

NCERT CBSE Solutions for Class 10 Science Chapter 7

Control and Coordination

Back of Chapter Questions

1. Which of the following is a plant hormone?

- (A) Insulin
- (B) Thyroxin
- (C) Oestrogen
- (D) Cytokinin.

Solution: (D)

Cytokinin is a plant hormone which is responsible for cell division and hence the growth in plants. Cytokinins are present in large concentrations in rapidly growing regions of a plant such as fruits and seeds.

2. The gap between two neurons is called a:

- (A) dendrite.
- (B) synapse.
- (C) axon.
- (D) impulse.

Solution: (B)

Synapses are the junctions at which neurons pass on the electrical impulse from one another. The electrical impulse is sent by a neuron from its nerve endings via the synapse and is received by the other neuron through the dendrites. The electrical impulses are transmitted through a synapse in the form of chemical signals called neurotransmitters.

3. The brain is responsible for

- (A) thinking.
- (B) regulating the heartbeat.
- (C) balancing the body.
- (D) all of the above.

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Solution: (D)

The brain is responsible to carry off all of the above-mentioned activities. Cerebrum, present in the forebrain, is the thinking region of the brain. Hindbrain regulates involuntary activities such as heartbeat and balancing of the body.

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:

Specialised tips of nerve cells act as receptors which are located in the sensory organs- skin, tongue, the retina of the eyes, inner ear and nose. Receptors sense the changes in the environment and generate an impulse accordingly, which is transmitted to the central nervous system to generate a response.

Receptors that are present in the tongue **detect taste**. Such receptors are called gustatory receptors. Olfactory receptors are the receptors present in the nose that **detect the smell**.

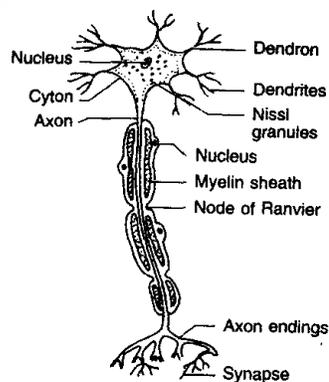
When we fall sick with a common cold, our nose often gets blocked. Due to this blockage, the olfactory receptors are unable to detect the smell. Thus, we cannot smell anything if our olfactory receptors do not work well.

If receptors do not work properly, we **cannot respond to external stimuli**. This might lead us to dangerous situations such as burning of hands if we cannot sense heat from a flame.

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

Solution:

Diagram of Neuron-



A nerve cell (Neuron)

Functions of a Neuron

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A neuron is the basic unit of the nervous system. They generate and transmit electrical impulses. Different parts of neurons perform different functions such as-

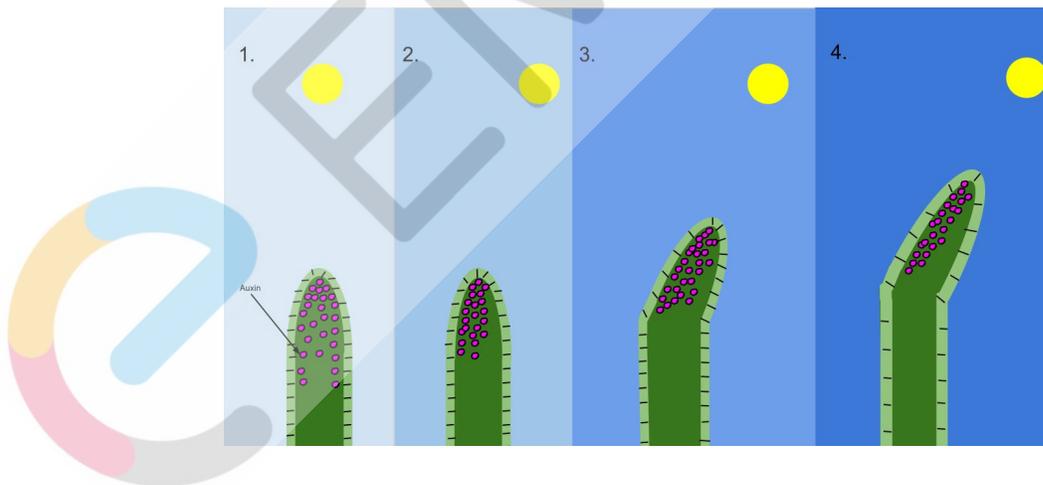
- (a) **Axon-** It is a long slender structure which **transmits electrical impulses away** from the cell body.
- (b) **Dendrites-** These are branched structures which **receive impulses** from other neurons. They have a large surface area to receive the signals. Dendrites receive electrical impulses and conduct them to the cell body. Most neurons have more than one set of dendrites.
- (c) **Nerve ending /Axon Ending:** They transmit the electrical impulse to another neuron or an effector organ. To transmit the electrical impulse, chemical signals are released

