodium, Dengue fever - Dengue virus.

Learning outcome

Collects information on different kinds of viral diseases and takes part in awareness programmes against them.

Activity

Statements related to a pathogen is given below.

- Included in the category of virus.
- Spread through body fluids.
- Enters the body and multiplies using the genetic mechanism of lymphocytes.

a) Name the pathogen.

b) Identify the disease.

c) What are the ways by which this pathogen spreads?

Scoring indicators

a) HIV (Human Immuno deficiency Virus)

b) AIDS (Acquired Immuno Defeciency Syndrome)

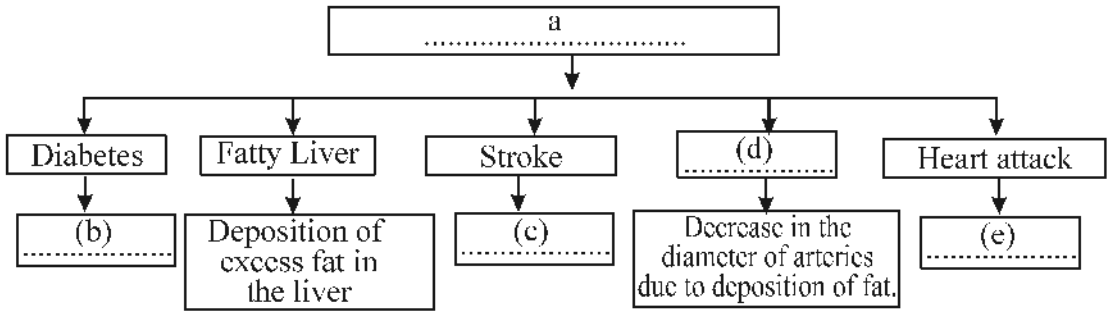
c) Through sexual contact with HIV infected person, From HIV infected mother to the foetus, By sharing needle and syringe contaminated with HIV components, Through the reception of blood and organs contaminated with HIV.

Learning outcome

Adopts a lifestyle that prevents lifestyle diseases.

Activity

Observe the illustration and answer the questions given below:-



i) Complete the illustration suitably.

ii) What is the common name of diseases indicated in the illustration.

iii) What are the reason for these type of diseases?

Scoring indicators

i) a) Lifestyle diseases.

b) Deficiency of insulin or its malfunctioning.

c) Rupture of blood vessels in brain, block of blood flow.

d) Hypertension

e) block of blood flow due to deposition of fat in coronary arteries, which supplies blood to the heart.

ii) Lifestyle diseases.

iii) The changes in food habits, lack of physical exercise, stress, bad habits like consumption of alcohol, drug abuse, smoking etc., lead to various lifestyle diseases.

ADDITIONAL QUESTIONS

1. Arrange the statements suitably in the table given below.

a) Has no cell organelles as seen in normal cells.

b) Causes Anthrax.

c) The toxins produced by these, damage living cells.

d) Multiplies by taking control over the genetic mechanism of host cells.

e) Causes Dengue fever.

f) Multiply through binary fission.

Virus	Bacteria

2. Identify the word pair relationship and fill the missing word. Mention the relation between pairs.

   i) AIDS : through body fluids :: Nipah : .....

   ii) Hepatitis : Virus :: Diphtheria : .....

   iii) Inflammation of udder : Bacteria :: Foot and mouth disease : .....

3. The symptoms of a disease is given in the box. Analyse the data and answer the questions given below.

Fever, throat pain and inflammation in the lymph glands of the throat, produced an ash coloured thick coating in the throat.

   (a) Identify the disease.

   (b) Name the pathogen.

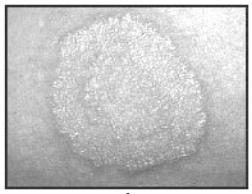
   (c) What is the reason for the production of an ash coloured thick coating in the throat?

   (d) Explain the treatment for the disease.

4. Identify the odd one . Mention the common feature of others.

   Hepatitis, Tuberculosis, Diphtheria, Leptospirosis

5. Observe the figure and answer the questions given below.



A

B

   a) Identify the diseases indicated as A,B.

   b) Name the pathogens which cause these diseases.

   c) How does these diseases spread?

6. Write the concepts related to the harmful effects of smoking that can be included in a poster used for awareness.

   (Hints - How smoking affects brain, lungs and heart)

7. Select the statements related to Haemophilia from the statements given below.

   (a) Excess blood is lost even through minor wounds.

(b) Deformities in the sequencing of amino acids which are the building blocks of haemoglobin.

(c) Red blood cells bend like sickle.

(d) The genes that control protein synthesis which help in blood clotting become defective.

(e) RBCs get collected in the blood vessels and block the flow of blood in them.

8. Select the correct pairs.

a) Anthrax _ Virus

b) Foot and mouth disease - Virus

c) Inflammation of udder - Bacteria

d) Foot and mouth disease - Bacteria

9. Arrange column B and C with the data in column A.

A	B	C
Brinjal	Bud rot	Virus
Coconut	Mosaic disease	Bacteria
Pea	Blight disease	Protozoa
	Wilt disease	Fungus

10. Complete the table.

Disease	Pathogen	Symptoms	Mode of transmission
Leptospirosis	Leptospira	.....(a).....	.....(b).....
Diphtheria	.....(c).....	Fever, throat pain and inflammation in the lymph glands of the throat.	.....(d).....
.....(e).....	Virus	Inflammation of the liver, dark yellow colour in the mucus membrane, white portion of the eyes and the nails.	.....(f).....

11. Arun reached a flood relief camp because of flood. On the last day of the camp the health workers give a check list related to the

precautions to be taken after flood. Make a ✓mark on the statements related to the precautions to be practiced after flood.

(a) Drink boiled water only. ☐

(b) Use the well water as such. ☐

(c) Dump the wastes in an area. ☐

(d) Use water purified by Chlorine. ☐

(e) Take preventive medicines without the directions of experts. ☐

(f) Keep stagnent water as such. ☐

(g) Ensure personal hygiene and environmental hygiene . ☐

(h) Eliminate the vectors. ☐

(i) People living in unsafe places must to be shifted safe places as per instructions. ☐

Scoring Indicator

1

Virus	Bacteria
a, d, e	b, c, f

2. (i) through bats, viral diseases and the mode of invasion into the human body.

(ii) Bacteria/ *Corynebacterium diphtheriae* , diseases and pathogens.

iii) Virus, Animal diseases and pathogens.

3. (a) Diphtheria

(b) A bacteria namely Corynebacterium diphtheriae.

(c) The toxins produced by the pathogen produce an ash coloured thick coating in the throat within two or three days.

(d) Antitoxins which act against the toxins are used to protect the uninfected cells. But, if the disease becomes severe the patient cannot be recovered through medication. So vaccination is the best preventive method.

4. Hepatitis, Others are bacterial diseases

5. (a) A - Ringworm B - Filariasis

(b) Ringworm - Fungus Filariasis - Filarial worm

(c) Ringworm - spreads through contact.

Filariasis - spread by culex mosquitoes.

6. Brain - Stroke, Addiction to nicotine.

Lungs - Lung cancer, Emphysema, Bronchitis.

Heart - Hypertension, Loss of elasticity of arteries, Decrease in functional efficiency.

7. (a) Excess blood is lost even through minor wounds.

(d) The genes that control protein synthesis which help in blood clotting become defective.

8. b, c

9. Brinjal - Wilt disease - Bacteria.

Coconut - Bud rot - Fungus.

Pea - Mosaic disease - Virus.

10. (a) Severe fever, headache, muscle pain, redness in eyes.

(b) Through the urine of rat, dog and certain other animals.

(c) Corynebacterium diphtheriae.

(d) Spreads through cough, sneezing or directly from the infected person to another person.

(e) Hepatitis

(f) Transmitted through contaminated food and water, blood components and excreta of the patient. Certain hepatitis do get transmitted in the same way as the transmission of HIV.

11. (a), (d), (g), (h), (i)

UNIT TEST

4. Keeping Diseases Away

Time : 40 Mts.
Score : 20

Answer all questions from 1 to 3. Each question carries 1 score (3 × 1 = 3 Score)

1. Select the correct answer.
   The cause of Fatty Liver
   (A) Decrease in the diameter of arteries due to deposition of fat.
   (B) Deposition of excess fat in the liver
   (C) Rupture of blood vessels in brain, block of blood flow
   (D) Radiation
2. Identify the odd one . Mention the common feature of the others.

   Tuberculosis, Nipah, Hepatitis, Chikungunya

3. Identify the word pair relationship and fill the missing word. Mention the relation between pairs.

   Rat fever : Leptospira :: Diphtheria : .....

Answer any four questions from 4 to 8 . Each question carries 2 score (4 x 2 =8 Score)

4. Observe the name of diseases given in the box and answer the questions given below.

   Chikungunya, Filariasis, Malaria, Dengue fever

   a. What is the common peculiarity of these diseases?
   b. How can we control the spreading of these diseases?
5. What are the health problems associated with smoking in the following organs?
   a) Brain (b) Lungs
6. Select the statements related to bacteria from the statements given below.
   (a) Causes Malaria (b) Multiplies by taking control over the genetic mechanism of host cells. (c) Included in the group of fungus (d) The toxins produced by these, damage living cells. (e) Multiply through binary fission.
7. Explain cancer. What are the causes which lead to the transformation of normal cells into cancer cells ?
8. The symptoms of a communicable disease is given below.

   Manifestation of round, red blisters on the skin.

   (a) Identify the disease. Name the pathogen.
   (b) How does this disease spread?

Answer any three questions from 9 to 12 . Each question carries 3 score (3x3 =9 Score)

9. Observe the illustration and answer the questions given below:-

Red blood cell

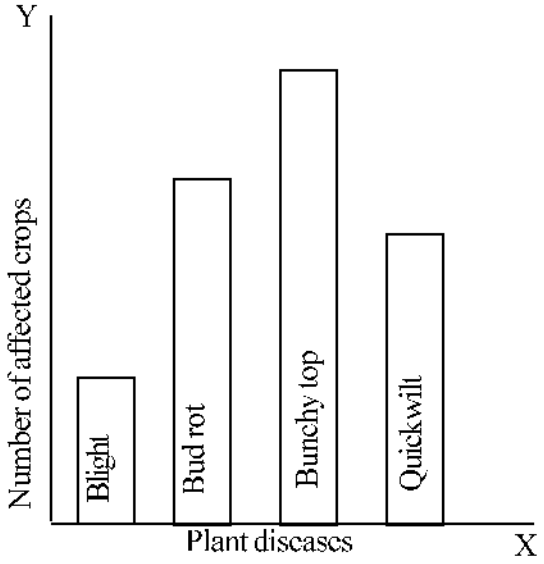
a. Identify the disease.
b. What is the cause of this disease?
c. How does the deformity of red blood cells affect the body?

10. What are the concepts related to " How AIDS does not spread" that can be included in a pamphlet preparing for the awareness against AIDS.

11. Arrange column B and C with the data in column A.

A	B	C
(i) Malaria	(a) Filarial worm	(1) Appearance of reddish scaly rashes that cause itching
(ii) Filariasis	(b) Fungus	(2) Loss of body weight, fatigue, persistent cough
(iii) Athlets' foot	(c) Virus	(3) High fever with shivering and profuse sweating
	(d) Plasmodium	(4) Swelling in the lymph ducts due to obstruction in the flow of lymph

12. Observe the graph and answer the questions given below:-



a. Name the crops which are affected by these diseases.
b. Name the pathogen of the least affected crop.
c. Identify the fungal diseases.

Answer Key		
Qn.No.	Scoring indicators	Score
1	B	1
2	Tuberculosis, others are diseases caused by virus	1
3	*Corynebacterium diphtheriae*, diseases and their pathogen	1
4	(a) Diseases spread by mosquitoes/ Communicable diseases.	1
	(b) Keep the surroundings clean, Observe Dry day, Pervent stagnation of water, Use mosquito net etc.	1
5	(a) Brain - Stroke, Addiction to nicotine.	1
	(b) Lungs - Lung cancer, Bronchitis, Emphysema.	1
6	d,e	2
7	Cancer is caused by the uncontrolled division of cells and their spread to other tissues.	1
	Environmental factors, smoking, radiations, virus, hereditary factors, and alterations in genetic material.	1
8	(a) Ringworm, Fungus.	1
	(b) Through contact.	1
9	(a) Sickle cell anaemia	1
	(b) The defects of genes may also cause deformities in the sequencing of amino acids which are the building blocks of haemoglobin.	1
	(c) Decreases the oxygen carrying capacity of red blood cells. The RBCs in the shape of sickles aggregate and block the flow of blood through the blood vessels.	1
10	by touch, shaking hands, coughing, sneezing etc. through insects like mosquitoes, house flies etc. by staying together and sharing food. by using same toilets. by taking bath in the same pond.	3
11	(i) - d - 3 , (ii) - a -4, (iii) - b - 1	3
12	(a) Blight - Paddy , Bud rot - Coconut, Bunchytop - Banana, Quickwilt -Pepper	1
	(b) Bacteria	1
	(c) Bud rot, Quickwilt.	1

Unit 5

SOLDIERS OF DEFENSE

Concepts

- Immunity - The natural ability of our body to prevent germs from entering the body and also to destroy those that have entered it.
- Non-specific defense mechanism is a mechanism that protects us from all pathogens without considering their characteristic features..
- Blood and defense mechanisms - Raising body temperature, Production of antibodies, Healing of wounds, Inflammatory response, Phagocytosis, Healing of the wound, Blood clotting.
- The defense mechanism that identifies the structure of each antigen and destroys it specifically is called specific defense.
- Lymphocytes, a type of white blood cells, acts as a part of specific defense.
- Various systems of medicine – Allopathy, Ayurveda, Homeopathy, Unani etc.
- Effective diagnosis is essential for treatment in any system of medicine.
- Immunization is the artificial method to make the defense cells alert against the attack of pathogens.
- Vaccines are the substances used for artificial immunization.
- Antibiotics are used to resist bacterial diseases.
- The basis of blood grouping is the presence of antigen A and antigen B in red blood cells.
- Defense mechanisms in plants include Bark , Cuticle in leaves , Cell wall , Callose etc

Learning outcome

Explains how white blood cells act against pathogens.

