CBSE CLASS X

Science (086)

ANSWER KEY

AI-generated question paper

Code: 609ZKO	Questions: 17	Maximum Marks: 34	Generated: 2026-06-25 17:28

SELECTIONS USED

Subject	Science
Lessons	6 Control and Coordination
Level of understanding	Initial understanding
Question selection	Curated chapter coverage (~3 questions per section)
Model	claude-sonnet-4-6

Composition — Difficulty: 11 straightforward · 6 medium | Types: 9 Short · 5 Very short · 3 MCQ

Q1. straightforward · initial-understanding · § 6.1 ANIMALS – NERVOUS SYSTEM **[3]**

Describe the journey of a nerve impulse from a receptor to an effector (muscle or gland). Name the types of neurons involved at each stage.

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Model Answer

Journey of a nerve impulse from receptor to effector:

1. **Receptor** detects a stimulus; the dendritic tip of a **sensory (afferent) neuron** generates an electrical impulse.
2. The impulse travels along the dendrite → cell body → axon of the sensory neuron to the spinal cord/brain.
3. Here, an **interneuron (relay/association neuron)** processes and relays the impulse.
4. The impulse is then carried by a **motor (efferent) neuron** to the effector (muscle or gland).
5. At each junction, chemicals cross the **synapse** to continue the impulse. At the neuromuscular junction, the impulse causes the muscle to contract or the gland to secrete.

Source: Chapter 6, Section 6.1 – Animals: Nervous System

Explanation

- Examiners expect **three neuron types named correctly**: sensory, relay/interneuron, motor.
- The pathway must be in sequence: receptor → sensory neuron → interneuron → motor neuron → effector.
- Mention **synapse** as the chemical bridge between neurons — it is a key term.
- For 3 marks, one mark each is typically awarded for: (i) correct pathway/sequence, (ii) naming the three neurons, (iii) role of synapse and effector response.

Q2. straightforward | initial-understanding | § 6.1.1 What happens in Reflex Actions? **[1]**

Where in the nervous system is a reflex arc formed, and why is it located there rather than in the brain?

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Model Answer

A reflex arc is formed in the **spinal cord**. It is located there rather than the brain because the spinal cord allows faster responses — waiting for the brain would take too long and cause harm.

Explanation

The key points examiners expect: (1) location = spinal cord, (2) reason = speed/efficiency — the brain's thinking process is too slow for urgent responses like withdrawing from heat. Both points are needed for full credit.

Q3. medium | initial-understanding | § 6.1.1 What happens in Reflex Actions? **[3]**

When you accidentally touch a hot object, why is the response carried out without waiting for the brain to think about it? Explain the advantage this gives.

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Model Answer

When we touch a hot object, the response is carried out by a **reflex arc** — a nervous pathway connecting sensory nerves to motor nerves through the **spinal cord**, without involving the brain.

The nerve that detects heat connects directly to the nerve that moves the muscle, right at the spinal cord. This means the signal does not travel all the way up to the brain and back, saving time.

Advantage: Brain thinking involves complex interactions of many neurons, which takes time. During this delay, the hand could get seriously burnt. The reflex arc allows a much faster response, protecting the body from injury.

Source: Chapter 6, Section 6.1.1 – Reflex Actions

Explanation

- Examiners look for three things: (1) **what** happens (reflex arc via spinal cord), (2) **why** it is fast (bypasses brain), and (3) the **advantage** (prevents greater injury/burn).
- Don't just say "it's automatic" — name the **reflex arc** and **spinal cord** for full marks.
- One mark each: mechanism, reason for speed, advantage.

Q4. straightforward | initial-understanding | § 6.1.2 Human Brain **[3]**

Name the part of the human brain that is responsible for thinking. List any two types of sensory information (e.g., sight, smell) whose processing centres are located in this part.

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Model Answer

Part responsible for thinking: The **fore-brain** is the main thinking part of the human brain.

Two types of sensory information processed in the fore-brain:

1. **Sight (vision)** – a separate area of the fore-brain is specialised for processing visual information.
2. **Smell (olfaction)** – a separate area of the fore-brain is specialised for processing smell.

(Other valid answers include hearing, taste, etc.)

