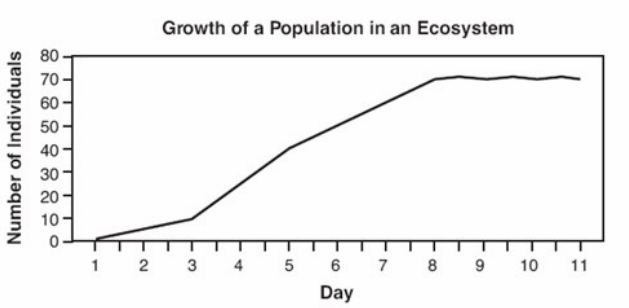
Name: Date:

1

On which day did the population represented in the graph below reach the carrying capacity of the ecosystem?



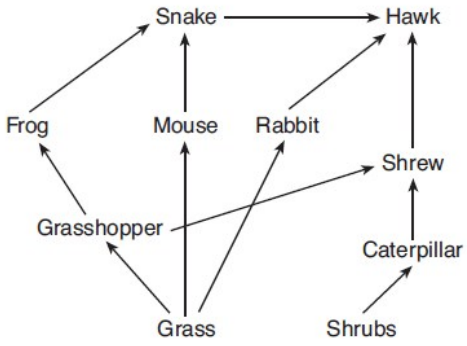
(1) day 11

(2) day 8

(3) day 3

(4) day 5

Base your answers to the following questions on the diagram below that shows interactions between several organisms located in a meadow environment and on your knowledge of biology.

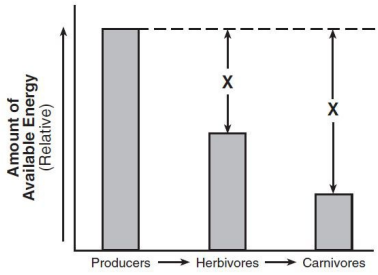


2

A rapid *decrease* in the frog population results in a change in the hawk population. State how the hawk population may change. Support your answer. [1]

3

The graph below represents the amount of available energy at successive nutrition levels in a particular food web.



The Xs in the diagram represent the amount of energy that was most likely

(1) changed into inorganic compounds

(2) retained indefinitely by the herbivores

(3) recycled back to the producers

(4) lost as heat to the environment

4

Which factor has the greatest influence on the type of ecosystem that will form in a particular geographic area?

(1) genetic variations in the animals
(2) climate conditions
(3) number of carnivores
(4) percentage of nitrogen gas in the atmosphere

5

A food chain is represented below.

Grass → Cricket → Frog → Owl

This food chain contains

(1) 4 consumers and no producers
(2) 1 predator, 1 parasite, and 2 producers
(3) 2 carnivores and 2 herbivores
(4) 2 predators, 1 herbivore, and 1 producer

6

A volcanic eruption destroyed a forest, covering the soil with volcanic ash. For many years, only small plants could grow. Slowly, soil formed in which shrubs and trees could grow. These changes are an example of

(1) manipulation of genes
(2) evolution of a species
(3) ecological succession
(4) equilibrium

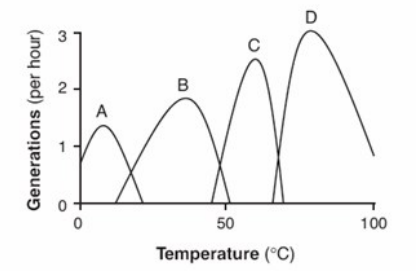
7

Rabbits are herbivores that are not native to Australia. Their numbers have increased steadily since being introduced into Australia by European settlers. One likely reason the rabbit population was able to grow so large is that the rabbits

(1) were able to prey on native herbivores
(2) reproduced more slowly than the native animals
(3) successfully competed with native herbivores for food
(4) could interbreed with the native animals

8

The graph below provides information about the reproductive rates of four species of bacteria, *A*, *B*, *C*, and *D*, at different temperatures.

