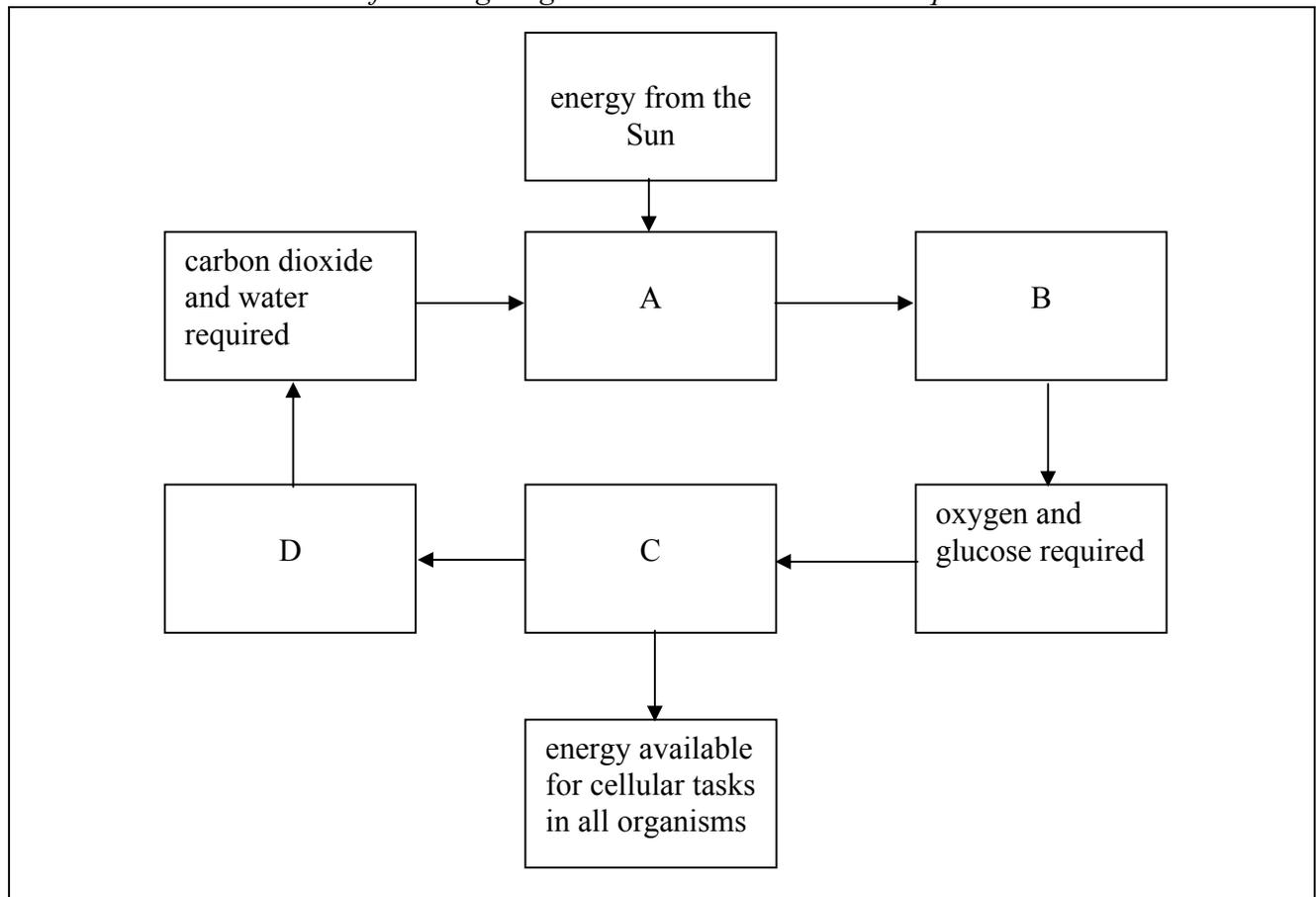


### Multiple Choice Questions

- Decide which of the choices best completes the statement or answers the question.
- Locate that question number on the separate answer sheet provided.
- Use the procedure described by your teacher to answer each question. For example, “fill in the circle that corresponds to your choice” or “make an X over the letter corresponding to your choice.”

Use the following diagram to answer the next three questions.