Activity

Observe the figure and answer the questions given below.

A B C D E

(a) Identify the white blood cells.

(b) What are the defense actions of the white blood cells indicated as A,B,C?

(c) Write the defense action of the white blood cell indicated as D?

(c) Write the defense action of the white blood cell indicated as E?

Scoring indicators

a. A - Eosinophil B - Monocyte C - Neutrophil D - B Lymphocyte E - T Lymphocyte

b. Eosinophil - Synthesizes chemicals that destroy foreign bodies. Synthesizes chemicals required for the inflammatory responses.
Monocyte - Engulfs and destroys germs.
Neutrophil - Engulfs bacteria, synthesizes chemicals that destroy bacteria.

c. B- Lymphocytes produce certain proteins that act against antigens. These are called antibodies.
Antibodies destroy the pathogens in three different ways.

1. Destroy the bacteria by disintegrating their cell membrane.
2. Neutralise the toxin of the antigens.
3. Destroy the pathogens by stimulating other white blood cells.

d. T-Lymphocytes - Stimulate other defense cells of the body, destroy the cells affected by virus, destroy cancer cells.

Learning outcome

Engages in awareness programmes by internalising the importance of blood donation.

Activity

Complete the worksheet with the details of your classmates.

No	Name	Blood Group	Antigen	Antibody	Blood group/ Groups he/she can receive.
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

a. Everyone cannot receive blood from all blood groups. Explain.

b. Prepare a poster on the significance of blood donation.

Scoring indicators

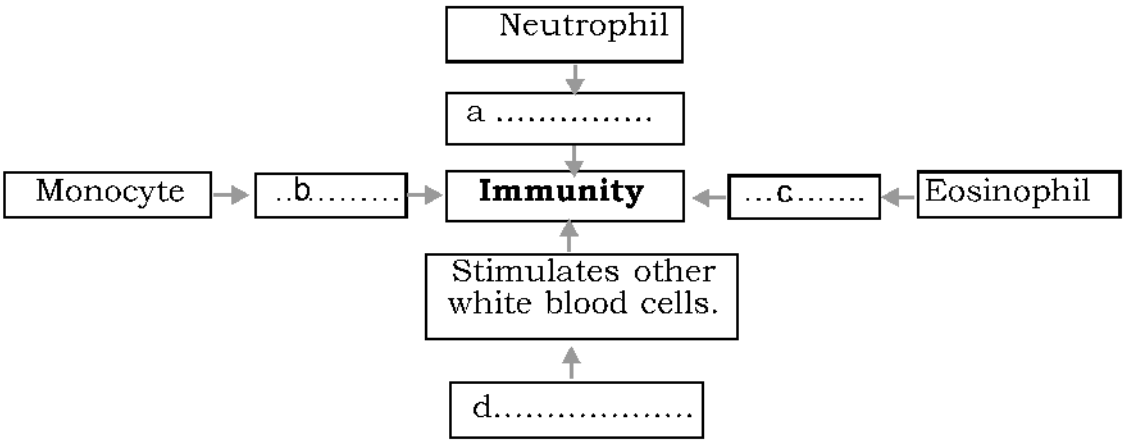
a. When a foreign antigen reaches one's blood, it stimulates defense activity. As a result, the antigen present in the received blood and antibody in the recipient's blood will react each other and form a blood clot. Hence, everyone cannot receive blood from all blood groups.

Learning outcome

Explains how white blood cells act against pathogens

Activity

Complete the illustration:



Scoring indicators

a. Engulfs and destroys the bacteria, produces chemicals that can destroy bacteria.
b. Engulfs and destroys germs.
c. Produces chemical substances that destroy foreign bodies. Produces chemical substances needed for inflammatory response.
d. Basophil.

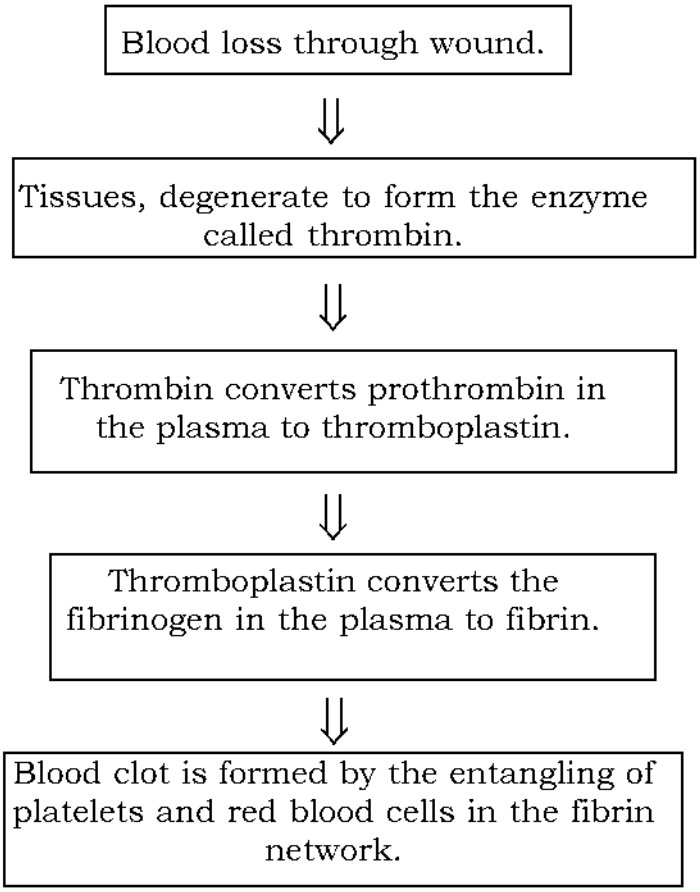
ADDITIONAL QUESTIONS

1. Identify the odd one. Mention the common features of others.

   a. Cardiology, ECG, Neurology, E.N.T

   b. EEG, ECG, B.C.G, C.T. Scaner

2. Different stages of blood clotting is given as flow chart. Make Corrections if necessary:-



3. White blood cells play an important role in specific defense mechanism.
   a. Which are the white blood cells that act as part of specific defense mechanism?
   b. Where does it mature?
   c. What is the role of antibodies in specific defense mechanism?

4. Complete the table related to modern diagnostic tools.

Equipment	**Use**
.....(a).....	to get three-dimensional visuals of internal organs.
C.T.Scanner	.....(b).....
Ultra Sound Scanner	.....(c).....
.....(d).....	to record electric waves in the brain.

5. Statements related to defense mechanisms in plants are given below. Name the terms related to the statements.

   a. Waxy coating in the epidermis of leaf and stem - .....
   b. Prevents the entry of germs which have crossed the cell wall - .....
   c. Chemical substances provide rigidity to the cell wall - .....

6. "Prevention is better than cure"
   a. What are the precautions to be taken to prevent diseases?
   b. List the various systems of medicine for the treatment of diseases?

7. Blood groups of Siva, Prabha & Nivedh are given below. Complete the following table by analyzing the information:

   Siva – Blood group with three antigen.

   Prabha – Blood group without antigen.

   Nivedh – Positive Blood group having A antigen.

Name	Blood group	Antigen (A /B/ D)	Antibody(a/b)	Blood group/ groups which can be received
Siva				
Prabha				
Nivedh				

8. Make corrections if any, in the statements related to inflammatory response.
   a. The cells that get damaged by a wound produce certain chemical substances which start inflammatory response.
   b. Dilate the blood vessels.
   c. Platelets from the blood vesssel reach the wound site.
   d. Lymphocytes destroy the germs by engulfing them.

9. The scars of a cycle accident were totally disappeared from Prabha's hand, but scar of burning remains evenafter 10 years. What explanation would you give for these two situations?

10. Identify the word pair relationship and fill the missing word. Mention the relation between pairs.

    a. Destroy the bacteria by disintegrating their cell membrane : B Lymphocytes.
    Capable of destroying cancer cells and cells affected by virus: .....

    b. C.T. Scanner : X ray :: Ultra Sound Scanner : .....

11. Doctor suggested blood transfusion for Nandu who met with an accident. "Nandu can receive only same blood group as his blood contains both antibodies"

    a. What is Nandu's blood group?

    b. What is the basis of blood grouping?

    c. Blood groups are classified as positive and negative. What is the basis of this?

12. Modern diagnosis provides accurate information about diseases. What are the diagnostic methods /instruments used to find out the following diseases?

Diseases /condition	Equipments used for diagnosis
Variation in Heart beat.	.....and.....
High Blood Pressure.	.....
Epilepsy .	.....

13. "Raju takes antibiotic in all disease conditions without the prescription of doctor".
    Is it a good practice? Justify your answer.

14. By observing a swelling in the wounded part of Ramu, friend said "Germs are the reason for swelling."

    Do you agree with this statement? Why?

15. On the way to school, Amal was bitten by a dog. When he reached the hospital, bleeding from wound had been stopped. The doctor suggested dressing of wound and rabies vaccination.

    a. List out all defense mechanisms related to this casuality.

    b. Which is the induced immunity among them?

    c. What is the importance of vaccination?

16. Blood clot is the continuous activity of enzymes and proteins.

    a. Which enzyme starts the process of blood clotting?

    b. What are the proteins involved in blood clotting?

    c. What are the roles of vitamin K and calcium ions in blood clotting?

17. "Germs and their toxins are used as vaccines. So vaccination is not advisable".

    Some people spread such news through social medias.

    As a science student, what is your opinion about this news? Justify.

18. The table related to specific defense and white blood cells are given below. Arrange them in the correct order.

Defense activity	**White Blood Cells**
Produces chemical substances that destroy foreign bodies.	Neutrophil
Produces chemicals that can destroy bacteria.	Basophil
Stimulates other white blood cells.	Lymphocyte
	Eosinophil

19. Raju: "Fever is an immune response mechanism."

Anu: "Fever need not be treated."

What is your opinion about the statements? Explain.

20. Select the correct instructions related to blood donation.

(a) People in the age group 15 -60 can donate blood.

(b) Blood donation can be done once in three months.

(c) Blood donation causes problem to the donor's health.

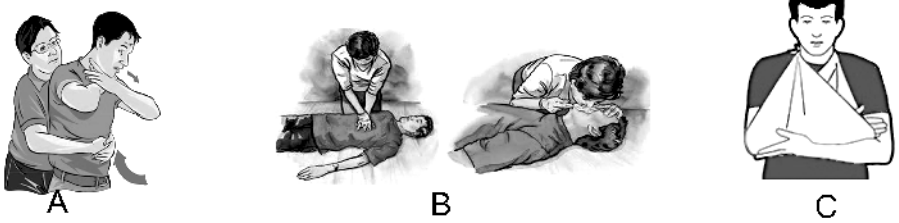
(d) Pregnant women and breast feeding mothers should not donate blood.

(e) Persons with communicable diseases (transmitted through blood) should not donate blood.

21. Name the diseases against which the following vaccines are used.

(a) O.P.V (b) Pentavalent (c) M.M.R.

22. The given pictures indicating first aid given to victims who were met with accidents.



A B C

(a) Identifying the given methods of first aid.

(b) From the above said methods of first aid, choose suitable first aids to be given to the victims in the following situations.

(i) Getting electric shock.

(ii) Fracture in the arm, while playing.

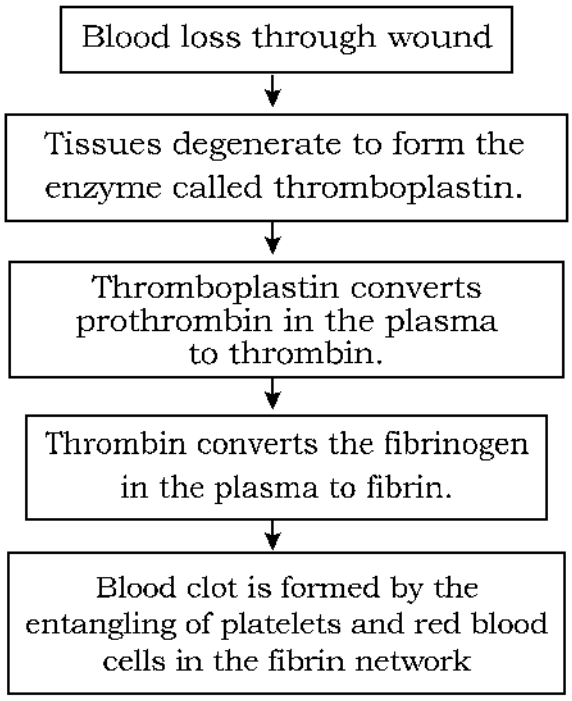
(iii) Food traped in the trachea while eating.

(iv) To save the life of a victim who drown in water.

Answer Key

1. a. ECG, others are specialization in modern medicine.
   b. B.C.G, others are equipments of modern diagnostic tools.

2.



3. a. B lymphocytes and T lymphocytes
   b. B lymphocytes- bone marrow , T lymphocytes – thymus gland.
   c. Antibodies destroy the pathogen in three different ways.
   (i) Destroy the bacteria by disintegrating their cell membrane.
   (ii) Neutralise the toxin of the antigens.
   (iii) Destroy the pathogens by stimulating other white blood cells.

4. a. MRI Scanner (Magnetic Resonance Imaging Scanner)
   b. to get three-dimensional visuals of internal organs with the help of computer, using X-rays.
   c. to understand the structure of internal organs using ultrasonic sound waves.
   d. Electro Encephalo Gram (EEG)

(

(ഡി) ഇലക്ട്രോ കാർഡിയോ ഗ്രാം

5. a. Cuticle b. Callose c. Lignin, Cutin, Suberin
6. a. Nutritious Food, Good hygiene, Proper Life style, Vaccination etc
   b. Allopathy , Ayurveda , Homeopathy ,Unani etc.
7.

Name	Blood Group	Antigen(A /B/ D)	Antibody(a/b)	Blood group/ groups which can be received
Siva	AB+ve	A,B,D	-	All groups
Prabha	O -ve	-	a,b	O -ve
Nivedh	A+ve	A,D	b	A,O

8. a,b - No correction.
   c. White blood cells from the blood vessel reach the wound site.
   d. WBC/ Neutrophil /Monocyte destroy the germs by engulfing them.
9. In cases when new tissues cannot be formed, the connective tissue heals the wound. In such situations, the wound scar remains.
10. a. T lymphocytes, Lymphocytes and their function.
    b. Ultrasonic waves, Equipment for diagnosis and their working mechanism.
11. a. O Group
    b. Presence of antigen A, antigen B.
    c. Antigen D/ Rh factor
12.

