CBSE CLASS X

Science (086)

ANSWER KEY

AI-generated question paper

Code: 8MEMBQ **Questions: 12** **Maximum Marks: 21** **Generated: 2026-06-25 17:24**

SELECTIONS USED

Subject	Science
Lessons	13 Our Environment
Level of understanding	Initial understanding
Question selection	Curated chapter coverage (~3 questions per section)
Model	claude-sonnet-4-6

Composition — Difficulty: 6 straightforward · 6 medium | Types: 5 Short · 4 Very short · 3 MCQ

Q1. straightforward · initial-understanding · § Introduction **[1]**

What term describes all the interacting organisms in an area together with the non-living physical factors of their surroundings?

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Model Answer

An **ecosystem** is the term that describes all the interacting organisms in an area together with the non-living physical factors (abiotic components like temperature, soil, rainfall) of their surroundings.

Source: Chapter 13, Section 13.1 – Ecosystem: What Are Its Components?

Explanation

The examiner expects the single word **ecosystem** along with a brief definition. Mentioning biotic (living) and abiotic (non-living/physical) components strengthens the answer. Avoid writing a long paragraph — one clear sentence is enough for 1 mark.

Q2. straightforward | initial-understanding | § 13.1 ECO-SYSTEM — WHAT ARE ITS COMPONENTS? **[1]**

What is an ecosystem? Give one example of a biotic and one example of an abiotic component found in a pond ecosystem.

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Model Answer

An ecosystem is a system where all living organisms (biotic components) and physical surroundings (abiotic components) interact with each other. In a pond ecosystem, **fish** is a biotic component and **sunlight/water** is an abiotic component.

Source: Chapter 13, Section 13.1

Explanation

This question is worth only 1 mark, so one clean sentence covering the definition plus the two examples is sufficient. Examiners look for: (1) the idea of interaction between living and non-living components, (2) one correct biotic example (fish, aquatic plants, frogs, etc.), and (3) one correct abiotic example (water, sunlight, temperature, minerals, etc.). Do not write more than 2 lines.

Q3. medium | initial-understanding | § 13.1 ECO-SYSTEM — WHAT ARE ITS COMPONENTS? **[3]**

What role do decomposers play in an ecosystem, and what would happen to the environment if they were absent?

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Model Answer

Role of Decomposers:
Decomposers (bacteria and fungi) break down dead and decaying organic matter — dead plants, animals, and their waste — into simple inorganic substances like minerals and nutrients, which are returned to the soil. This makes nutrients available again for producers (plants), completing the nutrient cycle in the ecosystem.

If Decomposers Were Absent:
Dead organic matter would keep accumulating in the environment. Nutrients locked in dead organisms would never be recycled back into the soil. This would deprive producers of essential minerals, disrupting the entire food chain. The ecosystem would eventually collapse due to nutrient depletion and overwhelming accumulation of waste.

Source: Our Environment, Chapter 13

Explanation

- Examiners expect **two clear parts**: the role (nutrient/mineral recycling) and the consequence of absence (accumulation of dead matter + nutrient depletion).
- The source passage emphasises interdependence of ecosystem components and biodegradable waste — tie decomposers to **biodegradable breakdown** and **nutrient cycling**.
- Avoid vague phrases like "they help the environment." Be specific: *break down → release minerals → absorbed by producers*.
- At 3 marks, aim for ~2–3 focused points per part — do not over-write.

Q4. medium | initial-understanding | § 13.1 ECO-SYSTEM — WHAT ARE ITS COMPONENTS? **[1]**

Which of the following correctly explains why food chains rarely have more than four trophic levels?
(A) Producers can only support three types of consumers at a time.
(B) So little usable energy remains after four trophic levels that supporting another level becomes impossible.
(C) Carnivores refuse to eat organisms beyond the fourth trophic level.
(D) The number of individual organisms increases at every higher trophic level, making energy transfer inefficient.

A Producers can only support three types of consumers at a time.
B So little usable energy remains after four trophic levels that supporting another level becomes impossible.
C Carnivores refuse to eat organisms beyond the fourth trophic level.
D The number of individual organisms increases at every higher trophic level, making energy transfer inefficient.

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Model Answer

(B) So little usable energy remains after four trophic levels that supporting another level becomes impossible.

Explanation

The 10% energy law states only ~10% of energy passes to the next trophic level; after four levels, energy is too little to sustain further consumers. Options A, C, and D are factually incorrect as per the textbook.