1. Identify the process that would be taking place in box A of this flow chart.
  - a. cellular respiration
  - b. chemosynthesis
  - c. photosynthesis
  - d. albedo

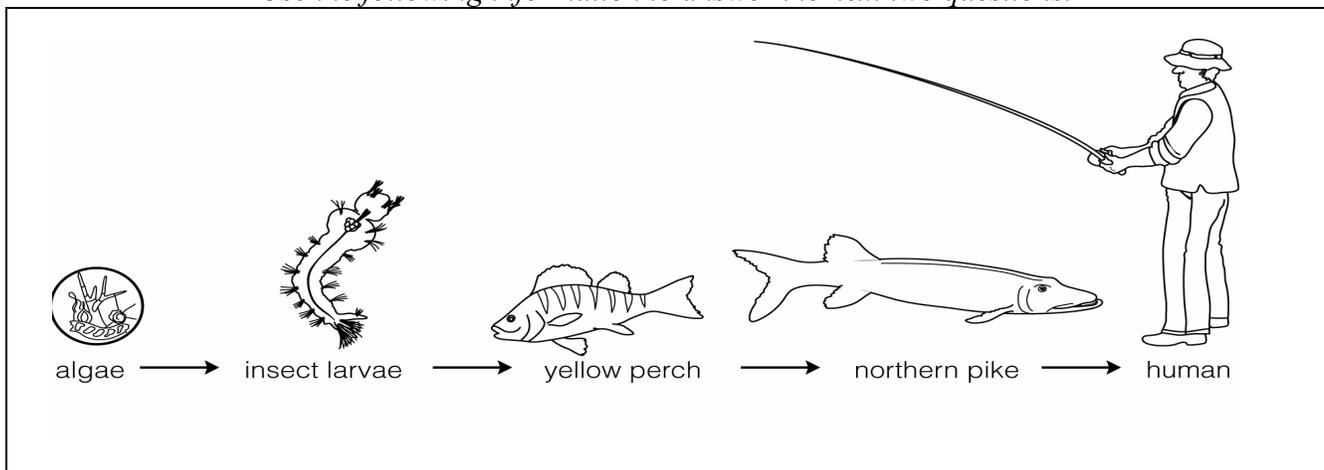
<b>ASSESSMENT</b>	<b>Chapter 1 Test</b>	<b>BLM 1.3.1</b>
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2. Which row describes what is happening in box B and box D of the flow chart?

Row	Box B	Box D
a.	oxygen and glucose produced	carbon dioxide and water released
b.	oxygen and glucose required	carbon dioxide and water required
c.	oxygen and glucose produced	carbon dioxide and water required
d.	oxygen and glucose required	carbon dioxide and water released

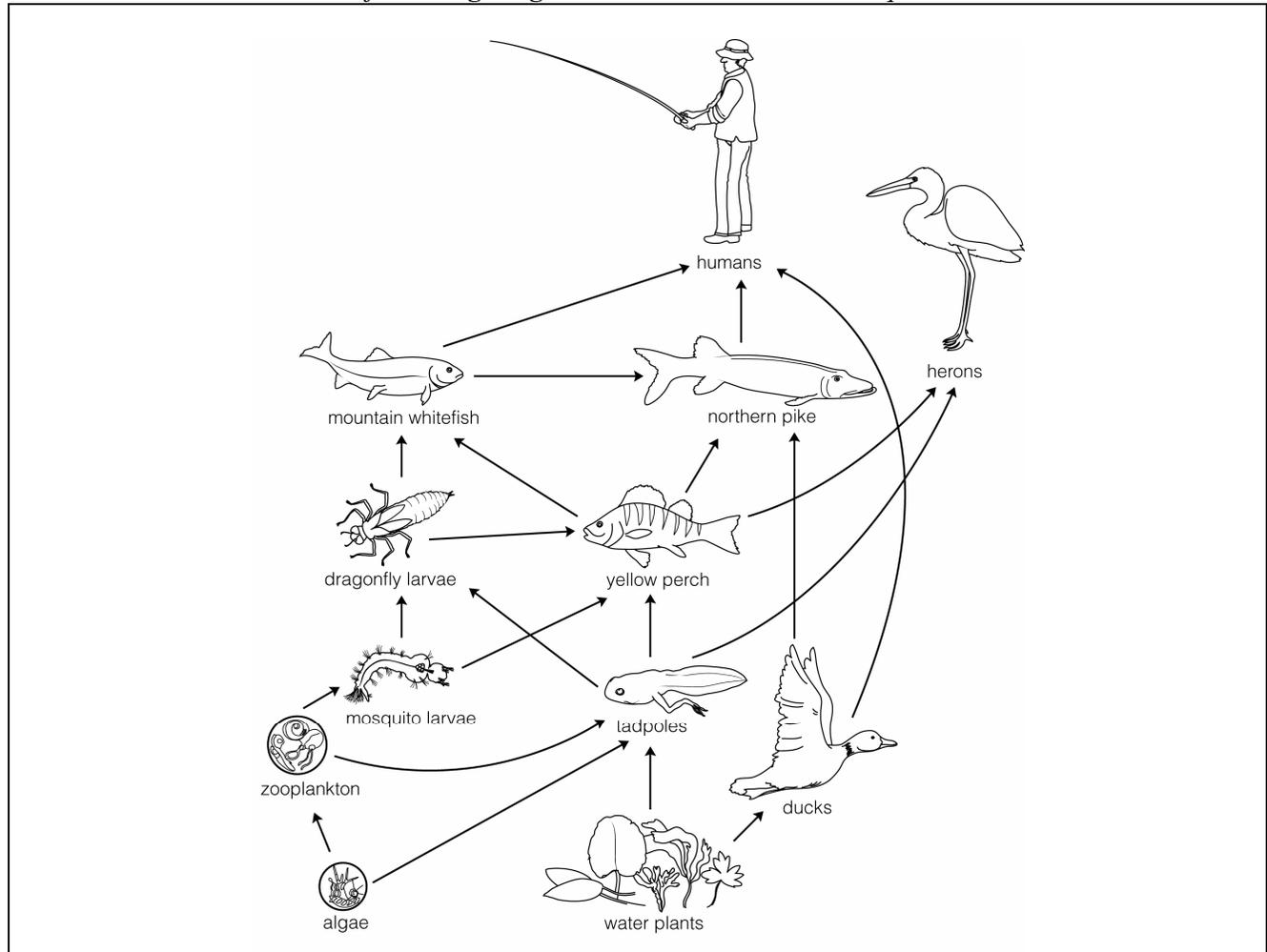
3. Which statement does NOT describe the difference between the flow chart above and one that you would draw for some deep-ocean volcanic vents?
- Energy from the Sun would be replaced by energy from hydrogen sulfide.
  - Organisms in box A would be replaced by photosynthetic algae.
  - Organisms in box C would be replaced by giant tube worms.
  - Sulfuric acid is produced as a by-product of the process represented by box A.

