

## 2. RESPONSES LIKE THESE TOO

### Major Ideas :

1. Under emergency situations, our body responds spontaneously and involuntarily.
2. **Reflex actions** are sudden, involuntary reaction of the body, in response to a stimulus. All reflex actions are unconscious actions. Reflex actions, sometime, serve as a protective mechanism. Reflex actions occur from the brain and spinal cord.
3. Reflexes formed from the brain are known as cerebral reflexes. ( Blinking of the eye, Sudden movement when hearing a loud noise etc. are examples). Reflexes formed from the spinal cord are known as spinal reflexes. ( Sudden withdrawal of hands when we accidentally touch on an hot object, Withdrawal of legs when a thorn penetrates our leg etc. are examples)

Certain reflexes are developed through constant practice and experience. Such reflexes are known as conditioned reflexes. ( Application of sudden brakes by a driver, Salivation at the thought of tasty food etc. are examples)

4. **Reflex arc** is the path of impulses in a reflex action.

A reflex arc involves a stimulus receiving receptors , a sensory neuron, an inter neuron , a motor neuron and an effecting part (like muscles or glands).

5. There are internal receptors too in our body to recognize internal stimuli.

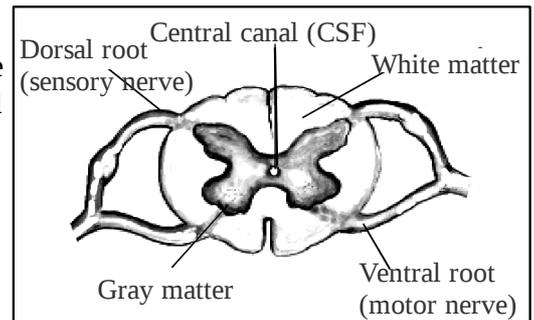
\* **Chemoreceptors** [stimulated by chemicals]

\* **Baroreceptors** [stimulated by internal pressure]

6. Human nervous system is classified in to Central Nervous System and Peripheral Nervous System.

Both the brain and spinal cord come under the central nervous system. All nerves, originate from CNS (both 12 pair cranial nerves and 31 pair spinal nerves) are included in the peripheral nervous system.

7. **Spinal cord**, which is the continuation of medulla oblongata, is situated with in the vertebral column and is covered by a three layered membrane, called meninges. Outer is white matter and inner is grey matter. The **central canal** at its centre is filled with CSF. Spinal nerves originate from the spinal cord as **dorsal root** (sensory) and **ventral root** as (motor).



8. A few nerves in the peripheral nervous system function as the Autonomous Nervous System, which operates automatically and involuntarily. Autonomous nervous system includes both the sympathetic and parasympathetic systems.
9. The contrasting actions of Sympathetic and Parasympathetic nervous systems help to maintain the normalcy of the physiological activities.
10. The complementary actions of the autonomous nervous system.

SYMPATHETIC SYSTEM	PARASYMPATHETIC SYSTEM
<ul style="list-style-type: none"> <li>- Dilation of eye pupil</li> <li>- Increase the rate of heart beat</li> <li>- Dilation of trachea</li> <li>- Conversion of glycogen to glucose</li> <li>- Secretion of hormones increase</li> <li>- Relaxation of the muscles of urethra</li> </ul>	<ul style="list-style-type: none"> <li>- Constriction of eye pupil</li> <li>- Decrease the rate of heart beat</li> <li>- Constriction of trachea</li> <li>- Conversion of glucose to glycogen</li> <li>- Secretion of hormones decrease</li> <li>- Contraction of the muscles of urethra</li> </ul>
<ul style="list-style-type: none"> <li>- Decrease in the secretion of saliva, functions of stomach, intestinal peristalsis.</li> </ul>	<ul style="list-style-type: none"> <li>- Increase in the secretion of saliva, functions of stomach, intestinal peristalsis.</li> </ul>

11. **Alzheimer disease** (Continuous degeneration of neurons due to plaque by the accumulation of an insoluble protein), **Parkinson disease** (Degeneration of specific ganglia in the brain due to the deficiency of dopamine), **Epilepsy** (Discharge of irregular electrical impulses from brain), **Stroke** (Damage to brain tissues due to the lack of blood), **Paralysis** etc. are disorders of the nervous system.

12. All organisms, including unicellular organisms, are capable to respond to various stimuli. Plasma membrane, cytoplasm, eye-spot, nerve net, ommatidia, Jacobson's organ, Chloroplasts, phytochrome are mechanism seen in different living beings.

### QUESTIONS & ANSWERS

1. Spinal cord : Spinal reflex  
Cerebrum : ..... ?

**Ans:** Cerebral reflex.

2. What is reflex action ? The mouth of a child waters on seeing another child eating tamarind. What kind of reflex action is this ?

**Ans:** (See major ideas 2). Conditioned reflex, developed through constant practice and experience.

3. Find out the odd one and justify your answer.

- On touching hot object, the hand is withdrawn.
- On hearing the school bell, students stand up on.
- The cloth being falls down when the needle penetrates the hand.
- On touching on ice unknowingly, the hand is quickly withdrawn.

**Ans:** b. On hearing the school bell, students stand up on. This is an example of conditioned reflex, formed from brain. All others are spinal reflexes.

