

NCERT Solutions for Class 10 Science Chapter 7
Control and Coordination

Exercise 7.1

Question 1:

What is the difference between a reflex action and walking?

Solution:

Reflex action	Walking
<p>1. A reflex action is an instant, involuntary response to a stimulus.</p> <p>2. It does not involve any thinking. For example, we pull back our hand immediately on touching a hot object.</p>	<p>1. Walking, on the other hand, is a voluntary action. It is under our conscious control.</p> <p>2. The response to a reflex action is generated at the spinal cord whereas walking is under the control of the motor area of the brain.</p>

Question 2:

What happens at the synapse between two neurons?

Solution:

Starting with nerve impulse, when it reaches the end of an axon, the axon releases chemicals called neurotransmitters like acetylcholine.

- Neurotransmitters travel crossing the junction between the axon and the dendrites of the next neuron. This point is called a synapse.
- Neurotransmitters get bind to the membrane of these dendrites.
- This binding allows the nerve impulse to travel through the receiving neuron until it reaches the muscle cells or we can say target cells.

Question 3:

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

Solution:

Cerebellum, a part of hindbrain maintains posture and equilibrium of the body.

Question 4:

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

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Solution:

Forebrain is the thinking part of the brain. It has separate areas that are specialized for smelling, hearing, sight, taste, etc. When we smell the incense stick, olfactory receptors present in the nose detects it. Now, by putting together with the information received from other receptors and with the information already stored in the brain as memory, we detect the smell of an incense stick.

Question 5:

What is the role of the brain in reflex action?

Solution:

Reflex action gives the immediate, involuntary response to a stimulus by human beings. 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 through effectors (output) is known as a reflex arc. The reflex arc is the pathway for signalling between effectors and receptors in a reflex action. The signalling is through the actions of the neuron i.e. sensory and motor neuron, which connect to each other in the spinal cord.

Exercise 7.2

Question 1:

What are plant hormones?

Solution:

Plant hormones also known as phytohormones are naturally occurring organic substances that regulate growth and metabolism inside plant cells. These are synthesized in very small quantities in one part of the plant body and are trans located to other parts when required. The main five types of plant hormones are gibberellins, auxins, ethylene, abscisic acid, and cytokinin.

Question 2:

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

Solution:

The movement of leaves of the sensitive plant, *Mimosa pudica* also known as “touch me not”, occurs in response to contact stimuli or touch. This is one of a type of nastic movement. Such movements occur due to the difference in turgor pressures in cells of the leaf. This movement is not growth dependent. These movements have no direction. Example of phototropism is the movement of sunflower in the direction of sunlight.

Question 3:

Give an example of a plant hormone that promotes growth.

Solution:

Example of a hormone of a plant that promotes its growth is Auxin.

Question 4:

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

Solution:

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At the shoot-tip auxin is synthesized. It helps the shoot tip's cell to grow longer. When one side of a tendril encounters support, auxin stimulates much faster growth of the cells on the opposite side, leading to uneven growth on either side of the tendril. Hence the tendril to form a coil around the support.

Question 5:

Design an experiment to demonstrate hydrotropism.

Solution:

The movement of plant parts in response to water is known as Hydrotropism. Positive hydrotropism is shown by roots as they grow towards water. This can be demonstrated as follows:

Take two beakers with labelling A and B. Fill beaker A with water. Now with the help of a filter paper, make a cylindrical-shaped roll and keep that as a bridge between both beaker A and B. In the middle of the filter paper bridge, attach some germinating seeds. Now, the entire set-up is covered with a transparent plastic container so that the moisture is retained.

Exercise 7.3

Question 1:

How does chemical coordination take place in animals?

Solution:

Hormones help in chemical coordination to take place in animals. Various physiological processes in living organisms are regulated by hormones. It is secreted by specific glands. The hormones act on target organs which may be far away from the gland. The endocrine system helps in the regulation of physiological processes and control and coordination by hormones. The physiological processes are controlled and coordinated by the nervous system along with the endocrine system in our body.

Question 2:

Why is the use of iodised salt advisable?

Solution:

Consumption of iodine in the diet helps to synthesize thyroxin in the body. Deficiency of thyroxin results in the enlargement of the thyroid gland. This can lead to simple goitre disease.

Question 3:

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

Solution:

Adrenaline and noradrenaline are also called epinephrine and norepinephrine respectively. The stimulation of the sympathetic nervous system is due to Adrenaline. It prepares the body for any emergency.