Diseases /condition	Equipments used for diagnosis
Variation in Heart beat	Stethoscope and ECG
High Blood Pressure	Sphygmomanometer
Epilepsy	EEG

13. It is not proper to use antibiotics without the prescription of a doctor. Their regular use brings many side effects
    · develops immunity in pathogens against antibiotics.
    · destroys useful bacteria in the body.
    · reduces the quantity of some vitamins in the body.
14. Agree with this statement.
    The cells that get damaged by a wound or an infection produce certain chemical substances. These substances dilate the blood vessels and thereby increasing the blood flow.

15. a. Blood clotting, Inflammatory response, Phagocytosis, Vaccination
    b. Vaccine.
    c. Many incurable diseases can be prevented by acquiring induced immunity .

16. a .Thromboplastin

    b. Prothrombin , Fibrinogen

    c. Thromboplastin converts prothrombin in the plasma to thrombin in the presence of calcium ions and vitamin K.

17. Dead germs or their toxins or neutralized pathogens are used as antigens in vaccines. Many incurable diseases can be prevented by acquiring induced immunity.

18.

Defense activity	**White Blood Cells**
Produces chemical substances that destroy foreign bodies.	Eosinophil
Produces chemicals that can destroy bacteria.	Neutrophil
Stimulates other white blood cells.	Basophil

19. Fever is a defense mechanism of the body. Rise in body temperature reduces the rate of multiplication of pathogens. If the rise in body temperature persists for a long time, it may badly affect the internal organs including the brain. Hence it is necessary to seek medical assistance immediately.

20. b,d,e

21. (a) O.P.V - Polio (b) Pentavalent - Diphtheria, Tetanus, Pertussis (whooping cough), Hepatitis B and Haemophilus influenzae type b (c) M.M.R. -Measles, mumps, and rubella (German measles)

22. (a) A- Removing objects stuck in trachea. B - Giving artificial respiration C- Arm supported by sling
    (b) (i),(iv) - Giving artificial respiration
    (ii) - Arm supported by sling.
    (iii) Removing objects stuck in trachea.

UNIT TEST

5 Soldiers of Defense

Time : 40 Mts.
Score : 20

Answer all questions from 1 to 3. Each question carries 1 score (3x1 = 3 Score)

1. Identify the word pair relationship and fill the missing word. Mention the relation between pairs.
   Neurology: Treatment of nervous disease : Cardiology : .....
2. Which of the given blood group contains Antigen D?
   (i) A -ve (ii) AB +ve (iii) O-ve (iv) B –ve
3. Identify the odd one. Mention the common features of others
   B.C.G., T.T., O.P.V.,EEG

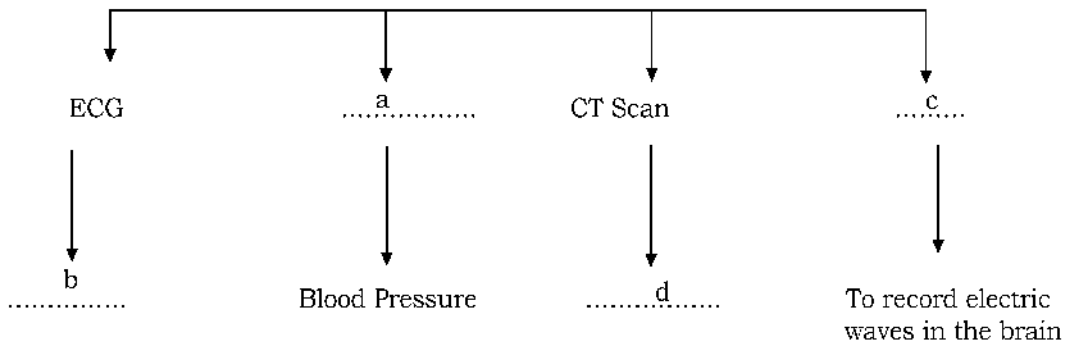
Answer any four questions from 4 to 8 . Each question carries 2 score (4 x 2 =8 Score)

4. Skin is the largest organ in our body. How does the skin participate in defense mechanisms?
5. Vitamin K and calcium ions are essential for blood clotting.
   a. What is the importance of Vitamin K and calcium ions in blood clotting?
   b. Which is the blood cell that helps blood clotting?
6. Words related to defense system is given in the box below. Make suitable pairs.

> Phagocytosis, Defense mechanism in plants, Lymphocytes, Nonspecific defense, Callose, Induced immunity, Vaccines, Specific defense.

7. Complete the illustration.

Instruments for diagnosis



Answer Key

Qn. No	Scoring indicators	Score
1.	Treatment of heart , specialization and related areas	1
2.	(ii)AB +ve	1
3.	EEG, Others are vaccines	1
4.	A protein called keratin makes the skin a thick fort which prevents germs from entering it. Sebum produced by sebaceous glands and some acids in the skin are also disinfectants.	2
5.	a. Thromboplastin converts prothrombin in the plasma to thrombin in the presence of calcium ion and vitamin K.	1
	b. Platelets	1
6.	Phagocytosis – Nonspecific defense Callose – Defense mechanism in plants Lymphocytes – Specific defense mechanism Vaccines - Induced immunity	2
7.	a) Sphygmomanometer b) To record electric waves in the heart muscle. c) EEG d) To get three-dimensional visuals of internal organs.	2
8.	a. Produces chemical messages. b. White blood cells from the blood vessel reach the wound site.	1 1
9.	**Nonspecific defense mechanism** / **Specific defense mechanism** Bleeding from wounded tissue. / Lymphocytes destroy bacteria that enter Swelling in the wounded parts. / in the blood. Phagocytosis.	3
10.	(i)Phagocytosis	1
	(ii) Phagocytes reach near the pathogens → Engulfs pathogen in the membrane sac → Lysosome combines with membrane sac → The pathogens are degenerated and destroyed by the enzymes in lysosome	2
11.	a. Bark	1
	b. Defends the attack of microorganisms.	1
	c. Prevent the entry of germs which have crossed the cell wall,through the cell membrane.	1
12.	(a) A- Epidermis B- Sebaceous gland C - Sweat gland (b) Epidermis : A protein called keratin present here prevents the entry of germs. Sebaceous gland : Sebum produced by the gland makes the skin oily and water proof. Sweat gland : The disinfectants present in the sweat produced by this gland destroys the germs.	3

Unit 6

UNRAVELLING GENETIC MYSTERIES

CONCEPTS:

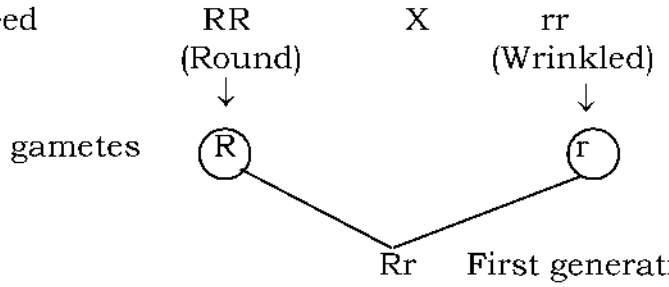
- The similarities and differences between parents and offsprings.
- Heredity, Variation, Genetics.
- Mendel's experiment and contributions
- Gene - Allele.
- Chromosomes in Humans.
- Basis of variations.
- Structure of DNA .
- Gene Action.
- Differences between DNA and RNA .
- Crossing over in chromosomes.
- Sex determination in Humans.
- Scientifically, all men are of the same race.

Learning Outcome

- Utilizes hybridization experiments to explain the inheritance of hereditary characters.
- Differentiates and explains gene and allele.

Activity

Observe the illustration and write down the answers.



a) Which is the recessive trait in first generation?

b) How does the parental plant with round shaped seed and the plant in the first generation differ in their alleles?

Scoring indicator

a) Wrinkled.

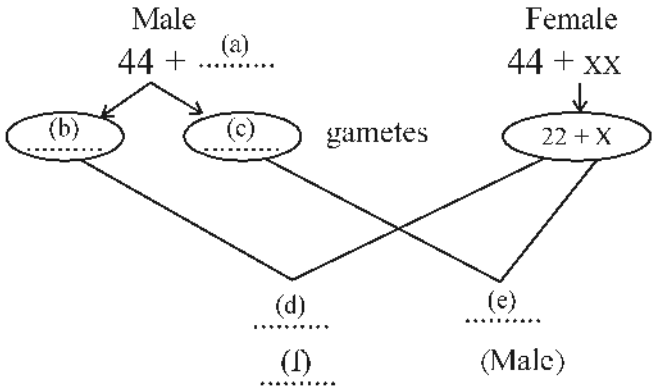
b) Parental plant -RR, First generation-Rr

Learning outcome

Illustrates what determines sex in humans.

Activity

Complete the illustration



Scoring indicator

a) XY

b) 22 + X

c) 22 + Y

d) 44 + XX

e) 44 + XY

f) Female

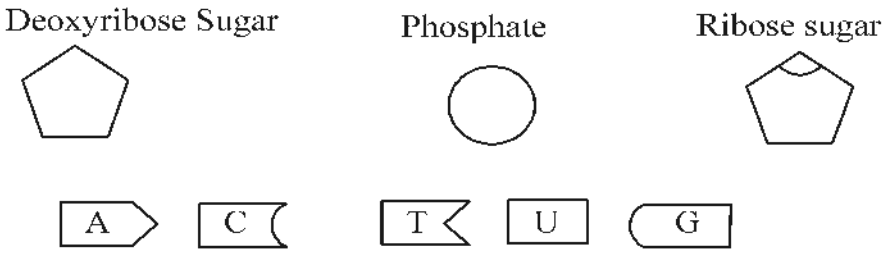
Learning outcome

- Explains the structure of DNA.
- Compares DNA and RNA and lists similarities and differences

Activity

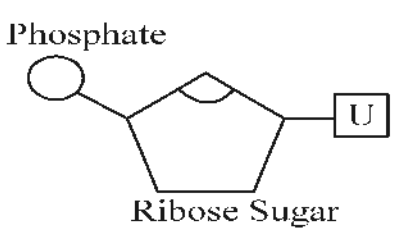
The components of nucleic acids are given below. Using these

components illustrate specific RNA nucleotide and specific DNA nucleotide.

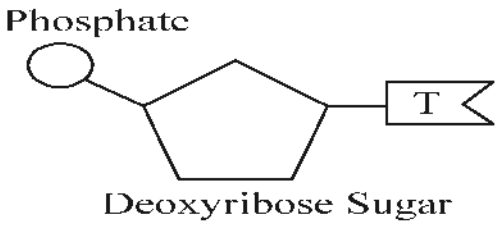


Scoring indicator

RNA Nucleotide



DNA Nucleotide



Learning outcome

Utilizes hybridization experiments to explain the inheritance of hereditary characters.

Activity

Find the odd one. Write the common feature of others.

a) TTRR, TtRr, TtRR, ttRr

b) TTYY, Ttyy, TtYy, TTYy

c) TTAa, TtAA, TTaa, TtAa

Hints:

T - Tall t - Dwarf R - Round seed r - Wrinkled seed

Y - Yellow fruit y - Green fruit A - Axial flower a - Terminal flower

Scoring indicator

a) ttRr - Others are tall with Round seed.

b) Ttyy - Others are tall with yellow fruit.

c) TTaa- others are tall with Axial flowers

ADDITIONAL QUESTIONS

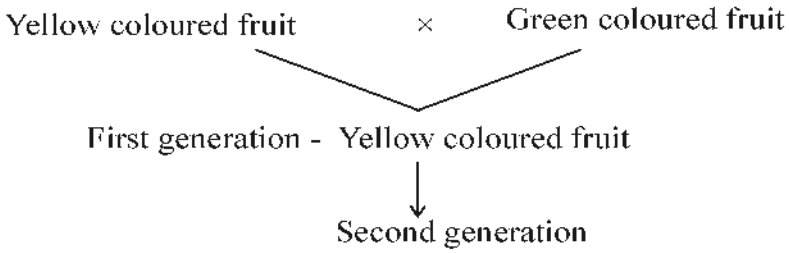
1. Select the correct nitrogen base pairs from the following:-
   Adenine - Guanine
   Adenine - Thymine
   Cytosine - Thymine
   Guanine - Cytosine

2. Variations are due to certain processes taking place in the initial phase of meiosis.
   a) Analyse the statement and identify the process.
   b) How does this process cause variations?

3. Protein synthesis takes place by the combined action of different RNAs. Write the name and functions of different RNAs.

4. Identify the word pair relationship and fill in the blanks appropriately. Mention the relation between pairs.
   Male : 44 + XY
   Female: .....

5. Analyse the hybridization experiment carried out by Mendel and answer the questions given below.

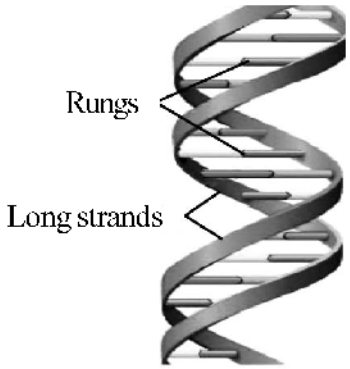


   a) Identify the dominant and recessive traits in first generation.
   b) What are the characters expressed in the offsprings of the second generation obtained by the self pollination of first generation plants? Write the ratio.
   c) What are the inferences formulated by Mendel after observing second generation plants?

6. The skin colour is an adaptation to live under sun. This is the opinion of Anu in a debate conducted in the class.
   a) Name the pigment protein which imparts colour to skin.
   b) Write the reason for the difference in the colour of skin.
   c) Write your opinion about racial differences based on the skin

colour.

7. Observe the illustration and answer the questions given below.



a) Name the scientists who proposed this double helical model of DNA.

b) Name the components with which the long strands of DNA is made up of.

8. Some of the contrasting traits in pea plants selected by Gregor Johann Mendel for his experiments are given below. Complete the table.

