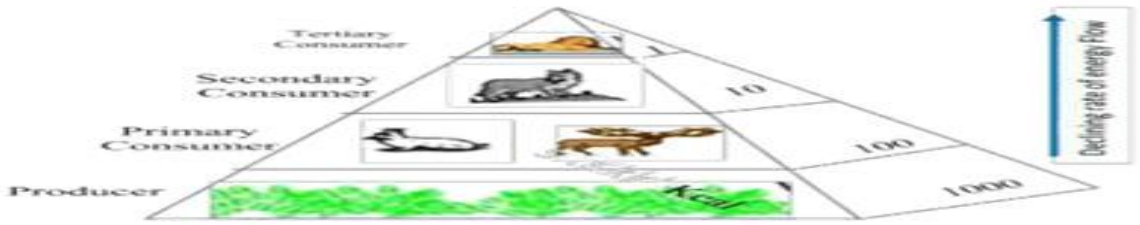
INDIAN SCHOOL AL WADI AL KABIR		
CLASS: XII	**DEPARTMENT: SCIENCE 2025-26** **SUBJECT: BIOLOGY**	**DATE: 06/11/2025**
WORKSHEET NO:12	**TOPIC: ECOSYSTEM**	**NOTE: A4 FILE FORMAT**
CLASS & SEC:	**NAME OF THE STUDENT:**	**ROLL NO.**

CASE STUDY

1. An ecological pyramid is used to graphically represent the structure of an ecosystem, depicting the new biomass at various trophic levels. The pyramid shows the first trophic level or producers at the bottom that form the base, followed by the successive tiers of the trophic categories of consumers.

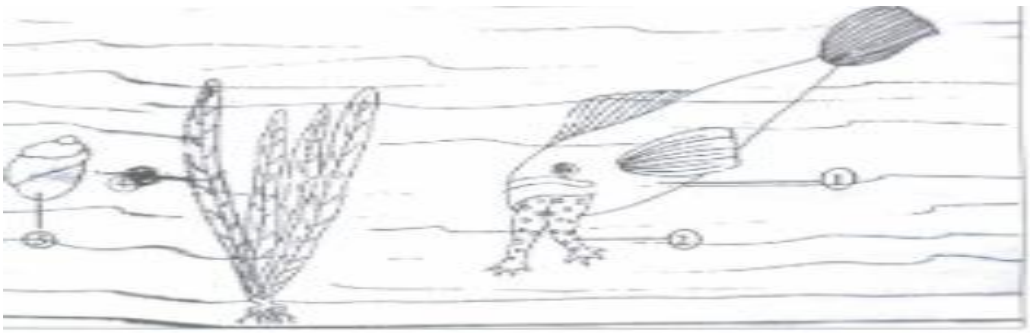


a) Identify the type of pyramid and comment on why it is always upright. (1)

b) Illustrate one terrestrial ecosystem which shows an inverted pyramid of numbers. (1)

c) Differentiate between GFC & DFC (2)

2. A part of an aquatic ecosystem is represented in the picture provided below



a) Construct a food chain operating in this ecosystem. (1)
b) Mention the relationship between 3 & 4 with regard to trophic levels. (1)
c) How will a pond act as a mini ecosystem? (2)

3. You may have heard of the earthworm being referred to as the farmer's 'friend'. Decomposers break down complex organic matter into inorganic substances like carbon dioxide, water and nutrients and the process is called decomposition. The important steps in the process of decomposition are fragmentation, leaching, catabolism, humification and mineralisation. Decomposition is largely an oxygen-dependent process. The rate of decomposition is controlled by the chemical composition of detritus and climatic factors.

a) Name the raw material of decomposition. (1)

b) When water-soluble inorganic nutrients go down in the soil and precipitate as unavailable salts, then the process is called (1)

(i) Catabolism

(ii) Fermentation

(iii) Humification

(iv) Leaching

c) Briefly explain how the rate of decomposition is controlled by the chemical composition of detritus and climatic factors. (2)

MULTIPLE CHOICE QUESTIONS (1 Mark)

1. Approximately how much of the solar energy that falls on the leaves of a plant is converted to chemical energy by photosynthesis?

a. Less than 1% b. 2-10% c. 30% d. 50%

2. Which of the following is not a producer?

a. *Spirogyra* b. *Agaricus* c. *Volvox* d. *Nostoc*

3. Productivity is the rate of production of biomass, expressed in terms of:

i. (kcal m^{-3}) yr^{-1}
ii. $gm^{-2}yr^{-1}$
iii. g^{-1} yr^{-1}
iv. (kcal m^{-2}) yr^{-1}

a. ii b. iii c. ii and iv d. i and iii

4. The process of mineralisation by microorganisms helps in the release of:

a. inorganic nutrients from humus

b. both organic and inorganic nutrients from detritus

c. organic nutrients from humus

d. inorganic nutrients from detritus and formation of humus.

5. An inverted pyramid of biomass can be found in which ecosystem?

a. Forest

b. Marine

c. Grassland

d. Tundra

6. Which of the following ecosystems is most productive in terms of net primary production?

a. Deserts

b. Tropical rainforests

c. Oceans

d. Estuaries

7. Among the following, where do you think the process of decomposition would be the fastest?

a. Tropical rain forest

b. Antarctic

c. Dry arid region

d. Desert

8. If the carbon atoms fixed by producers have already passed through three species, the trophic level of the last species would be.

a. First trophic level

b. Second trophic level

c. Third trophic level

d. Fourth trophic level

TWO MARK QUESTIONS

9. Expand PAR, how much PAR is used in gross primary productivity?

10. Give an account of factors affecting the rate of decomposition.

11. Why is the length of a food chain in an ecosystem generally limited to 3-4 trophic levels?

12. Which ecosystem has maximum stratification? Justify.

13. Construct a grazing food chain using the following with five links.

(Earthworm, bird, snake, vulture, grass, grasshopper, frog, decaying plant matter)

THREE MARKS QUESTIONS

14. What are ecological pyramids? Mention its limitations
15. Briefly describe the process of decomposition
16. Construct a pyramid of biomass starting with phytoplankton. Label 3 trophic levels. Is the pyramid upright or inverted? Why?