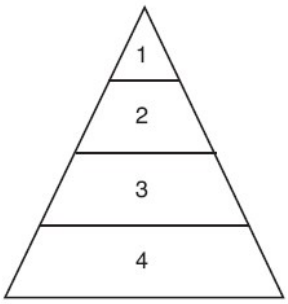


Which statement is a valid conclusion based on the information in the graph?

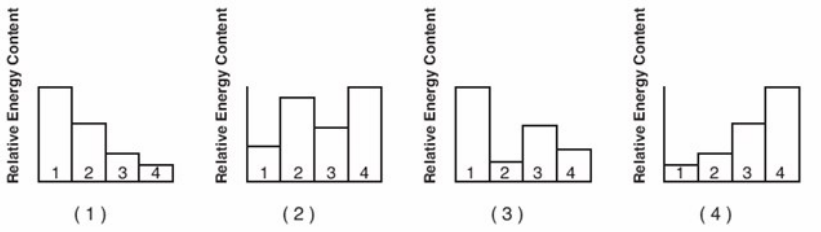
(1) Changes in temperature cause bacteria to adapt to form new species.
(2) Increasing temperatures speed up bacterial reproduction.
(3) Bacteria can survive only at temperatures between 0°C and 100°C.
(4) Individual species reproduce within a specific range of temperatures.

9

An energy pyramid is shown below.

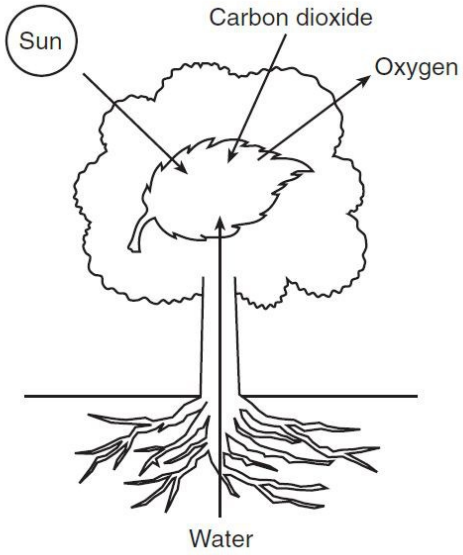


Which graph best represents the relative energy content of the levels of this pyramid?



10

The diagram below represents events associated with a biochemical process that occurs in some organisms.



Which statement concerning this process is correct?

(1) The process represented is respiration and the primary source of energy for the process is the Sun.

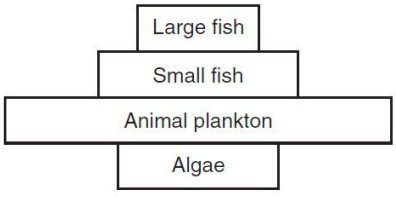
(2) The process represented is photosynthesis and the primary source of energy for the process is the Sun.

(3) This process converts energy in organic compounds into solar energy which is released into the atmosphere.

(4) This process uses solar energy to convert oxygen into carbon dioxide.

11

The diagram below represents an energy pyramid constructed from data collected from an aquatic ecosystem.



Which statement best describes this ecosystem?

(1) The ecosystem is most likely unstable.

(2) Long-term stability of this ecosystem will continue.

(3) The herbivore populations will continue to increase in size for many years.

(4) The producer organisms outnumber the consumer organisms.

12

In 1859, a small colony of 24 rabbits was brought to Australia. By 1928 it was estimated that there were 500 million rabbits in a 1-million square mile section of Australia. Which statement describes a condition that probably contributed to the increase in the rabbit population?

(1) The rabbits were affected by many limiting factors.

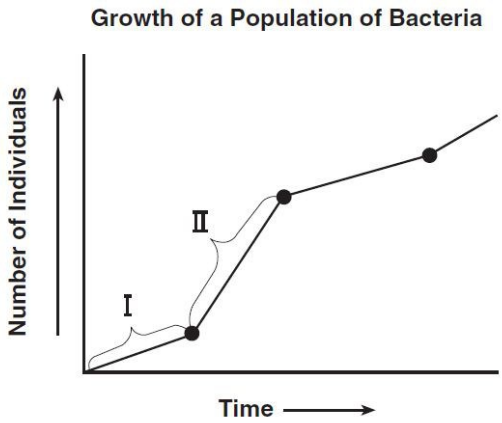
(2) The rabbits reproduced by asexual reproduction.