*Use the following information to answer the next two questions.*



4. Identify the heterotroph(s) in this diagram.
- algae
  - insect larvae only
  - yellow perch and human only
  - insect larvae, yellow perch, northern pike, and human
5. Which group of organisms is missing from this food chain?
- producers
  - primary consumers
  - decomposers
  - secondary consumers

Use the following diagram to answer the next two questions.



6. Which row identifies three secondary consumers as identified in this partial food web?

Row	Secondary Consumer	Secondary Consumer	Secondary Consumer
a.	mosquito larva	tadpoles	yellow perch
b.	mountain whitefish	northern pike	herons
c.	water plants	yellow perch	northern pike
d.	zooplankton	humans	dragonfly larvae

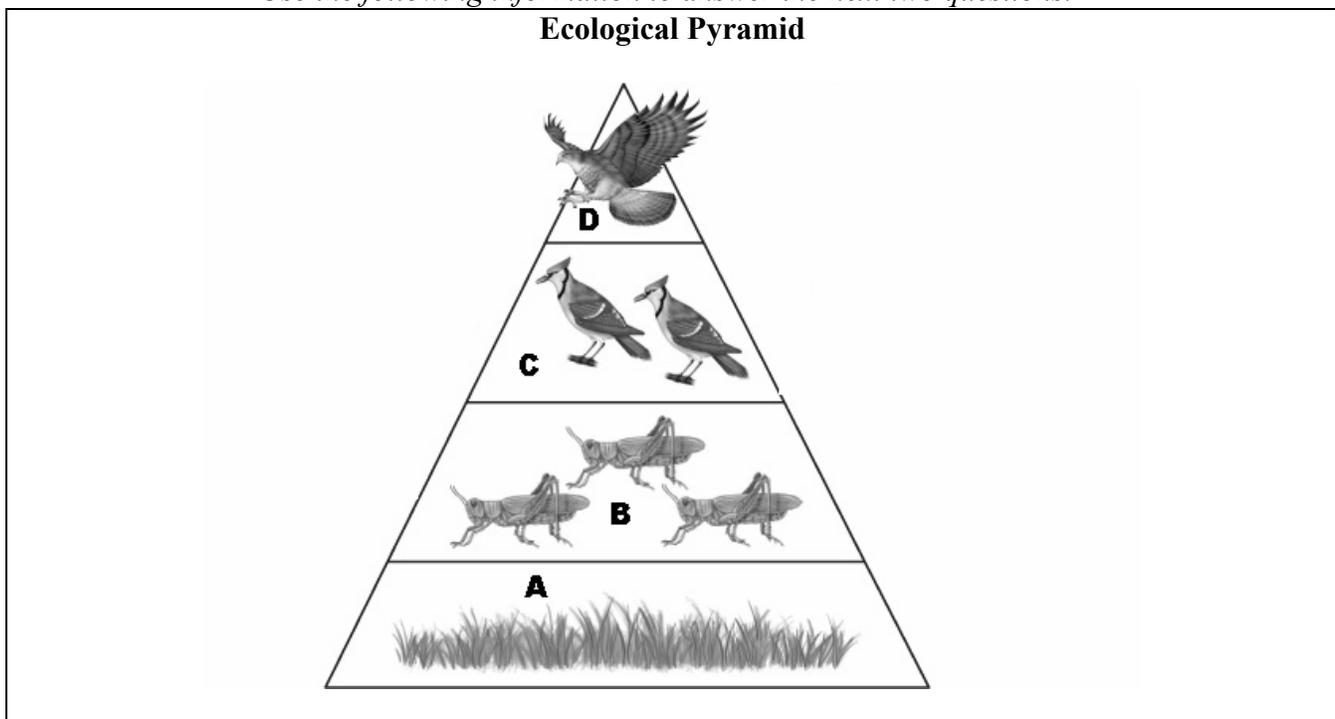
7. Which food chain would provide the greatest amount of energy to the northern pike?