FIVE MARKS QUESTIONS

17. (a)Draw the ideal pyramid of energy up to four trophic levels, where 10,000 J are available from sunlight to the primary producer. Indicate the amount of end product available at each trophic level.

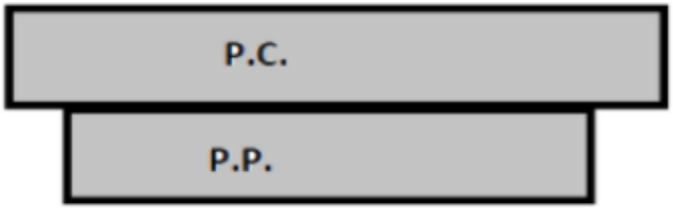
(b) Why is the pyramid of energy always upright? Explain.
(c) Mention the limitations of an ecological pyramid.

18.(a) Give an example of a pyramid where a small standing crop of phytoplankton supports a large standing crop of zooplankton. Draw the pyramid.

(b) How is the pyramid of biomass of a forest ecosystem different from that of a lake ecosystem?

PREVIOUS IMPORTANT BOARD QUESTIONS

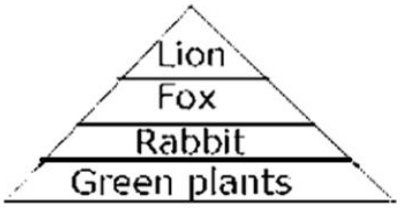
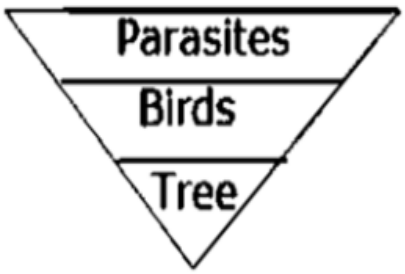
19. If we count the number of insects on a tree and the number of small birds depending on those insects, as also the number of larger birds eating the smaller, what kind of pyramid of 20 numbers would we get?
20. Name any two man-made ecosystems?
21. Define stratification?
22. What is the shape of the pyramid of biomass in the sea? Why?
23. In the pyramid of biomass drawn below, name the two crops (i) one which is supported (ii) one which supports. In which ecosystem are such types of pyramids found?



24. What is meant by the ecological pyramid? With the help of one example each, show that the pyramid of numbers can be both upright as well as inverted.
25. What are the limitations of ecological pyramids?
26. What is decomposition? Describe the different processes involved in decomposition.

HINTS/SOLUTION

	MULTIPLE CHOICE QUESTIONS	
1	b. 2-10%	1
2	b. *Agaricus*	1
3	c. ii and iv	1
4	a. inorganic nutrients from humus	1
5	b. Marine	1
6	b. Tropical rain forests	1
7	a. Tropical rain forest	1
8	d. Fourth trophic level	1
	TWO MARKS QUESTIONS	
9	Photosynthetically Active Radiation, 2-10%	2
10	Environmental factors and chemical nature of detritus	2
11	It is due to law of 10%	2
12	Tropical rain forest, vertical distribution of different layers	2
13	Any one food chain – with 5 trophic levels	2
	THREE MARKS QUESTIONS	
14	Graphical representation of food chain, Limitations – only food chain but not food web, decomposers are not represented, organism belonging to two or more trophic levels cannot be represented	3
15	Explanation of – fragmentation, leaching, catabolism, humification and mineralisation	3
16	Inverted pyramid – construction, biomass of phytoplankton will be less	3
	FIVE MARKS QUESTIONS	
17	Construction of pyramid, energy level based on law of 10%, upright pyramid, limitations	5
18	(a) Pyramid of biomass – inverted (b) Forest – upright and inverted in lake ecosystem	5
	PREVIOUS BOARD QUESTIONS	
19	Inverted Pyramid of Number.	1
20	Aquarium and Garden are two man-made ecosystems.	1
21	In an ecosystem, stratification refers to the vertical distribution of distinct species at different levels.	1
22	The shape of the pyramid of biomass in the sea is inverted. This is because the amount of biomass is maximum at the apex of the pyramid and least at the bottom of the pyramid.	2
23	i. Supported trophic level is formed by zooplanktons (Primary consumers). ii. Supporting trophic level is formed by phytoplankton (Secondary consumers). such types of pyramids are found in aquatic ecosystems.	2
24	A pyramid of numbers is a graphical representation of the number of organisms at each trophic level.	5

	In an upright pyramid of numbers, the more abundant species form the first trophic level i.e., the base of the pyramid, and less abundant species remain near the top. Example: - Grassland ecosystem   In a grassland ecosystem, producers (Green plants) are more in number, and herbivores (Rabbit) are more than carnivores (Fox and Lion). In an inverted pyramid of numbers, the most abundant species occurs at the top while the less abundant species form the base of the pyramid. Example: - Tree ecosystem	
25	i. Does not account for the equivalent species belonging to two or more trophic levels. ii. Assumes a simple food chain and does not account for a food web. iii. Saprophytes have been excluded from ecological pyramids	3
26	The important steps in the process of decomposition are fragmentation, leaching, catabolism, humification and mineralisation (explain each step briefly)	5

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