CBSE CLASS X

# Science (086)

ANSWER KEY

*AI-generated question paper*

**Code: OAZJNT** **Questions: 32** **Maximum Marks: 69** **Generated: 2026-06-25 17:25**

**SELECTIONS USED**

| | |
|---|---|
| Subject | Science |
| Lessons | 13 Our Environment |
| Level of understanding | Exam-ready |
| Question selection | CBSE board paper, whole lesson (~80 marks across Sections A-E) |
| Model | claude-sonnet-4-6 |

Composition — Difficulty: 12 straightforward · 16 medium · 4 deep | Types: 13 MCQ · 6 Short · 4 Very short · 3 Assertion–reason · 3 Long · 3 Case-based | Sections: A 16Q/16m · B 4Q/8m · C 6Q/18m · D 3Q/15m · E 3Q/12m

**Q1.** straightforward exam-ready **[1]**

Which of the following correctly describes an ecosystem?
(A) Only the living organisms in a habitat
(B) All interacting organisms in an area together with the non-living constituents of the environment
(C) Only the physical factors like temperature, rainfall and soil
(D) The food chains present in a forest

A Only the living organisms in a habitat
B All interacting organisms in an area together with the non-living constituents of the environment
C Only the physical factors like temperature, rainfall and soil
D The food chains present in a forest

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### Model Answer

**(B)** All interacting organisms in an area together with the non-living constituents of the environment.

### Explanation

The textbook explicitly defines an ecosystem as "all the interacting organisms in an area together with the non-living constituents of the environment." Options A and C describe only parts (biotic or abiotic), and D describes just one component (food chains). Always remember: ecosystem = biotic + abiotic components together.

Source: Chapter 13, Section 13.1

**Q2.** straightforward exam-ready **[1]**

Which of the following is an example of a human-made (artificial) ecosystem?
(A) Forest
(B) Pond
(C) Lake
(D) Crop-field

A Forest
B Pond
C Lake
D Crop-field

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## Model Answer

**(D) Crop-field**

Crop-fields are human-made (artificial) ecosystems. Forests, ponds and lakes are natural ecosystems.

Source: Chapter 13, Section 13.1

## Explanation

The textbook explicitly states: *"forests, ponds and lakes are natural ecosystems while gardens and crop-fields are human-made (artificial) ecosystems."* For MCQs, simply writing the correct option with a one-line justification is sufficient for full marks.

**Q3.** straightforward exam-ready **[1]**

Approximately what percentage of the food eaten by an organism at one trophic level becomes available as body mass for the next trophic level?

(A) 1%
(B) 10%
(C) 50%
(D) 100%

A 1%
B 10%
C 50%
D 100%

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### Model Answer

**(B) 10%**

An average of 10% of the food eaten by an organism at one trophic level is turned into its own body mass and made available for the next trophic level.

### Explanation

The **10% law** is a key concept in energy flow through ecosystems. The source passage explicitly states: *"An average of 10% of the food eaten is turned into its own body and made available for the next level of consumers."* The rest is lost as heat, used in digestion, or for work. This is why food chains are limited to 3–4 steps. Remember: green plants capture ~1% of *sunlight* energy, but 10% of *food energy* passes between trophic levels — don't confuse the two.

Source: Chapter 13, Section 13.1.1 Food Chains and Webs

**Q4.** straightforward exam-ready **[1]**

Which of the following food chains is correctly ordered?
(A) Goat → Grass → Human
(B) Grass → Goat → Human
(C) Human → Goat → Grass
(D) Grass → Human → Goat

A Goat → Grass → Human
B Grass → Goat → Human
C Human → Goat → Grass
D Grass → Human → Goat

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### Model Answer

**(B) Grass → Goat → Human**

In a food chain, energy flows from producer to consumer. Grass (producer) is eaten by goat (primary consumer), which is eaten by human (secondary consumer).

### Explanation

A food chain always begins with a **producer** (green plant/grass) and energy flows in one direction toward higher trophic levels. The source passage (Chapter 13, Exercise Q2) directly lists "Grass, goat and human" as a correct food chain. Options A and C reverse the order; option D skips the goat as intermediate consumer.

Source: Chapter 13 (Our Environment), Exercises Q2 & Section 13.1.1

**Q5.** straightforward exam-ready **[1]**

The progressive accumulation of non-degradable chemicals at each successive trophic level is called:
(A) Biodegradation
(B) Biological magnification
(C) Eutrophication
(D) Decomposition

A Biodegradation
B Biological magnification
C Eutrophication
D Decomposition

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### Model Answer

**(B) Biological magnification**

The progressive accumulation of non-degradable chemicals at each successive trophic level in a food chain is called **biological magnification**.

### Explanation

The key phrase is "progressive accumulation at each successive trophic level." Biological magnification (biomagnification) is the correct term — concentrations of harmful chemicals like pesticides increase as we move up the food chain. Eutrophication refers to excess nutrients in water bodies; biodegradation and decomposition are breakdown processes, not accumulation. This concept is directly covered in Chapter 13 (Our Environment).

