

Chapter 7: Control and Coordination Science

In Text Questions

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

Answer

A reflex action is a voluntary action which is a rapid and automatic response to stimuli while walking is a voluntary action which requires our thinking and is under our control.

2. What happens at the synapse between two neurons?

Answer

A synapse is the gap between the two neurons. At synapse the electrical signals are converted into chemicals that can easily cross the gap and pass on to the next neurons where they are again converted into electrical signals.

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

► Cerebellum

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

Answer

When the smell of the incense stick reaches to our nose then the olfactory receptors present in our nose detect it and send this information to the fore brain in the form of electrical signals. The fore brain interprets this information as the smell of incense stick where it is already stored.

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

Answer

The brain has no direct involvement in reflex action. It is mainly controlled by the spinal cord as these actions do not require thinking and are very quick actions.

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1. What are plant hormones?

Answer

Plant hormones are the fluids which are secreted within the plant also known as phytohormones. Plant hormones regulate the growth and development of the plant. Examples of plant hormones are auxin, gibberellins etc.

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

Answer

The movements of the leaves of the sensitive plant are touch sensitive and independent of growth while the movement of the shoot towards light is growth related and known as phototropism.

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

► Auxin

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

Answer

When tendrils come in contact with any support, the part of the tendril in contact with the object does not grow as rapidly as the part of the tendril away from the object. This is caused by the action of auxin hormone. Less auxin occurs on the side of contact as compared to the free side as a result, auxin promotes growth on the free side and the tendrils coil around the support.

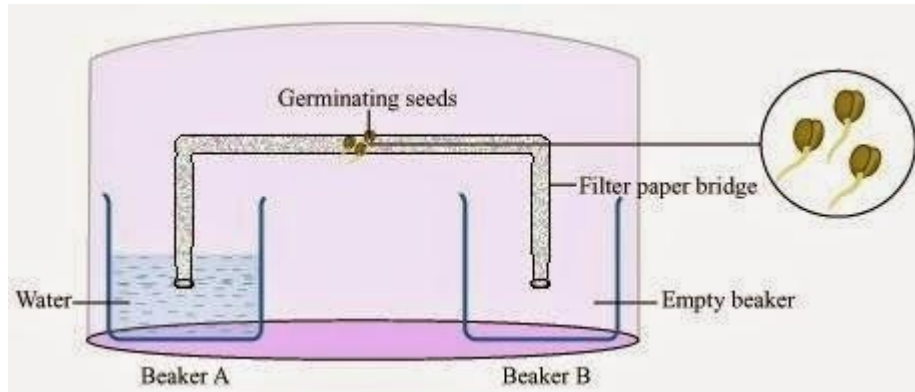
5. Design an experiment to demonstrate hydrotropism.

Answer

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.

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1. How does chemical coordination take place in animals?

Answer

Chemical coordination takes place in animals with the help of hormones. Hormones are the chemical fluids that are secreted by the glands of the endocrine system. Hormones regulate the overall growth and development of the animals.

2. Why is the use of iodised salt advisable?

Answer

Iodine stimulates the thyroid gland to produce thyroxin hormone. It regulates carbohydrate, fat, and protein metabolism 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. Therefore, iodised salt is advised for normal functioning of the thyroid gland.

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

Answer

When someone is in danger or in emergency then adrenal gland secrete adrenaline hormone. It is secreted directly into the blood and is transported to different parts of the body. It speeds up the heartbeat and hence supplies more oxygen to the muscles. This results in increasing breathing rate and blood pressure which enable them to fight with such urgent situation.

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

Answer

Diabetes is caused due to less or no secretion of hormone insulin by pancreas. In such a person, blood sugar level is high. Insulin converts extra sugar present in blood into glycogen. Thus, patients suffering from diabetes are given insulin injection to control their blood sugar level.

Exercise

1. Which of the following is a plant hormone?

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

2. The gap between two neurons is called a

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

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3. The brain is responsible for

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

Answer

Functions of receptors:

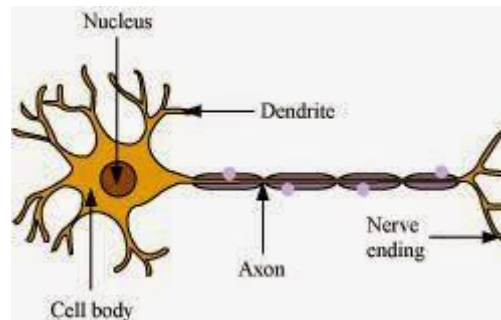
- They sense the external stimuli such as heat or pain.
- They also trigger an impulse in the sensory neuron which sends message to the spinal cord.

When the receptors are damaged, the external stimuli transferring signals to the brain are not felt. 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.

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

Answer



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 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.

6. How does phototropism occur in plants?

Answer

The growth movement in plants in response to light stimulus is known as phototropism. The shoots show positive phototropism and the roots show negative phototropism. This means that the shoots bend towards the source of light whereas the roots bend away from the light source.

For Example: The flower head of sunflower is positively phototropic and hence it moves from east to west along with the sun.

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

Answer

In case of the spinal cord injury, the signals coming from the nerves as well as the signals coming to the receptors will be disrupted. As both these signals meet in a bundle in spinal cord so there is any spinal cord injury then both these signals are

disrupted.

8. How does chemical coordination occur in plants?

Answer

Chemical coordination occurs in plants with the help of plant hormones. Different plant hormones help to coordinate growth, development, and responses to the environment. They are synthesized at places away from where they act and diffuse to the area for action, For example, auxin promotes cell growth, gibberellins promote stem growth, cytokinins promote cell division and abscisic acid inhibits growth and its effects include wilting of leaves.

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

Answer

There are various organs in an organism. These organs must be carefully controlled and coordinated for the survival of an organisms. In the body of an organism various fluids are secreted from the glands of the endocrine system. These hormones are responsible for the overall growth and development of an organism. All others daily decision that includes voluntary and involuntary action are controlled by central nervous system(CNS).

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

Answer

Involuntary action is the set of muscle movement which do not require thinking. But it is controlled by brain for example beating of heart beat while on the other hand, the reflex action is rapid and spontaneous action in response to any stimulus. For example closing of eyes immediately when bright light is focused.

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

Answer

Nervous System Mechanism	Hormonal System Mechanism
It is consist of nerve impulses between PNS, CNS and Brain.	It consists of endocrine system which secretes hormones directly into blood.

The axons and dendrites transmit the information through a coordinated effort.	The information is transmitted or transported through blood.
The flow of information is rapid and the response is quick.	The information travels slowly and the response is slow.
Nerve impulses are not specific in their action.	Each hormone has specific actions.
Effects are short lived.	It has prolonged effects.

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

Answer

Movement in sensitive plants	Movement in our legs
The movement in a sensitive plant is a response to stimulus(touch) which is a involuntary action.	Movement in our legs is a voluntary action.
No special tissue is there for the transfer of information	A complete system CNS and PNS is there for the information exchange.
Plant cells do not have specialised protein for movements.	Animal cells have specialised protein which help muscles to contract.