Parental plants	**First generation**	**Dominant trait**	**Recessive trait**	**Second generation (Ratio)**
Position of flowers Axial × Terminal	Axial flowers	.....(a).....	.....(b).....	3 Axial : 1 Terminal
Shape of seeds Round × Wrinkled	....(c).....	Round	Wrinkled	.....(d).....
Colour of seed coat Green × Yellow	Green coloured seed coat	Green colour	.....(e).....	.....(f).....

9.. Protein synthesis is controlled by the genes present in DNA. Then what is the role of RNA?- Write scientific explanation about Manu's doubt.

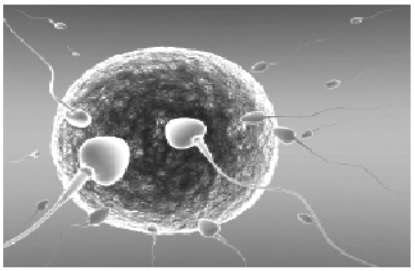
10.. The allele combination given below is about the plant in the first generation, formed as a result of the hybridization between grey coloured round seeded pea plant and white coloured wrinkled seeded pea plant.

GgRr (First generation)

a) Identify the alleles of the plant related to the trait 'Shape of the seed'.

b) Identify the gametes formed from this plant.

11. Observe the figure and answer the questions given below:-



(a) Identify the process.

(b) How does this process bring variation in offsprings?

Scoring Indicator

1. Adinine - Thymine
   Guanine - Cytosine
2. a) Crossing over of chromosomes
   b) • Part of a DNA crosses over to become the part of another DNA.
   • This causes differences in the distribution of genes.
   • When these chromosomes are transferred to the next generation, new characters are expressed.
3.

Types of RNA	Function
mRNA	Carries information from DNA to ribosomes and controls the protein synthesis.
tRNA	Carries aminoacids to ribosomes.
rRNA	Associated with ribosomes, also have a role in protein synthesis.

4. 44 + XX, Genetic mechanism in humans.
5. a) Dominant trait - Yellow coloured fruit
   Recessive trait - Green coloured fruit
   b) Yellow coloured fruit, green coloured fruit

Ratio - 3 : 1

c) • A character is controlled by the combination of two factors.
- In the first generation one trait is expressed and other trait remains hidden.
- The trait that remains hidden in the first generation appears in the second generation.
- The ratio of the dominant and recessive traits in the Second generation is 3:1

6. a) Melanin.

b) Due to the difference in gene function.

c) • Skin colour is an adaptation to live under the sun.
- Races among mankind are only cultural .
- Scientifically all men are of the same race.
- Consider all men as equal without any racial differences.

7. a) James Watson.

Francis Crick.

b) Deoxyribose sugar.

Phosphate.

8. (a) Axial (b) Terminal (c) Round seed (d) 3 Round : 1 Wrinkled (e) Yellow coloured seed coat (f) 3 green : 1 Yellow

9. DNA is not directly involved in protein synthesis. RNA is the molecule that carries information from DNA to ribosomes and controls protein synthesis.

10. a) R, r

b) (GR) (Gr) (gR) (gr)

11. (a) Fertilization.
(b) The chromosomes of parents reach the offsprings through gametes. When gametes undergo fusion, the combination of allele changes. This causes the expression of characteristics in offsprings that are different from parents. Thus, fertilization causes variations in the next generation.

UNIT TEST

6. Unravelling Genetic Mysteries

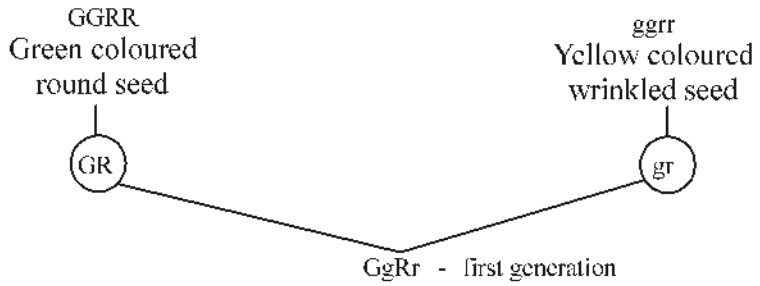
Time : 40 Mts.
Score : 20

Answer all questions from 1 to 3. Each question carries 1 score.
(3 × 1 = 3 Score)

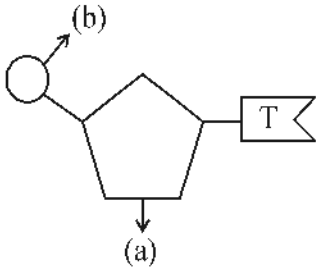
1. Identify the word pair relationship and fill the missing word. Mention the relation between pairs.
   Thymine : DNA
   Uracil : _____
2. Find the odd one and write down the common features of others.
   Phosphate, Sugar, Aminoacid, Nitrogenbase.
3. Select the correct answer.
   Protein synthesis takes place in.
   A) Ribosome B) tRNA C) Nucleus D) DNA

Answer any four questions from 4 to 8. Each question carries 2 score **(4 × 2 = 8 Score)**

4. Observe the illustration showing the hybridization experiment conducted by Mendel on traits, and answer the questions below:-



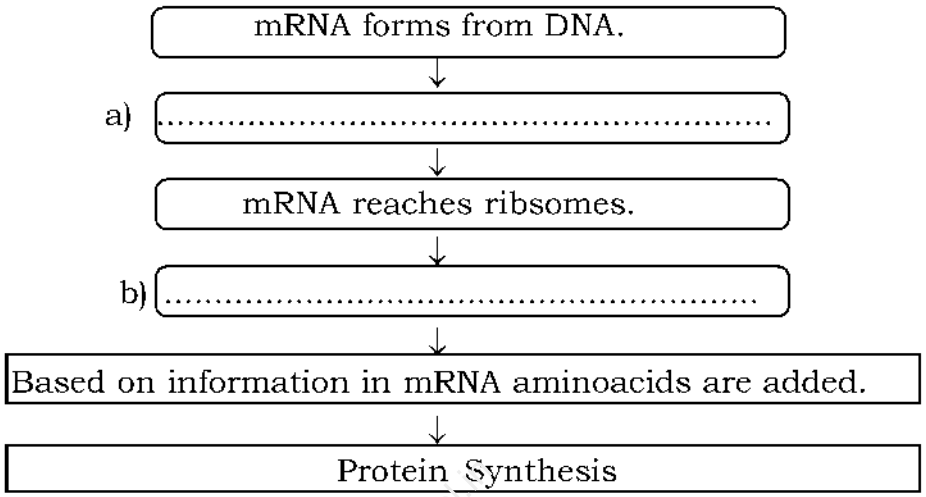
   a) Which are the dominant traits in first generation?
   b) What are the possible characters of pea plants in the next generation?
5. Observe the figure and answer the questions given below.



i) Identify the figure.

ii) Name the parts indicated as a and b

6. Complete the flowchart based on gene action:-



7. It is a common practice in our society to blame woman who give birth to female children only. As a science student, how will you respond to this situation? Substantiate.

8. Observe the figure and answer the questions given below.

a) Identify the figure?

b) Which are the sex determining chromosomes?

Answer any three questions from 9 to 12 Each question carries 3 score. **(3 × 3 = 9 Score)**

9. The features of nucleic acids are given below. Identify them and complete the table.

- Double strand.
- Ribose sugar.
- Thymine, Adenine, Guanine, Cytosine.
- Single strand.
- Uracil, Adenine, Guanine, Cytosine.
- Deoxyribose sugar.

DNA	RNA

10. Observe the illustration and answer the questions given below.

a) Identify the process.

b) How does this process bring variation in the offsprings?

11. Complete the table

GgRr X GgRr

Green coloured round seed — Green coloured round seed — (First generation self pollination)

	GR	Gr	gR	gr
GR	GGRR	GGRr	GgRR	(a)
Gr	GGRr	GGrr	GgRr	(b)
gR	GgRR	GgRr	ggRR	(c)
gr	(d)	Ggrr	(e)	(f)

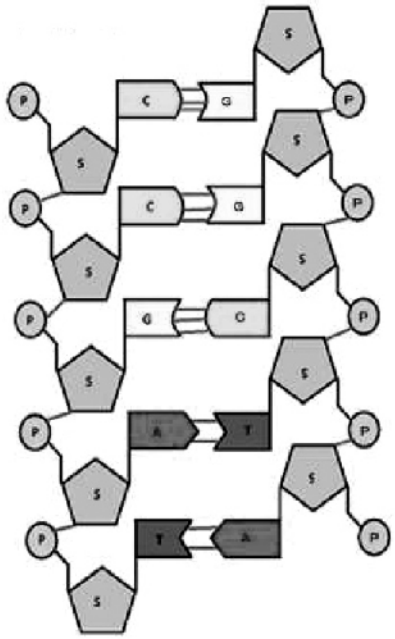
12. Illustrate the structure of DNA molecule using the given components.

a) Which are the components of long strand?

b) Name the basic unit of DNA.

Answer Key

Qn No.	Scoring Indicators	Score
1.	RNA -Nucleic acids and nitrogen base	1
2.	Aminoacids, othes are the components of nucleotide.	1
3.	(A) Ribosome	1
4.	a) Green coloured round seed b) Greeen coloured round seed Green coloured wrinkled seed Yellow coloured round seed Yellow coloured wrinkled seed	2
5.	i) Thymine nucleotide ii) a) Deoxyribose sugar b) Phosphate	2
6.	a) mRNA reaches outside the nucleus. b) tRNA carries aminoacids to the ribosomes.	2
7.	It is not fair to criticize. The possibility for the birth of male and female is equal. The Y chromosome of the father determines whether the child is male or female.	2
8..	a) Chromosome b) X Chromosome Y Chromosome	2
9.	**DNA** / **RNA** * double strand / * Single strand * Deoxyribose sugar / * Ribose sugar * A, T, C, G / * A, U, C, G	3
10.	a) Crossing over of chromosome	1

	b) Part of a DNA crosses over to become the part of another DNA.This causes differences in the distribution of genes. When these chromosomes are transferred to the next generation, new characters are expressed.	2
11.	a) GgRr (b) Ggrr (c) ggRr (d) GgRr(e) ggRr (f)ggrr	3
12.		
	a) Deoxyribose sugar, Phosphate b) Nucleotides.	3

Unit 7

GENETICS FOR THE FUTURE

Concepts

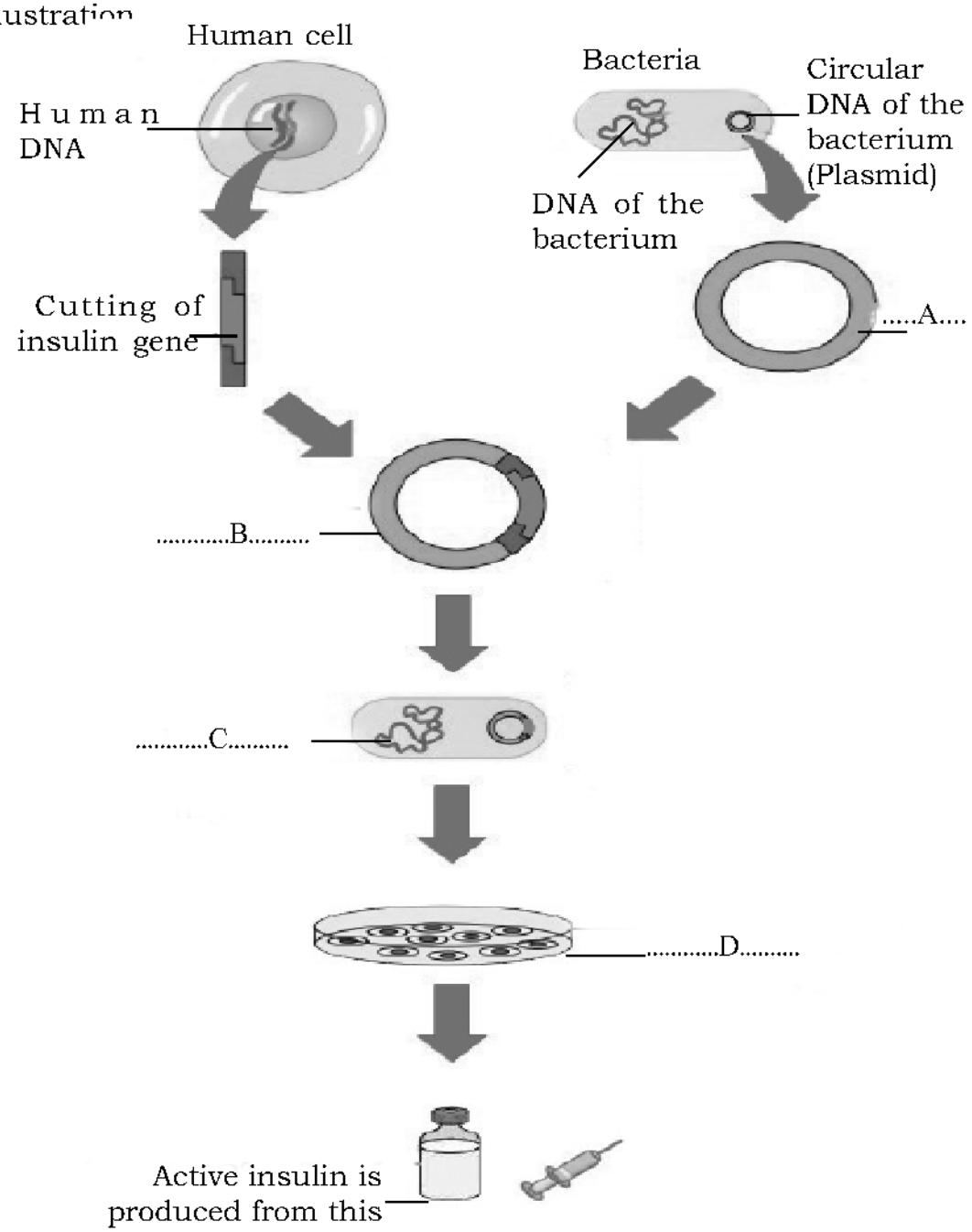
- The growth of Genetics
- Traditional biotechnology
- Modern biotechnology
- Genetic engineering
- The production of aritificial insulin
- DNA Finger printing
- Production of medicines from animals
- Human genome project
- Gene therapy
- Scope of genetic engineering
    - Genetically modified animals and crops
    - Gene Therapy
    - Medicines
    - Forensic test
- Misuse of Genetic engineering
    - Bioweapons, Biowar
    - Genetic modifications

Learning outcome

Presents with evidences that organisms with desirable qualities can be produced through genetic engineering.