(3) The rabbits were unable to adapt to the environment.

(4) The rabbits had no natural predators in Australia.

13

The graph below shows the growth of a population of bacteria over a period of 80 hours.



Which statement best describes section II of the graph?

(1) The population has reached the carrying capacity of the environment.

(2) The rate of reproduction is slower than in section I.

(3) The population is greater than the carrying capacity of the environment.

(4) The rate of reproduction exceeds the death rate.

14

Two food chains are represented below.

Food chain A: aquatic plant → insect → frog → hawk
Food chain B: grass → rabbit → hawk

Decomposers are important for supplying energy for

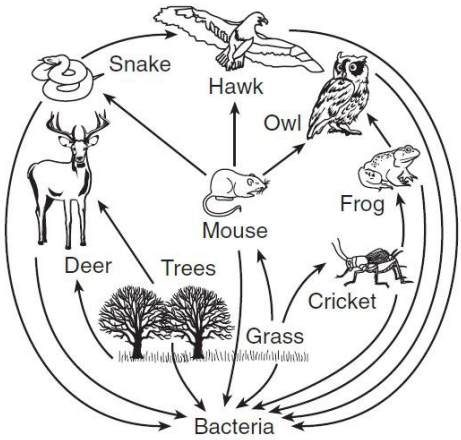
(1) food chain A, only

(2) food chain B, only

(3) both food chain A and food chain B

(4) neither food chain A nor food chain B

15



What is an appropriate title for this diagram?

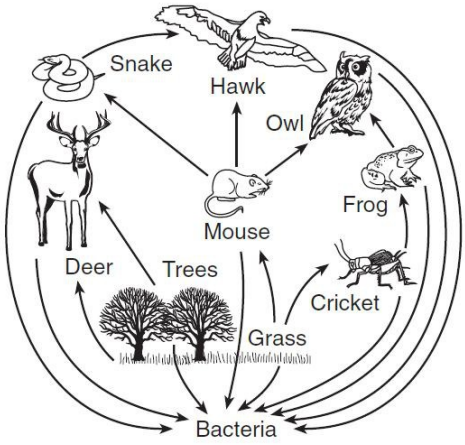
(1) Energy Flow in a Community

(2) Ecological Succession

(3) Biological Evolution

(4) A Food Chain

16



Which organism carries out autotrophic nutrition?

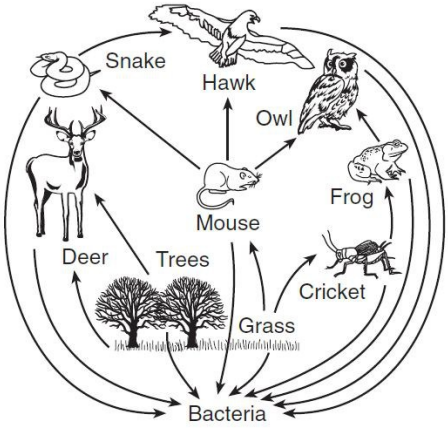
(1) hawk

(2) cricket

(3) grass

(4) deer

17



State what would most likely happen to the cricket population if all of the grasses were removed. [1]

_____

_____

18

Base your answer to question 58 on the information below and on your knowledge of biology.

Cargo ships traveling to the Great Lakes from the Caspian Sea in Eurasia often carry water in tanks known as ballast tanks. This water helps the ships to be more stable while crossing the ocean. Upon arrival in the Great Lakes, this water is pumped out of the ships. Often this water contains species that are not native to the Great Lakes environment. The zebra mussel is one species that was introduced into the Great Lakes in this way.

Although large numbers of zebra mussels often clog water intake pipes of power plants and other industries, the mussels have a benefit. Each mussel filters about a quart of water per day, absorbing cancer causing PCB's from lake water in the process.

