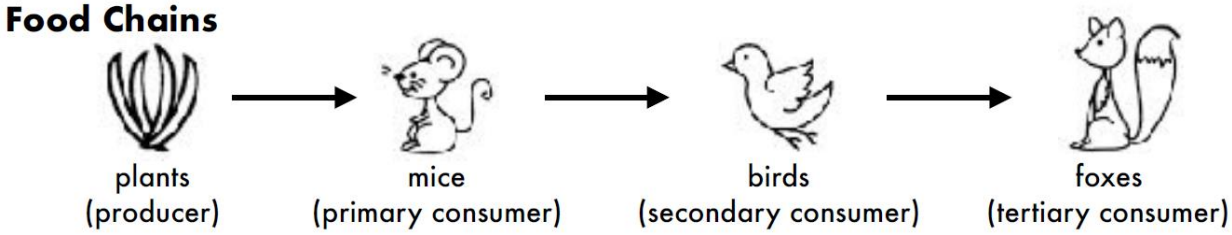
Energy to Live: Food Chains, Food Webs, and Energy Pyramids

Every organism on Earth needs energy to live. Except for newly discovered species living in the deepest parts of the ocean, every species on Earth gets the energy they need to live from the sun. Food chains and food webs can both be used to show how energy moves from the sun to different animals.