Activity

The stages in the production of bacteria that are capable of producing insulin through genetic engineering, are illustrated below. Complete the illustration



Scoring indicator

A. Isolation of plasmid B. Joining insulin gene with plasmid C. Plasmid with ligated insulin gene is inserted in to bacterial cell D. Bacteria that multiply in the culture medium produce inactive insulin.

Learning outcome

Gives example for DNA finger printing and its uses

Activity

Information related to DNA finger printing are illustrated below. Complete the illustration suitably.

Basic principle of DNA finger printing.	⇒	A .....
The technology of testing the arrangement of nucleotides.	⇒	.....B.....
The arrangement of nucleotides are more similar in	⇒	C .....
DNA testing is otherwise known as	⇒	D .....
The exponent of this technology is	⇒	.....E.....

F

The uses of this technology are
a. To identify parents
b. .....
c. .....
d. .....

⇒

G

The body parts which help to identify persons
a. part of skin
b. .....
c. .....
d. .....

Scoring indicator

A. The arrangement of nucleotides in each individual differs.

B. DNA profiling

C. Close relatives

D. DNA Finger printing

E. Alec Jeffrey

F. b) To identify the persons missing due to natural calamities.

c) To identify the war victims.

d) To identify criminals.

G. b) Hair

c) blood

d) Saliva

Learning outcome

- Explains how human genome project and gene mapping becomes beneficial for the sustenance of human beings.
- Explains gene therapy and its scope.

Activity

Table related to human genome project is given below. Choose suitable words from box and complete the table

	A	B
A	The technology used to identify the location of a gene in the DNA	.....
B	The sum of genetic material present in an organism	.....
C	The Non functional genes in a DNA	.....
D	Cure genetic disease by removing disease causing genes from the genome and inserting normal functional genes.	.....
E	The year in which Human genome project started	.....

Gene therapy, `1990, Junk genes, Genome, Gene Mapping, Finger printing, 2003

Scoring indicator

A – Gene Mapping

B – Genome

C – Junk genes

D – Gene therapy

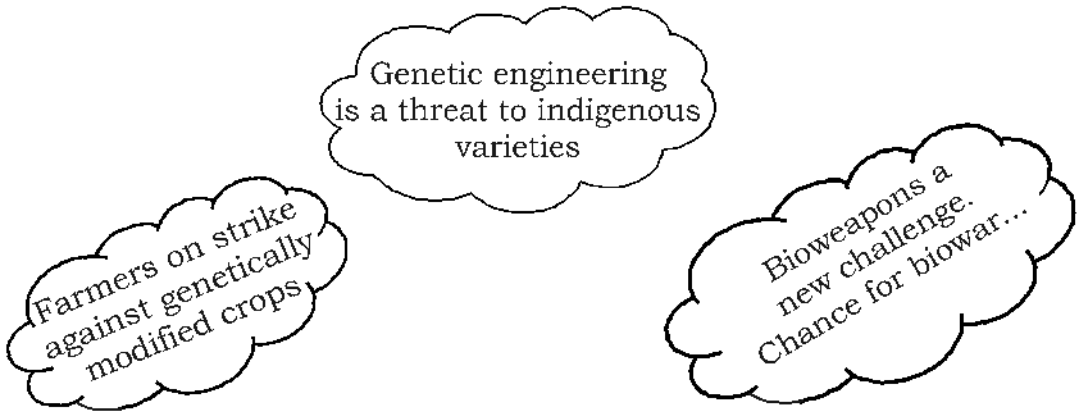
E – 1990

Learning outcome

Develops an attitude against the misuse of genetic engineering and engages in awareness programmes.

Activity:

Analyse the collage and answer the questions given below.



a. What are the threats mentioned in the collage?

b. Can we encourage biotechnology? Substantiate the statement.

Scoring indicator

a. Genetically modified crops became a threat to indigenous varieties. It is argued that the products obtained from genetically modified crops may cause health problems.

Genetically modified pathogens may be used as bioweapons and this become a threat to the existance of human beings. There is posibility of misusing bacteria like super bugs.

b. Production of high yielding varieties of cash crops, food crops, cattle breeds, ornamental fishes, and gene thereapy are the achievements of biotechnology. So it would be encouraged. At the same time we should be vigilant against its misuse.

ADDITIONAL QUESTIONS

1. Identify the word pair relationship and fill the missing word. Mention the relation between pairs.

   Genetic glue : Ligase

   Genetic scissors : ————

2. Find out the correct statements.

   A. The method of selection and rearing of cattle and crops of superior hybrid variety is traditional biotechnology.

   B. The enzyme ligase is used to cut off genes.

   C. The modern biotechnology includes the production of organisms with desired qualities by changing their genetic material.

   D. Viruses can be used for the production of insulin.

   a) A and B are correct b) B and C are correct

   c) A and C are correct d) C and D are correct

3. The vectors used to transfer genes from one cell to another is——

   a) Virus b) Enzymes c) RNA d) Bacterial DNA

4. News report - The child who had been missing for long years is identified with the help of DNA testing.

   What is the basis of DNA Testing?

5. The technology of testing the arrangement of nucleotides is

   A) Genome B) DNA Profiling

   C) Gene mapping D) Gene therapy

6. "One of the future promises of genetic engineering is pharm animals" What is the importance of this concept?

7 "Unable to identify the dead bodies of victims of okhi and related natural calamities" news paper report.

   Can the dead bodies be scientifically identified and returned to relatives? Name the technology which helps this. Who is the exponent of this technology?

8. Observe the picture and write answer to the questions below.

(a) Identify the logo.

(b) Write the relevence of this project.

(c) What are the major findings of this project?

9. "Presently insulin for man is produced by bacteria"- Ammu's doubt on hearing this TV news is given below.

a) Which technology is used for this?

b) Will the future generation of this bacteria have the ability to produce insulin? Why?

Write your explanation for Ammu's doubt.

10. Observe the table below and make suitable pairs.

a. Treatment of genetic disease	1. Gene mapping
b. Sum of genetic material of an organisam	2.Gene therapy
c. Finding out the location of gene in DNA	3. DNA profiling
d. Testing the arrangement of nucleotides in DNA	4. Genome

11. Complete the table.

Protein required for treatment	Disease/Symptom
.....(a).....	Viral diseases
Insulin	.....(b).....
.....(c).....	Pain
Somatotropin	.....(d).....

12. "Bioweapons may be used in future wars", It is the opinion of a biologist. Is there any posibility to this? What is your opinion? What is bioweapon? What is biowar?

13. The Karshaka sree award winner Ramettan said, "If the present scenario continues, our indigenous varieties of vegetables would be wiped out" why did he comment like this? What is your conclusion?
14. A teacher attending a science seminar said "It is posible to convert a milk giving animal into a medicine giving animal, thus we could solve shortage of medicine". Is this concept posible? How?
15. How many genes are present in human genome?
16. The technology that controls traits of organisms by bringing about desirable changes in their genetic constitution is ——

    a) Gene mapping b) DNA profiling

    c) Genome project d) Genetic engineering
17. Can we find out relationships through DNA testing? How?
18. What is the basic principle of gene therapy?

Scoring Indicator

1. Restriction endonuclease, enzymes utilized in genetic engineering
2. (c) A and C are correct
3. d) Bacterial DNA
4. The arangement of nucleotides in the DNA of each person differs. This is the basis of DNA testing. The arrangement of nucleotides among close relatives have many similarities.
5. B) DNA Profiling
6. Genes responsible for the production of human insulin and growth hormones are identified and inserted in animals and transforming them into pharm animals.

   Compared to bacteria, the rearing and management of pharm animals are easy and medicines can be extracted from their blood or milk.
7. Yes. This technology is known as DNA finger printing. Alec Jeffrey is the exponent of this technology.
8. (a) Logo of human genome project.

   (b) The secrets of human genome were revealed. It helped to identify the location of a gene in the DNA responsible for a particular trait by gene mapping. Also helpful in gene therapy.

(c) Human genome has about 24000 functional genes. Major share of human DNA includes junk genes.There is only 0.2 percent difference in DNA among humans.About 200 genes in human genome are identical to those in bacteria.

9. a. Genetic engineering

   b. Yes, genes responsible for producing insulin are transfered to the next generation.

10. a-2, b-4, c-1, d-3

11. (a) Interferons (b) Diabetes (c) Endorphin (d) Growth disorders

12. The statement points out the misuse of genetic engineering. There are chances of biowar. Genetically modified pathogens and pathogens multiplied through biotechnology are used as bioweapons. The method of application of bioweapons upon enemies is called biowar.

13. Ramettan shared the opinion, that genetically modified crops are threat to the indigenous varieties. Bt brinjal, Bt cotton etc are examples. It is also criticised that genetically modified crops and its products may cause health issues to human.

14. The teacher presented the scope of genetic engineering. Genes responsible for the production of human insulin, growth hormone etc. are identified and inserted in animals like cow, pig, etc transforming them into pharm animals.

15. Human genome has about 24000 functional genes.

16. d) Genetic engineering

17. We can find out relationships through DNA testing. The arrangement of nucleotides among close relatives shows more similarities. So this technology is helpful to find out hereditary characteristics, to identify real parents in cases of parental disputes.

18. The sum of genetic material present in an organism is called its genome. We can cure genetic diseases by removing disease causing genes from the genome and inserting normal functional genes. The basis of gene therapy is the identification of location of a particular gene in the DNA.

UNIT TEST

7. Genetics For The Future.

Time : 40 Mts.
Score : 20

Answer all questions from 1 to 3. Each question carries 1 score

(3 × 1 = 3 Score)

1. Identify the word pair relationship and fill the missing word.

   Testing the arrangement of nucleotides : DNA Profiling

   Finding the location of gene in a chromosome: .....

2. Identify the odd one. Mention the common feature of others.

   Gene therapy, Gene mapping, Genome, C.T. scaning

3. Fill up suitably:

   _____ is known as genetic scissors.

Answer any 4 questions from 4 to 8. Each question carries 2 score. **(4 × 2 = 8 Score)**

4. "ATM Robbery - Culprits identified, the blood stain in the ATM machine helped the investigation team" .....

   What is the technology pointing out in the press release? What is its basis?

5. Pharm animals - is there any scientific basis? What are its advantages?

6. Main stages of production of insulin by bacteria are given below. Rearrange them in order.

   a) Plasmid with ligated insulin gene is inserted into bacterial cell.

   b) Cutting the gene responsibile for the production of insulin.

   c) Joining insulin gene with plasmid.

   d) Isolation of plasmid.

   e) Bacteria produce inactive form of insulin.

   f) Producing active insulin.

7. "Genetic engineering is an asset to our food security". The minister for food and agriculture said during a school visit. Do you agree with this statement? Why?

8. Write any two examples of misuse of genetic engineering.

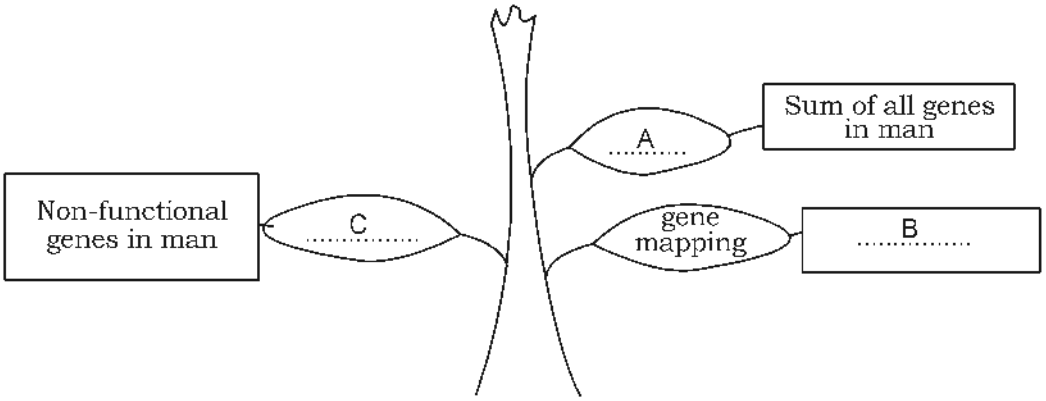
Answer any 3 questions from 9 to 12. Each question carries 3 score. **(3 × 3 = 9 Score)**

9. Human genome project is a remedy for many problems faced by mankind. Explain.

10. Now it is possible to cut, join and transfer genes to desirable cells. What are the various factors responsible for this?