Q5. straightforward | initial-understanding | § 13.1.1 Food Chains and Webs **[3]**

In the food chain Grass → Grasshopper → Frog → Snake, identify the trophic level occupied by each organism and name the type of consumer each animal represents.

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Model Answer

Organism	Trophic Level	Type of Consumer
Grass	1st (Producer)	— (Autotroph)
Grasshopper	2nd	Primary consumer (Herbivore)
Frog	3rd	Secondary consumer (Small carnivore)
Snake	4th	Tertiary consumer (Larger carnivore)

The autotrophs (grass) fix solar energy at the first trophic level. Each subsequent animal feeds on the organism below it, moving energy up the chain, with only ~10% transferred at each level.

Source: Chapter 13, Section 13.1.1 – Food Chains and Webs

Explanation

- **Trophic level** = each step in a food chain; examiners expect you to number them (1st, 2nd, etc.) AND name the level (producer, primary consumer, etc.).
- The textbook explicitly lists: herbivores = primary consumers (2nd), small carnivores = secondary consumers (3rd), larger carnivores = tertiary consumers (4th). Use these exact terms.
- A table format is clear and earns full marks efficiently for this type of question — it covers all three required organisms (animals) plus the producer without wasting words.
- Do **not** confuse "trophic level" with "consumer level" — grass is at the 1st trophic level but is **not** a consumer.

Q6. straightforward | initial-understanding | § 13.1.1 Food Chains and Webs **[1]**

Only about 10% of the energy available at one trophic level passes on to the next. What happens to the remaining 90%?

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Model Answer

The remaining 90% is lost as heat to the environment, and some is used in digestion and doing work by the organisms at that trophic level.

Source: Our Environment, Chapter 13, Section 13.1.1

Explanation

The key phrase examiners look for is **"lost as heat to the environment"** plus mention of use in digestion/life processes. Avoid vague answers like "it is used up" — be specific that energy is dissipated as heat and used in metabolic activities, making it unavailable to the next level.

Q7. medium | initial-understanding | § 13.1.1 Food Chains and Webs **[1]**

Which of the following correctly explains why harmful chemicals like pesticides are found in the highest concentration in organisms at the top of a food chain?
(A) Top-level consumers eat the most food, so they ingest more pesticides directly from the soil.
(B) Pesticides are produced naturally by large carnivores as a by-product of digestion.
(C) Non-degradable chemicals are not excreted and keep accumulating at each successive trophic level, reaching the highest concentration in top consumers.
(D) Pesticides evaporate from lower trophic levels and are absorbed through the skin of top-level consumers.

A Top-level consumers eat the most food, so they ingest more pesticides directly from the soil.
B Pesticides are produced naturally by large carnivores as a by-product of digestion.
C Non-degradable chemicals accumulate progressively at each trophic level, so the final consumer inherits the combined load from all levels below.
D Pesticides evaporate from lower trophic levels and are inhaled by top-level consumers.

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Model Answer

(C) Non-degradable chemicals accumulate progressively at each trophic level, so the final consumer inherits the combined load from all levels below.

Explanation

The textbook (Ch. 13) explicitly states that pesticides "are not degradable" and therefore "get accumulated progressively at each trophic level," with the maximum concentration reaching top consumers — this phenomenon is called **biological magnification**. Options A, B, and D are factually incorrect as per the chapter.

Q8. medium | initial-understanding | § 13.2 HOW DO OUR ACTIVITIES AFFECT THE ENVIRONMENT? **[3]**

What is biological magnification? Name the organism in a food chain that would have the highest concentration of pesticides, and give one reason why.

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Model Answer

Biological magnification is the increase in the concentration of harmful chemicals (like pesticides) at each successive trophic level in a food chain. This happens because these chemicals are non-biodegradable and accumulate in the body of organisms.

The **top consumer** (e.g., humans) in a food chain has the **highest concentration** of pesticides.

Reason: Since these chemicals cannot be broken down, they keep accumulating at each trophic level. By the time they reach the top consumer, the concentration becomes the highest, as the top consumer eats many organisms from the lower levels over its lifetime.

Source: Our Environment, Chapter 13

Explanation

- **3 marks = 3 points:** Define biological magnification (1 mark) + name the correct organism (1 mark) + give a valid reason (1 mark).
- Examiners expect the term "non-biodegradable" in the reason — it is the key word from the chapter.
- "Top consumer / top carnivore / humans" are all accepted; pick any one.
- Don't write a long paragraph — three tight points are enough for full marks.