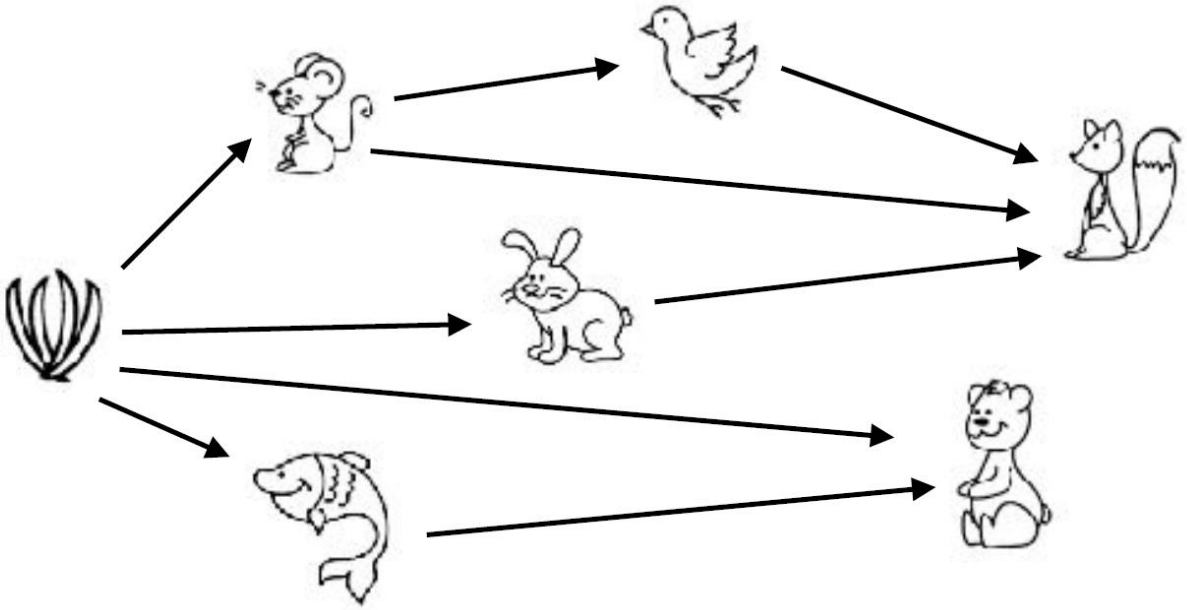


A *food chain* shows the path of energy through a chain of different organisms. The first link on a food chain is a *producer*. Producers include plants, bacteria, and algae. Plants are an important producer for humans. They use energy from the sun, water, and carbon dioxide in a process called *photosynthesis* to create energy. The plants use some of this energy to live and grow; the rest is stored for later use. The organism that eats the plant is called the *primary consumer* in the food chain. Both herbivores and omnivores eat plants. *Herbivores* only eat producers such as plants. *Omnivores* will eat both producers and other consumers (meat). The next link in the food chain is the *secondary consumer*. Secondary consumers are either carnivores or omnivores that eat the primary consumers. *Carnivores* only eat meat (other consumers). Another carnivore or omnivore will eat the secondary consumer. These are called *tertiary consumers*. There can be many links a food chain, but most food chains have a limited number of consumers. This is because a lot of energy is lost with every link of the chain. Each organism will use some of the energy it gets from eating, meaning that less energy is available to the next organism along the chain. This means that there is a lot less energy available to the tertiary consumer than the primary consumer.
This explains why there are so many more plant-eating fish than fish-eating sharks in the ocean. Currently, there are about 19 billion chickens living on Earth. Compare this number to the 7 billion humans who eat the chickens.

The last link in the food chain is a *decomposer*. Decomposers include bacteria and fungi. These organisms break down dead plants and animals. The nutrients from the dead plants and animals are then left in the soil. The next generation of plants will use these nutrients to grow and develop.

Food Webs

A *food web* is similar to a food chain, but instead of showing just one energy path, it shows many possible energy paths. For example, an owl (secondary consumer) eats mice (primary consumer), but it also eats rabbits (another primary consumer). Similarly, a goat (primary consumer) is eaten by both a jackal and a lion. Instead of showing just one set of relationships, a food web shows many different relationships between plants and animals.

