

NCERT Solutions for Class X

Science

Chapter 7 – Control and Coordination

1: What is the difference between a reflex action and walking?

Ans: The difference between a reflex action and walking are as follows:

Reflex Action	Walking
A reflex action is a spontaneous, fast reaction to stimuli.	Walking is an activity that is undertaken voluntarily.
It does not require any thought.	While walking, we have conscious control over it.
Walking provides tasks that do not involve the survival and protection of organs or organisms.	Reflex action serves the survival and protection of organs or organisms.

2. What happens at the synapse between two neurons?

Ans:

1. When a nerve impulse reaches the end of an axon, substances called neurotransmitters are released (e.g., acetylcholine).
2. Neurotransmitters pass between the axon and the dendrites of the following neuron at the axon-dendrite junction. A synapse is the name for this juncture.

3. Neurotransmitters bind to the dendrites' membranes, allowing the nerve impulse to pass through to the receiving neuron and reach the target site. (muscle cells)

3. Which part of the brain maintains posture and equilibrium of the body?

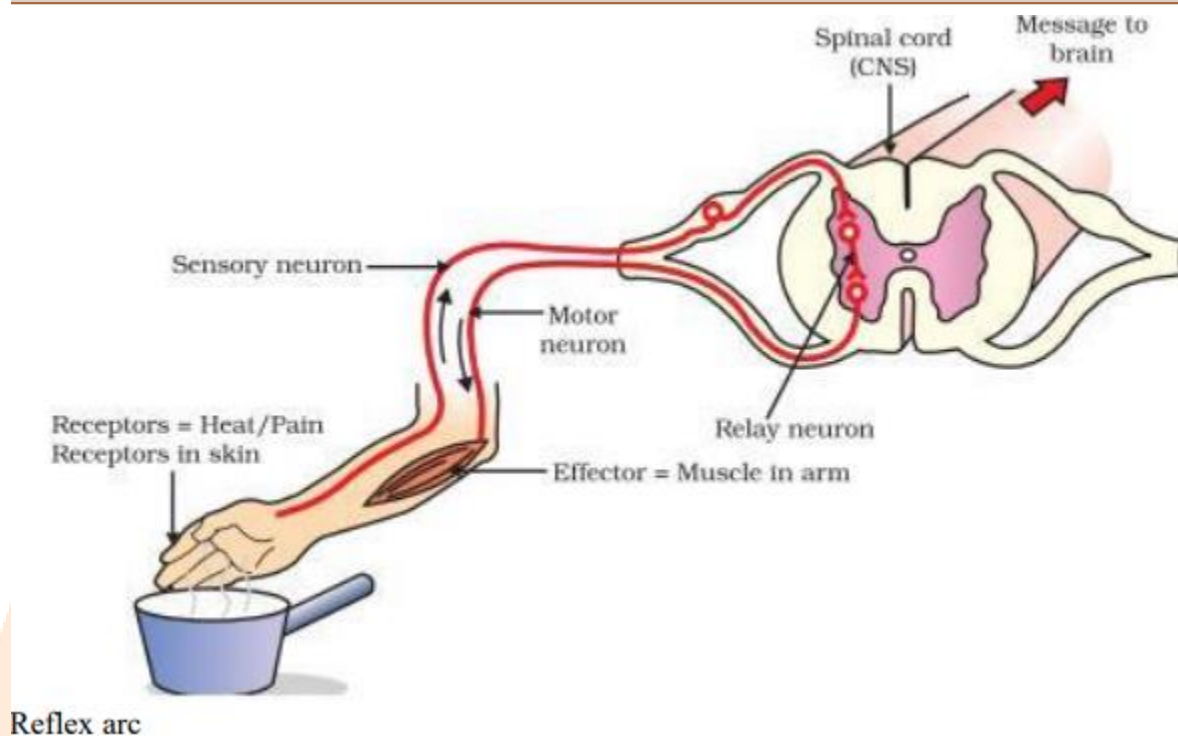
Ans: The cerebellum, a component of the hindbrain, is in charge of regulating bodily posture and balance.

4. How do we detect the smell of an agarbatti (incense stick)?

Ans: When the scent of an incense stick reaches our nose, it is detected by olfactory receptors. It is interpreted by the forebrain by combining it with information received from other receptors as well as information previously stored in the brain as memory.

