

Our Environment

Periodic Test

Q.1. What are the abiotic components of an ecosystem?

Answer: The non-living parts of an ecosystem are called abiotic components. Abiotic components include sunlight, water wind, temperature, altitude (height), soil, pH, and atmospheric gases.

Q.2. How much energy of Sun can be converted into food energy by the green plants?

Answer: Energy flow in an ecosystem is unidirectional. Energy always flow from sun to the producers and then to the consumers. 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.

Q.3. Why only 10% energy and mass is transferred to next level in a food chain?

Answer: When green plants are consumed by the herbivores (primary consumers) most of the energy is liberated as heat to the environment, some amount goes into digestion and some energy used for growth and reproduction. Only 10% of the food eaten is turned into its own body and made available for the next level of consumers.

Q.4. What is meant by a trophic level?

Answer: i. The group of organisms that occupy the same level in a food chain is called trophic level.

ii. For example, in a grassland ecosystem, the different species of grasses are primary producers make up one trophic level.

iii. Similarly different species of grass eating animals (herbivores) are at one trophic level.

Q.5. Pick the biodegradable substances from the following:

Cotton, rubber, leather, radioactive material.

Answer: Biodegradable substances are those which can be breakdown or degraded by microorganisms such as bacteria and fungi. Cotton, rubber and leather are biodegradable substances in above given substances.

Q.6. Pick the non-biodegradable, substances from the following:

Animal bones, wool, paper, glass.

Answer: Non-biodegradable substances are those which cannot be breakdown or degraded by microorganisms such as bacteria and fungi. Glass is no-biodegradable substance in above given substances.

Q.7. Select from the following substances which have posed a threat to the environment:

Aerosols, consumers, bacteria, CFCs.

Answer: Aerosol and CFCs are substances that posed a threat to the environment

- Aerosol is a substance enclosed under pressure and released as a fine spray by means of a propellant gas. For example, body deodorant, any of spray.
- CFCs or Chlorofluorocarbons are a group of man-made compounds containing chlorine, fluorine and carbon. They are harmful and cause depletion of ozone layer.

Q.8. Give the full form of CFC.

Answer: Full for of CFCs is chlorofluorocarbons, commonly known as Freon, CFCs are used in in air-conditioning, refrigeration, blowing agents in foams, insulations and packing materials, propellants in aerosol cans.

Q.9. What happens during the first step of ozone formation in the atmosphere?

Answer: Ozone is formed naturally in the stratosphere layer of the atmosphere by a 2-steps reactive process. In the step-1, solar ultraviolet radiation (sunlight) breaks apart an oxygen molecule to form two separate oxygen atoms.



Q.10. Choose one consumer each that belongs to the second and third trophic levels from the organisms given below:

Eagle, frog, tiger, rabbit, box.

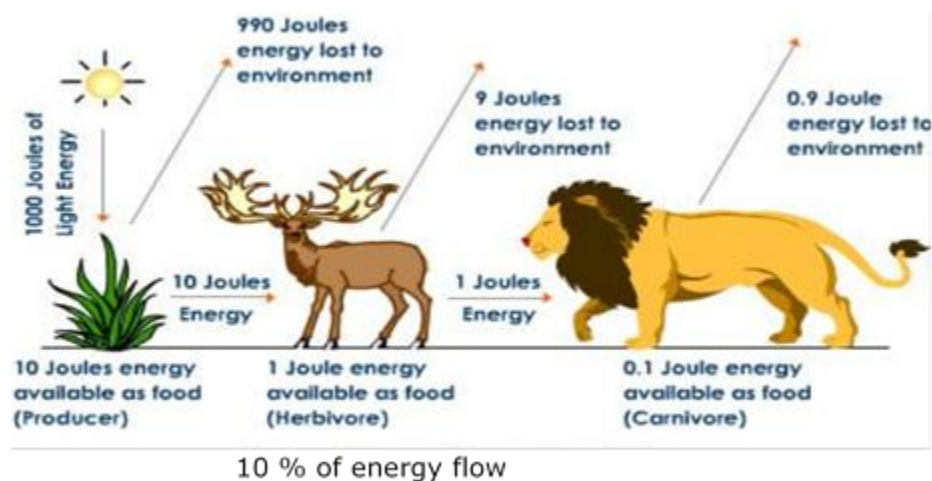
Answer: • Frog and rabbit belong to second trophic level as they are carnivores feed on plants or producers.