- algae → tadpoles → yellow perch → northern pike
- water plants → tadpoles → dragonfly larvae → mountain whitefish → northern pike
- water plants → ducks → northern pike
- algae → zooplankton → mosquito larvae → dragonfly larvae → mountain whitefish → northern pike

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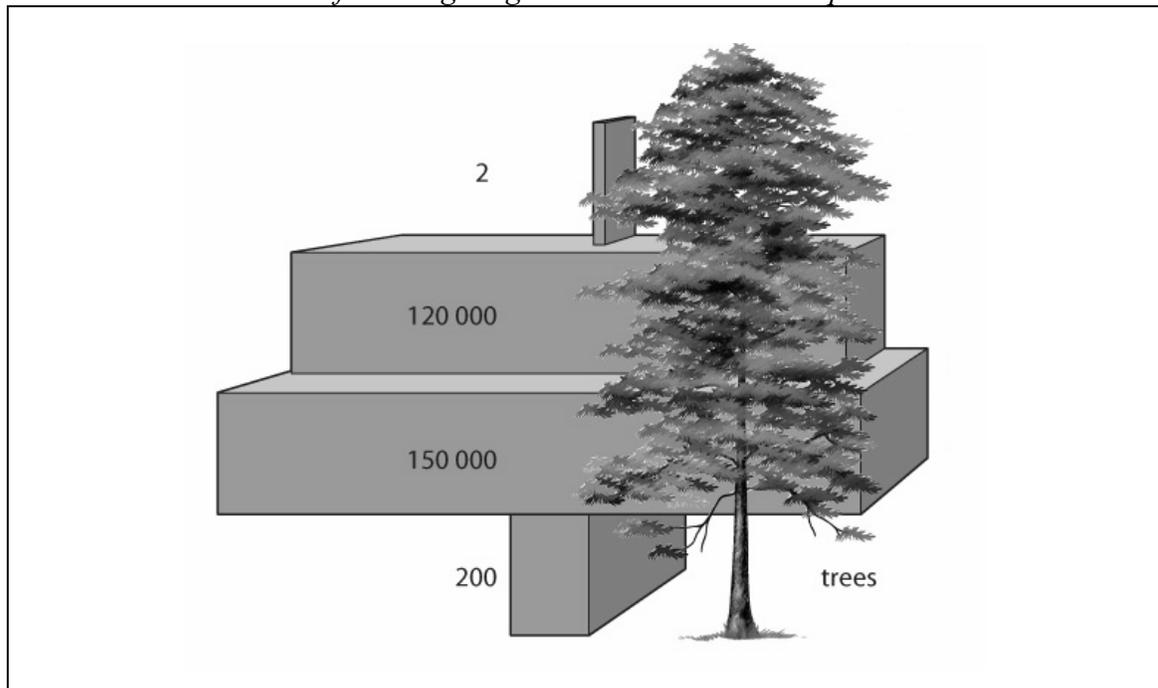
8. Which of the following statements is FALSE?
- Earth is a closed system to matter.
  - Energy follows a one-way path through the biosphere.
  - With each conversion of energy, there is less energy available to do useful work.
  - Energy can be created and destroyed.
9. Herbivores eat plants and carry out cellular respiration to access the energy stored in carbohydrates. Identify the process in green plants that allows them to access the energy stored in glucose.
- photosynthesis
  - chemosynthesis
  - osmosis
  - cellular respiration
10. The term used to describe the dry mass of living or once living organisms per unit area is:
- biomass.
  - biodiversity.
  - albedo.
  - trophic.
11. Which of the following is NOT an ecological pyramid?
- pyramid of numbers
  - pyramid of matter
  - pyramid of energy
  - pyramid of biomass

*Use the following information to answer the next two questions.*



12. Which group of organisms represented on the illustration on the previous page would receive the least amount of energy?
- A
  - B
  - C
  - D
13. Which of the following is NOT a reason why less energy is transferred from the small song birds to the hawk?
- Much of the energy available to the song bird is transferred to the environment as heat.
  - Much of the energy available to the song bird is transferred to decomposers through feces.
  - Much of the energy available to the song bird is transferred to its body tissues for growth and maintenance.
  - Much of the energy available to the song bird is transferred to the grasshoppers as food energy.