**Q6.** medium exam-ready **[1]**

In which group do ALL items belong to non-biodegradable waste?
(A) Vegetable peels, plastic bags, glass
(B) Plastic bags, CFCs, glass bottles
(C) Paper cups, cotton cloth, fruit peels
(D) Wood, grass, leather

A Vegetable peels, plastic bags, glass
B Plastic bags, CFCs, glass bottles
C Paper cups, cotton cloth, fruit peels
D Wood, grass, leather

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## Model Answer

**(B) Plastic bags, CFCs, glass bottles**

Plastic bags, CFCs, and glass bottles are all non-biodegradable — they cannot be broken down by biological processes and persist in the environment for a long time.

## Explanation

- Options A, C, and D each contain at least one biodegradable item (vegetable peels, fruit peels, paper cups, cotton, wood, grass, leather — all broken down by microorganisms).
- Option B is correct because plastic bags, CFCs, and glass bottles are all human-made, non-biodegradable substances that resist biological breakdown.
- Key trick: eliminate options with any biodegradable item to find the all-non-biodegradable group.

**Q7.** straightforward exam-ready **[1]**

The ozone layer protects life on Earth mainly by:
(A) Providing oxygen for respiration
(B) Shielding the Earth's surface from ultraviolet radiation
(C) Absorbing infrared radiation from the Sun
(D) Filtering out visible light

A Providing oxygen for respiration
B Shielding the Earth's surface from ultraviolet radiation
C Absorbing infrared radiation from the Sun
D Filtering out visible light

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### Model Answer

**(B) Shielding the Earth's surface from ultraviolet radiation**

The ozone layer absorbs harmful UV radiation from the Sun, protecting organisms from damage such as skin cancer in humans.

Source: Chapter 13, Section 13.2.1

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### Explanation

The passage explicitly states: *"ozone performs an essential function. It shields the surface of the earth from ultraviolet (UV) radiation from the Sun."* Options A, C, and D are incorrect — ozone does not provide oxygen for respiration (that is $O_2$), does not primarily absorb infrared radiation, and does not filter visible light.

**Q8.** straightforward exam-ready **[1]**

Which class of synthetic chemicals is primarily responsible for the depletion of the ozone layer?
(A) DDT
(B) Chlorofluorocarbons (CFCs)
(C) Carbon dioxide
(D) Sulphur dioxide

A DDT
B Chlorofluorocarbons (CFCs)
C Carbon dioxide
D Sulphur dioxide

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### Model Answer

**(B) Chlorofluorocarbons (CFCs)**

CFCs, used as refrigerants and in fire extinguishers, are the synthetic chemicals primarily responsible for the depletion of the ozone layer.

### Explanation

The textbook (Chapter 13) explicitly states that the decrease in ozone levels "has been linked to synthetic chemicals like chlorofluorocarbons (CFCs)." DDT is a pesticide, $CO_2$ causes global warming, and $SO_2$ causes acid rain — none deplete the ozone layer.

**Q9.** straightforward exam-ready **[1]**

Green plants in a terrestrial ecosystem capture approximately what percentage of the sunlight energy that falls on their leaves and convert it into food energy?

(A) 10%

(B) 5%

(C) 1%

(D) 0.1%

A 10%
B 5%
C 1%
D 0.1%

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## Model Answer

**(C) 1%**

Green plants in a terrestrial ecosystem capture about **1%** of the energy of sunlight that falls on their leaves and convert it into food energy.

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

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## Explanation

The passage explicitly states: *"The green plants in a terrestrial ecosystem capture about 1% of the energy of sunlight that falls on their leaves and convert it into food energy."* Do not confuse this with the **10% law**, which refers to energy transfer between trophic levels (i.e., only 10% of food eaten by one level passes to the next). These are two different figures and are frequently mixed up in MCQs.

**Q10.** medium exam-ready **[1]**

Which of the following best describes the flow of energy in an ecosystem?
(A) Cyclic — energy keeps returning to each trophic level
(B) Unidirectional — energy flows from autotrophs to consumers and is not reversed
(C) Bidirectional — energy flows both ways between producers and consumers
(D) Random — energy flows in no particular direction

A Cyclic — energy keeps returning to each trophic level
B Unidirectional — energy flows from autotrophs to consumers and is not reversed
C Bidirectional — energy flows both ways between producers and consumers
D Random — energy flows in no particular direction

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### Model Answer

**(B) Unidirectional — energy flows from autotrophs to consumers and is not reversed**

The flow of energy is unidirectional. Energy captured by autotrophs does not revert to solar input, and energy passed to herbivores does not return to autotrophs.