6. How does phototropism occur in plants?

Solution:

Phototropism is a directional movement of plants in response to light which acts as a stimulus. This movement depends on growth. The stem is positively phototropic so it moves towards the light. Root, on the other hand, is negatively phototropic and thus moves away from the sunlight.

Auxin is a plant hormone that promotes phototropism. Auxin is synthesized at the shoot tip. At the growing shoot tip, auxin diffuses to the part of the plant in shade and elongates those cells. This makes the plant bend towards the direction of light.



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

Solution:

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Spinal cord has a bundle of nerves which **serves as a meeting point of all nerves** from the body which then connect to the brain. An injury to the spinal cord, therefore, will disrupt all the nerve signals, including the reflex arc.

8. How does chemical coordination occur in plants?

Solution:

Plants rely on plant hormones for chemical coordination.

There are four major plant hormones-

- (i) **Auxin-** Auxin is a plant hormone which is synthesized at the shoot tip. It helps the **cells grow longer**. It is responsible for the bending of the stem towards the light. At the growing shoot tip, auxin diffuses to the part of the plant in shade and elongates those cells. This makes the plant bend towards the direction of light.
- (ii) **Gibberellin-** Like auxin, gibberellin also **promotes the growth of the stem**. It also plays a key role in seed germination.
- (iii) **Cytokinin-** Cytokinin is responsible for **cell division** and hence the growth in plants. Cytokinins are present in large concentrations in rapidly growing regions of a plant such as fruits and seeds.
- (iv) **Abscisic acid-** Plant hormones generally promote the growth of the plant. However, the growth needs to be in check. Abscisic acid is the hormone that **inhibits growth** in plants. One of the effects of abscisic acid (also called ABA) is the wilting of leaves.

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

Solution:

Multicellular organisms have complex body structures with specialized systems to carry out specific functions. To maintain life, the functioning of all these systems must be synchronized as all life processes are interdependent. All the systems must work together to respond to any external stimuli. Thus, organisms have evolved a system of control and coordination. The coordination in humans is carried out by the nervous system through electric impulses as well as through hormones (chemical coordination).

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

Solution:

Following are the differences between involuntary actions and reflex actions-

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Involuntary Action	Reflex Action
Involuntary actions are controlled by the brain (hindbrain and midbrain).	Reflex actions do not involve the control of the brain. It is controlled by the spinal cord .
They mostly affect the movement or functioning of internal body parts such as the movement of the heart during a heartbeat.	Reflex action produces an external response which involves the movement of skeletal muscles, such as the movement of hands away from a hot surface.
The involuntary actions are produced in response to internal stimuli .	Reflex actions are produced in response to external stimuli .

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

Solution:

The differences between the nervous and hormonal controls are as follows-

Nervous Control	Hormonal Control
Nervous control relies on the generation of electrical impulses and their conduction to bring about a suitable response.	Hormonal control relies on the release of hormones (chemical substances) which act on the effector organs to bring about the response.
Nerve impulses are transported through neurons .	Hormones are transported through the blood .
The response is produced quickly .	The production of response is slower .
The effect is transient and vanishes as soon as the response is generated.	The effect of hormones is prolonged .

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

Solution:

The differences between movements in a sensitive plant, such as drooping of leaves of *Mimosa* upon touching, and our leg movements are as follows-

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Movement in a Sensitive Plant	Movement in Legs
The signal of touch is conducted through turgor pressure means but there is no specialized tissue for the conduction of the signal.	The signal for movement is conducted by electrical impulses through specialized nerve cells .
Movement in leaves is brought about by a change in the shape of cells which occurs due to the movement of water .	Movement in muscle occurs due to change in shape of muscle cells which occurs due to contraction and relaxation of muscle cells .
No specialized proteins are involved in the movement.	Specialized proteins in muscle cells are involved in the movement.