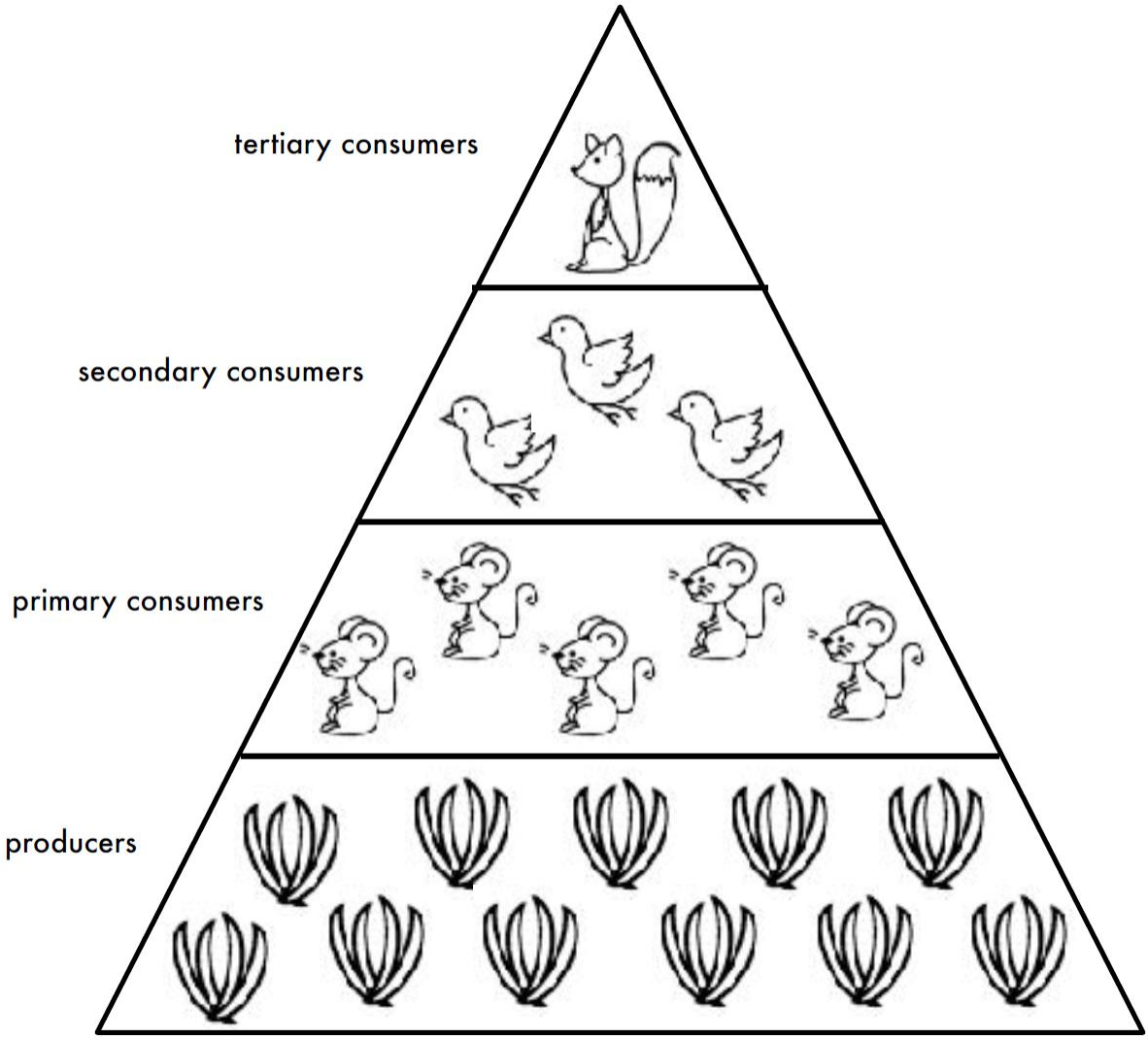


Drawing Food Chains and Food Webs

When drawing a food chain or food web it is important to remember to draw an arrow from the plant or animal that is being eaten to the animal that eats it. The arrows show the direction energy is moving through the food web or food chain. Also, decomposers are not usually shown in food chains or food webs. Even though they are an important part of the ecosystem, drawing decomposers can be confusing because they decompose all plants and animals. This means they do not have a specific place on a food web or food chain.

Energy Pyramids

Energy pyramids reinforce the idea that both the amount of energy available and the number of organisms decrease as you move up the food chain. Notice that there are lots of plants in the bottom level of the energy pyramid, but only one tertiary consumer at the top of the pyramid.



Notice that the food chain and the energy pyramid are describing the same relationships, but they are sharing different information about the relationships. Also notice that all the energy in the pyramid comes from the plant producers. Since the plants get their energy from the sun, all the organisms in the pyramid get their energy from the sun as well. As you move up the pyramid only ten percent of the energy gets passed on to the next level, for example if the producer received 100 Joules of energy than the primary consumers would only receive 10 Joules of energy. Then the secondary consumers would only receive 1 Joule of energy from the 10 Joules the primary consumer received.

Energy to Live: Food Chains, Food Webs, and Energy Pyramids Questions

Multiple Choice Questions:

1. Why is this passage called Energy to Live?
    a. It explains why organisms need energy to live.
    b. It explains where different organisms get their energy to live.
    c. It proves that all organisms get their energy to live directly from the sun through photosynthesis.
    d. It suggests that only some organisms need energy to live.

2. What is the main idea of the passage?
    a. Every organism needs energy to live.
    b. Food chains are an important tool for understanding the relationships between animals.
    c. Food chains, food webs, and energy pyramids are used to describe the transfer of energy through different organisms.
    d. Producers make their own energy.

3. Based on the information in the passage, which inference can the reader make?
    a. If the rabbits in a community die off, this will cause many of the foxes to starve.
    b. Plants use photosynthesis to create energy.
    c. Food chains include all of the possible predator/prey relationships in an area.
    d. Plants are sometimes at the top of an energy pyramid.

4. What is the best definition for *photosynthesis* based on the passage?
    a. Creating energy from nothing.
    b. Moving down along the energy pyramid.
    c. The way bees get energy from flowers.
    d. Using the energy from the sun and other materials to create energy.