11. Genetic engineering has merits as well as demerits. Explain any three demerits.

12. Complete the missing words in the word tree.



SCORING INDICATOR

Que No		Score
1.	Gene mapping	1
2	C.T. Scaning, others related to genetic engineering.	1
3	Restriction endonuclease.	1
4.	DNA Finger printing. The arrangement of nucleotides in the DNA of each person differs.	1
5.	Yes, have scientific basis. Genes responsible for the production of human insulin and growth hormones are inserted in the genetic constitution of domestic animals and transform them into pharm animals. Medicines can be extracted from the milk or blood of pharm animals.It is easy to manage animals compared to bacteria.	2
6.	b) Cutting the gene responsibile for the production of insulin. d) Isolation of plasmid. c) Joining insulin gene with plasmid. a) Plasmid with ligated insulin gene is inserted into bacterial cell. e) Bacteria produce inactive form of insulin. f) Producing active insulin.	2
7.	High yielding varities of edible crops and cash crops can be developed by genetic engineering. Disease resistant and high yielding varities of domestic animals can be developed. So I agree with the statement of the minister.	1 1
8.	Genetically modified pathogens may be a threat to mankind. The pathogens produced through biotechnology may be used in biowar and will be a great disaster to man kind.	2
9.	The sum of genetic meterial present in an organism is its genome. By removing disease causing genes from the genome and inserting normal functional genes, we can cure genetic diseases. This method of treatment is called gene therapy.	3

10.	In order to cut the genes, restriction endonuclease is used. It is also known as genetic scissors. For joining genes the enzyme ligase is used. It is also known as genetic glue. The vectors used to transfer genes from one cell to another. Plasmids in bacteria are generally used as vectors.	3
11.	1. It is said that genetically modified crops are threat to indigenous varieties. 2. It is criticised that genetically modified crops and their products cause health issues in humans. 3. There is a posibility of using genetically modified pathogens for biowar.	3
12.	A. Genome B. The technology to identify the location of a gene in the DNA. C. Junk genes.	3

Unit 8

THE PATHS TRAVERSED BY LIFE

CONCEPTS

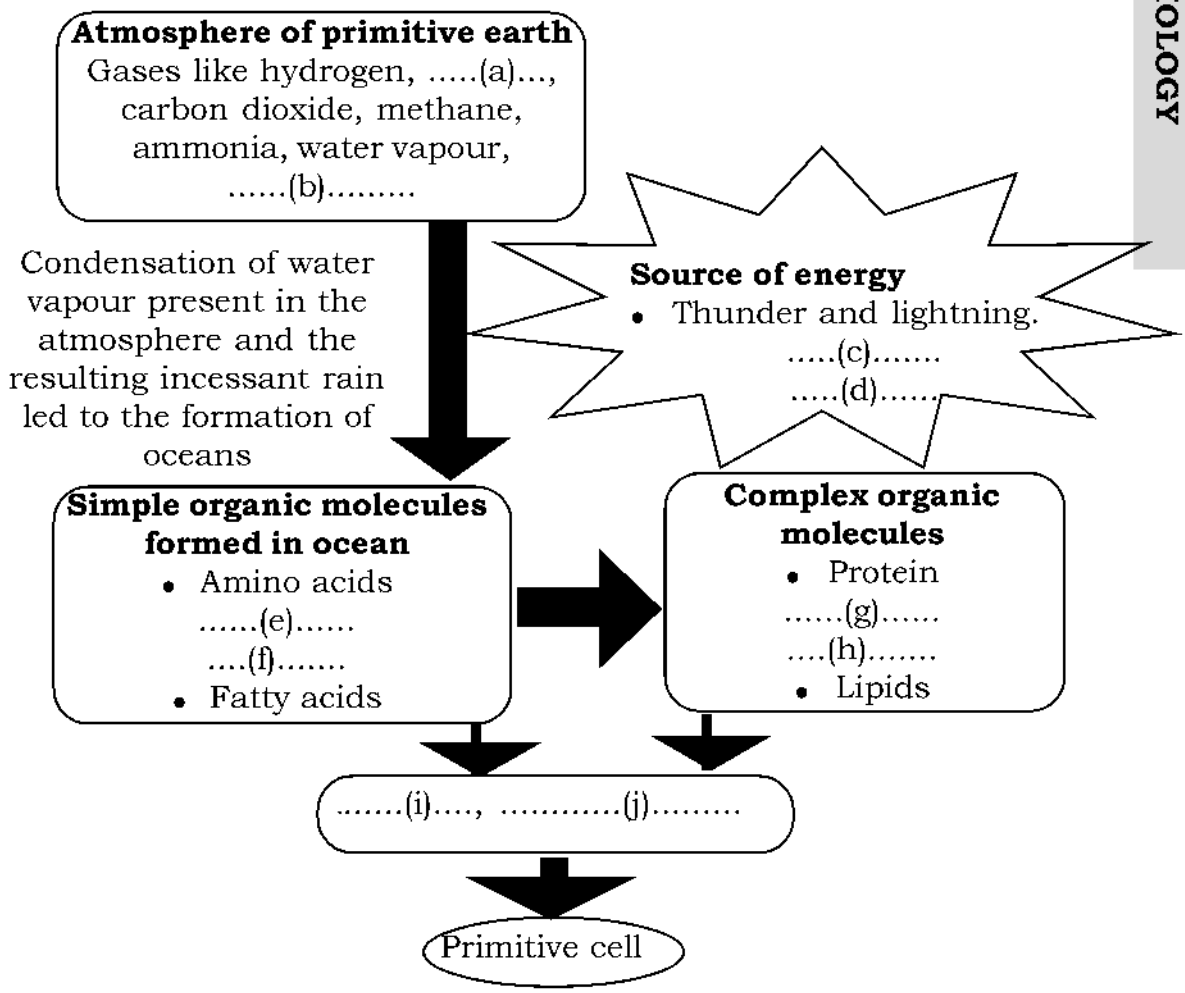
- Theories related to the origin of life on earth which are discussed even today – The Panspermia hypothesis, the theory of Chemical evolution.
- The characters developed during the lifetime of organisms are called acquired characters.
- The theory of natural selection put forth by Charles Robert Darwin is the scientifically logical theory of evolution.
- Neo Darwinism is the modified version of Darwinism, which was revised in the light of new information made after Darwin.
- Evidences of evolution-
  - The study of fossils (Paleontology)
  - Comparative morphological studies
  - Physiology
  - Biochemistry
  - Molecular biology
- Fossils are the remnants of primitive organisms.
- Organs that are similar in structure and perform different functions are called homologous organs.
- Through a comparative study of protein molecules in different species, the evolutionary relationship among organisms can be identified.
- Evolution of human beings.
- Mass Extinction.

Learning Outcome

Illustrates and explains the origin of life on earth.

Activity

Complete the illustration that list the main concepts of the theory of chemical evolution.



Scoring indicator

a. Nitrogen b. Hydrogen sulphide c. Ultraviolet radiations

d. Volcanic eruptions e. Monosaccharide f. Nitrogen bases

g. Ploysaccharide h. Nucleotides i. Nucleic acids

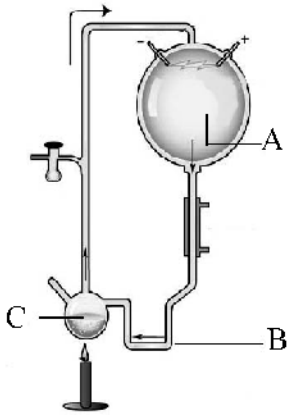
j. lipid layer

Learning Outcome

Illustrates and explains the origin of life on earth.

Activity

The experimental set up created by Harold Urey and Stanley Miller is illustrated below.



a) Which are the chemical components indicated by A,B and C?

b) Name the theory supported through this experiment.

c) What inference was arrived from the experiment?

Scoring indicator

a) A- Methane. Ammonia, Water vapour

B- Amino acids

C- Water

b) Theory of chemical evolution

c) Organic molecules were formed as a result of chemical reactions that occurred in water, under specific conditions of the primitive earth.

Learning outcome

Analyses and explains how fossil studies provide evidence of evolution.

Activity

Fossils obtained from the different layers of rocks clearly indicate the evolution of eukaryotes from prokaryotes.

a) What are fossils?

b) Prokaryotes are one among the primitive organisms. What are the paleontological evidences that support this statement?

c) What inferences do you get from fossil studies?

Scoring indicator

a) Fossils are the remnants of primitive organisms. Fossils may either be the body, its parts or imprints of organisms.

b) The age of fossils can be calculated scientifically. They are categorised on the basis of geological time scale and their peculiarities are studied. The oldest fossils available are those of prokaryotes that lived 3.5 billion years ago.

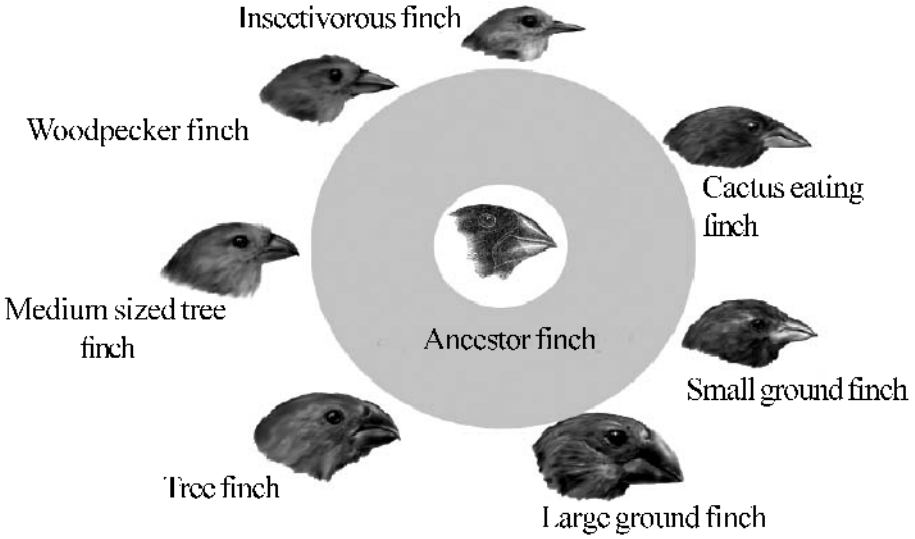
c) Primitive fossils have simple structure. Recently formed fossils have complex structure. Certain fossils are connecting link between different species.

Learning Outcome

Analyses major theories of evolution and explains their merits and demerits.

Activity

Observe the illustration and answer the questions given below:



a) What are the peculiarities of the beaks of the finches?

b) How do these peculiarities help finches in their survival?

Scoring Indicator

a) 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.

b) The finches had beaks adapted to their feeding habits.

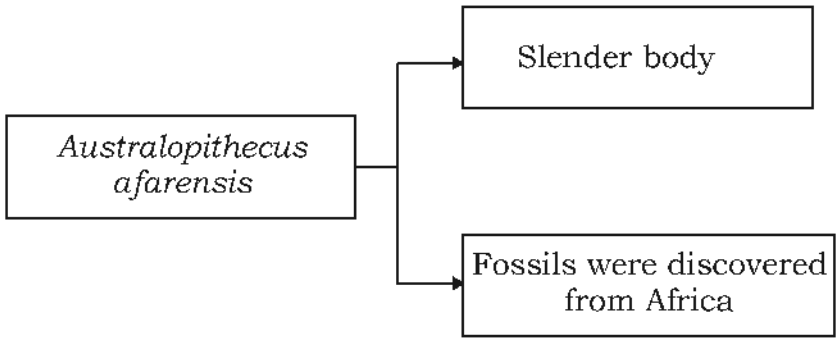
Learning Outcome

Illustrates and explains the major stages of human evolution.

Activity

Illustration related to the organisms that are included in the evolutionary history of man is given below:

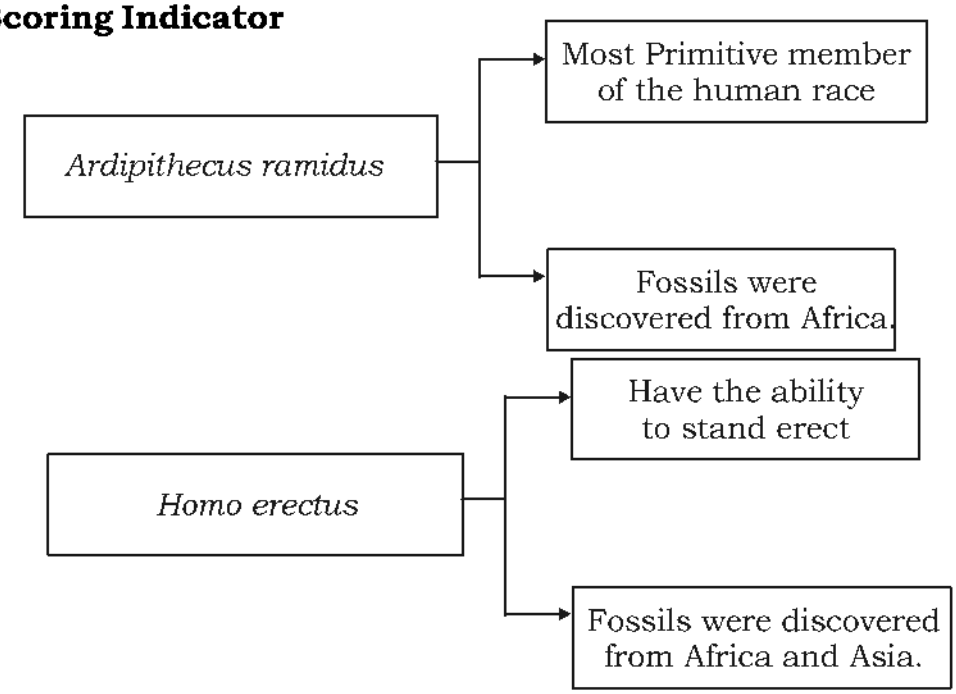
Sample

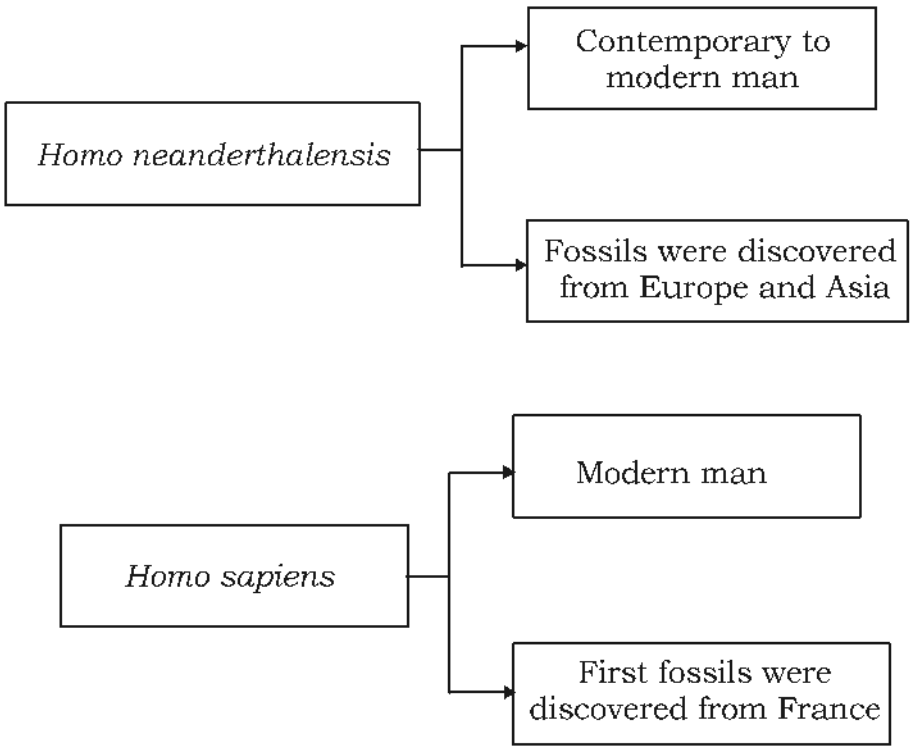


The organisms included in the evolutionary history of modern man is given below. Illustrate them as in the sample.