The result of adrenaline secretion is getting scared, sweating, shivering, etc. All these responses enable better transport of oxygen to muscle tissues for respiration. This release more energy for either flight or fight. Thus, adrenaline enables the body to deal with any emergency or in stress. Therefore, it is also known as an emergency hormone.

Question 4:

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

Solution:

During diabetes mellitus, the level of sugar in the blood i.e glucose is too high. A hormone secreted by the pancreas is insulin, which helps in regulating blood sugar levels by converting excess glucose to glycogen in the liver. In such patients, the amount of insulin secreted by the pancreas is not enough to convert glucose to glycogen. That's the reason the diabetic patients are treated by injecting injections of insulin.



Exercise Chapter 7

Question 1:

Which of the following is a plant hormone?

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

Solution 1:

(d) Among the given options, 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) Synapse represents the gap between two neurons.

Question 3:

The brain is responsible for

- (a) Thinking.
- (b) Regulating the heartbeat.
- (c) Balancing the body.
- (d) All of the above.

Solution 3:

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

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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:

Sensory cells are receptor cells. They are usually located in our sense organs, such as the inner ear, the nose, the tongue, the eyes and the skin.

Functions of receptors:

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

Question 5:

Draw the structure of a neuron and explain its function.

Solution 5:

Neurons are the structural and functional unit of the nervous system. The three main parts of a neuron are axon, dendrite, and cell body. Structure of a neuron Functions of a neuron:

Neuron performs the functions of-

- I. Transfer of impulse from the outside environment to the brain or spinal cord.
- II. Coordination between brain/spinal cord and other organs.

Question 6:

How does phototropism occur in plants?

Solution 6:

The movement of parts of plant in response to the light energy is Phototropism. Shoots are positively phototropic whereas roots are negatively phototropic. Plants exhibit phototropism due to the action of auxins such as indole-acetic acid (IAA). When one side of the shoot is exposed to sunlight molecules of indole-acetic acid (IAA) move to the opposite side which is shaded. IAA initiates cell division and elongation on the shaded side and not on the side of the shoot exposed to the light.

Question 7:

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

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Solution 7:

In case of any injury to the spinal cord, all nervous signalling will get affected. This will affect the transmission of impulses from receptors to the brain as well as a 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 a stimulus by showing movements. The development, growth and response in plants to the environment is controlled and coordinated by a special class of chemical substances called as phytohormones or plant hormones. For example, a hormone produced in roots when required is trans located to the other parts of the plants. The five major types of phytohormones are auxins, gibberellins, cytokine, abscisic acid, and ethylene. These phytohormones are either growth promoters such as auxins, gibberellins, cytokinin, and ethylene and growth inhibitors such as abscise acid.

Question 9:

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

Solution 9:

The maintenance of the functions of the body in response to changes in the body by working together for different integrated systems of the body is known as coordination. All the movements that occur in response to stimuli need to be carefully coordinated and controlled. Co-ordination of various responses is essential for the organism to function efficiently considering all the stimuli and their effect. Therefore, various responses and physiological processes must be coordinated. In animals, the control and coordination movements are provided by muscular systems and nervous systems. In plants, control and coordination are 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 control the food movement in the alimentary canal. These actions are however directly under the brain's control. On the other hand, the reflex actions pulling back of the hand on touching a hot

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object show sudden response and do not involve any thinking. This means that reflex actions are not under the control of the brain unlike the involuntary actions.

Question 11:

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

Solution 11:

Nervous system mechanism

1. The conveying of information is in the form of electric impulse.
2. The information is transmitted by axons and dendrites through a coordinated effort.
3. The information flow is rapid and also the response is quick.
4. Its effects are short-lived.
5. Does not cause growth

Hormonal system mechanism

1. The conveying of information is in the form of chemical messengers.
2. Blood is responsible for the transmission of information.
3. The flow of information is slow and also the response is slow.
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

1. The movement that takes place in a sensitive plant (For ex: Mimosa pudica) occurs in response to touch (stimulus).
2. For this movement, the transmission of information is from cell to cell by electrochemical signals. This is because the plants have no any specialized tissue for conduction of impulses.
3. For this movement to occur, the plant cells change its shape by changing the water amount in them.

Movement in our legs

1. An example of voluntary actions is the movement in our legs.
2. The messages or signals for these actions are passed to the brain and hence the actions are consciously controlled.