In between chapter questions

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

Solution:

A reflex action is an automatic spontaneous response to a stimulus. It does not involve any thinking. For example, when the bright light is focused on our eyes, we immediately close it.

Walking, on the other hand, is a voluntary action. It is acquired through learning. A voluntary action is under our conscious control.

2. What happens at the synapse between two neurons?

Solution:

Synapse is a small gap that occurs between the axon of one neuron and the dendrite of another neuron. It acts as a passage for the transfer of the nerve impulse. The transfer of impulses occurs as the chemicals 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 dendrites of another neuron.

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

Solution:

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

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

Solution:

Our brain is divided into three main parts- forebrain, midbrain, and hindbrain. The forebrain is the thinking part of our brain.

It has separate areas specialized for hearing, smelling, sight, taste, touch, etc.

The forebrain also has regions that collect information or impulses from the various receptors.

When the smell of an incense stick reaches us, the olfactory receptors located in our forebrain detects 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.

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

Solution:

Reflex action is a sudden response to a stimulus and does not involve any thinking. In a reflex action, the stimulus is detected by the sensory nerves that carry the impulse to the spinal cord where it is interpreted and the response is sent back by the motor neuron.

The pathway followed by the reflex action is called the reflex arc. The reflex arc is formed in the spinal cord. The brain is only aware of the signal and the response that has taken place. However, the brain has no role to play in the creation of the response.

6. What are plant hormones?

Solution:

Plant hormones or phytohormones are naturally-occurring organic substances synthesized in minute quantities in the plant body and help in regulating plant growth and other physiological processes.

The five major types of phytohormones are auxins, gibberellins, cytokinins, abscisic acid, and ethylene.

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

Solution:

The movement of the leaves of the sensitive plant, *Mimosa pudica* or "touch me not"; occurs in response to touch or contact. Here, touch or contact acts as stimuli. This movement is independent of growth. The movement of a shoot towards light is known as phototropism. This type of movement is directional and is growth dependent.

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

Solution:

Auxin is a growth-promoting plant hormone.

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

Solution:

Auxin is synthesized at the shoot tip. It helps the cell to grow longer. When a tendril comes in contact with a support, auxin stimulates faster growth of the cells on the opposite side, so that the tendril coils around the support.

10. Design an experiment to demonstrate hydrotropism.

Solution:

Aim of the experiment: To demonstrate hydrotropism.

Method: Place germinating seeds in moist sawdust or cotton contained in a sieve or mesh wire.

Observation: At first radicles appear and they grow downwards towards the gravity. After some time the radicles again bend back and move towards the sieve containing sawdust or cotton.

Conclusion: Roots show both hydrotropic as well as geotropic response. The hydrotropic response is stronger than geotropic response.

11. How does chemical coordination take place in animals?

Solution:

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Chemical coordination in animals takes place with the help of hormones. Hormones are the chemical messengers that regulate the physiological processes in living organisms. Hormones are secreted by endocrine glands. Therefore the chemical coordination in animals takes place through the endocrine system.

12. Why is the use of iodized salt advisable?

Solution:

Iodized salt is advised for the normal functioning of the thyroid gland. Iodine stimulates the thyroid gland to produce thyroxine hormone.

It also regulates carbohydrate, fat, and protein metabolism in our body. Deficiency of this hormone results in the enlargement of the thyroid gland. This is called goiter, which is characterized by a swollen neck.

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

Solution:

Adrenaline is a hormone secreted by the adrenal glands. It is also known as an emergency hormone. It is produced in response to Fight, Flight and Fear.

When secreted in large amounts, it speeds up the heartbeat and increases the blood supply to skeletal muscles, increases the breathing rate and blood pressure. All these responses enable the body to deal with any stress or emergency.

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

Solution:

In diabetes sugar level in the blood rises. Insulin is a hormone secreted by the pancreas that helps in regulating the blood sugar level. So, diabetic patients are treated by giving injections of insulin.