### Explanation

The textbook explicitly states: *"the flow of energy is unidirectional"* — energy moves from producers → primary consumers → secondary consumers → tertiary consumers and is never reversed. At each step, energy is also lost as heat, so it cannot cycle back. This is a frequently tested concept; remember it contrasts with the **cycling of matter** (which does cycle), making option B the only correct choice.

**Q11.** straightforward exam-ready **[1]**

[mcq] Which of the following contains ONLY biodegradable items?
(A) Grass, flowers and leather
(B) Grass, wood and plastic
(C) Fruit peels, paper and cotton cloth
(D) Plastic bags, glass and DDT

A Grass, flowers and leather
B Grass, wood and plastic
C Fruit peels, cake and lime juice
D Plastic bags, glass and DDT

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### Model Answer

**(C) Fruit peels, cake and lime juice**

Fruit peels, cake, and lime juice are all derived from natural/biological sources and can be broken down by biological processes, making them biodegradable. Plastic, glass, and DDT are non-biodegradable.

### Explanation

The textbook defines biodegradable substances as those broken down by biological processes (bacteria/saprophytes). Items of natural origin — food waste, plant matter, natural fibres — are biodegradable. Plastic, glass, and DDT resist biological breakdown and are non-biodegradable. Note: the correct option in the source passage is **(c) Fruit-peels, cake and lime-juice**, which matches Option C here.

Source: Chapter 13, Section 13.2.2 (Exercise Q.1)

**Q12.** straightforward exam-ready **[1]**

When a series of branching food chains interconnect rather than forming a single straight line, the resulting network is called a:

(A) Trophic pyramid

(B) Food web

(C) Energy chain

(D) Decomposition chain

A Trophic pyramid
B Food web
C Energy chain
D Decomposition chain

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### Model Answer

**(B) Food web**

When branching food chains interconnect instead of forming a straight line, the resulting network is called a **food web**.

### Explanation

The textbook (Chapter 13) explicitly states: "instead of a straight line food chain, the relationship can be shown as a series of branching lines called a **food web**." Trophic pyramid refers to energy/number levels; "Energy chain" and "Decomposition chain" are not defined terms in the syllabus.

**Q13.** medium exam-ready **[1]**

Improvements in lifestyle leading to increased use of disposable, non-biodegradable packaging has caused which of the following problems?
(A) Faster nutrient cycling in soils
(B) Greater accumulation of persistent waste in the environment
(C) Increased rate of photosynthesis by producers
(D) Improved soil fertility

A Faster nutrient cycling in soils
B Greater accumulation of persistent waste in the environment
C Increased rate of photosynthesis by producers
D Improved soil fertility

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### Model Answer

**(B) Greater accumulation of persistent waste in the environment**

Non-biodegradable packaging cannot be broken down by biological processes and persists in the environment for a long time, causing serious accumulation of waste.

### Explanation

The passage directly states: "Changes in packaging have resulted in much of our waste becoming non-biodegradable" and non-biodegradable substances "persist in the environment for a long time or may harm the various members of the eco-system." Options A, C, and D are unrelated to non-biodegradable waste disposal. Always link "non-biodegradable" → "persists" → "accumulates."

**Q14.** medium exam-ready **[1]**

[assertion_reason] Assertion (A): Among all organisms in a food chain, the highest concentration of pesticides is found in organisms at the highest trophic level.
Reason (R): Non-degradable pesticides get accumulated progressively at each trophic level through biological magnification, so organisms at higher trophic levels accumulate greater concentrations.

Options:
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false but R is true.

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### Model Answer

**(A)** Both A and R are true and R is the correct explanation of A.

Non-degradable pesticides accumulate at each trophic level through biological magnification, so the highest trophic level organisms accumulate maximum concentration.

Source: Chapter 13, Section 13.1.1 (Food Chains and Webs)

### Explanation

The textbook explicitly states: "As these chemicals are not degradable, these get accumulated progressively at each trophic level. As human beings occupy the top level in any food chain, the maximum concentration of these chemicals get accumulated in our bodies." This directly confirms both A and R, and R correctly explains A. Option (A) is the answer.

**Q15.** medium exam-ready **[1]**

Assertion (A): Food chains in nature are generally limited to three or four trophic levels.
Reason (R): A large amount of energy is lost as heat at each trophic level, leaving very little usable energy for organisms beyond the fourth level.

Options:
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false but R is true.

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### Model Answer

**(A) Both A and R are true and R is the correct explanation of A.**

Only about 10% of energy passes to the next trophic level; the rest is lost as heat. So very little usable energy remains beyond the fourth level, limiting food chain length to 3–4 steps.

### Explanation

The textbook explicitly states: "Since so little energy is available for the next level of consumers, food chains generally consist of only three or four steps. The loss of energy at each step is so great that very little usable energy remains after four trophic levels." This directly confirms both A and R, and R correctly explains why A is true. The 10% law is the key concept here.

