

Intext Exercise 1**Question 1:**

What is the difference between a reflex action and walking?

Solution 1:

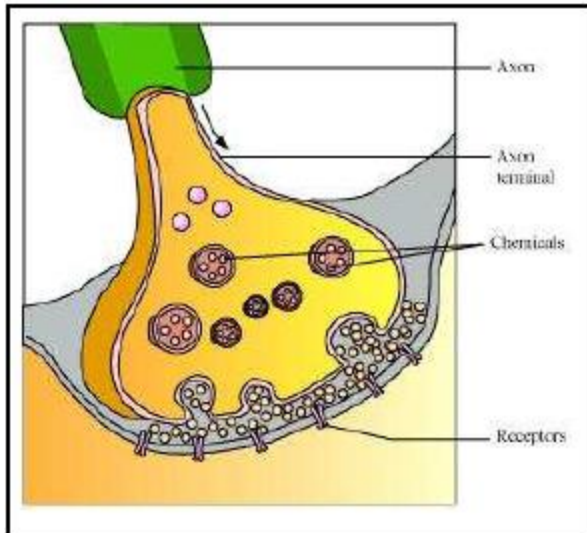
A reflex action is a rapid, automatic response to a stimulus. It does not involve any thinking. For example, we close our eyes immediately when the bright light is focused. Walking, on the other hand, is a voluntary action. It is under our conscious control. The response to the reflex action is generated at the spinal cord whereas walking is under the control of the motor area of the brain.

Question 2:

What happens at the synapse between two neurons?

Solution 2:

A very small gap that occurs between the last portion of axon of one neuron and the dendron of the other neuron is known as a synapse. It acts as a one way valve to transmit impulses in one direction only. This uni-direction transfer of impulses occurs as the chemicals or neurotransmitters are produced in only one side of the neuron i.e., the axon's side. From axon, the impulses travel across the synapse to the dendron of the other neuron.



A synapse or neuromuscular junction

Question 3:

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

Solution 3:

Cerebellum, a part of hindbrain is responsible for maintaining posture and equilibrium of the body.

Question 4:

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

Solution 4:

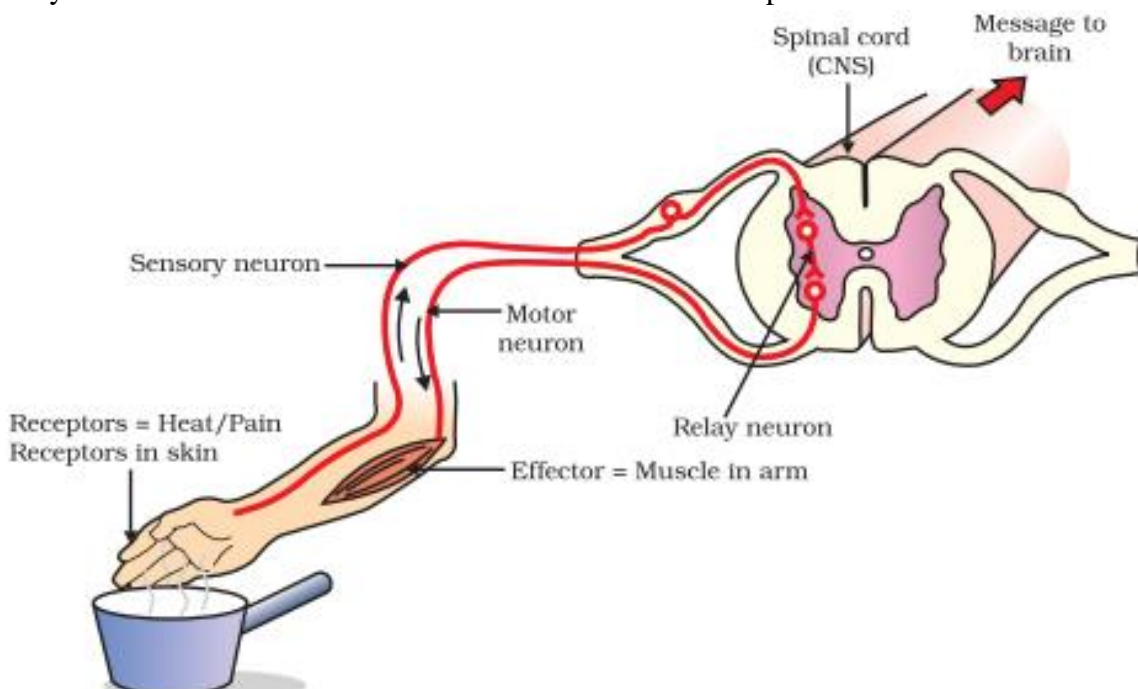
The thinking part of our brain is the forebrain. It has separate areas that are specialized for hearing, smelling, sight, taste, touch, etc. The forebrain also has regions that collect information or impulses from the various sensory receptors. When the smell of an incense stick reaches us, our olfactory receptors detect it. Then, the forebrain interprets it by putting it together with the information received from other receptors and also with the information already stored in the brain as memory.