*Use the following diagram to answer the next question.*

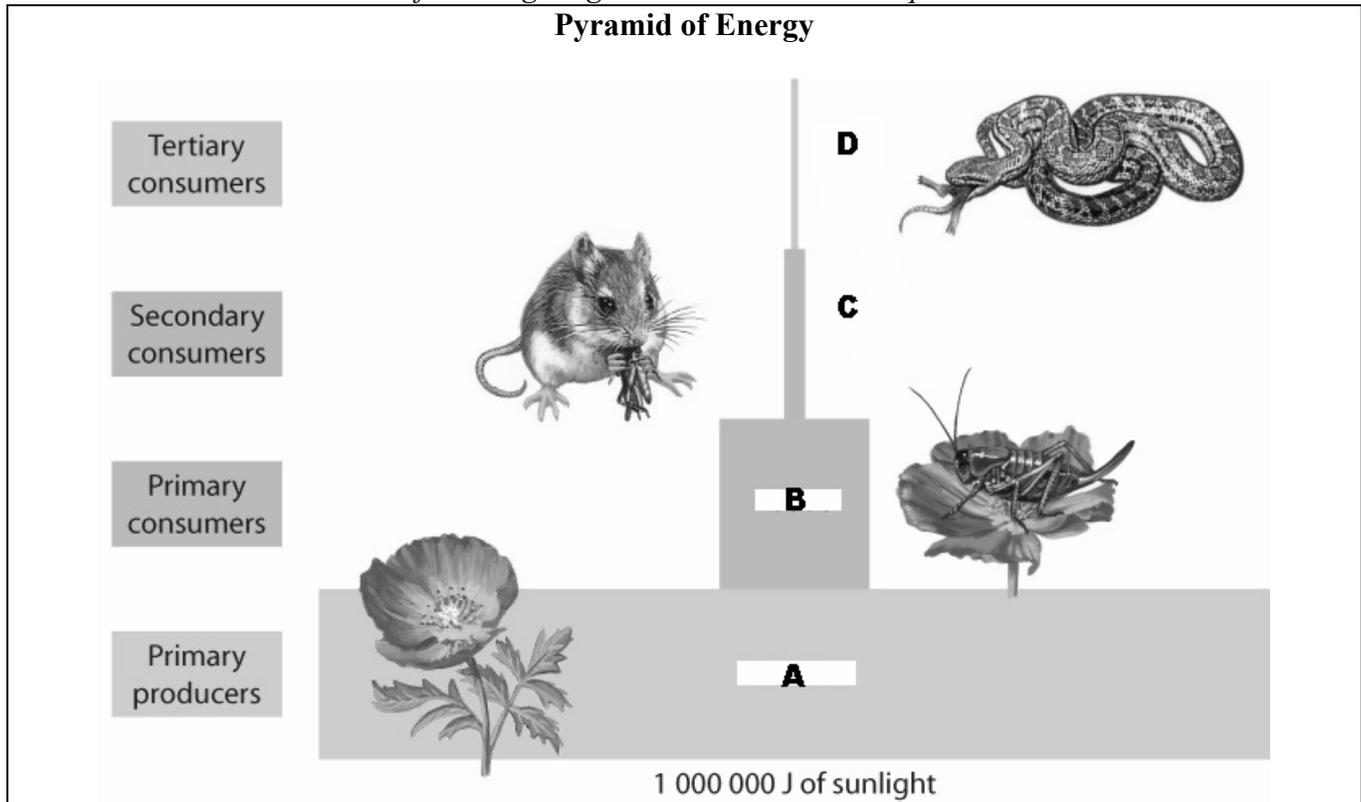


**Pyramid of Numbers for a Woodland Ecosystem**

14. Which statement best explains the shape of this pyramid of numbers?
- A single tree at the first trophic level may feed thousands of plant-eating insects at higher trophic levels.
  - In many cases in ecosystems, animals at higher trophic levels are fewer in number than organisms at lower trophic levels.
  - Each time a cell uses energy to perform a function, some of the energy is dispersed (lost) as unusable heat.
  - Only a very small fraction of the Sun's radiant energy is absorbed by and incorporated into plant material.

