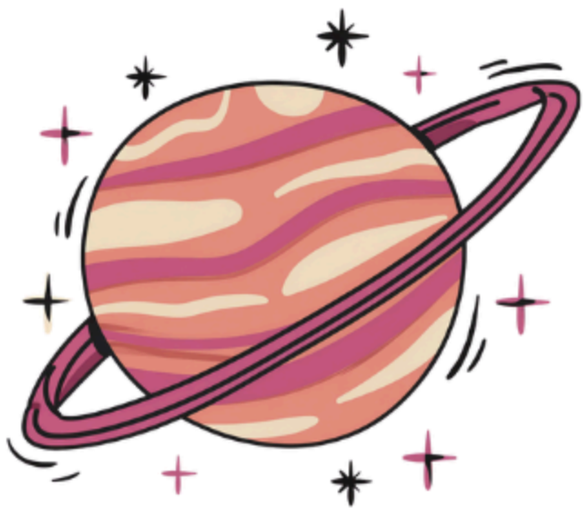

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Class - 10th

NCERT Solution

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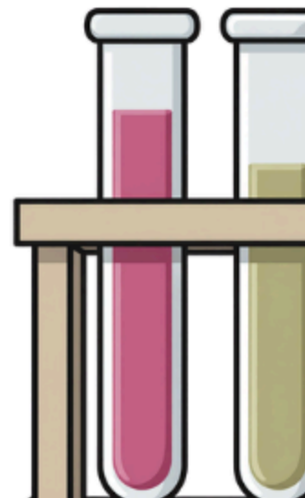
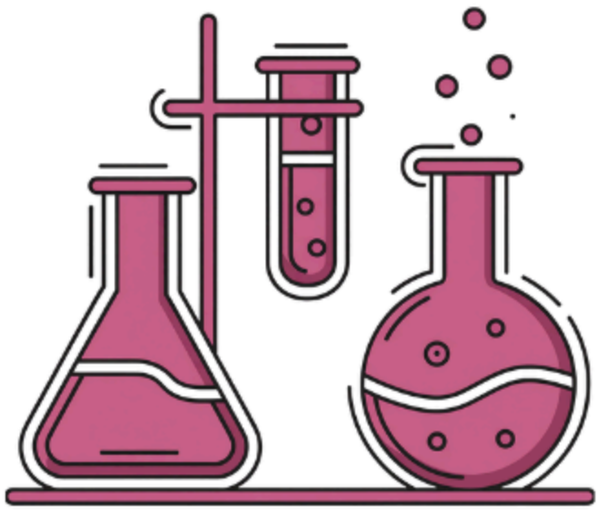




CLASS 10 SCIENCE CHAPTER 6 CONTROL AND COORDINATION NCERT : DETAILED SOLUTIONS

1. **Which of the following is a plant hormone?**
(1) Insulin
(2) Thyroxin
(3) Oestrogen
(4) Cytokinin

Ans. (4) Cytokinin

2. **The gap between two neurons is called a -**
(1) dendrite
(2) synapse
(3) axon
(4) impulse

Ans. (2) synapse

3. **The brain is responsible for -**
(1) thinking
(2) regulating the heart beat
(3) balancing the body
(4) all of the above