The goby, a bottom-feeding fish from Europe, was introduced into the Great Lakes in a similar way a few years later. The gobies have become a dominant species in the Great Lakes, eating small zebra mussels and the eggs and young of other fish. Gobies are eaten by large sport fish. These sport fish have been tested and PCB's have been found in their tissues. Recommendations have been made that people limit the number of sport fish they eat.

Explain how the introduction of foreign species can often cause environmental problems. In your answer be sure to:

- **state how the zebra mussels and gobies were introduced into the United States[1]**
- **state one way either the zebra mussels or gobies have become a problem in their new environment [1]**
- **describe how both zebra mussels and gobies contribute to increasing the concentration of PCB's in sport fish [2]**

_____

_____

_____

_____

_____

_____

_____

_____

_____

19

Why is a mushroom considered a heterotroph?

(1) It manufactures its own food.
(2) It divides by mitosis.
(3) It transforms light energy into chemical energy.
(4) It obtains nutrients from its environment.

20

Global warming has been linked to a *decrease* in the

(1) size of the polar ice caps
(2) temperature of Earth
(3) rate of species extinction
(4) rate of carbon dioxide production

21

Decomposers are necessary in an ecosystem because they

(1) produce food for plants by the process of photosynthesis
(2) provide energy for plants by the process of decay
(3) can rapidly reproduce and evolve
(4) make inorganic materials available to plants

22

A manatee is a water-dwelling herbivore on the list of endangered species. If manatees were to become extinct, what would be the most likely result in the areas where they had lived?

(1) The biodiversity of these areas would not be affected.
(2) Certain producer organisms would become more abundant in these areas.
(3) Other manatees would move into these areas and restore the population.
(4) Predators in these areas would occupy higher levels on the energy pyramid.

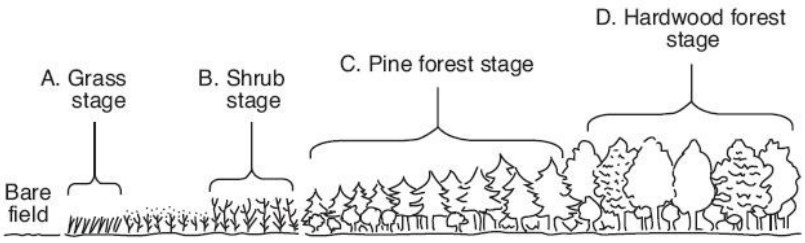
23

A serious threat to biodiversity is

(1) habitat destruction
(2) maintenance of food chains
(3) competition within a species
(4) a stable population size

24

The diagram below represents the various stages of ecological succession in New York State.



If the ecosystem is not altered, which stage would be the most stable?

(1) grass

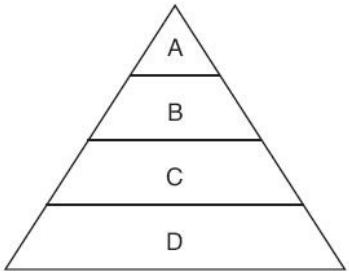
(2) shrub

(3) pine forest

(4) hardwood forest

25

Base your answer to the following question on the energy pyramid below and on your knowledge of biology.



Which level includes organisms that receive their energy from level B?

(1) A

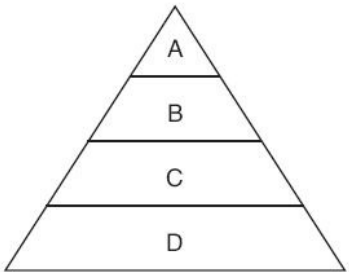
(2) B

(3) C

(4) D

26

Base your answer to the following question on the energy pyramid below and on your knowledge of biology.



Which level includes organisms that get their energy exclusively from a source other than the organisms in this ecosystem?

(1) A

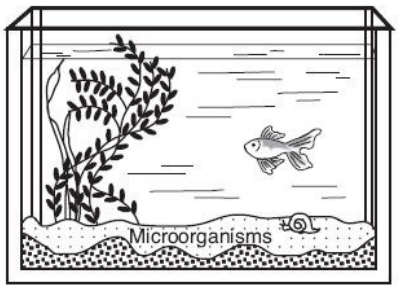
(2) B

(3) C

(4) D

27

Which statement most accurately predicts what would happen in the aquarium shown below if it were tightly covered and maintained in natural light for one month?