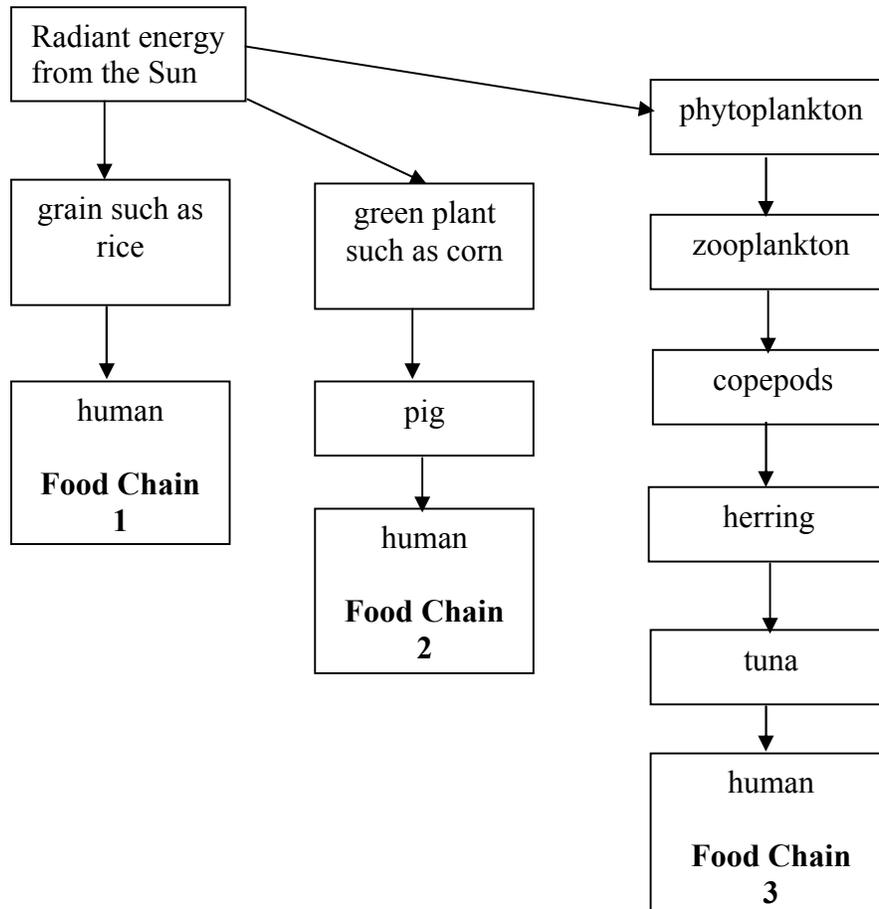
<b>ASSESSMENT</b>	<h1>Chapter 1 Test</h1>	<b>BLM 1.3.1</b>
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Use the following diagram to answer the next question.



15. Of the available radiant energy reaching the green plant, only about 1% is captured and used for photosynthesis. How much is of this energy would be available to the rattlesnake. (Assume the 10 percent rule of energy transfer in an ecosystem.)
- 10 000 J
  - 100 J
  - 10 J
  - 0.01 J
16. Which of the following statements is TRUE?
- A pyramid of numbers is always upright because there can never be fewer producers than consumers.
  - A pyramid of biomass is always upright because there can never be fewer producers than consumers.
  - A pyramid of energy is always upright because there can never be less energy in a lower trophic level than in a higher one.
  - A pyramid of energy is never upright because there can never be less energy in a lower trophic level than in a higher one.

Use the following information to answer the next two questions.



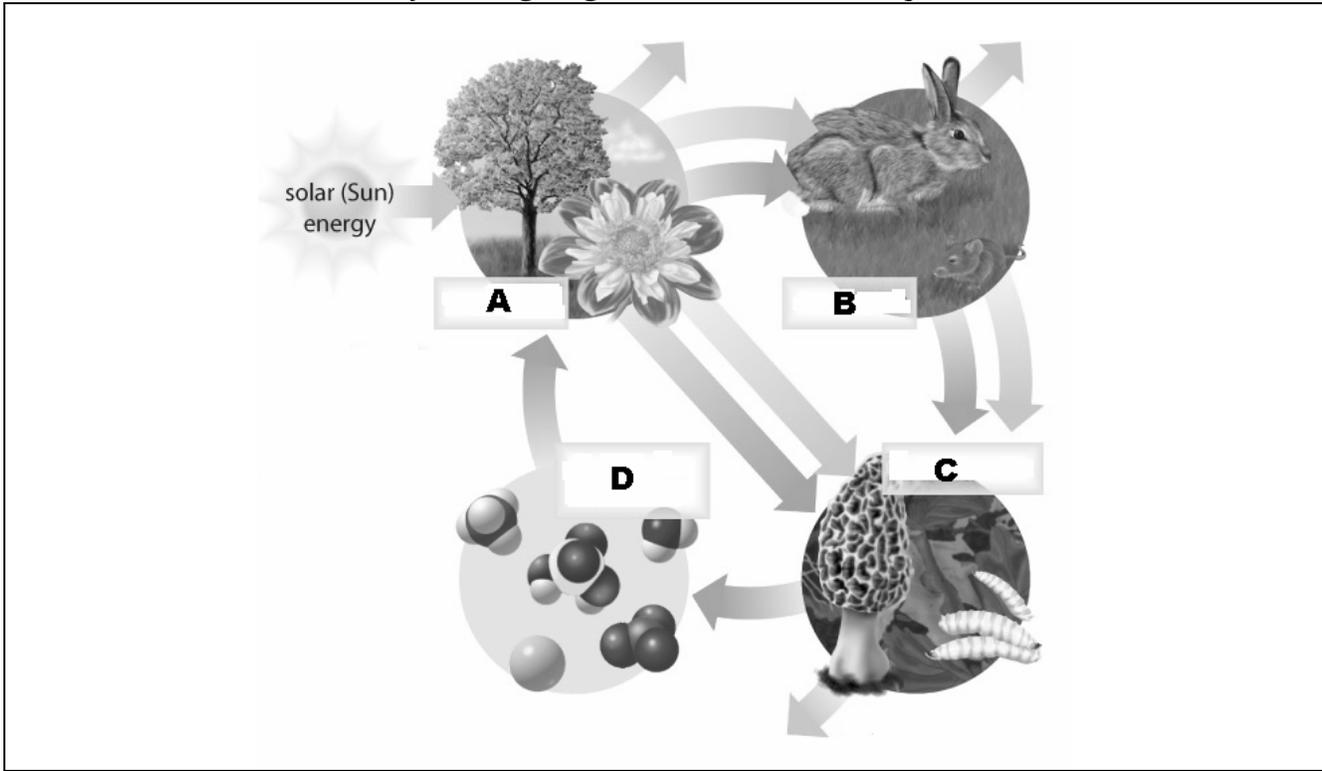
17. Which food chain provides the maximum amount of energy to the human?
- Food Chain 1
  - Food Chain 2
  - Food Chain 3
  - All food chains provide equal amounts of energy to the human.
18. Based on this diagram, why might some people suggest that humans should eat only plant material?
- More energy is available to humans if they consume animals such as the pig.
  - More energy is available to humans if they consume only plant material.
  - More energy is available to humans if they occupy the sixth trophic level.
  - More energy is available to humans if they occupy the first trophic level.