Matching:

5. Match the following facts about food chains and food webs.

_____ show one set of predator/prey relationship

_____ show all predator/prey relationships in the ecosystem

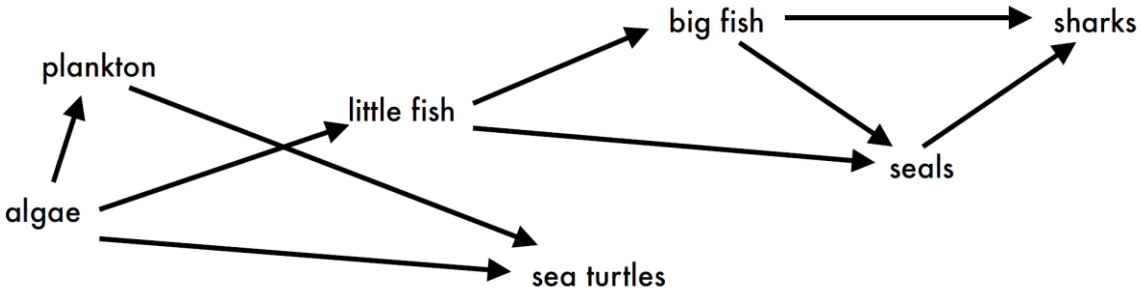
_____ shows how energy is passed through different consumers

_____ Does not include producers

a. Both food chains and food webs
b. Food chains
c. Food webs
d. Wrong since both food chains and food webs do this

True/ False Questions:

Below is a food web. Answers the true/false question about the food web below.



6. The seal is a predator to the little fish.
    a. True
    b. False

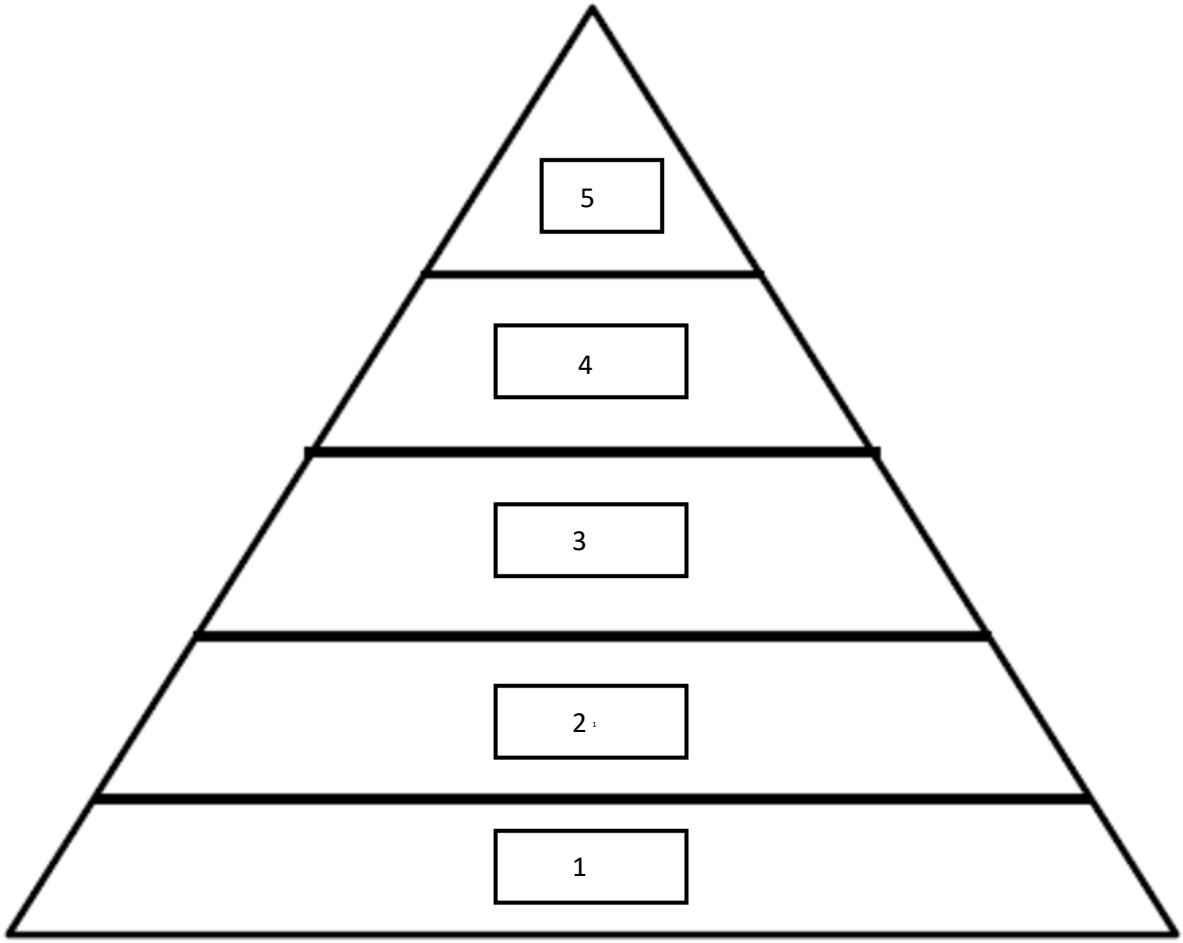
7. Sharks are both predators and prey.
    a. True
    b. False