(1) The water temperature would rapidly decrease.

(2) The process of respiration in the snail would decrease.

(3) The rate of reproduction of the fish would be affected.

(4) The organisms would probably survive because materials would cycle.

28

Base your answer to the following question on the information below and on your knowledge of biology.

After the Aswan High Dam was built on the Nile River, the rate of parasitic blood-fluke infection doubled in the human population near the dam. As a result of building the dam, the flow of the Nile changed. This changed the habitat, which resulted in an increase in its population of a certain aquatic snail. The snails, which were infected, released larvae of the fluke. These larvae then infected humans.

The role of the snail may be described as a

(1) host
(2) parasite
(3) producer
(4) decomposer

29

The table below shows the abundance of some greenhouse gases in the atmosphere.

Abundance of Some Atmospheric Greenhouse Gases

Greenhouse Gases	Abundance (%)
carbon dioxide (CO_2)	99.438
methane (CH_4)	0.471
nitrous oxide (N_2O)	0.084
other gases (CFCs, etc.)	0.007
Total	100.000

Identify the most abundant greenhouse gas and state *one* human activity that is a source of this gas. [1]

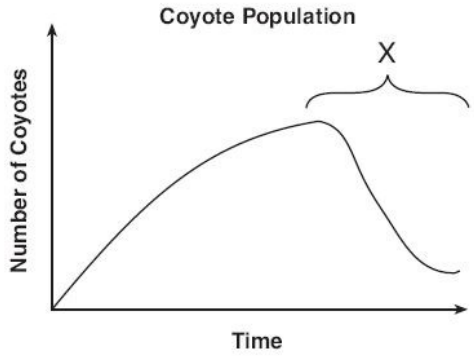
Greenhouse gas: _____

_____

_____

30

The graph below shows the growth of a population of coyotes in a wilderness area.



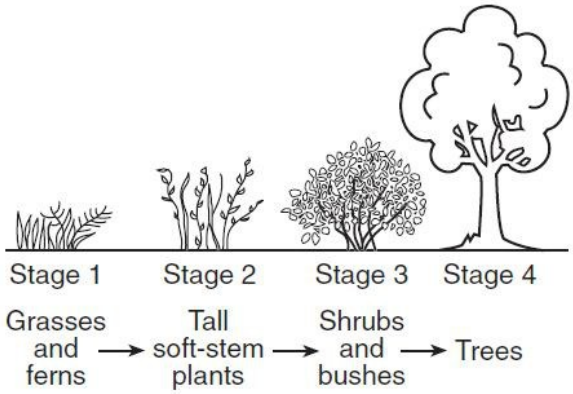
State *one* possible cause for the population decrease at X. [1]

_____

_____

31

Changes in an ecosystem over a long period of time are shown in the diagram below.



These changes will most likely lead to a

(1) stable ecosystem that can last for many years

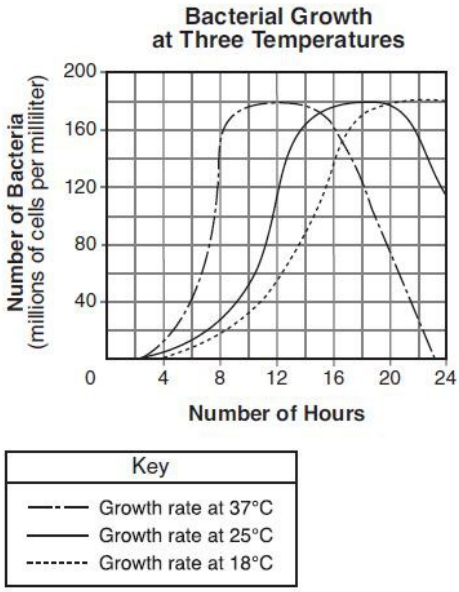
(2) loss of heterotrophs that cannot be recovered

(3) long-term rise in environmental temperatures

(4) forest consisting of only producers and decomposers

32

The graph below represents the growth of bacteria cultured at three different temperatures over a period of 24 hours.