Question 5:

What is the role of the brain in reflex action?

Solution 5:

Reflex actions are sudden and involuntary responses, which do not involve any thinking. The sensory nerves that detect the stimulus are connected to the motor nerves that move the muscles. Such a connection of detecting the signal from the receptors (input) and responding to it quickly (output) through effectors is called a reflex arc. The reflex arc is the pathway for signaling between receptors and effectors in a reflex action. The signaling is through the actions of the sensory and motor neuron which connect to each other in the spinal cord.



Reflex arc

Reflex arcs are formed in the spinal cord but the information (input) reaches the brain. The brain is only aware of the signal and the response that has taken place. Brain stores this information in the memory. This is helpful in conditioning of certain reflexes. However, the brain has no role to play in the creation of the response.

Intext Exercise 2

Question 1:

What are plant hormones?

Solution 1:

Plant hormones or phytohormones are naturally-occurring organic substances that regulate growth and metabolism in plant cells. These are synthesized in one part of the plant body (in minute quantities) and are translocated to other parts when required. The five major types of phytohormones are auxins, gibberellins, cytokinins, abscisic acid, and ethylene.

Question 2:

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

Solution 2:

The movement of leaves of the sensitive plant, *Mimosa pudica* or “touch me not”, occurs in response to touch or contact stimuli. This is a type of nastic movement called as seismonasty. Such movements occur due to the difference in turgor pressures in cells of the leaf. This movement is independent of growth. These movements are non-directional. The movement of shoot towards light is known as phototropism. These kind of tropic movements occur due to growth in a specific direction. Thus, this type of movement is directional and is growth dependent.

Question 3:

Give an example of a plant hormone that promotes growth.

Solution 3:

Auxin is an example of growth-promoting plant hormone.

Question 4:

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

Solution 4:

Auxin is synthesized at the shoot tip. It helps the cells of the shoot tips to grow longer. When one side of a tendril comes in contact with a support, auxin stimulates faster growth of the cells on the opposite side, leading to uneven growth on either side of the tendril. This causes the tendril to form a coil around the support. This makes the tendrils appear as a watch spring.

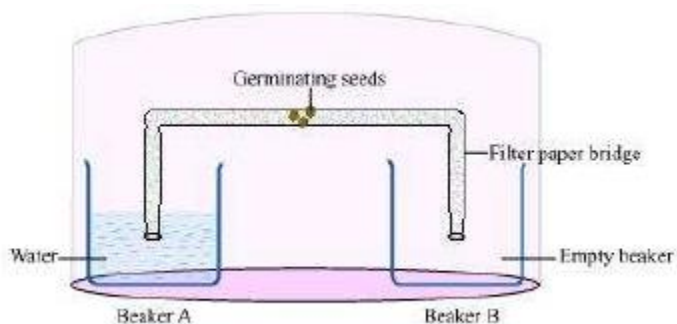
Question 5:

Design an experiment to demonstrate hydrotropism.

Solution 5:

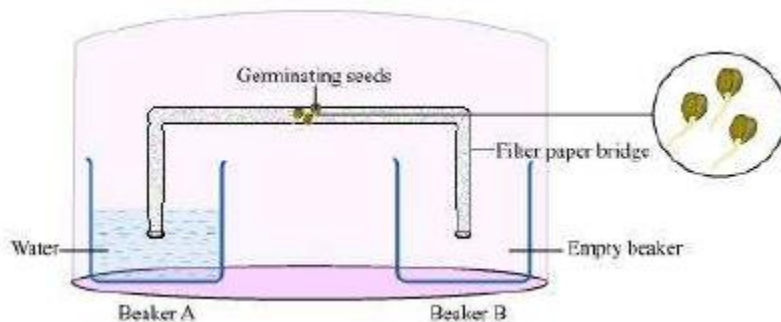
Hydrotropism is the movement of plant parts in response to water. Roots show positive hydrotropism as they grow towards water. This can be demonstrated as follows:

Take two small beakers and label them as A and B. Fill beaker A with water. Now make a cylindrical-shaped roll from a filter paper and keep it as a bridge between beaker A and beaker B, as shown in the figure. Attach few germinating seeds in the middle of the filter paper bridge. Now, cover the entire set-up with a transparent plastic container so that the moisture is retained.