Source: Chapter 6, Section 6.1.2 – Human Brain

Explanation

- The question has two parts: name the part (1 mark) + list two sensory areas (2 marks). Always label both parts clearly.
- The textbook explicitly states: *"The fore-brain is the main thinking part of the brain... Separate areas of the fore-brain are specialised for hearing, smell, sight and so on."* Use this exact language.
- Do not confuse fore-brain (thinking) with mid-brain/hind-brain (involuntary actions) or cerebellum (balance). Examiners check for this distinction.
- Any two from: sight, smell, hearing, taste — all are acceptable as the textbook lists them.

Q5. straightforward | initial-understanding | § 6.1.2 Human Brain **[1]**

Which one of the following correctly describes the role of the cerebellum?
(A) It controls involuntary actions such as salivation and blood pressure.
(B) It is the main thinking part and interprets sensory information.
(C) It is responsible for precision of voluntary actions and maintaining posture and balance.
(D) It relays signals between the spinal cord and the fore-brain.

A It controls involuntary actions such as salivation and blood pressure.
B It is the main thinking part and interprets sensory information.
C It is responsible for precision of voluntary actions and maintaining posture and balance.
D It relays signals between the spinal cord and the fore-brain.

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Model Answer

(C) It is responsible for precision of voluntary actions and maintaining posture and balance.

Explanation

The textbook explicitly states: "a part of the hind-brain called the cerebellum... is responsible for precision of voluntary actions and maintaining the posture and balance of the body." Option A describes the medulla, B describes the fore-brain, and D describes the mid-brain's relay function.

Q6. straightforward | initial-understanding | § 6.1.3 How are these Tissues protected? **[1]**

What two structures protect the brain and spinal cord in the human body?

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Model Answer

The brain is protected by a **bony box (cranium/skull)** and a **fluid-filled balloon (cerebrospinal fluid)**; the spinal cord is protected by the **vertebral column (backbone)**.

Explanation

The passage from section 6.1.3 directly states both protective structures. Examiners expect you to name the bony box for the brain and the vertebral column for the spinal cord — two structures for the 1 mark. Mentioning the fluid-filled balloon is a bonus detail but not strictly required.

Q7. medium | initial-understanding | § 6.2 COORDINATION IN PLANTS **[3]**

The leaves of a touch-me-not (chhui-mui) plant fold up and droop when touched. (i) Name the type of movement shown by this plant. (ii) Is any growth involved in this movement? Give a reason for your answer.

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Model Answer

(i) The movement shown by the touch-me-not plant is called **nastic movement** (or immediate response to stimulus / seismonasty).

(ii) No, **no growth is involved** in this movement.

Reason: The leaves move in response to touch by changing the amount of water in their cells, causing the cells to swell or shrink and thus change shape. This is a rapid response that does not depend on cell division or elongation (growth). If the plant were prevented from growing, this movement would still occur.

Source: Chapter 6, Section 6.2 and 6.2.1

Explanation

- Examiners expect the term "nastic movement" or at minimum a clear statement that it is movement **independent of growth**; some marks go to the correct naming.
- The key distinction CBSE tests here: seismonastic/nastic movement = **no growth**; tropic movement (e.g., bending toward light) = **growth-dependent**. State this contrast clearly.
- For the reason, always mention the **mechanism**: change in water content → swelling/shrinking of cells → change in shape. This earns the reasoning mark.
- Avoid writing "the plant feels pain" — that is incorrect and will lose marks.

Q8. medium | initial-understanding | § 6.2.1 Immediate Response to Stimulus **[3]**

The leaves of a sensitive plant (chhui-mui) fold up when touched at one point, even though the movement occurs at a different point. What causes the cells at the base of the leaf to change their shape and bring about this movement?

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Model Answer

When a sensitive plant is touched, the information is transmitted from cell to cell through **electrical-chemical signals**. This information reaches the cells at the **base of the leaf (pulvinus)**. These cells change their shape by **changing the amount of water in them** — some cells lose water and shrink while others swell, causing the leaf to fold and droop. Unlike animal muscle cells, which use specialised proteins, plant cells rely entirely on this **osmotic change** (gain or loss of water) to alter their shape and bring about movement.

Source: Chapter 6, Section 6.2.1 — Immediate Response to Stimulus

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Explanation

- The examiner expects three key points: (1) electrical-chemical signal transmission, (2) cells at the leaf base change shape, and (3) shape change occurs due to change in water content (swelling/shrinking) — NOT by specialised proteins like in animals.
- Avoid confusing this growth-independent movement with tropic movements (like phototropism), which involve auxins and cell elongation.
- The term "pulvinus" is a bonus but not required for full marks in Class 10.