**ASSESSMENT**

**Chapter 1 Test**

**BLM 1.3.1**

Use the following diagram to answer the next question.

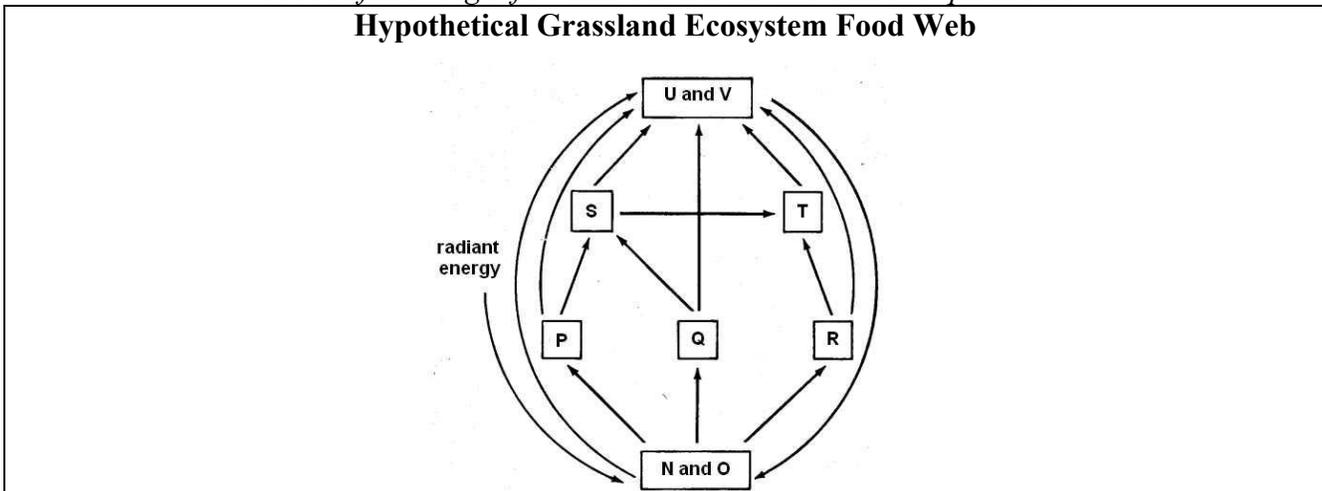


19. Which row would provide the most accurate labels for A, B, C, and D in the flow chart above?

Row	A	B	C	D
a.	inorganic nutrients	decomposers	consumers	producers
b.	consumers	decomposers	inorganic nutrients	producers
c.	decomposers	inorganic nutrients	producers	decomposers
d.	producers	consumers	decomposers	inorganic nutrients

Use the following information to answer the next two questions.

**Hypothetical Grassland Ecosystem Food Web**



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20. Organisms labelled U and V are vital to the grassland ecosystem because
- they capture radiant energy from the Sun to produce food for themselves.
  - they protect the grassland by eating insect pests such as grasshoppers.
  - they recycle energy throughout the grassland ecosystem.
  - they return organic and inorganic matter to the soil, air, and water.