5. What is the role of the brain in reflex action?

Ans: Humans' rapid, spontaneous response to stimuli (sudden change in the environment) is known as reflex action. The sensory nerves, which detect the stimuli, are linked to the motor nerves, which control muscle movement. A reflex arc is a relationship between perceiving the signal from receptors (input) and immediately responding to it (output) through effectors. In a reflex action, the reflex arc is the channel for signalling between receptors and effectors. The sensory and motor neurons that connect to each other in the spinal cord are responsible for the signalling. Although reflex arcs originate in the spinal cord, the information (input) is sent to the brain. The signal and response that have occurred are the only things that the brain is aware of. This knowledge is stored in the brain's memory. This aids in the conditioning of specific reflexes. The brain, on the other hand, has no part in the production of the response.



1. What are plant hormones?

Ans: Plant hormones, also known as phytohormones, are naturally occurring chemical compounds that govern plant cell growth and metabolism. These are made in one section of the plant's body and then moved to other parts as needed. Auxins, gibberellins, cytokinin, abscisic acid, and ethylene are the five major types of plant hormones.

2. How is the movement of leaves of the sensitive plant different from the movement of a shoot towards light?

Ans: The sensitive plant *Mimosa pudica*, also known as "touch me not," moves its leaves in reaction to touch or contact stimuli. This is a nastic movement of some sort. This sort of thing happens because of differences in turgor pressures in leaf cells. Growth has no bearing on this movement. These are asymmetrical movements. Phototropism is the migration of a shoot towards light. These trophic changes occur as a result of growth in one direction. As a result, this form of movement is directed and depends on growth. The migration of a sunflower in the direction of the sun is an example of phototropism.

3. Give an example of a plant hormone that promotes growth.

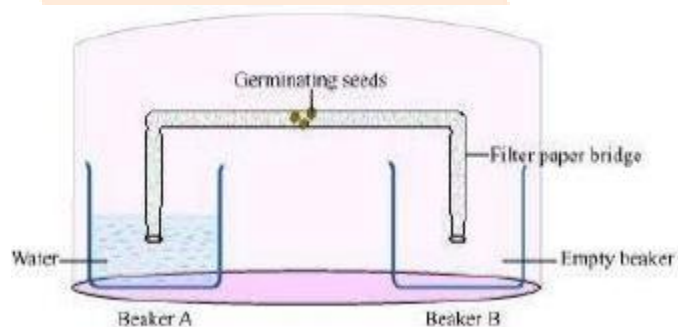
Ans: Auxin is an example of a plant hormone that promotes growth.

4. How do auxins promote the growth of a tendril around a support?

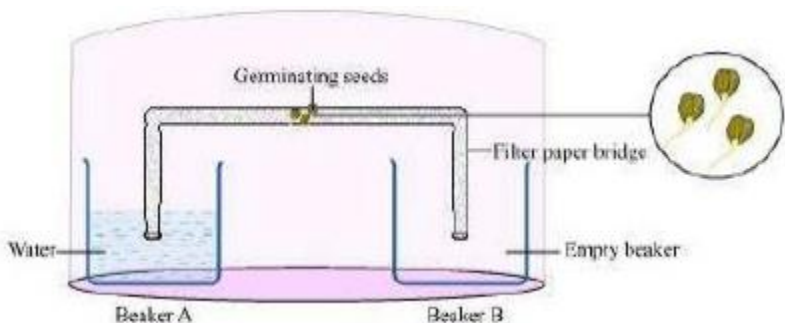
Ans: The growth hormone auxin is produced at the tip of the shoot of the plant. It promotes the growth of longer cells at the shoot tips. Auxin induces faster growth of cells on the opposite side of a tendril when it encounters a support, resulting in unequal growth on both sides of the tendril. Due to this, the tendril coils around the support. As a result, the tendrils resemble a watch spring as they wrap around the support.

5. Design an experiment to demonstrate hydrotropism.

Ans: The movement of plant components in reaction to water is known as hydrotropism. As roots grow towards water, they exhibit positive hydrotropism. As an example : Label two tiny beakers with the letters A and B. Beaker A should be filled with water. As depicted in the diagram below, roll out the filter paper in cylindrical shape and to bridge between beaker A and beaker B. In the midst of the filter paper bridge, place a few growing seeds. Cover the entire set-up with a transparent plastic container to keep the moisture from escaping.