- Eagle and tiger belong to third trophic level as they are carnivores feed on herbivores or primary consumers.

Q.11. State 10% law. Explain with an example how energy flows through different trophic levels.

Answer: As we know that only 10% of energy is transferred from the first trophic level to the next and 90 % of the energy is lost as heat to the surroundings. Let's understand with an example.

Let's assume that the plants or producers have 10 joules of energy, according to 10 % law, only 1 joule of energy will be available for transfer to next trophic level that is herbivores (deer) and 10 % of 1 joule that is 0.1 joule of energy is available for the carnivores (lion).



Q.12. (a) How do autotrophs prepare their food?

(b) In the following food chain, 500J of energy is available to plant. How much energy will be available at I consumer and II consumer levels?

Plant → Sheep → Man

Answer: (a) Autotrophs prepare their food (carbohydrate) in presence of sunlight with the help of carbon dioxide and water. This process is called photosynthesis.

(b) According to 10% law, 10 % of 500J that is 50J is transferred to sheep (I consumer). Hence, 5J of energy is transferred to lion (II consumer) that is 10 % of 50 J.

Q.13. Describe how ozone present in the atmosphere is important for sustaining the life on earth.

Answer: Ozone is a gas layer present in the stratosphere. This layer protects living beings on the Earth from harmful ultraviolet (UV) rays coming from the Sun. Without the layer of ozone in the atmosphere, it would be very difficult for anything to survive on the surface. Depletion of the ozone layer has consequences on humans, animals and plants.

Q.14. Mention any one advantage of using disposable paper cups over disposable plastic cups. Mention of manner in which these paper cups do not adversely affect the environment.

Answer: Disposable paper cups are advantageous over plastic cups as paper cups are bio-degradable and can be recycled. Whereas, plastic is very harmful and is non-biodegradable as well as a curse to the eco-system so it is better to use disposable paper cups which can be recycled easily. Therefore, using paper cups does not adversely affects environment.

Q.15. What would happen if a number of carnivores decreases in an ecosystem?

Answer: The following consequences may occur due to decreases in number of carnivores in an ecosystem?

- (i) Population of herbivores will increase due to absence of its predator.
- (ii) Autotrophs will disappear from earth due to overgrazing done by herbivores.
- (iii) Both these factors may disturb the food chain and food webs thus affecting the ecosystem.

Q.16. Explain how do decomposers help in recycling of materials in the ecosystem.

Answer: Decomposers such as bacteria and fungi break down dead plants and animal wastes in the process of decomposition. During decomposition complex substances converted into simple inorganic nutrients such as carbon and nitrogen. These nutrients are back into the environment so, that the producers can use them.

Q.17. Name the radiations from the Sun that are absorbed by ozone layer. Mention one harmful effect caused by them.

Answer: The radiations from the Sun that are absorbed by ozone layer is ultraviolet (UV) radiation. UV radiation causes skin damage, in some cases the DNA damage causes genetic mutations. Prolonged exposure of UV radiation which can lead to skin cancer. Long exposure to eyes causes cataract.

Q.18. Explain how making of “Kulhads” affects our environment.

Answer: Kulhads are made of soil. Use of earthen kulhads is not an environmentally friendly decision because for making enough kulhads upper layer of fertile soil is used. Loss of fertile soil can make land barren and unproductive. The removal of the layer of soil makes field to lose its fertility making it unfit for agriculture purpose.