**Q16.** deep exam-ready **[1]**

Assertion (A): Ozone ($O_3$) found at higher levels of the atmosphere is beneficial, while at ground level it is a poison.
Reason (R): At higher altitudes, ozone shields living organisms from harmful UV radiation; at ground level it is toxic to aerobic life.

Options:
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.

A Both A and R are true and R is the correct explanation of A.
B Both A and R are true but R is not the correct explanation of A.
C A is true but R is false.
D A is false but R is true.

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### Model Answer

**(A) Both A and R are true and R is the correct explanation of A.**

Ozone is a deadly poison at ground level but shields Earth from harmful UV radiation at higher altitudes, so R correctly explains A.

### Explanation

The textbook explicitly states that ozone "is a deadly poison" but at higher atmospheric levels "shields the surface of the earth from ultraviolet (UV) radiation." The Reason directly explains *why* the Assertion is true — making option (A) the correct choice. Examiners expect students to verify both the truth of A and R, and whether R logically explains A.

**Q17.** straightforward exam-ready **[2]**

Define 'biodegradable substances'. Give one example each of a biodegradable and a non-biodegradable waste commonly generated at home.

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### Model Answer

**Biodegradable substances:** Substances that are broken down by biological processes (action of bacteria or other saprophytes) are called biodegradable substances.

- **Biodegradable waste (home example):** Vegetable peels / spoilt food / used tea leaves.
- **Non-biodegradable waste (home example):** Plastic bags / empty medicine strips / bubble packs.

*Source: Our Environment, Section 13.2.2*

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### Explanation

- The definition must include the key idea: **broken down by biological processes** — not just "broken down naturally." Examiners look for this specific phrase from the textbook.
- One mark is for the definition; one mark is split between the two examples (both must be correct to score).
- Common mistakes: writing "decomposed by nature" (too vague) or giving examples that don't clearly belong to **home-generated** waste. Stick to kitchen/household items like vegetable peels (biodegradable) and plastic/medicine strips (non-biodegradable).

**Q18.** medium exam-ready **[2]**

What are decomposers? Explain why an ecosystem cannot function normally in their absence.

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### Model Answer

**Decomposers** are microorganisms (bacteria and fungi) that break down the complex organic matter of dead plants and animals into simple inorganic substances, which are returned to the soil.

In their absence, dead organic matter would keep accumulating, nutrients would not be recycled back into the soil, and producers (plants) would be deprived of minerals — disrupting the entire ecosystem.

### Explanation

- **1 mark** for defining decomposers (mention microorganisms + breaking down dead matter + releasing nutrients).
- **1 mark** for the consequence — nutrient cycling stops, minerals are not returned to soil, producers cannot grow, ecosystem collapses.
- Examiners look for the key phrase **"nutrient recycling"** or equivalent. Avoid vague answers like "the environment will get dirty."

**Q19.** medium exam-ready **[2]**

Pesticides sprayed on crops are not directly eaten by humans, yet they are detected in our food. Explain the pathway through which these chemicals ultimately reach our bodies.

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### Model Answer

Pesticides sprayed on crops enter the body of herbivores (e.g., grasshoppers, cattle) when they eat the crops. When humans consume these animals or their products (milk, meat), the pesticides enter our bodies. This process is called **biological magnification** — the concentration of harmful chemicals increases at each trophic level of the food chain.

### Explanation

The key concept here is **biological magnification (biomagnification)**. Examiners expect you to mention: (1) pesticides entering herbivores via crops, (2) transfer to humans through the food chain, and (3) the term "biological magnification" with the idea that concentration increases at higher trophic levels. Avoid mixing this with nervous system content from Ch. 6 — this question is purely from Ch. 13 (Our Environment).

**Q20.** medium exam-ready **[2]**

Distinguish between a food chain and a food web, giving one example of each.

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### Model Answer

**Food Chain:** A linear sequence where each organism eats the one before it.
*Example:* Grass → Goat → Human

**Food Web:** An interconnected network of multiple food chains in an ecosystem.
*Example:* Grass → Insect → Frog → Snake → Eagle (linked with other chains like Grass → Rabbit → Eagle)

*Source: Chapter 13, Section 13.1.1*

### Explanation

- Examiners expect a **definition + example** for each — both parts are needed for full marks (1 mark each).
- Key distinction: food chain = single straight-line sequence; food web = several interlinking food chains.
- Use examples directly from the textbook figures (forest, grassland, pond) for safety.
- Do **not** write long paragraphs — two crisp definitions and two examples are sufficient for 2 marks.

**Q21.** straightforward exam-ready **[3]**

[short_answer] What are trophic levels? Using the food chain — Grass → Grasshopper → Frog → Snake → Eagle — identify the trophic level of each organism. Which organism would have the least available energy, and why?