Observation: The roots of the germinating seeds will grow towards beaker A.



This experiment demonstrates the phenomenon of hydrotropism.

1. How does chemical coordination take place in animals?

Ans: Hormones assist animals to coordinate their chemical reactions. Hormone is a chemical messenger that controls a variety of physiological processes in living things. It is produced by glands in the body. Hormones work on organs that are often far removed from the gland. As a result, these hormones are released by glands in the bloodstream and delivered to the organ of action. The endocrine system is responsible for the regulation of physiological processes, as well as hormone control and coordination. The nervous system, in conjunction with the endocrine system, regulates and coordinates physiological activities in our bodies.

2. Why is the use of iodised salt advisable?

Ans: Iodine in the diet aids in the production of thyroxine in the body.

The thyroid gland enlarges as a result of thyroxine deficiency. This can result in a simple case of goitre.

3. How does our body respond when adrenaline is secreted into the blood?

Ans: Epinephrine and norepinephrine are the other names for adrenaline and noradrenaline, respectively. The sympathetic nervous system is stimulated by the hormone adrenaline. It prepares the body for any situation that may arise. Fear, sweating, shivering, and other physical reactions are all caused by adrenaline secretion. All of these responses improve oxygen flow to muscular tissues for

breathing, allowing more energy to be released for either flight or fight. As a result, adrenaline gives the body the ability to deal with any stress or disaster. As a result, it's also known as the "emergency hormone."

4. Why are some patients of diabetes treated by giving injections of insulin?

Ans: The level of sugar in the blood (glucose) is too high in diabetes mellitus. Insulin is a hormone produced by the pancreas that aids in blood sugar regulation by converting excess glucose to glycogen in the liver. The amount of insulin released by the pancreas is insufficient to convert glucose to glycogen in these people. It is for this reason that diabetic patients are treated with insulin injections.

1. Which of the following is a plant hormone?

**a. Insulin
Cytokinin**

(b) Thyroxin

(c) Oestrogen

(d)

Ans: Cytokinin

2. The gap between two neurons is called a

(a) dendrite.

(b) synapse.

(c) axon.

(d) impulse.

Ans: Synapse

3. The brain is responsible for

(a) thinking.

(b) regulating the heartbeat.

(c) balancing the body.

(d) all of the above.

Ans: All of the above

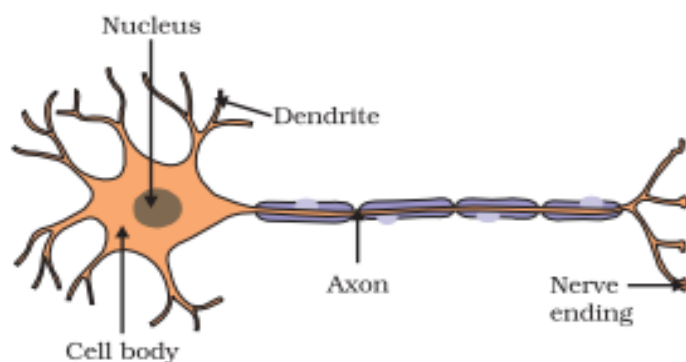
4. What is the function of receptors in our body? Think of situations where receptors do not work properly. What problems are likely to arise?

Ans: Sensory cells are receptor cells. Our sense organs, such as the inner ear, nose, tongue, eyes, and skin, are normally where they are found. Receptors have the following functions:

- They are aware of environmental stimuli like heat or discomfort.
- They also deliver a message to the spinal cord by triggering an impulse in the sensory neuron. External stimuli transmitting messages to the brain are not perceived when receptors are destroyed. This could cause harm to the body's tissues and organs. For example, if a person's receptors are damaged, he or she may not be able to hear when they are called out.

5. Draw the structure of a neuron and explain its function.

Ans: The nervous system's structural and functional unit is called the neuron. The axon, dendrite, and cell body are the three primary components of a neuron.



Structure of Neuron.

A neuron's functions include:

- Impulse transmission from the external environment to the brain or spinal cord.
- Brain/spinal cord coordination with other organs.