Q.19. What are top carnivores? Give two examples.

Answer: The top consumers are those predators which have no natural enemies. Top consumers are different in different food chains. Each food chain end with a top consumer. Some examples of top consumers are alligator, hawk, polar bear and lion or tiger.

Q.20. Will the impact of removing all the organisms in a trophic level be different for different trophic levels? Can the organisms of any trophic level be removed without causing any damage to the ecosystem?

Answer: • Yes, the impact of removing all the organisms in a trophic level will be different for different trophic levels.

- Removing producers will affect herbivores heavily due to absence of food. They will die.
- Similarly, the carnivores would also die in absence of herbivores.
- Removing herbivores from the food chain, Producers would grow enormous; carnivores would not get food.
- Removing carnivores, the population of herbivores would increase to unsustainable levels.
- No, the organisms of any trophic level cannot be removed without causing any damage to the ecosystem? It will disturb the food web and will create ecological imbalance.

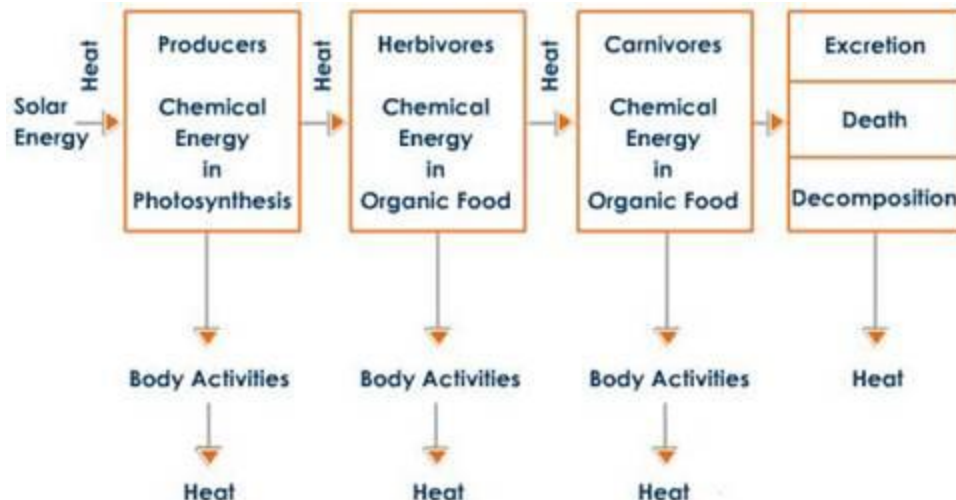
Q.21. Why is depletion of ozone layer a cause of concern?

Answer: • Ozone layer is a high concentration of ozone molecules present in the stratosphere.

- The main function of the ozone layer is to absorb the Sun's ultraviolet radiation, hence protecting the Earth from its harmful effects.
- Depletion of the ozone layer is a cause due to excessive use of CFCs or ammonia.
- Damage of ozone layer is cause of concern because ultra violet radiation from the sun will reach the earth and will effect human beings, plants and animals.
- After the Montreal Protocol, the Ozone layer is improving by the control use of CFCs and other harmful chemicals.

Q.22. Draw a line diagram to show flow of solar energy in ecosystem.

Answer:



Energy Flow in an Ecosystem

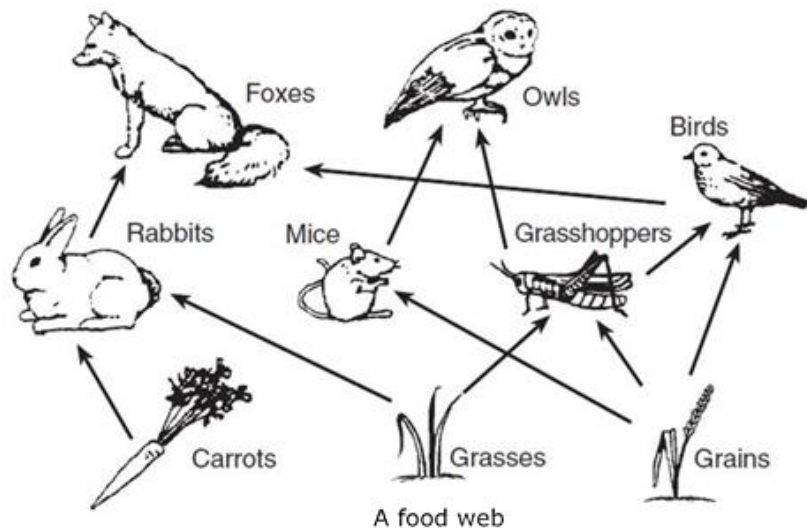
Q.23. In a certain study conducted on occurrence of DDT along food chains in an ecosystem, the concentration of DDT in grass was found to be 0.5 ppm (parts per million), in sheep it was 2ppm and in man it was 10 ppm. Why was the concentration of DDT maximum in case of man?

Answer: • DDT is an insecticide and is non-biodegradable compound.

- Once this insecticide sprayed in the environment, it stays for very long time and through food chain into the organisms.
- According to the concept of biomagnification, the maximum accumulation of a non-biodegradable pollutant is maximum in the highest trophic level.
- Hence, DDT gets accumulates at each trophic level and since, man is at the highest trophic level, there is maximum accumulation of DDT observed in them.

Q.24. Construct a food web by connecting three food chains.

Answer: A food web having three food chain:



Q.25. "Energy flow in a food chain is unidirectional". Justify this statement.

Answer: • Sun is the only source of energy. Producers convert solar energy into chemical energy in the form of food.

- The primary consumers (herbivores) depends on producers for food.
- According to the energy transfer law, only 10% of energy is transferred from one trophic level to the other.
- Therefore, the energy that is captured by the producers does not come back to the Sun and the energy transferred to the herbivores does not come back to the producers.
- It just keeps on moving to the next trophic level in a unidirectional way.
- That is why the flow of energy in the food chain is always unidirectional.

Q.26. Show steps of food chains operating in:

(a) Forests

(b) Grasslands

(c) Ponds.

Answer: (a) In a forest the steps of food chain:

Trees (producers) – Deer (primary consumer) – Lion (top consumer).

(b) In a grassland the steps of food chain

Grasses (producers) – rabbit (primary consumer) – snake (secondary consumer) –owl (top consumer).

(c) In a pond the steps of food chain

Algae and aquatic plants (producers) – small fish (primary consumer) – big fish (secondary consumer) – shark (top consumer).

Q.27. What are the problems caused by the non-biodegradable wastes that we generate?

Answer: • Non-biodegradable waste such as plastics, aluminium cans and pesticides are inert substances. These persist in the environment for very long time.

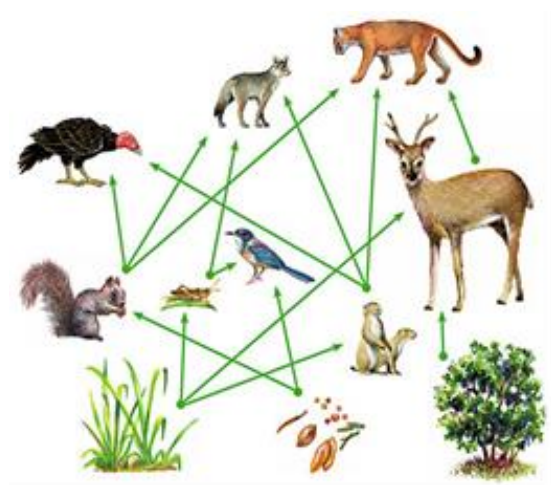
- This means that these substances require landfills for dumping.
- Excess of fertilizers, pesticides and other chemicals cause soil infertility and also affects aquatic life.
- Most of non-biodegradable chemicals are easily absorbed by the organisms causing biological magnification.