Q9. straightforward | initial-understanding | § 6.2.2 Movement Due to Growth **[1]**

What is meant by a tropic movement in plants? Give one example.

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Model Answer

A tropic movement is a directional growth movement in plants in response to an external stimulus, either towards or away from it.
Example: Shoot bending towards light (phototropism).

Source: Chapter 6, Section 6.2.2 – Movement Due to Growth

Explanation

The examiner looks for two things in this 1-mark answer: (1) the definition mentioning *directional growth* in response to a *stimulus*, and (2) one named example. Writing just "movement towards light" without the word *growth* may cost you the mark. "Phototropism" alone as an example is acceptable; you can also write "geotropism" (roots growing downward in response to gravity).

Q10. medium | initial-understanding | § 6.2.2 Movement Due to Growth **[3]**

A potted plant is kept near a window so that light falls on it from one side. After a few days, the shoot is seen bending towards the light. Name the hormone responsible for this bending and explain how it brings about the movement.

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Model Answer

Hormone responsible: Auxin

How it brings about bending:
Auxin is synthesised at the shoot tip. When light falls from one side, auxin diffuses towards the **shady side** of the shoot. This higher concentration of auxin on the shady side stimulates those cells to **elongate faster** than the cells on the light-exposed side. Due to unequal growth — faster on the shaded side, slower on the lit side — the shoot **bends towards the light**. This is an example of phototropism.

Source: Control and Coordination, Section 6.2.2 – Movement Due to Growth

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Explanation

- The examiner expects three clear points: (1) name the hormone = **auxin**, (2) auxin moves to the shady side, (3) unequal cell elongation causes bending. One mark each.
- Do not just say "the plant bends" — explain the *mechanism* (differential growth).
- The key phrase is **"cells grow longer on the shady side"** — this is what the textbook specifically states and what examiners look for.

Q11. medium | initial-understanding | § 6.2.2 Movement Due to Growth **[2]**

A tendril of a pea plant is touching a vertical stick on one side. Which side of the tendril will grow faster — the side in contact with the stick or the side away from it? What is the result of this difference in growth rate?

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Model Answer

The **side away from the stick** grows faster, because the part in contact with the support grows less rapidly than the part away from it.

As a result of this difference in growth rate, the tendril curves and circles around the object, allowing it to cling to the support.

Source: Chapter 6, Section 6.2.2 — Movement Due to Growth

Explanation

The examiner expects two clear points: (1) identify which side grows faster, and (2) state the result (curling/coiling around the support). The source passage directly states both facts. Avoid adding extra detail about auxins here — the question is about tendrils specifically, and a concise two-point answer is all that is needed for 2 marks.

Q12. straightforward | initial-understanding | § 6.2.2 Movement Due to Growth **[1]**

Which of the following correctly describes geotropism in a germinating seed?
(A) The root grows upward and the shoot grows downward, both responding to gravity.
(B) The root grows downward and the shoot grows upward, both responding to gravity.
(C) Both root and shoot grow towards the source of light.
(D) Both root and shoot grow away from the direction of gravity.

A The root grows upward and the shoot grows downward, both responding to light.
B The root grows downward and the shoot grows upward, both responding to gravity.
C Both root and shoot grow towards the source of light.
D The root grows towards water and the shoot grows towards light.

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Model Answer

(B) The root grows downward and the shoot grows upward, both responding to gravity.

Explanation

Geotropism is the directional growth response of a plant to gravity. Roots show **positive geotropism** (grow towards gravity/downward) and shoots show **negative geotropism** (grow away from gravity/upward). Option B is correct. Note that this is different from phototropism, which is a response to light, not gravity.

Source: Chapter 6, Section 6.2.2 — "The roots of a plant always grow downwards while the shoots usually grow upwards... in response to the pull of earth or gravity is, obviously, geotropism."

Q13. straightforward | initial-understanding | § 6.3 HORMONES IN ANIMALS **[1]**

Which gland secretes adrenaline, and directly into which medium is this hormone released?

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Model Answer

Adrenaline is secreted by the **adrenal glands** and is released directly into the **blood**, from where it is carried to different parts of the body.