Ardipithecus ramidus, Homo erectus, Homo neanderthalensis, Homo sapiens

Scoring Indicator





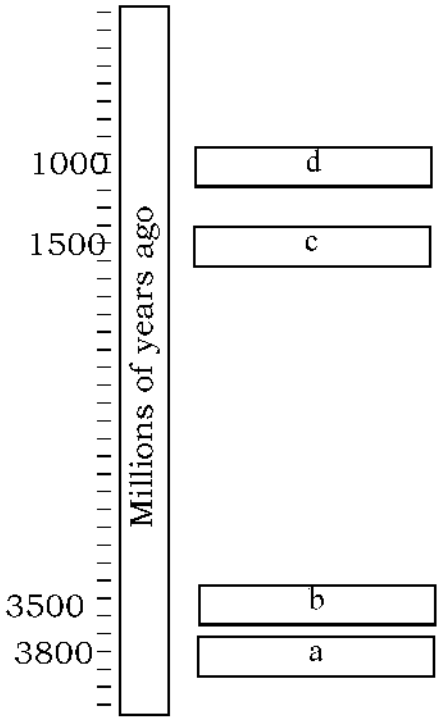
Learning Outcome

Logically explains the evolution of eukaryotes from primitive cells and the evolution of multicellular organisms from eukarotes.

Activity

The major events related to the origin of life are given in the box. Arrange them in the geological time scale suitably.

- Colony of eukaryotes
- Prokaryotes
- Eukaryotes
- Primitive cell
- Multicellular organisms



Geological time scale

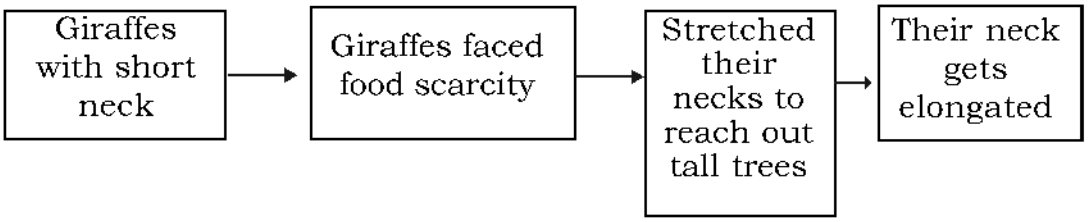
Scoring Indicator

a) Primitive cell (b) Prokaryotes (c) Eukaryotes, Colony of eukaryotes (d) Multicellular organisms

ADDITIONAL QUESTIONS

1. Major concepts of a theory put forth to explain the history of evolution from primitive cell to the existing biodiversity is given below as a flow chart.

   Observe the flow chart and answer the questions.



   a) Name the scientist who put forth this theory.

   b) Which concept was explained through this theory?

   c) What is the significance of this theory?

d) This theory was not accepted by the scientific world. Why?

2. Though different in appearance, human beings and bacteria have a common ancestor. Substantiate the statement.

3. Select the scientist from the box based on the statements given below.

Robert Malthus, Stanley Miller, Charles Darwin, Oparin, Hugo de Vries, Harold Urey, Haldane

a) Formulated the theory of mutation.

b) Scarcity of food led to diseases, starvation and struggle for existance.

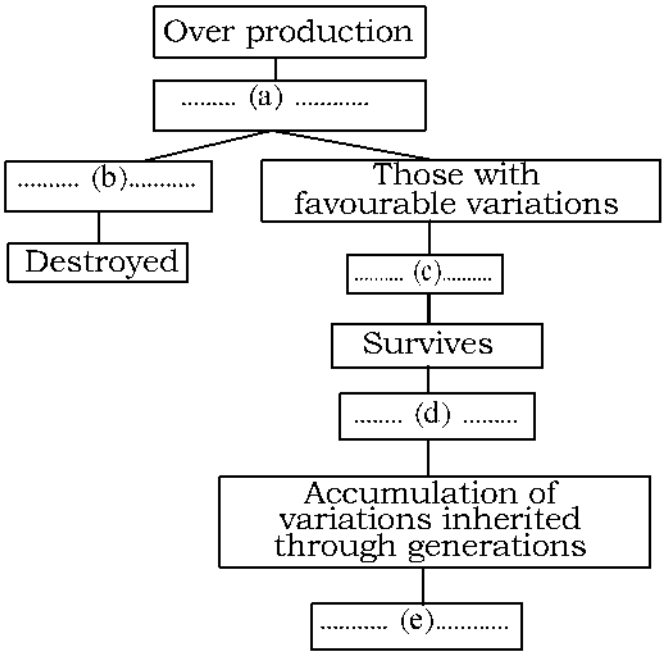
c) Proponents of the theory of chemical evolution.

d) Recreated the atmosphere of primitive earth in their experimental setup.

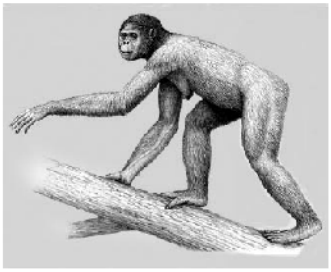
e) The author of " Origin of species by means of natural selection".

4. Explain Mutation theory.

5. Complete the illustration related to the theory of natural selection.



6. The picture of an organism that included in the evolutionary history of man is given below.



a. Name the organism.

b. What is the peculiarity of the organism?

7. An argument based on a theory related to the origin of life is given below in a box.

Life has been originated in some other planet in the universe and accidentally reached the earth.

a. Which is this theory?

b. Write the evidence that supports this argument.

8. The unwise interference of human beings will not destroy the continuity of life on earth. Substantiate the Statement.

9. The organisms in the evolutionary tree are given below.

Chimpanzee, Gibbon, Monkey, Man, Gorilla, Orangutan

a. Arrange them in the order of evolution.

b. Classify the above organisms and write the criteria.

10. Complete the given table showing the major eras related to the origin of life.

Period	Major eras
3800 million years ago	.....(a).....
.....(b).....	Origin of prokaryotes
1500 million years ago	.....(c).....
.....(d).....	Origin of multicellular organisms

Scoring Indicator

1. a. Jean Baptist Lamarck

b. Characters developed during the life time of organisms are

called acquired characters. Accumulation of acquired characters led to the formation of new species.

c. First attempt to present the evolutionary history.

d. This theory was not accepted by the scientific world as the acquired characters were not inheritable.

2. Eventhough bacteria and human beings are different in physical appearance, there are close resemblances in their cell structure and physiology,

i. Enzymes control chemical reactions.

ii. Energy is stored in ATP molecules.

iii. Genes determine hereditary traits.

iv. Carbohydrates, Proteins and fats are the basic substances.

3. a. Hugo de Vries

b. Robert Malthus

c. Oparin , Haldane

d. Harold Urey, Stanley Miller

e. Charles Darwin

4. Sudden changes that occur in genes are called mutations. New species are formed by inheriting such changes.

5. a. Struggle for existence

b. Those with unfavourable variations

c. Natural Selection

d. Favourable variations are transferred to the next generations

e. Origin of new species.

6. a. Ardipithecus ramidus

b. Most primitive members of the human race.

7. a. Panspermia hypothesis.

b. Organic substances identified in meteors that fell on earth.

8. Today we are aware of the challenges raised by climatic changes brought in by human interventions and extinction of organisms. Individuals and organizations are actively participating in programmes for the conservation of nature. Human beings are

capable of foreseeing far-reaching consequences and taking necessary precautions in this regard.

9. a. Monkey, Gibbon, Orangutan, Gorilla, Chimpanzee, Man

b.

Cercopithecoidea	Hominoidea
Monkey	Gibbon, Gorilla, Orangutan, Chimpanzee, Man
Small brain, Long tail	Developed brain, Freely movable hands

10. a. Origin of life on earth.

b. 3500 million years ago.

c. Origin of eukaryotes.

d. 1000 million years ago .

UNIT TEST

8. The Paths Traversed by Life

Time : 40 Mts.
Score : 20

Answer all questions from 1 to 3. Each question carries one score. (3 × 1 = 3 score)

1. Select the correct answer.
   The hypothesis which argues that life has originated in some other planet in the universe and accidentally reached the earth.
   (A) Theory of chemical evolution
   (B) Panspermia
   (C) Mutation theory
   (D) Theory of natural selection
2. Identify the word pair relationship and fill the missing word. Mention the relation between pairs.
   Charles Darwin : Theory of natural selection
   Hugo de Vries : .....
3. Identify the odd one. Mention the common features of others.
   Chimpanzee, Gorilla, Monkey, Gibbon

Answer any four questions from 4 to 8. Each questions carrier 2 score. (4 × 2 = 8 score)

4. Observe the structure of the forelimbs of the given organisms and answer the questions given below.

   a. What is the name of the organs, that are similar in structure but perform different functions?

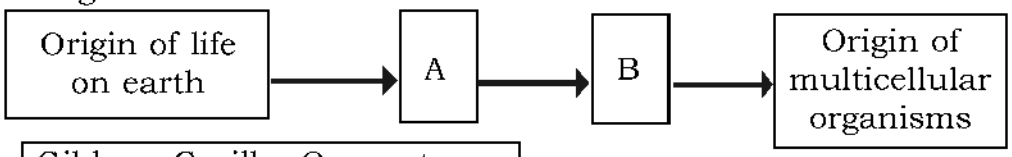
   b. How does the anatomical resemblance of forelimbs of the given organisms support the theory of evolution?

5. Arrange column B in accordance with the data of column A.

A **Organism**	B **Peculiarity**
a. Homo sapiens	(i) Most primitive member of the human race
b. Ardipithecus ramidus	(ii) Contemporary to modern man
c. Homo neanderthalensis	(iii) Modern man
d. Homo habilis	(iv) Thick chin and large teeth
	(v) Made weapons from stones.

6. Theory of chemical evolution was put forth in connection with origin of life.
   a. Name the proponents of this theory.
   b. Mention the major concepts of this theory.

7. Complete the flow chart showing the major stages related to the origin of life.



8. Gibbon, Gorilla, Orangutan
   a. Name the group in which the given organisms belong.
   b. Mention the peculiarities of this group.

Answer any three questions from 9 to 12. Each question carries 3 score. **(3×3 = 9 Score)**

9. "The pond will be over crowded, if all the small fishes grow" – this is the opinion of Raghu on seeing a pond full of small fishes. On the basis of Darwin's theory of natural selection what explanation can you give?

10. Analyse the table and answer the following questions.

Organism	Difference in the amino acids in the beta chain of haemoglobin in man.
Chimpanzee	No change.
Gorilla	Difference of one amino acid.
Rat	Difference of 31 amino acids.

a. Which organism is close to man from the evolutionary point of view?

b. What is the reason for the differences in the amino acids in the haemoglobin?

c. What is the advantage of such comparative studies?

11. The stages related to chemical evolution are given below. Arrange them correctly.

a. Formation of nucleic acids.

b. Formation of simple organic molecules.

c. Formation of primitive cell.

d. Formation of lipid layer.

e. Formation of oceans.

f. Formation of complex molecules.

12. The interference of human beings have a negative impact on the existence of organisms and nature itself.

The above statement is prsented by Sooraj in a debate related to nature club. Evaluate this statement and write down your opinions.

Answer Key

Qn. no.	Scoring/Evaluation keys -	Score
1.	(B) Panspermia .	1
2.	Mutation theory, Theories related to evolution	1
3.	Monkey, others are members of hominoidea	1
4.	a. Homologous organs	1
	b. Anatomical resemblances justify the inference that all organisms are evolved from a common ancestor.	1
5.	a - iii , b - i, c-ii, d -v	2
6.	a. J.B.S. Haldane, A.I.Oparin	1
	b. Life originated as a result of the changes that occurred in the chemical substances in water, under specific conditions of the primitive earth.	1
7.	(A) - Origin of prokaryotes	1
	(B) - Origin of eukaryotes	1
8.	(a) Hominoidea	1
	(b) Developed brain, Freely movable hands.	1
9.	Every species produces more number of offsprings than that can survive on earth. Resources are limited. There is a struggle for existence among organisms. In this competition, those with favourable variation will survive and others will be destroyed.	3
10.	(a) Chimpanzee	1
	(b) Because of the mutations that occur in the genes that determine amino acid sequence in protein molecules.	1
	(c) Molecular studies help to find out the evolutionary relationship among different species of organisms.	1
11.	e, b, f, a, d, c	3
12.	Biodiversity is on a dangerous decline due to the interference of human beings. Climatic changes brought about by human interventions leads to the extinction of organisms. Deforestation, hunting etc leads to envoronmental destruction and loss of biodiversity. Environmental pollution becomes a threat to the environment and living organisms. We must consciously engagae in the protection of environment and organisms. These would help to protest the climate change and save the organisms from their extinction.	3

Sample Question
Biology

Score : 40 Time : 1½ hr

Answer any 5 questions from 1 to 6. Each question carries 1 score. (5 × 1 = 5 Score)

1. Identify the word pair relationship and fill the missing word. Mention the relation between the pairs.

   Planaria : Eye spot

   House fly : .....

2. Select the correct answer.

   The hormone that helps in the reabsorption of water in the kidneys.

   a. TSH b. ACTH c. ADH d. GTH

3. Choose the right pairs.

   a. Nipah - Bacteria
   b. Malaria - Protozoa
   c. Filariasis - Fungus
   d. Tuberculosis - Virus
   e. Diphtheria - Bacteria

4. Identify the odd one. Mention the common features of others.

   B - Lymphocyte , T - Lymphocyte, Antibody, Monocyte

5. Find out the right statements given below.

   a) Hunger is an internal stimulus.

   b) Chemical evolution is the generally accepted theory related to the origin of life.

   c) Sickle cell anaemia is the condition in which excess blood is lost even through minor wounds.

   d) The deficiency of vitamin A causes goitre.