Which statement concerning the rate of cell division in the bacteria culture is correct?

(1) Cell division is most rapid at 37ºC between 6 and 8 hours after it began.

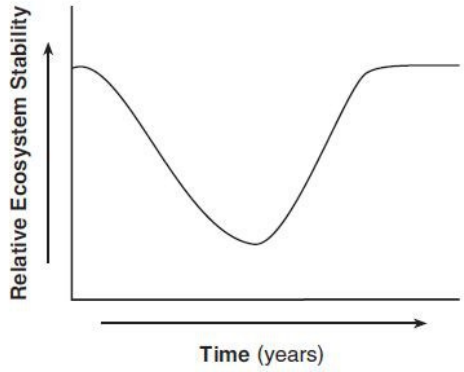
(2) Cell division is most rapid at 25ºC between 20 and 24 hours after it began.

(3) Cell division is most rapid at 18ºC between 4 and 8 hours after it began.

(4) Cell division occurs at the same rate no matter what the temperature.

33

The graph below shows changes in the stability of an ecosystem over a period of time.



Which statement best describes the change in ecosystem stability shown in the graph?

(1) A stable ecosystem can be altered, then it can recover to a point of stability.

(2) An ecosystem remains unchanged as its stability decreases.

(3) The stability of an ecosystem remains unchanged but its biodiversity decreases.

(4) A stable ecosystem cannot recover after it is altered.

34

Two interactions between organisms are shown in the table below. X and Y do not represent the same organisms in the two interactions.

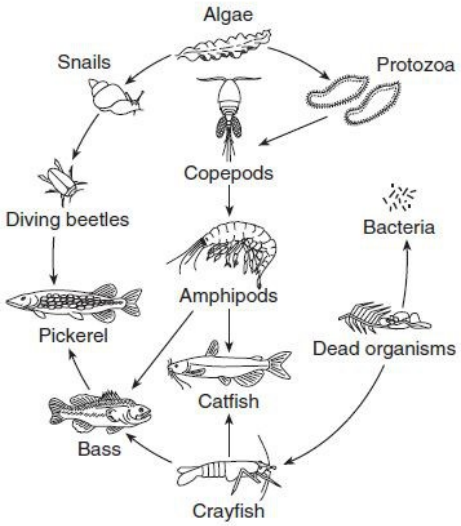
	Organism X	Organism Y
Interaction 1	predator	prey
Interaction 2	parasite	host

Which statement best describes the relationship between organism X and organism Y in each interaction?

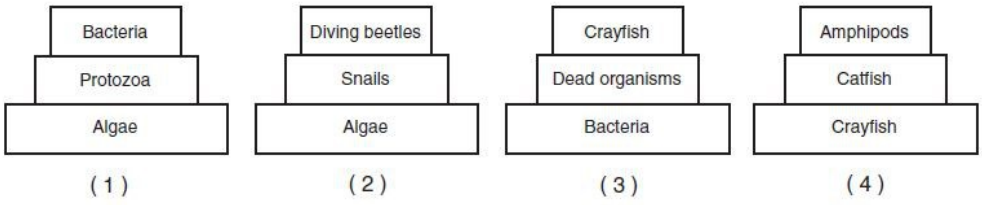
1. **Organism X is positively affected by the relationship and organism Y is negatively affected.**
2. **Organism X is negatively affected by the relationship and organism Y is positively affected.**
3. **Both organisms are positively affected by the relationship.**
4. **Both organisms are negatively affected by the relationship.**

35

Base your answers to questions 39 and 40 on the diagram below, which represents a pond food web, and on your knowledge of biology.



Which energy pyramid most accurately shows the energy relationships between three organisms in this food web?