Source: Chapter 6, Section 6.3 – Hormones in Animals

Explanation

The question targets two specific facts: (1) the name of the gland (adrenal gland) and (2) the medium into which the hormone is released (blood). Both must appear for full credit. Note that endocrine hormones are released directly into the bloodstream — this distinguishes them from exocrine glands that release secretions through ducts.

Q14. straightforward | initial-understanding | § 6.3 HORMONES IN ANIMALS **[3]**

State any three changes that occur in the human body when adrenaline is secreted during a frightening situation.

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Model Answer

When adrenaline is secreted into the blood during a frightening situation, the following changes occur:

1. **Heart rate increases** — the heart beats faster, supplying more oxygen to the muscles.
2. **Blood is diverted to skeletal muscles** — muscles around small arteries in the digestive system and skin contract, reducing blood flow to these organs and redirecting it to skeletal muscles.
3. **Breathing rate increases** — contractions of the diaphragm and rib muscles cause faster breathing, supplying more oxygen to the body.

These responses together prepare the body to either fight or flee the frightening situation.

Source: Chapter 6, Section 6.3 — Hormones in Animals

Explanation

- The examiner expects **three distinct, clearly stated changes** — one mark each.
- Each point must name the **organ/system affected** and the **change that occurs** (e.g., don't just say "heart beats faster" — link it to oxygen supply).
- The key phrase "fight or flight" can be mentioned but is not compulsory.
- All three changes must come from the adrenaline paragraph in 6.3; do not add unrelated content.

Q15. straightforward | initial-understanding | § 6.3 HORMONES IN ANIMALS **[1]**

A child is diagnosed with dwarfism caused by a hormone deficiency. Which hormone is deficient and which gland normally produces it?

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Model Answer

The deficient hormone is **Growth Hormone (GH)**. It is normally produced by the **pituitary gland**.

Explanation

Examiners expect both the hormone name and the gland in one line. Growth hormone (also called somatotropin) from the anterior pituitary gland controls body growth; its deficiency causes pituitary dwarfism. Note: though not detailed in the given passages, this is standard NCERT Class 10 Science (Chapter 6 – Control and Coordination) content on endocrine glands.

Q16. straightforward | initial-understanding | § 6.3 HORMONES IN ANIMALS **[1]**

Which of the following correctly describes the role of insulin in the body?
(A) It is secreted by the pancreas and raises blood sugar levels.
(B) It is secreted by the pancreas and lowers blood sugar levels.
(C) It is secreted by the adrenal gland and lowers blood sugar levels.
(D) It is secreted by the thyroid gland and lowers blood sugar levels.

A It is secreted by the adrenal gland and raises blood sugar levels.
B It is secreted by the pancreas and lowers blood sugar levels.
C It is secreted by the pituitary gland and regulates body growth.
D It is secreted by the thyroid gland and regulates metabolism.

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Model Answer

(B) Insulin is secreted by the pancreas and lowers blood sugar levels.

Explanation

Insulin is a hormone produced by the pancreas that regulates blood glucose by lowering high sugar levels. Students often confuse the gland (pancreas, not adrenal or thyroid) or the effect (lowers, not raises). Though the source passages don't detail insulin's action, this is standard NCERT Chapter 7 (Life Processes/Control & Coordination) content, and option B matches the correct factual statement given in the question stem.

Q17. medium | initial-understanding | § 6.3 HORMONES IN ANIMALS **[3]**

Explain how the feedback mechanism controls the secretion of insulin in the body. Use the example of blood sugar levels rising after a meal in your answer.

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Model Answer

When we eat a meal, blood sugar (glucose) levels rise. The pancreas detects this rise and secretes the hormone **insulin** into the blood. Insulin signals body cells to absorb glucose, converting it to glycogen, thereby lowering blood sugar levels back to normal.

Once blood sugar returns to the normal level, the pancreas receives this information and **reduces insulin secretion**. This self-regulating process — where the output (lowered blood sugar) controls the further secretion of the hormone — is called the **feedback mechanism**.

Source: Control and Coordination, Chapter 6

Explanation

- The examiner wants three clear points: (1) stimulus — blood sugar rises, (2) response — insulin is secreted, (3) feedback — normal sugar level switches off insulin secretion.
- Use the term **feedback mechanism** explicitly; it is the key term in the question.
- Keep the example of the meal and blood sugar central throughout — don't give a generic answer.
- The source passages confirm hormones are regulated by a feedback mechanism; insulin/blood sugar is the standard textbook example for this concept in Chapter 6.

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