6. How does phototropism occur in plants?

Ans: The movement of plant components in reaction to light is known as phototropism. Shoots are phototropic in a positive way, whereas roots are phototropic in a negative way. The action of auxins like indole-acetic acid causes phototropism in plants (IAA). IAA molecules travel to the opposite (shaded) side of the shoot when one side is exposed to sunlight. IAA causes cell division and elongation on the shaded side of the shoot rather than the light-exposed side. This results in unequal growth on both sides of the stalk, with the shaded side growing faster than the sunny side. As a result, the shoot bends toward the light.

7. Which signals will get disrupted in case of a spinal cord injury?

Ans: All nerve signalling will be disrupted if the spinal cord is injured. This will have an impact on the transmission of impulses from receptors to the brain, as well as the brain's reaction to effectors, particularly motor neurons.

8. How does chemical coordination occur in plants?

Ans: Plants respond to stimuli by moving their leaves. A specific class of chemical molecules known as plant hormones or phytohormones regulates and coordinates plant growth, development, and reaction to the environment. Plant hormones are made in a specific area of the plant and are relocated to other sections of the body. When a hormone produced in roots is needed, it is translocated to other sections of the plant. Auxins, gibberellins, cytokinin, abscisic acid, and ethylene are the five major types of phytohormones. Auxins, gibberellins, cytokinin, and ethylene are examples of growth promoters, while abscisic acid is an example of growth inhibitor.

9. What is the need for a system of control and coordination in an organism?

Ans: Coordination is the process of maintaining body functioning in response to changes in the body by working together for distinct integrated body systems. All of the motions that occur as a result of stimuli must be meticulously coordinated and controlled. Controlling how you react to stimuli aids in the development of more efficient response mechanisms. When all of the stimuli and their effects are taken into account, the organism's ability to function efficiently is dependent on the coordination of numerous reactions. As a result, multiple physiological processes and responses must be synchronised. The neurological and muscular systems in animals offer movement control and coordination. Phytohormones are responsible for controlling and coordinating plant behaviour.

10. How are involuntary actions and reflex actions different from each other?

Ans: Involuntary actions are beyond our ability to control. We can't control the movement of food in the alimentary canal, for example. These actions, on the other hand, are directly controlled by the brain. On the other hand, reflex behaviours such as pulling back the hand when it comes into contact with a hot object are instantaneous and do not require any thought. This implies that, unlike involuntary activities, reflex actions are not controlled by the brain. Involuntary actions like heartbeat and peristalsis cannot be conditioned, whereas reflex actions may. It's feasible to conclude that involuntary acts are all reflex actions, however not all involuntary actions are reflex actions.

11. Compare and contrast nervous and hormonal mechanisms for control and coordination in animals.

Ans: Difference between nervous and hormonal mechanisms is as follows:

Nervous system mechanism	Hormonal system mechanism
<ul style="list-style-type: none"> The information is sent in the form of an electric impulse. 	<ul style="list-style-type: none"> Chemical messengers are used to transmit information.

<ul style="list-style-type: none"> The information is transmitted via a coordinated effort between the axons and dendrites actions. 	<ul style="list-style-type: none"> Blood is used to convey and carry information.
<ul style="list-style-type: none"> The flow of information is speedy, as is the response. 	<ul style="list-style-type: none"> Information moves slowly, and responses are also slow.
<ul style="list-style-type: none"> It has a short-term effect. 	<ul style="list-style-type: none"> It has a long-term effect.
<ul style="list-style-type: none"> Does not cause growth 	<ul style="list-style-type: none"> It can cause growth

12. What is the difference between the manner in which movement takes place in a sensitive plant and the movement in our legs?

Ans: Difference between mannerism of movement in sensitive plants and hormonal movement in our legs is as follows:

Movement in sensitive plants	Movement in our legs
<ul style="list-style-type: none"> In a sensitive plant like Mimosa pudica, movement happens in reaction to touch (stimulus). 	<ul style="list-style-type: none"> Voluntary acts include movements of our legs.
<ul style="list-style-type: none"> Because plants lack specialised tissue for the transmission of impulses, information is conveyed from cell to cell via electrochemical signals. 	<ul style="list-style-type: none"> These activities are consciously regulated since the signal or messages are sent to the brain.
<ul style="list-style-type: none"> Plant cells alter shape as the amount of water in them changes, allowing this movement to occur. 	<ul style="list-style-type: none"> Some proteins are found in animal muscle cells that allow movement to occur.