8. Little fish are both predators and prey in this food web.
    a. True
    b. False

9. Big fish are prey to seals.
    a. True
    b. False

Ordering:

10. Put the following organisms in order on the pyramid with 1 being the producer: Plankton, Big Fish, Little Fish, Algae, and Shark



Multiple Choice Questions:

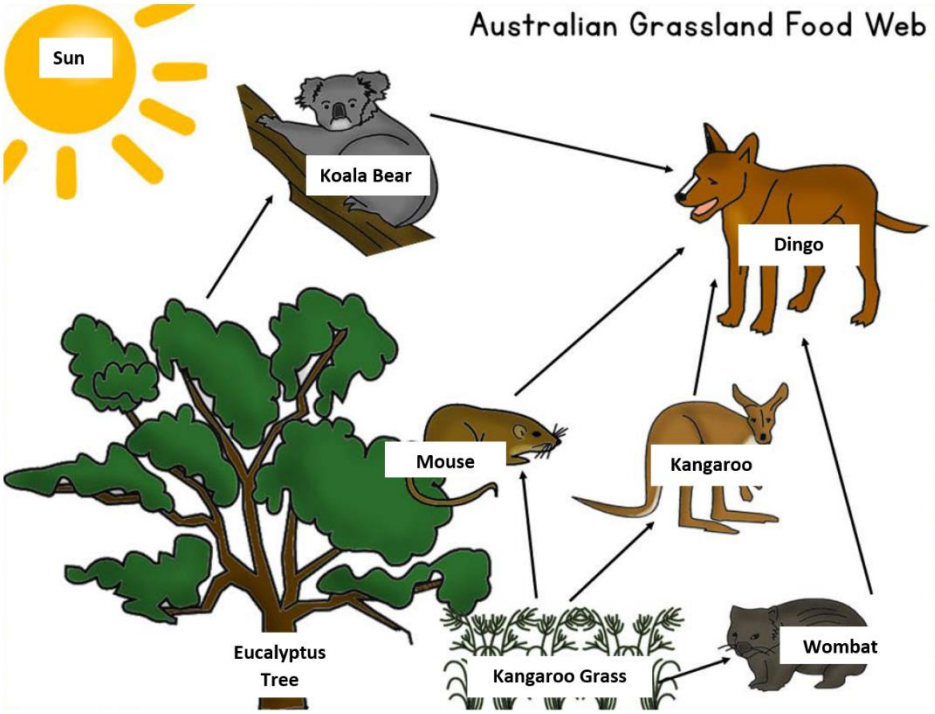
11. What happens to the energy in the pyramid as you move up?
    a. It increases by 100%
    b. Only 10% moves on
    c. It stays the same
    d. None of the above

12. Below is a food chain:

    Algae à plankton à small fish à big fish à shark

    Which one of these is the producer?
    a. Algae
    b. Plankton
    c. Small fish
    d. Big fish
    e. Shark