Q9. straightforward | initial-understanding | § 13.2.2 Managing the Garbage we Produce **[1]**

Define biodegradable and non-biodegradable substances. Give one example of each.

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Model Answer

Biodegradable substances are broken down by biological processes (microorganisms). *Example:* vegetable peels.
Non-biodegradable substances are not broken down biologically and persist in the environment. *Example:* plastic.

Source: Our Environment, Section 13.2.2

Explanation

Since this is a **1-mark question**, examiners expect both definitions in one or two compact lines with one example each. No elaboration needed. Key terms to use: "biological processes / microorganisms" for biodegradable, and "not broken down / persist" for non-biodegradable. Common examples: biodegradable — fruit peels, food waste; non-biodegradable — plastic, glass, DDT. Avoid writing lengthy paragraphs.

Q10. medium | initial-understanding | § 13.2.2 Managing the Garbage we Produce **[2]**

Plastics do not decompose when buried in soil, even though many food materials do. Why are bacteria and other decomposers unable to break down plastic?

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Model Answer

Bacteria and decomposers break down substances using **specific enzymes**. Just as enzymes in our body are specific to particular substances, no natural enzyme exists that can break down the chemical structure of plastics (human-made materials). Since plastics lack a matching biological enzyme, they cannot be decomposed by bacteria or other saprophytes, making them **non-biodegradable**.

Source: Chapter 13, Section 13.2.2 – Managing the Garbage we Produce

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Explanation

- The key concept here is **enzyme specificity** — examiners want this term used explicitly.
- Mention that plastic is a **human-made (synthetic) material**, for which no corresponding enzyme exists in nature.
- Avoid vague answers like "bacteria can't digest plastic" without explaining *why* (enzyme specificity is the reason).
- Two marks = two clear points: (1) enzymes are specific, (2) no enzyme exists for plastic → non-biodegradable.

Q11. straightforward | initial-understanding | § 13.2.2 Managing the Garbage we Produce **[1]**

Identify which of the following sets contains ONLY non-biodegradable items:
(A) Vegetable peels, used tea leaves, old cotton rags
(B) Spoilt food, newspaper, broken rubber slippers
(C) Empty plastic medicine strips, synthetic packaging material, plastic bags
(D) Fruit peels, dry leaves, empty glass bottles

A Vegetable peels, used tea leaves, old torn clothes
B Spoilt food, milk packets, broken footwear
C Empty plastic medicine strips, synthetic packaging material, plastic bags
D Fruit peels, waste paper, empty glass bottles

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Model Answer

(C) Empty plastic medicine strips, synthetic packaging material, plastic bags — all are non-biodegradable as they are human-made materials not broken down by biological processes.

Explanation

The passage (Activity 13.5) lists empty medicine strips/bubble packs and broken footwear as examples of waste, and states that human-made materials like plastics are **non-biodegradable**. Options A and D contain biodegradable items (vegetable/fruit peels, tea leaves, cotton, dry leaves, paper). Option B includes spoilt food (biodegradable). Only Option C has all non-biodegradable items.

Q12. medium | initial-understanding | § 13.2.2 Managing the Garbage we Produce **[3]**

State two ways in which changes in modern lifestyle have led to increased generation of non-biodegradable waste.

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Model Answer

Modern lifestyle has led to increased generation of non-biodegradable waste in the following ways:

1. **Change in packaging:** Changes in packaging have resulted in much of our waste becoming non-biodegradable. Products are increasingly packed in plastics and synthetic materials that cannot be broken down by biological processes.
1. **Use of disposable items:** Changes in attitude have made more and more things disposable (e.g., disposable plastic cups, wrappers, medicine strips/bubble packs). These single-use items are made of human-made materials like plastics, which are not broken down by bacteria or other saprophytes and persist in the environment for a long time.

Source: Chapter 13, Section 13.2.2 — Managing the Garbage we Produce

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Explanation

- The question asks for **two ways**, but it is 3 marks — so both points need some elaboration (not just one-word answers).
- The textbook explicitly states: *"Changes in packaging have resulted in much of our waste becoming non-biodegradable"* and *"more and more things we use becoming disposable"* — use these exact ideas.
- Avoid copying unrelated content (like CFCs or ozone); the question is specifically about non-biodegradable waste generation from lifestyle changes.
- Examiners look for: correct identification of the lifestyle change + linking it to non-biodegradable waste. Both points must be distinct.

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