

Questions 1 and 2. A study of consumption by moth caterpillars in Hubbard brook forest revealed that they ingested 48 kcal/square meter/year of which about 16 kcal/square meter/year was used in cellular respiration and 8 kcal/square meter/year was stored as growth and reproduction.

1. How much of the food energy was egested . Show calculations.

2. How much was assimilated? Show calculations.

Questions 3 and 4. A study of energy flow in a Georgia salt marsh revealed that gross production was about 36,380 kcal/square meter/year of which 7,900 kcal/square meter/year formed detritus and 305 kcal/square meter/year was consumed by insects.

3. What proportion of gross production was used for respiration? Show calculations.

4. What proportion of net production went directly to consumers? Show calculations.

Questions 5 and 6. Assume that nitrogen cycling in a deciduous forest ecosystem is complete and involves all the producers, consumers and nitrogen fixing, denitrifying and ammonifying bacteria described in lecture.

5. Trace an atom of N ( $N^{15}$ ) that was released into the atmosphere of the forest through its route to a bacterial cell that releases it back to the air.

6. Suppose that decomposers were removed from the forest ecosystem, predict what would happen to the rate of nitrogen cycling. Explain the logic behind your prediction.

7. A lab group of BioS 101 students conducted a germination experiment using Indian Grass seeds stratified in distilled water. They used the same experimental procedures you will be using this spring. They sowed 50 seeds in two petri dishes. Their results were as follows:

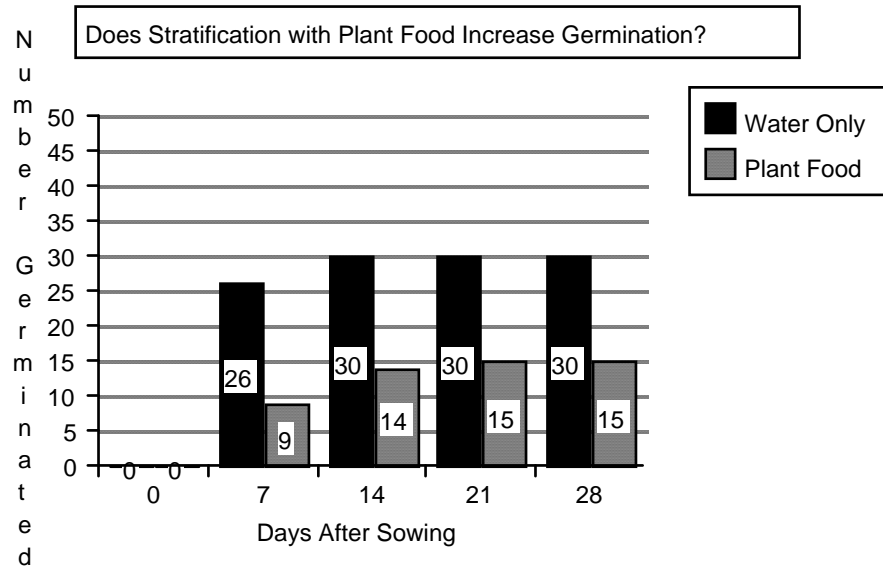
Days Since Sowing	Date Seeds Observed	Number of Seed Germinated
0	April 2, 1997	0
7	April 9, 1997	26
14	April 16, 1997	4
21	April 23, 1997	0
28	April 30, 1997	0

a. Make a graph that shows the number of seeds germinated on each day they were observed. Be sure to label the graph.

b. What proportion of the total seeds sown germinated on the 7th day after sowing?

\_\_\_\_\_ Show calculation.

8. They also germinated seeds that had been stratified with plant food. Here is their graph:



8a. If students transplanted the germinated seeds on each day that they observed them, how many germinated seeds (seedlings) from the Plant Food treatment did the students transplant on Day 14? \_\_\_\_\_

8b. Of the seeds that were stratified in Water Only, the highest number of seeds germinated between days \_\_\_\_\_ and \_\_\_\_\_.

9. Calculate the  $X^2$  for Water Only versus Plant Food treatment on day 28. Show calculation.

10. Before the experiment started the students hypothesized that seeds treated with Plant Food before they were sown would show a higher percentage of germination than those treated with Water Only. The students find that their results are statistically significant.

a. Their findings:

- do not support their predictions. They should accept the null hypothesis.
- support their predictions. They should accept the null hypothesis.
- do not support their predictions. They should reject the null hypothesis.
- support their predictions. They should reject the null hypothesis.

b. Give a reason for your choice.