Food Web and Food Chain Questions



Multiple Choice Questions:

13. What is missing from the following food chain?

Sun à koala bear à dingo

a. Consumer
b. Predator
c. Omnivore
d. Producer

14. Wombats eat grasses and other plants because they are ____.

a. Predators
b. Prey
c. Herbivores
d. Both B and C

15. Koala bears, kangaroos, and wombats are all examples of what type of consumer?

a. Omnivores
b. Carnivores
c. Producers
d. Herbivores

16. Eucalyptus trees and kangaroo grass are both examples of ___.

a. Producers
b. Consumers
c. Herbivores
d. Omnivores

17. The grass, the mouse, and the dingo are all part of a food chain. Which of the following is the grass?
    a. Consumer
    b. Producer
    c. Omnivore
    d. Herbivore

18. Dingos eat koala bears, mice, kangaroos, and wombats because they are ___.
    a. Omnivores
    b. Carnivores
    c. Consumers
    d. Both B and C

19. What do the koala bear, the mouse, the kangaroo, and the wombat have in common?
    a. They are prey
    b. They are consumers
    c. They are predators
    d. Both A and B

20. Where does the energy for this food web begin?
    a. The sun
       the grass
    b. The eucalyptus tree
    c. The dingo

21. From what does the koala get most of its energy?
    a. The grass
    b. The dingo
    c. The sun
    d. The eucalyptus tree

22. Which animal is not an herbivore?
    a. Koala bear
    b. Wombat
    c. Dingo
    d. Kangaroo

23. Which three words best describe the dingo?
    a. Omnivore, carnivore, herbivore
    b. Omnivore, consumer, producer
    c. Carnivore, consumer, producer
    d. Carnivore, consumer, predator

24. What three words best describe the kangaroo?
    a. Carnivore, omnivore, herbivore
    b. Producer, herbivore, prey
    c. Consumer, herbivore, prey
    d. Consumer, predator, prey

25. What do the koala bears, the kangaroo, the mouse, the wombat, and the dingo have in common?
    a. They are all predators
    b. They are all consumers
    c. They are all producers
    d. They are all prey

26. What animal would best fill in the blank for this food chain?
    Grass à _____ à dingo
    a. Mouse
    b. Kangaroo
    c. Wombat
    d. A, B, and C

27. Which of the following shows a food chain in the correct order?
    a. Grass à Kangaroo à Dingo
    b. Grass à Koala à Kangaroo à Dingo
    c. Dingo à Mouse à Grass
    d. Grass à Mouse à Wombat à Dingo

28. What do the arrows in the food web represent?
    a. The order in which the animals eat
    b. The order in which organisms die
    c. The flow of energy from one organism to another
    d. The order in which organisms are born

29. Where does the energy begin in this food chain?

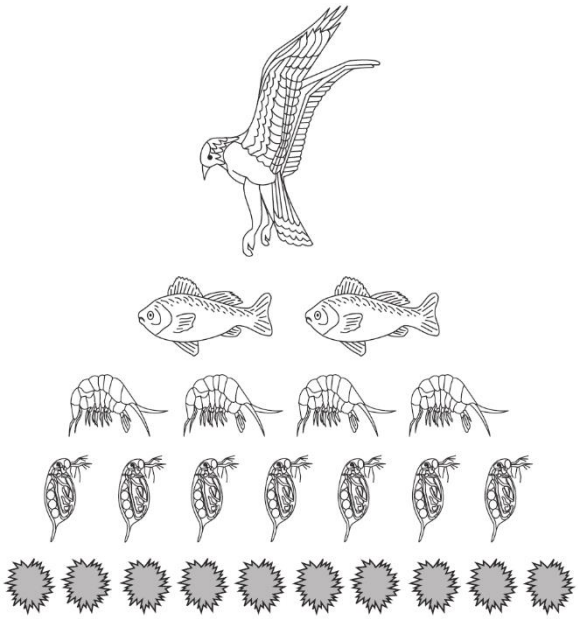
    a. The eucalyptus tree
    b. The sun
    c. The grass
    d. The dingo