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### Model Answer

**Trophic levels** are the steps or levels in a food chain, each occupied by organisms sharing the same position in the flow of energy.

| Organism | Trophic Level |
|---|---|
| Grass | 1st (Producer) |
| Grasshopper | 2nd (Primary consumer) |
| Frog | 3rd (Secondary consumer) |
| Snake | 4th (Tertiary consumer) |
| Eagle | 5th (Quaternary consumer) |

**Eagle** has the least available energy. At each trophic level, only **10%** of the energy is transferred to the next level; the rest is lost as heat. By the 5th trophic level, energy has been reduced to a tiny fraction of what was originally fixed by the grass.

*Source: Chapter 13, Section 13.1.1 — Food Chains and Webs*

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### Explanation

- **Define first**, then apply — examiners expect the definition before the example.
- The **10% law** is the key scientific reason for least energy at the top; always state it explicitly.
- A table is an efficient way to show trophic levels clearly and saves words — examiners appreciate it.
- Note: NCERT text shows food chains of 3–4 steps; a 5-step chain is valid but uncommon — identify Eagle as the **top/quaternary consumer** confidently.
- Do **not** write long paragraphs; this is 3 marks ≈ 60–90 words, so be concise.

**Q22.** medium exam-ready **[3]**

Explain why the number of individuals at successive trophic levels in an ecosystem keeps decreasing. In a food chain with four trophic levels, if producers have 10,000 units of energy, how much energy is available at the fourth trophic level? Show your working.

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### Model Answer

At each trophic level, only **10% of the energy** is transferred to the next level. The rest is lost as heat, used in digestion, and for life processes. Therefore, energy decreases rapidly at each successive trophic level, supporting fewer individuals.

**Working:**

- Producers (T1) = 10,000 units
- Primary consumers (T2) = 10% of 10,000 = **1,000 units**
- Secondary consumers (T3) = 10% of 1,000 = **100 units**
- Tertiary consumers (T4) = 10% of 100 = **10 units**

∴ Energy available at the fourth trophic level = **10 units**.

Source: Chapter 13, Section 13.1.1 (Food Chains and Webs)

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### Explanation

- The examiner expects the **10% law** to be stated clearly — this is the key concept.
- The calculation must show **all three steps** (T2, T3, T4) with working, not just the final answer.
- "Loss as heat/digestion/life processes" is the reason — one line is enough; don't over-explain.
- Always state the final answer explicitly. Skipping the working loses marks even if the answer is correct.

**Q23.** medium exam-ready **[3]**

What is biological magnification? Using a food chain as an example, explain why a carnivore at the top of the food chain would have a higher concentration of pesticides in its body than a herbivore feeding on the same plants.

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### Model Answer

**Biological Magnification:** The progressive increase in the concentration of harmful chemicals (like pesticides) at each successive trophic level of a food chain is called biological magnification.

**Example:**

$$\text{Plants} \rightarrow \text{Insects (herbivore)} \rightarrow \text{Frog} \rightarrow \text{Snake} \rightarrow \text{Eagle (carnivore)}$$

Pesticides are absorbed by plants from soil/water. Since these chemicals are **non-degradable**, they are not broken down and keep accumulating in the body of each organism. A herbivore eats many plants, collecting all their pesticide content. The top carnivore then eats many herbivores and intermediate consumers, so the chemicals concentrate further at each level. Thus, the top carnivore accumulates the **maximum concentration** of pesticides.

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

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### Explanation

- **1 mark** for defining biological magnification correctly.
- **1 mark** for a valid food chain with labels.
- **1 mark** for the explanation of *why* concentration increases — key idea is that chemicals are **non-degradable** and each consumer eats many organisms from the level below, so chemicals keep accumulating upward.
- Do not just say "carnivores eat more" — you must link it to the **non-degradable nature** of chemicals and their **progressive accumulation** at each trophic level.

**Q24.** medium exam-ready **[3]**

[short_answer] Explain how ozone is formed naturally in the upper atmosphere. Name the group of chemicals mainly responsible for the depletion of the ozone layer, and state two harmful consequences of ozone layer depletion.

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## Model Answer

**Formation of Ozone:**
UV radiation from the Sun splits oxygen molecules ($O_2$) into free oxygen atoms (O). These free atoms then combine with other oxygen molecules to form ozone:

$$O_2 \xrightarrow{UV} O + O$$

$$O + O_2 \rightarrow O_3 \text{ (Ozone)}$$

**Chemicals responsible for depletion:**
Chlorofluorocarbons (CFCs), used as refrigerants and in fire extinguishers.

**Two harmful consequences:**

1. Increased UV radiation reaching Earth causes **skin cancer** in humans.
2. UV radiation is highly damaging to all living organisms/ecosystems.

*Source: Chapter 13, Section 13.2.1*

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## Explanation

- Examiners expect the two chemical equations for ozone formation — writing them earns key marks.
- "CFCs" must be written in full at least once: **Chlorofluorocarbons**.
- The textbook explicitly mentions skin cancer as a consequence; always include it. For the second consequence, any reference to harm to organisms/UV damage is acceptable.
- Do not confuse ground-level ozone (pollutant) with stratospheric ozone (protective layer).