Comprehensive Exercises (MCQ)

Q.1. Organisms of a higher trophic level which feed on several types of organisms belonging to a lower trophic level constitute the:

- A. food web
- B. ecological pyramid
- C. ecosystem
- D. food chain

Answer: A network of different food chain operating at the same time is called food web. In food web organisms of a higher trophic level which feed on several types of organisms belonging to a lower trophic level.



A food web

Q.2. Flow of energy in an ecosystem is always:

- A. unidirectional**
- B. bidirectional**
- C. multidirectional**
- D. no specific direction**

Answer: Sun is the ultimate source of energy in an ecosystem. Energy always flows from sun to the producer through photosynthesis. From producers energy transfers to different consumers. It always flow from sun to producer and then to consumers.

Q.3. Disposable plastic plates should not be used because:

- A. they are made of materials with light weight**
- B. they are made of toxic materials**
- C. they are made of biodegradable materials**
- D. they are made of non-biodegradable materials**

Answer: Disposable plastic plates are made of non-degradable materials. Materials made of Plastic cannot be degrade or decomposed by mroorganisms such as bacteria and fungi.

Q.4. Depletion of ozone is mainly due to:

- A. chlorofluorocarbon compounds**
- B. carbon monoxide**
- C. methane**
- D. pesticides**

Answer: Chlorofluorocarbons (CFCs) are also called Freon. These compounds released into the atmosphere from spray cans, refrigerators, air conditioners. CFCs cause chemical reactions that break down ozone molecules. This causes reduction in absorption of ultraviolet radiation by ozone.

Q.5. Organisms which synthesise carbohydrates from inorganic compounds using radiant energy are called:

- A. decomposers**
- B. producers**
- C. herbivores**
- D. carnivores**

Answer: In a food chain organism which synthesise carbohydrates from inorganic compounds using radiant energy are called producers. These are autotrophs and make food for consumers.

Q.6. In an ecosystem, the 10% of energy available for transfer from one trophic level to the next is in the form of:

- A. heat energy**
- B. light energy**
- C. chemical energy**
- D. mechanical energy**

Answer. Energy available for transfer to the next level is in the form of food which is carbohydrate, a chemical energy.

Q.7. What will happen if deer is missing in the food chain given below?

Grass → Deer → Tiger

- A. the population of tiger increases**
- B. the population of grass decreases**
- C. tiger will start eating grass**
- D. the population of tiger decreases and the population of grass increases.**

Answer: Population of tiger will decrease due to absence its food (deer) and the population of grass will increase in the absence its consumer (deer).

Q.8. The decomposers in an ecosystem:

- A. convert inorganic material to simpler forms**
- B. convert organic material to inorganic forms**
- C. convert inorganic materials into organic compounds**
- D. do not breakdown organic compounds**

Answer: The decomposers are considered as cleaner of the Earth. Decomposers such as bacteria and fungi break down or decompose dead and decaying organic matter into simpler or inorganic forms.

Q.9. In a food chain, the third trophic level is always occupied by:

- A. carnivores**
- B. herbivores**
- C. decomposers**

D. producers

Answer: The third trophic level is occupied by the II consumer. II consumers are carnivores which feed on herbivores or grass eating animals. Carnivores are tiger, wolf, etc.

Q.10. An ecosystem includes:

A. all living organisms

B. non-living objects

C. both living organisms and non-living objects

D. sometimes living organisms and sometimes non-living objects.

Answer: Ecosystem is the interactions among living (biotic) organisms, and non-living things (abiotic).

Q.11. Which of the following limits the number of trophic levels in a food chain?

A. decrease in energy at higher trophic levels

B. deficient food supply

C. polluted air

D. water

Answer: As we know only 10 % of the total energy available at any trophic level is transferred to the next higher trophic level. So, as we move up the higher trophic level, the energy keeps on decreasing. Therefore, decrease in energy at higher trophic limits the food chain.