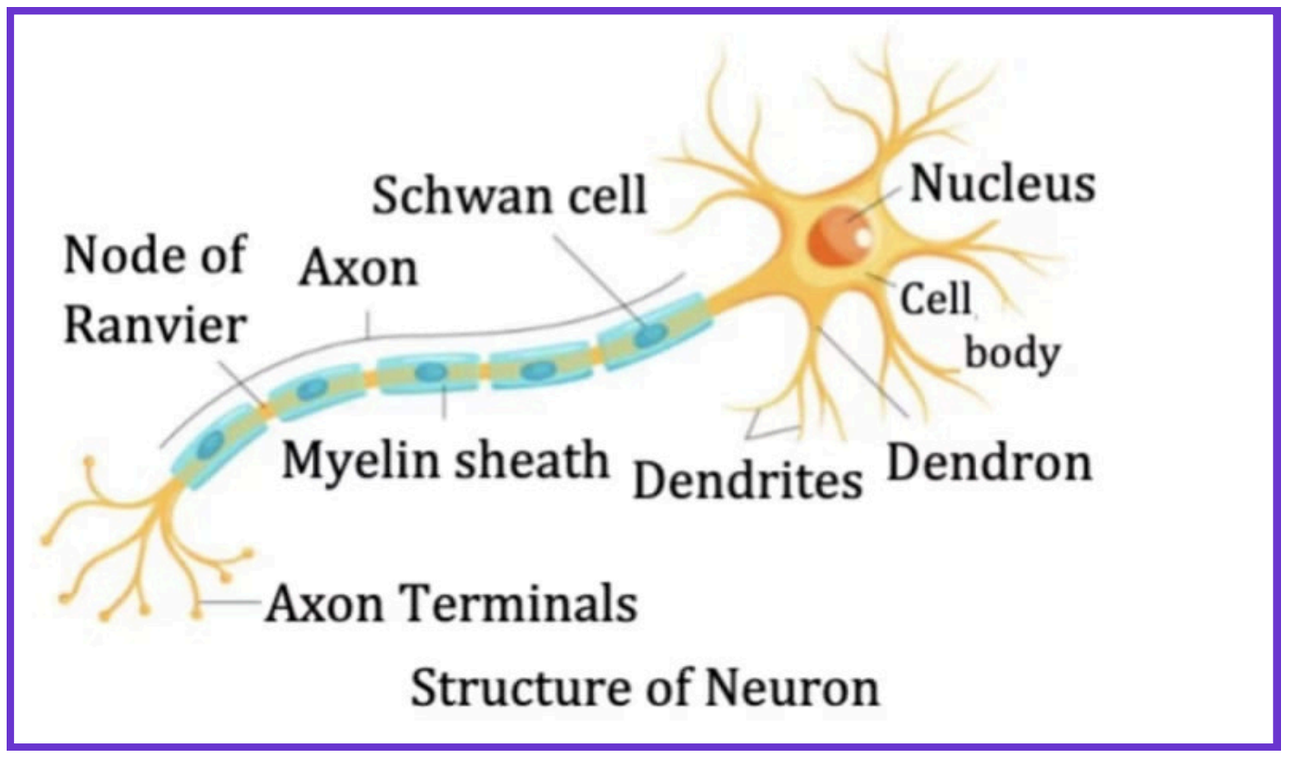
Ans. (4) all of the above

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. All information from the environment is detected by receptors. Receptors pass information in the form of electrical impulses to the brain by nerve cells and the brain sends information to effector organs for response. When receptors do not work properly, information from the environment (stimuli) cannot be detected and our body cannot respond accordingly.

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

Ans:



Structure of Neuron

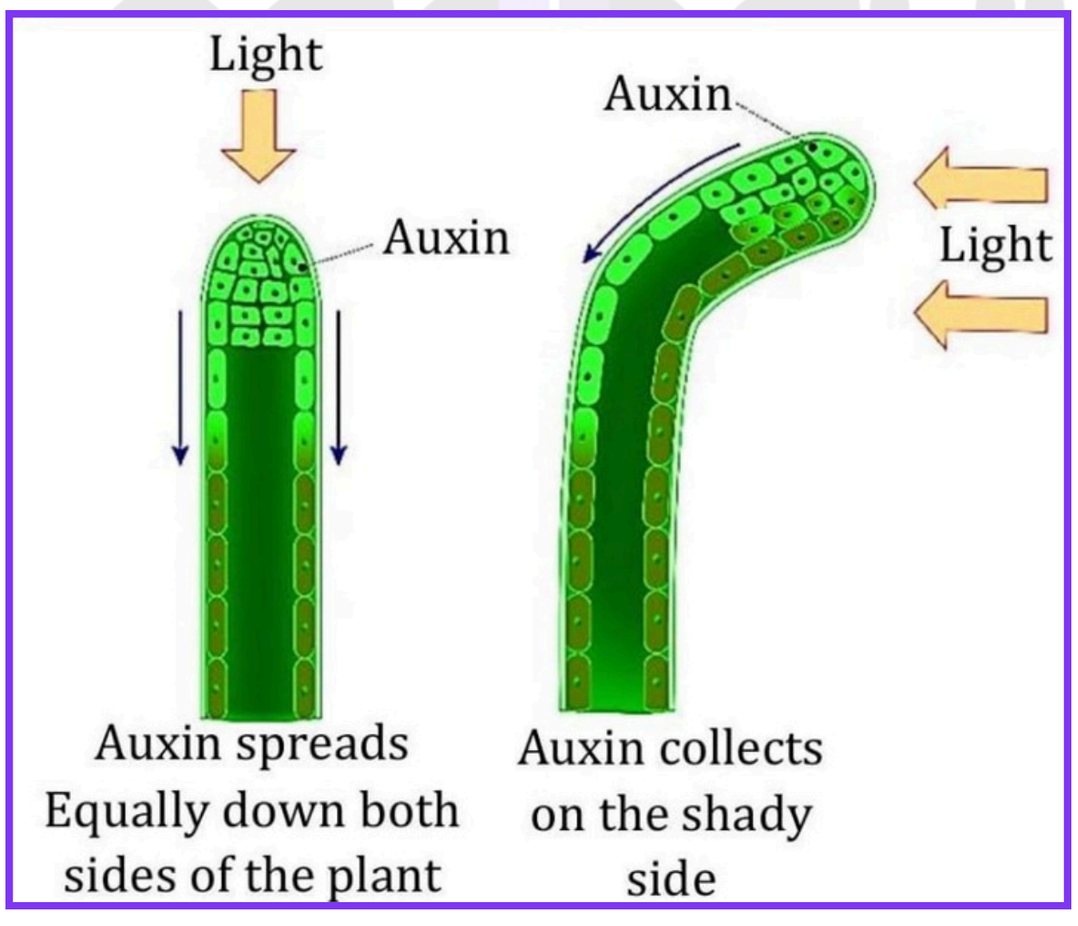
Function of a neuron :

(i) It helps in conducting impulses which enables the organism to show responses towards the stimuli.
(ii) It helps in regulating control and coordination in animals.

6. **How does phototropism occur in plants?**

Ans. The directional movement of a plant part/plant in response to light is called phototropism. The shoot responds by bending towards light while roots respond by bending away from the light. The plant stem responds to light and bends towards it due to the action of auxin hormone. This happens as follows.

(i) When sunlight falls on the plant, the auxin hormone present at the tip of the stem spreads uniformly down the stem. Due to the equal presence of auxin, both the sides of the stem grow straight and with same rapidity.



(ii) When the light falls only on the right side of the stem, then the auxin hormone collects in the left side of the stem, away from the light. This is because the auxin hormone prefers to stay in shade, i.e., moves away from the light. Thus, more auxin hormone is present in the left side of the stem as compared to the right. The left side of the stem grows faster than its right side and therefore, the stem bends towards the right side (direction of light). The effect of auxin on the growth of a root is exactly opposite to that on a stem. Auxin hormone increases the rate of growth in the stem, but it decreases the rate of growth in the root. The side of the root away from light will have all the auxin concentrated in it. Due to this, the side of the root which is away from light will grow slower than the other side and make the root bend away from light.

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

Ans. Spinal cord is an important component of the Central Nervous system. In case of a spinal cord injury, reflex actions and involuntary actions will get disrupted.