**Q25.** medium exam-ready **[3]**

Suggest three environment-friendly practices that can help an individual reduce the amount of non-biodegradable waste generated in daily life. Justify why each practice is effective.

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### Model Answer

Three environment-friendly practices to reduce non-biodegradable waste:

1. **Carry cloth bags while shopping** — This avoids the use of plastic carry bags, which are non-biodegradable and persist in the environment for a very long time.
1. **Avoid disposable plastic items** — Using reusable containers, cups, and bottles reduces the generation of plastic waste that cannot be broken down by biological processes.
1. **Choose products with minimal/biodegradable packaging** — Changes in packaging have resulted in much of our waste becoming non-biodegradable, so selecting eco-friendly packaging directly reduces such waste.

*Source: Our Environment, Section 13.2.2*

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### Explanation

- The question asks for **three practices + justification**, so each point must name the practice AND briefly explain why it works — that earns 1 mark each.
- The textbook directly states that "changes in packaging have resulted in much of our waste becoming non-biodegradable" and that non-biodegradable substances "persist in the environment for a long time or may harm the various members of the ecosystem." Use these ideas in justifications.
- Exercise Q3 lists cloth bags, switching off lights, and walking — carry bags is the most directly relevant to non-biodegradable waste. Build the other two from the chapter's discussion on plastics and packaging.
- Keep each justification to one sentence; don't over-explain.

**Q26.** deep exam-ready **[3]**

If all the organisms at one trophic level of an ecosystem are suddenly removed, what would be the consequences for (i) the trophic level immediately above it, and (ii) the trophic level immediately below it? Give a specific example to support your answer.

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### Model Answer

**(i) Trophic level above:** The organisms at the level immediately above would face a **shortage of food**, causing their population to **decline or starve**. For example, if all grasshoppers (primary consumers) are removed, frogs (secondary consumers) would have no food and their numbers would fall sharply.

**(ii) Trophic level below:** The organisms at the level immediately below would **increase in population** due to reduced predation. In the same example, removing grasshoppers would cause **grass (producers) to grow unchecked**, disturbing the ecosystem balance.

### Explanation

- Examiners expect **both consequences clearly distinguished** — starvation above, population boom below.
- A **specific, named example** (grasshopper, frog, grass) is required for full marks; a general statement alone will lose a mark.
- Keep terminology correct: use "trophic level," "food chain," "producers/consumers."
- The answer maps to the interdependence of ecosystem components (Chapter 13).

**Q27.** medium exam-ready **[5]**

[long_answer] (a) Define 'ecosystem'. Distinguish between biotic and abiotic components, giving two examples of each.
(b) Explain the roles of producers, consumers and decomposers in maintaining the balance of an ecosystem.
(c) Why are green plants called the primary source of energy in any ecosystem? What would happen if all producers were removed from an ecosystem?

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## Model Answer

**(a)** An **ecosystem** is a system in which all living organisms in an area interact with each other and with the non-living constituents of the environment, maintaining a balance in nature.

| | **Biotic Components** | **Abiotic Components** |
|---|---|---|
| Definition | Living organisms | Physical/non-living factors |
| Examples | Plants, animals | Temperature, soil |

**(b)**

- **Producers** (green plants) synthesise food from inorganic substances using sunlight, making solar energy available to all other organisms.
- **Consumers** (herbivores, carnivores) depend on producers directly or indirectly for sustenance, transferring energy through trophic levels.
- **Decomposers** (bacteria, fungi) break down dead remains into simple inorganic substances, returning nutrients to the soil for reuse by plants.

**(c)** Green plants capture solar energy and convert it into chemical energy (food) through photosynthesis, making them the **primary (first) source of energy** for all other organisms.

If all producers were removed, consumers would have no food source and would die. Decomposers would also eventually perish. The entire ecosystem would collapse as energy flow would stop completely.

*Source: Chapter 13, Section 13.1 & 13.1.1*

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## Explanation

- **(a):** Give the textbook definition and clearly separate biotic/abiotic with two examples each — a small table saves words.
- **(b):** Each role needs one clear sentence; examiners award one mark per component, so don't merge them.
- **(c):** Two distinct points — *why* green plants are the primary energy source (photosynthesis/solar energy capture), and *consequence* of removing producers (collapse of food chain). Both are needed for full marks.
- Keep language concise; CBSE rewards accuracy and coverage over length.

**Q28.** medium exam-ready **[5]**

(a) What is the ozone layer and where is it found in the atmosphere?
(b) Describe how UV radiation leads to the formation of ozone in the upper atmosphere, with the help of chemical equations.
(c) Explain how human activities have led to the depletion of the ozone layer, and discuss the environmental consequences of this depletion.
(d) What international measures have been taken to address this problem?

