Unit 4 · Ecology

WORKSHEET

Full marks 48

Name _____ Class _____ Roll no. _____ Date _____ Marks _____ / 48

1 Key words [4]

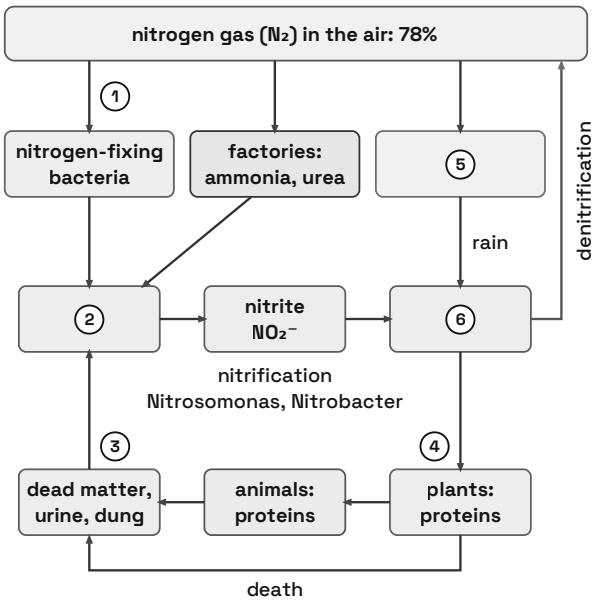
Fill in the blanks with words from the box. Two words in the box are not needed. Each blank carries 0.5 mark.

ammonification	assimilation	biomass	denitrification	fixation	gaseous	nitrification	reservoir	sedimentary	spindle

In a forest in summer, the pyramid of numbers has a narrow base, a wide middle and a narrow top: it is _____-shaped. The total dry mass of living matter at a trophic level is its _____. A large store where an element stays for a long time is a _____, and a cycle whose main store is rocks and soil is a _____ cycle. The change of nitrogen gas into compounds that plants can use is nitrogen _____. The uptake of nitrate by roots to make proteins is _____. Decomposers turn the nitrogen in dead matter into ammonium by _____, and bacteria in waterlogged soil turn nitrate back into nitrogen gas by _____.

2 Label the diagram [3]

The diagram shows the nitrogen cycle. Name the parts numbered 1 to 6. Each carries 0.5 mark.



1. _____ 2. _____

3. _____ 4. _____

5. _____ 6. _____

3 Multiple choice [5]

Choose the correct option for each of the following questions.

i. Which pyramid is always upright? [1]

a. pyramid of numbers
b. pyramid of biomass
c. pyramid of energy
d. all three

ii. The pyramid of numbers in a parasite food chain (tree → birds → lice) is: [1]

a. upright
b. spindle-shaped
c. inverted
d. the same as the pyramid of biomass

iii. In a food chain the producers store 8,000 kJ. How much energy reaches the secondary consumers? [1]

a. 800 kJ
b. 80 kJ
c. 8 kJ
d. 0.8 kJ

iv. The change of ammonium into nitrite and nitrate in the soil is called: [1]

a. nitrogen fixation
b. ammonification
c. nitrification
d. denitrification

v. Which of these is a sedimentary cycle? [1]

a. the nitrogen cycle
b. the oxygen cycle
c. the carbon cycle
d. the phosphorus cycle

4 Very short answers [4]

Write very short answers to the following questions.

a. Who first drew pyramids of numbers? [1]

b. In what unit is a pyramid of energy usually measured? [1]

c. Name the bacterium that fixes nitrogen in the root nodules of legumes. [1]

d. Name the process that gives oxygen to the air. [1]

5 Short answers [10]

Write short answers to the following questions.

a. A pyramid of energy can never be inverted. [2]

b. Food chains usually have no more than four or five trophic levels. [2]

c. Energy flows one way in an ecosystem, but matter goes round. [2]

d. Nitrogen is plentiful in the air, yet plants can suffer from nitrogen shortage. [2]

e. Write any two differences between nitrification and denitrification. [2]

6 Long answers [8]

Write long answers to the following questions.

a. State the ten percent law. Explain, with a labeled diagram, how energy is transferred through the trophic levels of an ecosystem. [4]

b. Describe the nitrogen cycle with a labeled diagram. Name the bacteria involved in each step. [4]

7 Numerical problems [11]

Solve the following problems. Show your working.

a. In a grassland, the producers take in 15,000 kJ/m^2 per year and the primary consumers 1,800 kJ/m^2 per year. Find the percentage of energy transferred. How much energy is lost from the producer level? [2]

Answer: _____

b. Basanta says a snake at level 4 of a food chain received 50 kJ, and the primary consumers below it received 20,000 kJ. Is this possible by the ten percent law? Show your working. **[3]**

Answer: _____

c. Lhamu counted the organisms in 1 m^2 of grassland: 600 grass shoots, 40 grasshoppers, 6 spiders and 1 lizard. (i) Draw the pyramid of numbers using 1 cm for every 50 organisms (draw any level shorter than half a centimeter as half a centimeter). (ii) If the grass stores 9,000 kJ, find the energy at each level by the ten percent law. **[4]**

Answer: _____

d. How many trophic levels can a chain support if the producers store 100,000 kJ and a population needs at least 5 kJ at its level to survive? Use the ten percent law. **[2]**

Answer: _____

8 Think **[3]**

Nothing in Nepal hunts adult tigers for food, except people. Use the ten percent law to explain why no animal lives only by eating tigers.

9 Activity: Observe an ecosystem and chart its pyramid (Practical 8) (not marked)

Mark a square 1 m by 1 m near your school, with a teacher, and watch it for at least 15 minutes. Count what you find and fill in the table. Then draw the pyramid of numbers on chart paper.

Trophic level	Organisms found	Number counted	Energy by the ten percent law (kJ)
Producers			10,000
Primary consumers			
Secondary consumers			
Tertiary consumers			