8. **How does chemical coordination occur in plants?**

Ans. In plants, chemical coordination occurs with the help of plant hormones (phytohormones). Different plant hormones help to coordinate growth, development and responses to the environment. They are synthesised at places away from where they act and simply diffuse to the area of action, for example, auxin.
Auxin promotes cell elongation, apical dominance and help in root initiation in cutting or in callus differentiation. Another example of plant hormones are gibberellins which help in growth of the stem. Cytokinins promote cell division. Abscisic acid is a plant hormone which inhibits growth, and its effects include wilting of leaves. Ethylene is a gaseous plant hormone which helps in ripening of fruits.

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

Ans. Multicellular organisms have diverse structures and functions. There are different systems which perform specific functions but the functioning of one system is not independent from the other. There is integration of all functional activities of the organisms. For example, digestive enzymes are secreted into the food canal only when there is food.
The integration is possible because of communication and control. Communication makes control possible. The control and coordination occur by two systems, i.e.,
(i) By the release of chemical messengers called the hormones from the endocrine system.
(ii) by the conduction of nerve impulse, i.e. nervous system.

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

Involuntary actions	Reflex actions
(A) They involve the autonomic nervous system.	They involve nerves, brain, and spinal cord.
(B) They usually occur in response to internal stimuli.	They operate against harmful stimuli, which are generally external and may cause injury.
(C) They are connected with the functioning of internal body parts.	They are connected with emergencies.
(D) These are regulated by medulla (hind-brain).	Reflex action is usually controlled by the spinal cord.
(E) The speed of response is slower.	The speed of response is very fast.
(F) Example: Beating of heart muscle.	Example: Removal of hand with a jerk when someone touches a hot object accidentally.

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

Ans.

Difference between Nervous and Hormonal Coordination

Nervous Coordination	Hormonal Coordination
It is sent as an electrical impulse along axons, and as a chemical across synapse.	It is sent as a chemical messenger via blood stream.
Information travels rapidly, in milliseconds.	Information travels slowly.
Information is directed to specific receptors—one or a few nerve fibres, gland cells or other neurons.	Information is spread throughout the body by blood from which the target cells or organs pick it up.
It gets response immediately.	It gets response usually slowly.
Its effects are short-lived.	Its effects are generally more prolonged.

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

Ans.

	Movement in Sensitive Plant	Movement in Legs
(A)	It occurs in response to an external stimulus like touch and shock.	It occurs in response to our requirement and is determined by will.
(B)	Plant cells change shape by changing the amount of water (turgor changes).	Movement in our legs is voluntary action which is controlled by nervous system.
(C)	No nerves are involved.	Nerves carry the message for movement of legs.
(D)	It is controlled by plant hormones.	It is controlled by cerebrum and cerebellum.

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

Ans.

	Reflex Action	Walking
Definition	Automatic, involuntary response to stimuli	Voluntary movement that requires brain control
Control	Controlled by the spinal cord	Controlled by the brain (cerebrum & cerebellum)
Conscious Effort	No conscious effort required	Requires conscious effort and coordination
Speed	Instantaneous	Gradual and controlled
Example	Knee-jerk reaction, blinking	Walking, running, skipping
Reversibility	Cannot be controlled voluntarily	Can be stopped or altered voluntarily
Effect on Body	Protects the body from harm	Helps in mobility and posture maintenance
Dependency on Stimuli	Occurs only when triggered by an external stimulus	Does not require an external stimulus, occurs voluntarily
Type of Nervous System	Involves autonomic nervous system	Involves central and peripheral nervous systems

14. **What happens at the synapse between two neurons?**

Ans. Synapse is the small gap between two neurons which permits a neuron to pass an electrical or chemical signal to another neuron.
Hence, at synapse the chemical substance or neurotransmitters are released by the axon ending of one neuron which is then received by the dendrites of another neuron. Thereby completing the transmission of nerve impulse between two neurons.

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

Ans. Cerebellum maintains posture and equilibrium of the body.

16. **How do we detect the smell of an Agarbatti (incense stick)?**

Ans. The smell of an Agarbatti (incense stick) is detected by the help of olfactory receptors present in our nose which then transmit an electrical signal to our brain to respond to its fragrance.