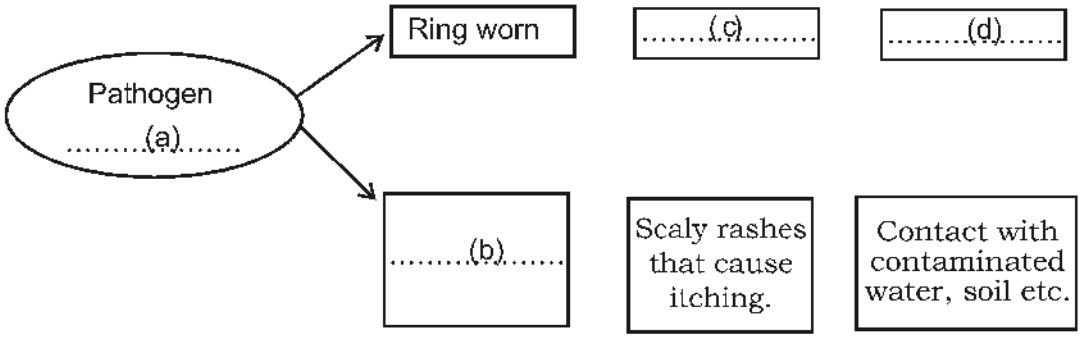
6. Name the basic unit of DNA molecule.

Answer any 6 questions from 7 to 13. Each question carries 2 score. (6 ×2 = 12 Score)

7. Artificial plant hormones are widely used in agricultural field. Write two such hormones and their uses.

8. Synapse is the junction between two neurons only. Evaluate the statement.

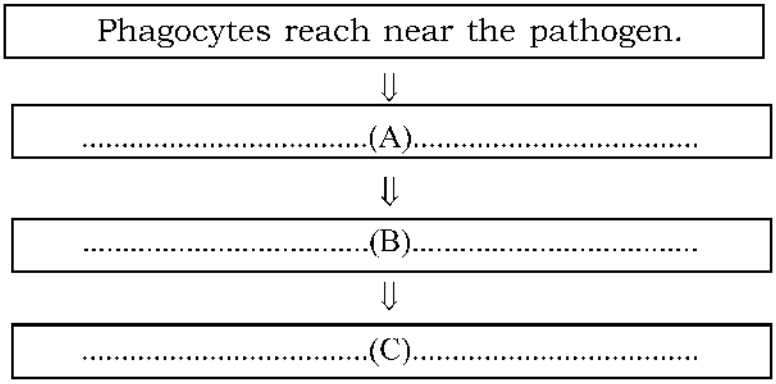
9. Complete the illustration suitably.



10. Correct the mistakes, if any, in the under lined words in the following statements related to sense organs.
    a) Taste buds are chemoreceptors found in papillae.
    b) Receptors are uniformly distributed in the skin.
    c) The impulses from olfactory recpters reach cerebellum through olfactory nerve.
    d) The impulses from taste buds reach the cerebrum and experience taste.

11. Rajesh said "cow's milk is a cure for diabetes."
    a) Do you agree with the opinion of Rajesh ?
    b) Is there any basis for the arguement of Rajesh ? Explain.

12. A flow chart related to the defence mechanism of body is given below.



    a. Complete the flow chart.
    b. Which type of defense mechanism is this ?

13. **News paper report**

The dead bodies of okhi storm and natural disaster victims are in unidentified condition.

a. Is there any technology to identify dead bodies ? Which is the technology?

b. What is the basic principle of this technology?

Answer any 5 questions from 14 to 19. Each question carries 3 score. **(5 ×3 = 15 Score)**

14. Rhodopsin $\underset{}{\overset{\text{light}}{\rightleftharpoons}}$ Retinal + opsin

a. How is this chemical reaction related to vision ?

b. The deficiency of vitamin A leads to poor vision in dim light. Why?

15. Stages related to the origin of life are given below. Analyse and write in order.

a. Organic compounds.

b. Prokaryotic cells.

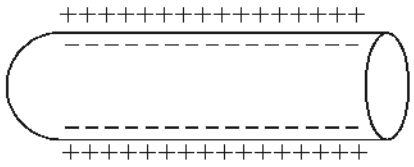
c. Chemical evolution.

d. Eukaryotic cells.

e. Multicellular organisms.

f. Colony of Eukaryotic cells.

16. Observe the figure and answer the questions given below:-

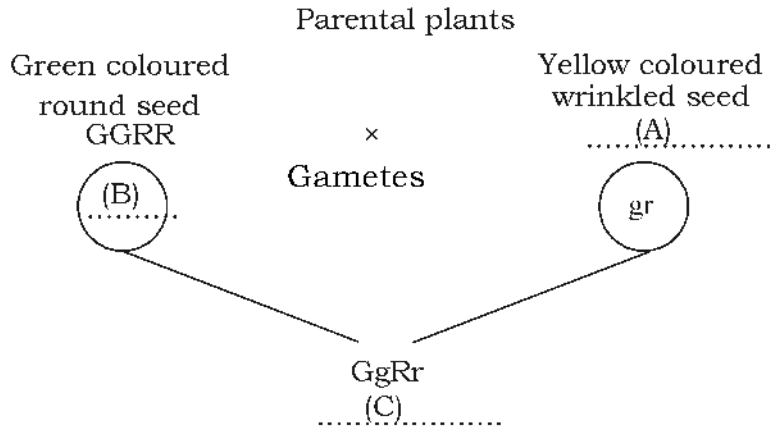


a. What does this figure indicate ?

b. What is the reason for the formation of difference in charges on either side of the plasma membrane ?

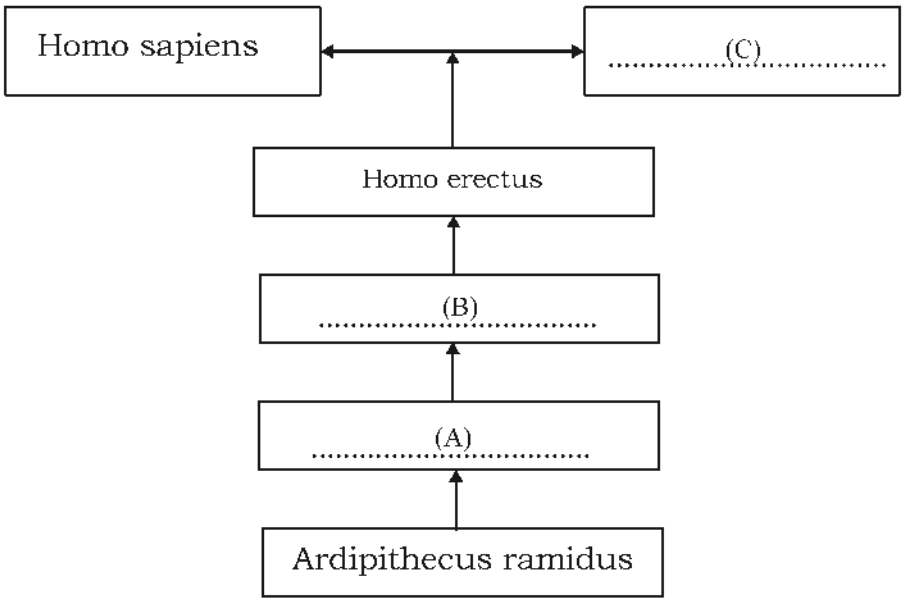
c. How do impulses get transmitted through axon?

17. Complete the illustration.



18. The major stages of evolution of modern man are given in the box. Complete the illustration by selecting suitable ones.

Ardipithecus ramidus, Homoneanderthalensis, Homo erectus, Homo sapiens, Australopithecus afarensis, Homo habilis.



19. The concepts included in a poster for awareness campaign conducted by the school health club against cancer are given below.

a) The disease cancer.

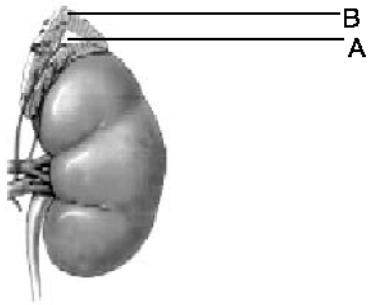
b) The causes of cancer.

c) Treatment of cancer.

What is your explanation for each concept?

Answer any two questions from 20 to 22. Each question carries 4 score. **(2 ×4 = 8 Score)**

20. Observe the figure and answer the following questions:-



a. Which endocrine gland is indicated in the figure?

b. Name the parts indicated by A and B.

c. Which are the hormones secreted by the part indicated as A. What are their functions?

21. The name of vaccines and the related diseases are given in cloumn A and B respectively. Make suitable pairs.

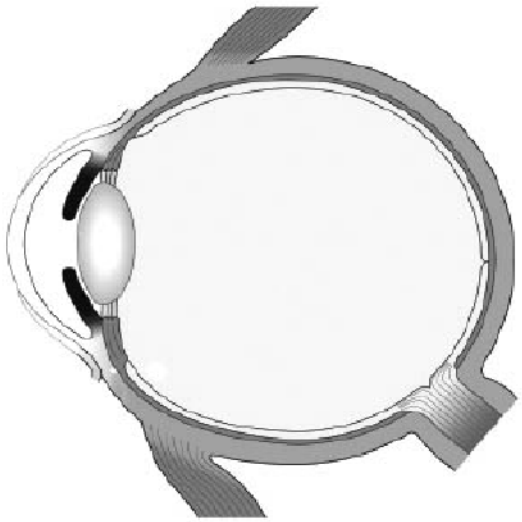
A

Vaccines
1. Pentavalent.
2. T.T.
3. B.C.G.
4. M.M.R.

B

Diseases
a. Tetanus
b. Rubella
c. Hepatitis - B
d. Tuberculosis

22. Redraw the diagram and label the following parts based on the statements givne below.



(a) Chamber filled with jelly like substance.

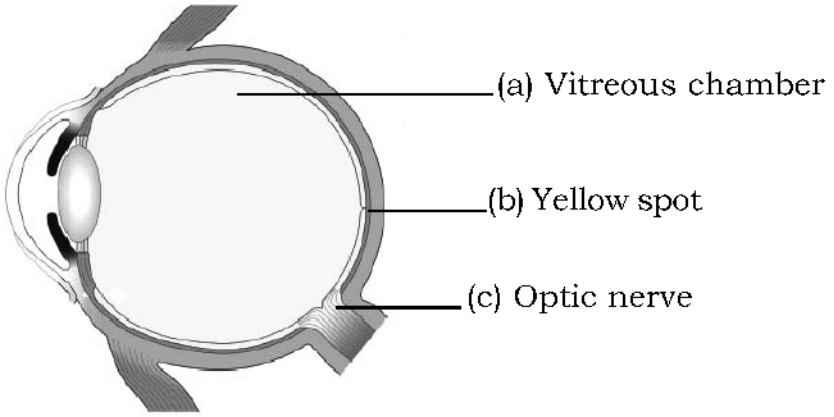
(b) Part of retina which has more photorecptors .

(c) The part which transmits impulses to visual centre of brain.

Answer Key

Sl. No.	Scoring indicators	Score
1.	Ommatidia, receptors of organism.	1
2	c	1
3	b. Malaria - Protozoa e . Diphtheria - Bacteria	1
4.	Antibody, others are white blood cells.	1
5.	a and b are correct.	1
6.	Nucleotide	1
7.	Abscisic acid -It is used for harvesting fruits at the same time. Ethylene - Used for the flowering of pineapple plants at a time and ripening of fruits.	2
8.	Statement is not fully correct /partially correct. Synapse is the junction between two neurons, or a neuron and a muscle cell or a neuron and a glandular cell.	2
9.	a. Fungus b. Athlets' foot c. Round red blisters d. Contact	2
10.	(a) No correction. (b) Receptors are <u>not uniformly</u> distributed all over the skin. (c) Impulses from the olfactory receptors reaches <u>cerebrum</u> through olfactory nerve. (d) No correction.	2
11.	a. Agree with the statement. b. Yes, it is possible to create pharm animals. Genes responsible for the production of human insulin are	

	identified and inserted in animals like cow and transforming them into pharm animals. Medicines can be extracted from their milk.	2
12.	a. A. Engulfs pathogens in the membrance sac. B. Lysosome combines with membrane sac. C. The pathogens are degenerated and destroyed by the enzymes in lysosome.	
	b. Phagocytosis	2
13.	a. Yes, DNA fingerprinting.	1
	b. The arrangement of nucleotides in the DNA of each person differs. The arrangement of nucleotides among close relatives have many similarities.	1
14.	a. When light rays fall on the pigment present in the rod cells, it dissociate into retinal and opsin. This chemical change leads to the formation of impulses. These impulses are transmitted to cerebrum through optic nerve and this enables vision.	1
	b. Retinal, which is a part of visual pigment seen in photoreceptors is derived from vitamin A. The deficiency of vitamin A result in the low production of retinal. This create deficiency of rhodopsin in the rod cells. The resynthesis of rhodopsin also gets blocked. This causes a condition called night blindness. The person cannot see objects clearly in dimlight.	2
15.	c. Chemical Evolution. a. Organic molecules. b. Prokaryotic cells. d. Eukaryotic cells. f. Colonies of eukaryotic cells. e. Multicellular organisms.	3
16.	a. Charge on either side of the plasma membrane of axon.	1
	b. Change in the distribution of ions.	1

	c. When stimulated the outer surface becomes negatively charged and inner surface becomes positively charged. This momentary charge difference in the axon membrane stimulates its adjacent parts. As this process proceeds impules get transmitted through axon.	1
17.	A - gg rr B - Gr C - green coloured round seed.	3
18.	A - Australopithecus afarensis.	1
	B - Homo habilis.	1
	C - Homo neanderthalensis.	1
19.	a. Cancer is caused by the uncontrolled division of cells and their spread to other tissues.	1
	b. Environmental factors, smoking, radiation, virus, hereditary factors.	1
	c. Surgery, chemotherapy, radiation therapy.	1
20	a. Adrenal gland	1
	b. A- Medulla B- Cortex	1
	c. Epinephrine - Nor epinephrine Epinephrine acts along with the sympathetic nervous system during emergencies. Thus, we can resist or with - draw ourselves from such situations. Norepinephrine - acts along with epinephrine	2
21.	1 - c, 2 - a, 3 - d, 4 - b	4
22.		4