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### Model Answer

**(a)** The ozone layer is a region in the upper atmosphere (stratosphere) where ozone ($O_3$) is present in higher concentrations. It shields Earth's surface from harmful ultraviolet (UV) radiation from the Sun.

**(b)** UV radiation splits $O_2$ molecules into free oxygen atoms, which then combine with $O_2$ to form ozone:

$$O_2 \xrightarrow{\text{UV}} O + O$$

$$O + O_2 \rightarrow O_3 \text{ (Ozone)}$$

**(c)** Synthetic chemicals called **chlorofluorocarbons (CFCs)**, used in refrigerants and fire extinguishers, have caused ozone depletion, which began to drop sharply in the 1980s. Consequences include increased UV radiation reaching Earth's surface, which is highly damaging to organisms — for example, it causes **skin cancer** in human beings.

**(d)** In **1987**, the United Nations Environment Programme (UNEP) forged an agreement to freeze CFC production at 1986 levels. It is now mandatory for all manufacturing companies worldwide to produce **CFC-free refrigerators**.

*Source: Chapter 13, Section 13.2.1*

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### Explanation

- The question has four sub-parts, so answer all four clearly labelled — examiners check this.
- Include **both chemical equations** for part (b); writing only one loses marks.
- For part (c), name **CFCs** specifically and give at least one consequence (skin cancer).
- For part (d), mention the **year (1987)**, **UNEP**, and the CFC-free refrigerator mandate — these are the specific facts examiners look for.
- Keep language concise; do not repeat information across sub-parts.

**Q29.** deep exam-ready **[5]**

(a) Distinguish between biodegradable and non-biodegradable substances with two examples each.
(b) How do non-biodegradable substances cause environmental problems? Discuss two specific ways.
(c) Even if all waste were biodegradable, could it still harm the environment? Explain your reasoning.
(d) Suggest two practical steps that local municipal bodies can take to manage biodegradable and non-biodegradable wastes effectively.

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## Model Answer

**(a)** Biodegradable substances are broken down by biological processes (bacteria, saprophytes). Non-biodegradable substances are not broken down this way and persist in the environment.

- **Biodegradable examples:** Vegetable peels, spoilt food
- **Non-biodegradable examples:** Plastic bags, empty medicine strips

**(b)** Two environmental problems caused by non-biodegradable substances:

1. They persist in the environment for a very long time, polluting soil and water bodies.
2. They may cause **biological magnification** — harmful chemicals accumulate and increase in concentration at higher trophic levels, damaging organisms including humans.

**(c)** Yes, even biodegradable waste can harm the environment. If generated in large quantities, it produces foul smell and harmful gases during decomposition, may contaminate water bodies, and can disturb the balance of nutrients in the soil.

**(d)** Two practical steps for municipal bodies:

1. Collect biodegradable and non-biodegradable wastes **separately** using different bins and treat them by composting and recycling respectively.
2. Ensure **proper sewage treatment** so that untreated waste does not pollute local water bodies and soil.

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

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## Explanation

- **(a)** The distinction must use the key phrase "broken down by biological processes." The textbook explicitly defines both terms this way — use these definitions, not vague ones.
- **(b)** Biological magnification is the textbook's own example of a specific problem; include it for full marks. Persistence in the environment is the other core point.
- **(c)** This tests critical thinking beyond definitions. The textbook asks this exact question (Exercise Q8) and the answer is that large quantities of even biodegradable waste cause pollution — gas production, water contamination, etc.
- **(d)** Activity 13.7 in the textbook explicitly asks students to check whether local bodies treat biodegradable and non-biodegradable wastes **separately** — make that your anchor point for a strong answer.

**Q30.** medium exam-ready **[4]**

Read the following passage and answer the questions that follow:

A farmer applied large quantities of pesticides to his paddy fields over several seasons to improve yield. After heavy rains, the water carrying dissolved pesticides drained into a nearby pond. The pond supported a food chain: Algae → Small fish → Large fish → Fish-eating birds. After a few years, scientists noticed that the fish-eating birds in the area were dying in large numbers. Chemical analysis showed that these birds had very high levels of pesticides in their bodies, even though the concentration of pesticides in the pond water itself was very low.

(i) Name the phenomenon responsible for the high pesticide concentration in the fish-eating birds. [1]
(ii) Arrange the four organisms — Algae, Small fish, Large fish, Fish-eating birds — in increasing order of pesticide concentration in their bodies. [1]
(iii) Explain why the concentration of pesticides is highest in the fish-eating birds even though the water contains only a very small amount of the chemical. [2]

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### Model Answer

**(i)** The phenomenon responsible is **Biological Magnification**.

**(ii)** Increasing order of pesticide concentration:

**Algae < Small fish < Large fish < Fish-eating birds**

**(iii)** Pesticides are non-biodegradable chemicals. When algae absorb them from water, small fish eat large amounts of algae, accumulating more pesticides. Large fish eat many small fish, concentrating the chemical further. Fish-eating birds, being at the top trophic level, consume the most large fish, so the maximum concentration accumulates in their bodies. Since the pesticides cannot be broken down or excreted, they build up progressively at each trophic level — a process called biological magnification — resulting in the highest levels in fish-eating birds, even though the water has very little of the chemical.