Q.12. In the given food chain, suppose the amount of energy at fourth trophic level is 5 kJ, what will be the energy available at the producer level?

Grass → Grasshopper → Frog → Snake → Hawk

A. 5 kJ

B. 50 kJ

C. 500 kJ

D. 5000 kJ

Answer: In the given food chain fourth trophic level is occupied by snakes. The available energy is 5 kJ at snakes, so at the producer level energy should be 5000 kJ. Grasshopper will get 500 kJ energy as per 10 % law and frog will get 50 kJ and then snake will get 5 kJ energy which is 10 % of 50 kJ.

Q.13. Accumulation of non-biodegradable pesticides in the food chain in increasing amount at each higher trophic level is known as:

- A. eutrophication**
- B. pollution**
- C. biomagnification**
- D. accumulation**

Answer: • Biological magnification occurs when the number of chemicals and toxins increase and accumulate through the trophic levels of a food chain.

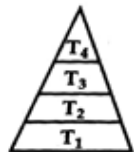
- Chemical substances from crop fields and industries are released into the environment, making their way toward food chains and food webs.
- Normally biological magnification doesn't affect directly but exposure to these harmful chemicals may cause some long-term side effects.

Q.14. Which one of the following is an artificial ecosystem?

- A. pond**
- B. crop field**
- C. lake**
- D. forest**

Answer: An artificial ecosystem is a man-made system where there is interaction among plants, animals, and people living in an area together with their surroundings. Examples are crop fields, aquarium.

Q.15. In the given figure, the various trophic levels are shown in the form of a pyramid. At which trophic level is maximum energy available and at which trophic level maximum number of organisms are present?



A. T₄

B. T₃

C. T₁

D. T₃

Answer: Trophic level 1 (T1) is occupied by primary producers. They utilize sun energy and produce food (carbohydrate). Since producers occupy the base of the pyramid, have maximum energy and numbers.

Comprehensive Exercises (T/F)

Q.1. Write true or false for the following statements:

The length and complexity of food chains remain mostly the same.

Answer: False.

The length of the food chain is different in different food chains. It depends on the amount of energy available at producers and on the population size of consumers.

Q.2. Write true or false for the following statements:

The flow of energy in a food chain is in both directions.

Answer: False.

No, the energy flow in an ecosystem is always unidirectional. It always flows only from the Sun to the producer and then to consumers, not vice-versa.

Q.3. Write true or false for the following statements:

The flow of organic matter in a food chain is unidirectional.

Answer: False.

The flow of organic matter in a food chain is bidirectional, through biogeochemical cycles, nutrients obtained after decomposition are cycled back to the soil.

Q.4. Write true or false for the following statements:

15% can be taken as the average value for the amount of organic matter that is present at each step and reaches the next level of consumers.

Answer: False.

Only 10 % of the available energy is transferred to the next trophic level, most of the energy is lost to the environment as heat.

Q.5. Write true or false for the following statements:

The green plants capture about 10% of the energy of sunlight that falls on their leaves and convert it into food energy.

Answer: False

In a terrestrial ecosystem, the green plants capture about 1% of the energy of sunlight that falls on their leaves and convert it into food energy.

Q.6. Write true or false for the following statements:

In any food chain, an average of 10% of the food eaten is turned into the body mass of an organism and made available for the next level of consumers.

Answer: True

Only 10 % of the available energy is transferred to the next trophic level.

Q.7. Write true or false for the following statements:

There are generally a greater number of individuals at the lower trophic levels of an ecosystem.

Answer: True

As we move up in ecological pyramid, number of individuals keeps on decreasing.

Q.8. Write true or false for the following statements:

Harmful chemicals enter into our body through biological magnification.

Answer: True

Chemical substances from crop fields and industries are released into the environment, make their way toward food chains and food webs. This is biological magnification. It doesn't affect directly but exposure to these harmful chemicals may cause some long-term side effects.