17. **What is the role of the brain in reflex action?**

Ans. The reflexes which involve only the spinal cord are called spinal reflexes. The spinal reflexes are produced in the spinal cord, but the message of reflex action taken also goes on to reach the brain where the thinking process occurs. Some reflex arcs involve the brain, rather than the spinal cord only. They are called cerebral reflexes. Closing of eyes when exposed to flash of light and salivation at the sight of tempting food are the examples of cerebral reflexes.

18. **What are plant hormones?**

Ans. Plant hormones also known as Phytohormones; are the chemical messengers synthesized in minute quantity in one part of plant body & diffuse to another part in plants where they influence the specific physiological processes.

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

Ans. The movement of leaves of the sensitive plant is nastic movement. It is growth independent movement whereas the movement of shoot towards light is a type of tropic movement. It is growth dependent movement occurring in the direction of stimulus (light).

20. **Give an example of a plant hormone that promotes growth.**

Ans. Auxin is an example of phytohormone which promotes growth. It helps in cell elongation, apical dominance and root initiation.

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

Ans. The movement of tendril around the support is caused by the hormone auxin. Less auxin occurs on the side of contact as compared to the free side. Auxin promotes growth on the free side. As a result of growth on the free side, the tendril coils around the support.

22. **Design an experiment to demonstrate hydrotropism.**

Ans. Aim: To demonstrate that roots show hydrotropism.

Method: Place germinating seeds in moist saw dust contained in a sieve.
Observation:
(i) The radicles pass down and come out of the sieve pores under the influence of gravity.
(ii) After some growth, the radicles move back and enter the saw dust again.
Conclusion:
(i) This shows that roots show both hydrotropic response and geotropic response.
(ii) The hydrotropic response of the root is stronger than the geotropic response.

23. How does chemical coordination take place in animals?

Ans. In animals, chemical coordination is achieved through the agency of hormones which function as chemical messengers or informational molecules. Hormones are secreted in very small amounts by specialized tissues in the body called endocrine glands. These glands are ductless and pour their secretions directly into blood. Blood transports them to the target tissues/organs. Hormones coordinate the activities of living organisms and also their growth. For example, the pancreas secretes two hormones-insulin and glucagon.

24. Why is the use of iodized salt advisable?

Ans. Iodine is important for the thyroid gland to make thyroxin hormone. Thyroxine regulates carbohydrates, proteins and fat metabolism in the body so as to provide the best balance for growth. If iodine is deficient in the diet, thyroxine cannot be produced and the thyroid gland at the neck swells, a condition called goitre. Use of iodized table-salt can provide the required amount of iodine in the diet.

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

Ans. Adrenaline is secreted into the blood during emergency conditions like fight, flight and fear. As a result -
(i) The heart begins to beat faster resulting in a supply of more oxygen to the muscles.
(ii) The blood to the digestive system and skin is reduced due to the contraction of smooth muscles around small arteries in these organs. This diverts the blood to our skeletal muscles.
(iii) The breathing rate increases because of the contractions of the diaphragm and the rib muscles.
(iv) All these responses together enable the body to be ready to deal with the situation.

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

Ans. The insulin hormone controls the metabolism of sugar. When the pancreas does not produce and secrete sufficient amounts of insulin into blood, then the sugar level in the blood rises. Therefore, the patient excretes sugar (glucose) in urine, feels excessive thirst and also urinates excessively. So, people having severe diabetes are treated by giving injections of insulin.

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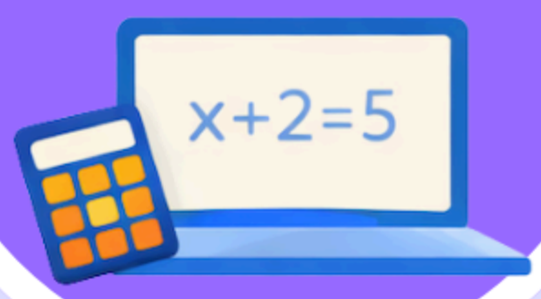

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