*Source: Chapter 13, Section 13.1.1 — Food Chains and Webs*

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### Explanation

- **(i)** is a straight one-mark recall — just name the term correctly.
- **(ii)** is one mark for the correct sequence; the food chain order directly gives the order of increasing pesticide concentration.
- **(iii)** is 2 marks — examiners expect two key ideas: (a) non-biodegradable nature causes accumulation at each trophic level, and (b) organisms at higher levels eat many organisms below, so concentration keeps increasing. Mentioning "biological magnification" again here strengthens the answer. Keep it concise — roughly 50–60 words for 2 marks.

**Q31.** medium exam-ready **[4]**

Read the following and answer the questions that follow:

A class was asked to bury two sets of waste materials in the school garden: Set A contained vegetable peels, leftover food and dried leaves; Set B contained plastic wrappers, an old polythene bag and an empty medicine strip. After 30 days, they dug up both sets. Set A had largely decomposed and was mixed into the soil, while Set B remained almost unchanged.

(i) What term describes the materials in Set A? What organisms are mainly responsible for their breakdown? [1]
(ii) Give a reason why the materials in Set B remained unchanged after 30 days. [1]
(iii) Describe two harmful effects that materials like those in Set B can have on the environment if left unmanaged. [2]

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### Model Answer

**(i)** The materials in Set A are called **biodegradable** substances. They are mainly broken down by **microorganisms (bacteria and fungi/saprophytes)** present in the soil.

**(ii)** The materials in Set B are **non-biodegradable**. Bacteria and other saprophytes do not possess the specific enzymes needed to break down human-made materials like plastic and polythene, so they remained unchanged.

**(iii)** Two harmful effects of non-biodegradable materials:

1. They **persist in the environment for a very long time**, accumulating in soil and water bodies, disrupting the ecosystem.
2. They may **harm living organisms** in the ecosystem — for example, through biological magnification if toxic substances enter food chains.

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

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### Explanation

- **(i)** The key term "biodegradable" and the agents (bacteria/fungi/saprophytes) are both needed for the 1 mark.
- **(ii)** The reason must refer to the **absence of specific enzymes** in microorganisms — this is exactly what the textbook states. Just saying "plastic doesn't decompose" is too vague.
- **(iii)** The textbook states non-biodegradable substances either "persist in the environment for a long time" or "harm the various members of the ecosystem." Mention both distinct effects. Biological magnification is a valid second point from the same chapter.

**Q32.** deep exam-ready **[4]**

Read the following and answer the questions that follow:

In a grassland ecosystem, the following food chain exists:
Grass → Rabbit → Fox → Lion

Assume that the grass (producers) fixes 1,00,000 units of energy from sunlight. A wildlife biologist observing this ecosystem notes that at higher trophic levels, there are far fewer individual organisms. He also notes that when a disease wiped out most of the fox population one year, rabbit numbers exploded and the grass was severely overgrazed.

(i) Using the 10% law, calculate the amount of energy available to the lion (4th trophic level). Show your calculation. [2]
(ii) Why are there far fewer individual lions than rabbits in this ecosystem? [1]
(iii) Based on the biologist's observation about foxes, explain what this tells us about the interdependence of organisms in a food chain. [1]

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### Model Answer

**(i) Energy available to the Lion (4th trophic level):**

Using the 10% law:

- Grass (1st trophic level) = 1,00,000 units
- Rabbit (2nd trophic level) = 10% of 1,00,000 = **10,000 units**
- Fox (3rd trophic level) = 10% of 10,000 = **1,000 units**
- Lion (4th trophic level) = 10% of 1,000 = **100 units**

∴ Energy available to the lion = **100 units**

**(ii)** Since only 10% of energy is transferred at each trophic level, very little energy remains by the time it reaches the lion (4th trophic level). Less available energy can support fewer individuals, so the number of organisms decreases at higher trophic levels.

**(iii)** When foxes were wiped out, rabbit numbers exploded and grass was severely overgrazed. This shows that every organism in a food chain is interdependent — removal of one organism at any trophic level disturbs the balance of the entire ecosystem.

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

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### Explanation

- **(i)** Always show each step of the 10% law calculation clearly — examiners award marks for working, not just the final answer.
- **(ii)** Link the reason directly to energy loss: less energy = fewer individuals. This is the concept of the **energy pyramid**.
- **(iii)** The biologist's observation is a classic example of a **trophic cascade** — use it to explain interdependence and balance in an ecosystem. Stick to the passage; don't over-elaborate.



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