30. Which food chain is not correct?
    a. Grass à kangaroo à dingo
    b. Eucalyptus tree à koala bear à dingo
    c. Grass à dingo à koala bear
    d. Grass à wombat à dingo

Energy Pyramid Questions:

31. In an ecosystem, the growth and survival of organisms are dependent on the availability of the energy from the Sun. This energy is available to organisms in the ecosystem because
    a. producers (plants) can use and store energy from sunlight
    b. consumers (animals) can transfer chemical energy to plants
    c. all organisms in a food web can use sunlight as energy
    d. all organisms in a food web feed on autotrophs

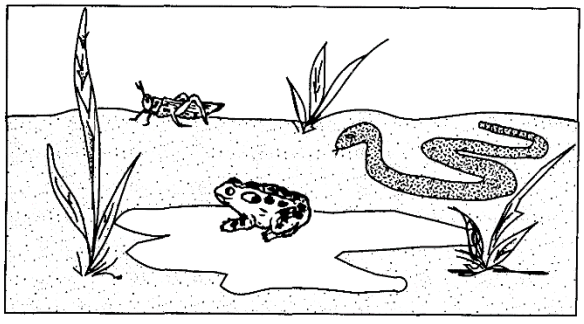
32. The diagram below represents different feeding levels in an energy pyramid.



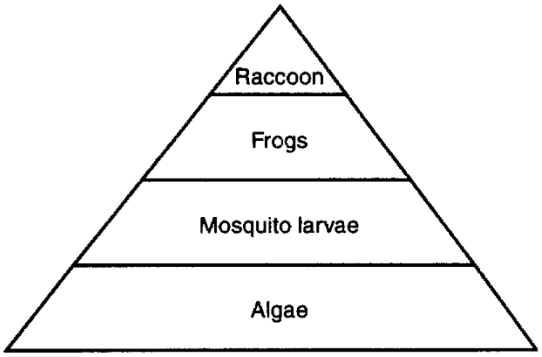
Which of the following statements **best** explains why the energy pyramid is narrowest at the top?

    a. The organisms at the top of the pyramid are the most efficient feeders.
    b. The organisms at the top of the pyramid have the largest population sizes.
    c. The organisms at the top of the pyramid need only a small amount of energy for their metabolism.
    d. The organisms at the top of the pyramid receive only a small fraction of the energy that originally enters the system.

33. The base of an energy pyramid for this ecosystem on the right would include which of the following?
    a. Frog
    b. Grasshopper
    c. Snake
    d. Grass



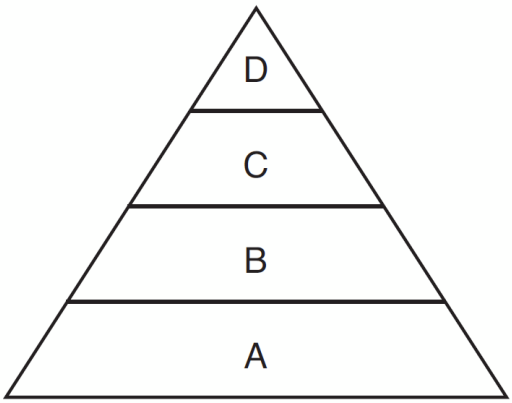
34. Base your answer to the following question on the diagram below.



Which term best describes the mosquito larvae?

a. producer
b. parasite
c. carnivore
d. consumer

35. Base your answer on the energy pyramid below and on your knowledge of biology.



This diagram can be used to represent the

a. dependency of animal survival on physical conditions in an ecosystem
b. loss of energy from various groups of organisms in an ecosystem
c. competition among species in an ecosystem
d. mechanisms that maintain homeostasis in the plants in an ecosystem

36. A pyramid of energy can be used to illustrate the loss of usable energy at each feeding level in a food web. In which feeding level would the smallest amount of energy be found?

a. autotrophs
b. primary consumers
c. producers
d. secondary consumers

37. A student observes a small pond community and notices that many geese are hatched there each spring. The baby geese feed on the grass surrounding the pond. The snapping turtles in the pond feed on the baby geese. Which pyramid of energy correctly illustrates these relationships?