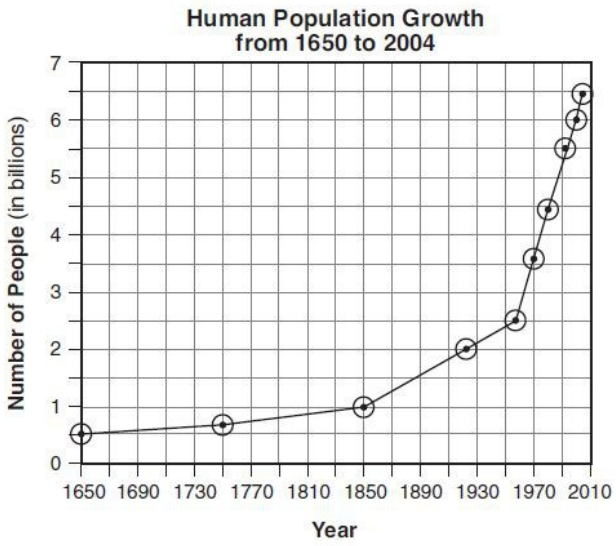
36

Which statement best describes what will most likely happen if the amphipod population is removed from this food web?

1. **Population sizes of species at feeding levels both before and after amphipods will decrease.**
2. **Population sizes of species at feeding levels both before and after amphipods will increase.**
3. **Population sizes of species at feeding levels after amphipods will increase and before amphipods will decrease.**
4. **Population sizes of species at feeding levels after amphipods will decrease and before amphipods will increase.**

37

The graph below shows data on human population growth.



The trend shown on the graph would most likely result in

(1) a decreased demand for deforestation

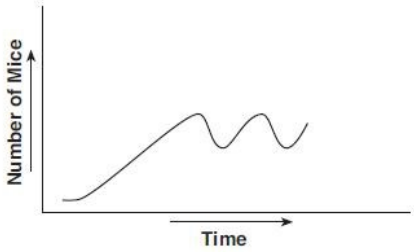
(2) an increase in available freshwater

(3) a decrease in air pollution

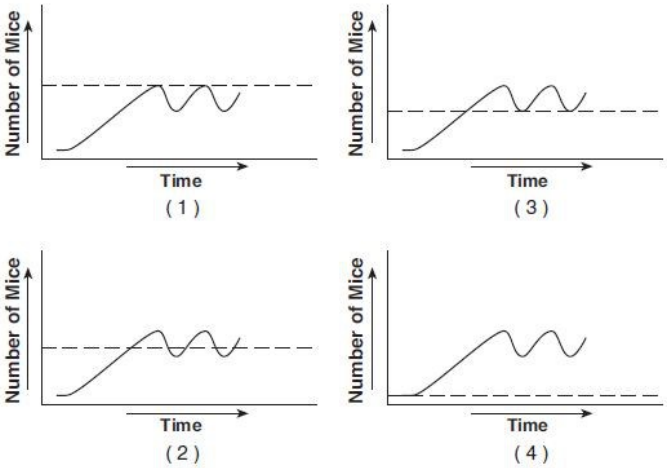
(4) an increased demand for land use

38

The graph below shows the growth of a field mouse population in an ecosystem over time.



The dashed line indicating the carrying capacity for the mouse population is correctly shown on which graph?



39

Each of the environmental problems listed below has had an impact on ecosystems.

increased ultraviolet radiation
global warming

Select one of these problems and write it in the space below. Explain how this problem has affected an ecosystem. In your answer, be sure to:

- **identify one specific cause of the environmental problem [1]**
- **identify one organism that has been affected by the problem and state one way that organism has been affected [1]**
- **state one action that can be taken to lessen the impact of this problem on the environment [1]**

Problem: _____

_____

_____

_____

_____

_____

_____

_____

_____

40

Base your answer on the information below and on your knowledge of biology.

In the abyssal zones (deepest zones) of oceans, organisms live in an ecosystem that lacks sunlight. Other environmental conditions include temperatures of 4ºC and extremely high water pressure. Dead material from upper ocean zones sinks and settles in the abyssal zone.

State one possible way that some organisms living permanently in the abyssal zone could obtain energy. [1]

_____

_____