Observation:

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



This experiment demonstrates the phenomenon of hydrotropism.

Intext Exercise 3**Question 1:**

How does chemical coordination take place in animals?

Solution 1:

Chemical coordination takes place in animals with the help of hormones. Hormone is a chemical messenger that regulates various physiological processes in living organisms. It is secreted by specific glands. The hormones act on target tissues which may be far away from the gland. Therefore, these hormones are secreted by the glands in to the blood and are thus transported to the target tissues where they act. The regulation of physiological processes, and control and coordination by hormones comes under the endocrine system. The nervous system along with the endocrine system in our body controls and coordinates the physiological processes.

Question 2:

Why is the use of iodised salt advisable?

Solution 2:

Iodine stimulates the thyroid gland to produce thyroxin hormone. It regulates the metabolism of carbohydrates, fats, and proteins in our body. Deficiency of this hormone results in the enlargement of the thyroid gland. This can lead to goitre, a disease characterized by swollen neck. Iodine is not easily available through food, especially plant based food. Seafood is rich in iodine but not available to a large number of people due to their habitation and food habits. Therefore, iodised salt is advised for normal functioning of the thyroid gland.

Question 3:

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

Solution 3:

Adrenalin is a hormone secreted by the adrenal glands in case of any danger or emergency or any kinds of stress. It is secreted directly into the blood and is transported to different parts of the body. When secreted in large amounts, it speeds up the heartbeat and hence supplies more oxygen to the muscles. The breathing rate also increases due to contractions of diaphragm and rib muscles. It also increases the blood pressure. The blood is diverted away from the stomach and intestines to the muscles of the limbs. All these responses enable better transport of oxygen to muscle tissues for respiration so as to release more energy for either flight or fight. Thus, adrenaline enables the body to deal with any stress or emergency. Therefore, it is also called as emergency hormone.

Question 4:

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

Solution 4:

Diabetes mellitus is a disease in which the level of sugar in the blood (glucose) is too high. Insulin, a hormone secreted by the pancreas, helps in regulating the blood sugar levels by converting excess glucose to glycogen in the liver. In such patients the amount of insulin secreted by pancreas is insufficient to cope with the amount of glucose in blood. This is the reason why diabetic patients are treated by giving injections of insulin.

NCERT Exercise**Question 1:**

Which of the following is a plant hormone?

- (a) Insulin
- (b) Thyroxin
- (c) Oestrogen
- (d) Cytokinin

Solution 1:

(d) Cytokinin is a plant hormone.

Question 2:

The gap between two neurons is called a

- (a) dendrite.
- (b) synapse.
- (c) axon.
- (d) impulse.

Solution 2:

(b) The gap between two neurons is called a synapse.

Question 3:

The brain is responsible for

- (a) thinking.
- (b) regulating the heart beat.
- (c) balancing the body.
- (d) all of the above.

Solution 3:

(d) The brain is responsible for thinking, regulating the heart beat and balancing the body.

Question 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?

Solution 4:

Receptors are sensory structures (organs/tissues or cells) present all over the body. The receptors are either grouped in case of eye or ear, or scattered in case of skin.

Functions of receptors:

- (i) They sense the external stimuli such as heat or pain.
- (ii) They also trigger an impulse in the sensory neuron which sends message to the spinal cord.

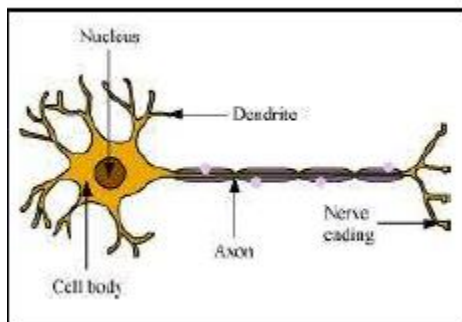
When the receptors are damaged, the external stimuli transferring signals to the brain are not felt. This could lead to damage to tissues and organs in the body. For example, in the case of damaged receptors, if we accidentally touch any hot object, then our hands might get burnt as damaged receptors cannot perceive the external stimuli of heat and pain.