4. When light falls, the eyes blink suddenly (cerebral reflex). Note down the path way of impulses during this action (reflex arc).

**Ans:**

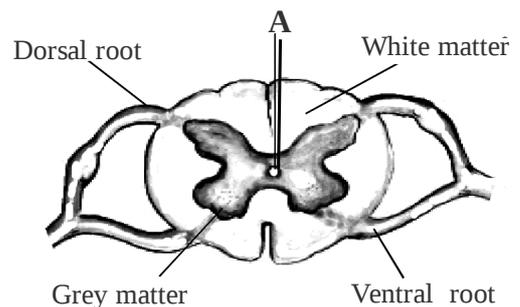
- \* When light falls, Photoreceptors stimulated
- \* Impulses are carried to the brain through sensory neuron.
- \* Inter neuron in the brain process the sensory impulse to the motor neuron
- \* Impulses are carried to the eyelids through the motor neuron
- \* The eyes blink.

5. Analyse the figure and answer to the questions that follows.

- What does the figure indicate ?
- Name the part which is labelled as A.

**Ans:**

- Spinal cord.
- Central canal (usually filled with CSF)



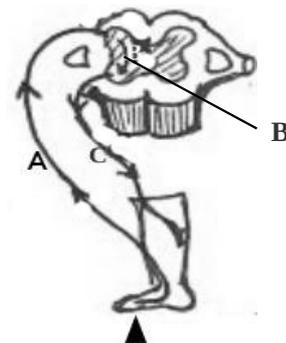
6. Sensory impulse : Dorsal root;  
Motor impulse : .....

**Ans:** Ventral root.

7. Observe the given reflex arc, when a spine penetrated one's foot. Name the neurons A, B and C in the figure.

**Ans:**

- Sensory nerve fibre.
- Inter neuron
- Motor neuron.



8. Reflex actions, sometime, serve as a protective mechanism. How ?

**Ans:** Due to reflex action, the Sympathetic system start functioning and as a result, physiological activities like working of heart and lungs increase to produce more energy. Thus our body becomes equipped to face the critical situation.

9. Pressure : Baroreceptor;  
Chemicals : ..... ?

**Ans:** chemoreceptor

10. Give examples for internal stimuli and their responses.

**Ans:** Change in blood pressure, Change in the level of CO<sub>2</sub> in blood, Change in water content, Change in the content of blood, Presence of germs etc. are internal stimuli.  
Increase in the body temperature, Tiredness, Unconsciousness, Vomiting etc. are the responses due to internal stimuli.

11. Rajesh is taking his food watching blood cold scenes of a film on TV. Will this affect his digestion ?  
Make inferences in connection with his sympathetic and parasympathetic system.

**Ans:** When excitement occur, sympathetic nervous system enhances the physiological activities, except activities related to the digestion. Since sympathetic system worked in Rajesh, it will affect his digestion and related activities.

12. List out the physiological changes that may occur when a boy facing the audience during a competition.

**Ans:**

- Increase the rate of heart beat
- Dilation of trachea / Increases breathing
- Conversion of glycogen to glucose
- Secretion of hormones increase
- Decrease in the secretion of saliva.

13. What is **photomorphogenesis** ?

**Ans:** The process of the formation of chlorophyll in the presence of light.

14. Name a protein pigment which helps in flowering and seed germination.

**Ans: Phytochrome.**

15. The plant, Nithyakalyani, flowers every day but the May flower plant flowers only during a particular season. Which is the protein seen in plants for such kind of light influenced responses ?

**Ans:** Phytochrome.

16. **Mechanism of stimuli-responses in some other organisms.**

**Chlamydomonas, Euglena** - Plasma membrane and cytoplasm help in stimulus-response.  
[Unicellular organisms] } Euglena has an **eye spot** to detect the presence of light.

**Hydra** - A **network of nerve cells** seen through out the body  
**Insects** - The compound eyes made up of thousands of **ommatidium** make clear and good vision.  
**Bats** - Echo location by receiving the echo of the **ultrasonic sound** helps movements in night.  
**Snakes** - Though the power of hearing is absent, snakes can sense the vibrations on the ground. They can sense the smell by the olfactory receptors in the **Jacobson's organ** situated in the roof of their mouth.

17. Plants : Phytochrome ,  
Euglena : ..... ?

**Ans:** Eyespot.

18. Table showing neural disorders, reason and symptoms.

Defect / Disorder	Cause, Symptom
<b>Alzheimer disease</b>	Continuous degeneration of neurons due to plaque by the accumulation of an insoluble protein. Complete loss of memory.
<b>Parkinson disease</b>	Degeneration of specific ganglia in the brain due to the deficiency of dopamine (a neurotransmitter). Tremor (due to irregular movement of involuntary muscles), flow of saliva, loss of body balance...
<b>Epilepsy</b>	Discharge of irregular electrical impulses from brain. Fits (due to uncontrolled muscular contractions), unconsciousness, clenching of teeth, biting of tongue, frothy discharge from mouth, noise...
<b>Stroke</b>	Damage to brain tissues due to the lack of blood (either by cerebral thrombosis or haemorrhage) Paralysis of any one side of the body, completely.

Paralysis, Poliomyelitis, Rabies, Leprosy etc are also examples for nervous disorders.