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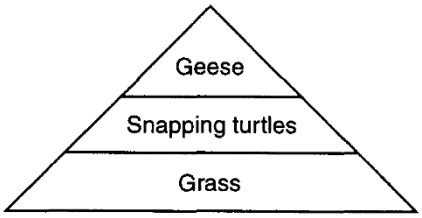

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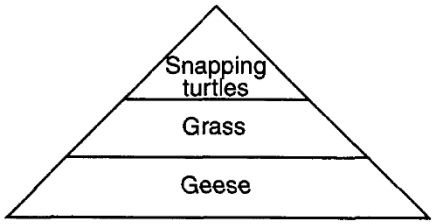

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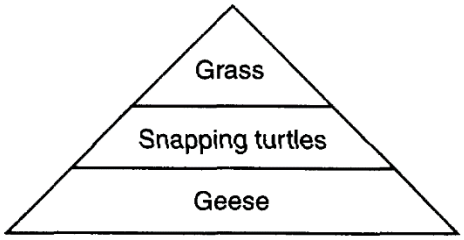

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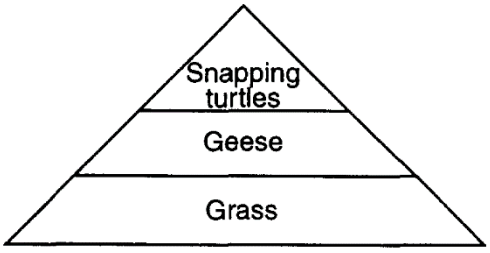
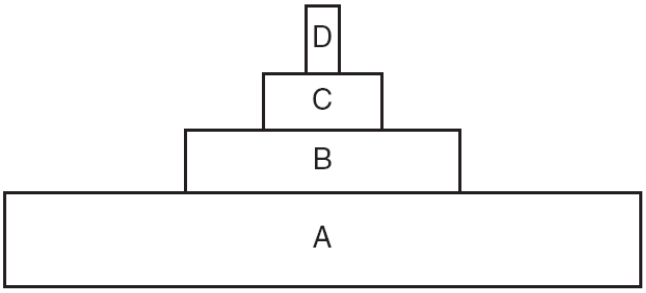


Answers questions 38 -45 based on the energy pyramid that is represented below.



38. How much energy would be available to the organisms in level C?
    a. all the energy in level A, plus the energy in level B
    b. all the energy in level A, minus the energy in level B
    c. a percentage of the energy contained in level B
    d. a percentage of the energy synthesized in level B and level D

39. Organisms that eat cows obtain less energy from the cows than the cows obtain from the plants they eat because the cows
    a. pass on most of the energy to their offspring
    b. convert solar energy to food
    c. store all their energy in milk
    d. use energy for their own metabolism

40. Letter A in the pyramid represents
    a. scavengers
    b. producers
    c. carnivores
    d. herbivores

41. The energy for use by organisms in level A originally comes from
    a. producers
    b. the Sun
    c. level B
    d. level D

42. Which statement about this energy pyramid is correct?
    a. Organisms in level D receive their energy directly from the Sun.
    b. Organisms in level B are carnivores.
    c. Organisms in level B receive their energy from level C.
    d. Organisms in level A are autotrophic.

43. Which statement correctly describes organisms in this ecosystem?
    a. Organisms in level B obtain their energy directly from the Sun.
    b. Organisms in level C obtain their nutrients directly from organisms in level D.
    c. Organisms in level A are herbivores.
    d. Organisms in level D are heterotrophic.

44. Where would carnivores most likely be located?
    a. A and B
    b. B and C
    c. C and D
    d. D and A

45. On which level is the greatest amount of available energy found?
    a. A
    b. B
    c. C
    d. D