Question 5:

Draw the structure of a neuron and explain its function.

Solution 5:

Neurons are the functional units of the nervous system. The three main parts of a neuron are axon, dendrite, and cell body.



Structure of a neuron

Functions of the three parts of a neuron:

Axon: It conducts messages away from the cell body.

Dendrite: It receives information from axon of another cell through chemical transmitters and conducts the messages towards the cell body.

Cell body: It contains nucleus, mitochondria, and other organelles. It is mainly concerned with the maintenance and growth.

Question 6:

How does phototropism occur in plants?

Solution 6:

Phototropism is the movement of plant parts in response to light. The shoot is positively phototropic as it moves towards light whereas the root is negatively phototropic as it moves away from light.

Plants exhibit phototropism due to the action of auxins like indole-acetic acid (IAA). When one side of the shoot is exposed to sunlight molecules of IAA move to the opposite (shaded) side. IAA initiates cell division and elongation in the shaded side and not in the side of the shoot exposed to the light. This causes unequal growth on both sides of the shoot with the shaded portion growing more than the side exposed to sun. This causes the shoot to bend towards the light.

Question 7:

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

Solution 7:

The reflex arc connections between the input and output nerves meet in a bundle in the spinal cord. Nerves from all over the body meet in a bundle in the spinal cord on their way to the brain. In case of any injury to the spinal cord, all nervous signaling will be affected. This will affect the transmission of impulses from receptors to the brain as well as response from the brain to the effectors, especially the motor neurons.

Question 8:

How does chemical coordination occur in plants?

Solution 8:

Plants respond to stimuli by showing movements. The growth, development, and responses to the environment in plants is controlled and coordinated by a special class of chemical substances known as hormones. These hormones are produced in one part of the plant body and are translocated to other parts. For example, a hormone produced in roots is translocated to other parts when required. The five major types of phytohormone are auxins, gibberellins, cytokinins, abscisic acid, and ethylene. These phytohormones are either growth promoters (such as auxins, gibberellins, cytokinins, and ethylene) or growth inhibitors such as abscisic acid.

Question 9:

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

Solution 9:

The maintenance of the body functions in response to changes in the body by working together of various integrated body systems is known as coordination. All the movements that occur in response to stimuli need to be carefully coordinated and controlled. Control over responses to stimuli helps in more efficient response mechanisms. Co-ordination of various responses is essential for the organism as a whole to function efficiently taking into account all the stimuli and their effect. Therefore, various responses and physiological processes have to be co-ordinated so that they take place in the right cell in the right amount at the right time. In animals, the control and coordination movements are provided by nervous and muscular systems. In plants the control and co-ordination is done by the action of phytohormones.

Question 10:

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

Solution 10:

Involuntary actions cannot be consciously controlled. For example, we cannot consciously control the movement of food in the alimentary canal. These actions are however directly under the control of the brain. On the other hand, the reflex actions such as closing of eyes immediately when bright light is focused show sudden response and do not involve any thinking. This means that unlike involuntary actions, the reflex actions are not under the control of brain. Reflex actions can be conditioned whereas involuntary actions like heartbeat and peristalsis cannot be conditioned. It is possible to say that all reflex actions are involuntary but all involuntary actions are not reflex actions.

Question 11:

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

Solution 11:

Nervous system mechanism	Hormonal system mechanism
1. The information is conveyed in the form of electric impulse	1. The information is conveyed in the form of chemical messengers
2. The axons and dendrites transmit the information through a coordinated effort.	2. The information is transmitted or transported through blood.
3. The flow of information is rapid and the	3. The information travels slowly and

response is quick.	the response is slow.
4. Its effects are short lived. 5. Does not cause growth	4. It has prolonged effects. 5. It can cause growth

Question 12:

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

Solution 12:

Movement in sensitive plants	Movement in our legs
1. The movement that takes place in a sensitive plant such as <i>Mimosa pudica</i> occurs in response to touch (stimulus).	1. Movement in our legs is an example of voluntary actions.
2. For this movement, the information is transmitted from cell to cell by electrochemical signals as plants do not have any specialised tissue for conduction of impulses.	2. The signal or messages for these actions are passed to the brain and hence are consciously controlled.
3. For this movement to occur, the plant cells change shape by changing the amount of water in them.	3. In animal muscle cells, some proteins are found which allow the movement to occur.