### Numerical Response Questions

- Record your answers in the numerical-response section on the answer sheet provided.
- If an answer is a value between 0 and 1 (e.g., 0.25), then be sure to record the 0 before the decimal place.

### Feeding Relationships

1: producers      2: decomposers      3: primary consumers      4: secondary consumers

1. Match the following feeding relationships, as numbered below, to the letters N and O; P, Q, and R; S and T; U and V in the food web above.

**Answer:**

\_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_      \_\_\_\_\_  
 N and O      P Q R      S T      U and V

*Use the following information to answer the next question.*

#### Radiant Energy

Scientists estimate that 1 to 2 percent of all the energy that reaches Earth from the Sun is captured by producers and converted to chemical energy through photosynthesis.

(Assume for the purposes of this question that 100 percent of the radiant energy from the Sun reaches Earth's atmosphere.)

Statements related to the amount of radiant energy reaching the Earth:

- energy captured by producers on land and in the ocean
- energy absorbed at Earth's surface
- energy reflected from clouds, dust particles in the atmosphere, and water and land at Earth's surface
- energy absorbed by atmosphere and clouds

2. Rank these statements in order from the greatest amount of energy to least amount of energy.

**Answer:** \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

<b>ASSESSMENT</b>	<h1>Chapter 1 Test</h1>	<b>BLM 1.3.1</b>
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*Use the following information to answer the next two questions.*

### Marine Organisms

The following organisms form a food chain in a marine ecosystem in the Pacific Ocean near the coast of British Columbia.

- 1 killer whale (Orca)
- 2 phytoplankton
- 3 herring (small fish)
- 4 zooplankton
- 5 salmon

3. Use the numbers associated with each organism listed above to construct a typical food chain. Record your **five-digit answer beginning with the organism occupying the first trophic level and ending with the organism occupying the fifth trophic level.**

Answer: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

*Use the additional information to answer the next question.*

### Ten Percent Assumption

For convenience, ecologists often assume that 10 percent of the energy at one trophic level is transferred to the next trophic level. This 10 percent assumption is sometimes referred to as the “rule of 10.” The rule of 10 makes energy calculations easier, but it is an oversimplification.

4. Assume, for the purposes of this question, that the organisms occupying the first trophic level receive 100 percent of the available radiant energy from the Sun. Use the rule of 10 to predict the relative amount of energy that would be available to the organisms occupying the fourth trophic level. Record your answer **as a value from 0 to 1, rounded to two decimal places.**

Answer: \_\_\_\_\_

*Use the following information to answer the next question*

### Potato Beetle

From the energy that a potato beetle gains from food, the beetle uses 17 percent for growth and loses 33 percent by cellular respiration and 50 percent through feces (wastes).

5. If the potato beetle consumes 750 J of energy, calculate how much of this energy is available to the next energy level. **Round and record your answer to one decimal place** in the numerical response section on the answer sheet.

Answer: \_\_\_\_\_

<b>ASSESSMENT</b>	<h1>Chapter 1 Test</h1>	<b>BLM 1.3.1</b>
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## Written Response Question

Use the following information to answer the next question.

### Northern Leopard Frog (*Rana pipiens*)

Until recently, one of the most common sounds heard in Western Canada's national parks was the low-pitched snores and grunts of the northern leopard frog, or *Rana pipiens*. The northern leopard frog has also been called the “meadow frog,” “grass frog,” and the “labrador frog.” It belongs to the order *Anura* (frogs and toads), family *Ranidae*, or true frogs, and to the genus *Rana*, the only genus of true frogs in North America. The species name is *pipiens*. Right now, 21 species of frogs inhabit North America, including the bullfrog, northern red-legged frog, and the green frog. There are currently no known subspecies of *Rana pipiens*.

Frogs are an important part of ecological balance of many habitats. Frogs are important links in the food chain since they consume insects and become food to larger wildlife. Frogs are an indicator species, which means that they are good at showing us how our activities affect our shared ecosystems. For example, because frogs are so sensitive to their surroundings, they show us the damaging effects that acid rain and global warming have on our ecosystem.

Source: <http://biology.mcgill.ca>

1. a) Explain why frogs are called indicator species. (2 marks)

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- b) Draw a possible food web involving frogs and at least 9 other organisms. You do not have to use actual illustrations of the plants and animals – you can use words and arrows to complete your food web. (5 marks)

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c) Select one food chain from your food web and draw in it in the space below. Your food chain should include organisms from four trophic levels. Label the trophic level of each organism in your food chain. (4 marks)

d) Predict what might happen to the food web you constructed above if all of the frogs died and explain how these events could affect the stability of a wetland ecosystem. (4 marks)

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e) Besides acid rain and climate change, identify two other possible reasons why frogs are disappearing and explain how each would affect frog populations in North America. (4 marks)

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