

19. Organisms and their Environment

(Past Year Topical Questions 2010-2015)

May/June 2010 (11)

- 31** The size of the arrows shows the approximate, relative amounts of energy passing from one stage to the next in a food chain.

Which chain represents the energy losses between trophic levels?

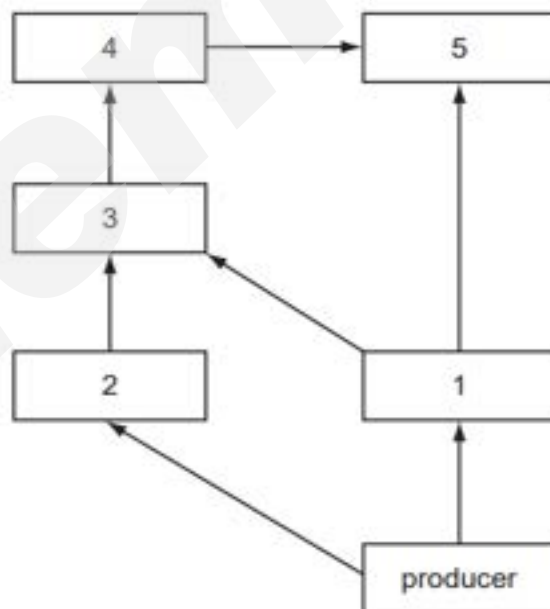
A sun \longrightarrow grass \longrightarrow rabbit \longrightarrow fox

B sun \longrightarrow grass \longrightarrow rabbit \longrightarrow fox

C sun \longrightarrow grass \longrightarrow rabbit \longrightarrow fox

D sun \longrightarrow grass \longrightarrow rabbit \longrightarrow fox

- 32** The diagram shows a food web.

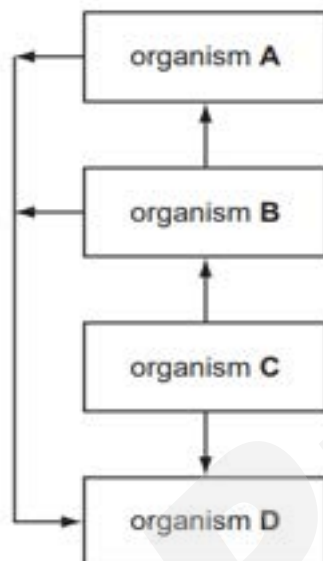


Which organisms occupy the same trophic level?

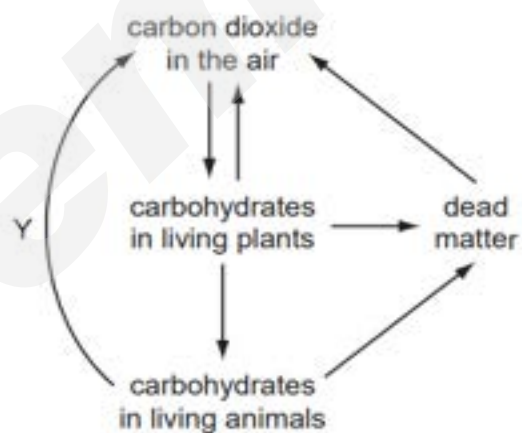
- A** 3 and 2 **B** 4 and 1 **C** 5 and 2 **D** 5 and 3

33 The diagram shows the flow of energy in a food chain.

Which organism is the producer in the food chain?



35 The diagram shows part of the carbon cycle.

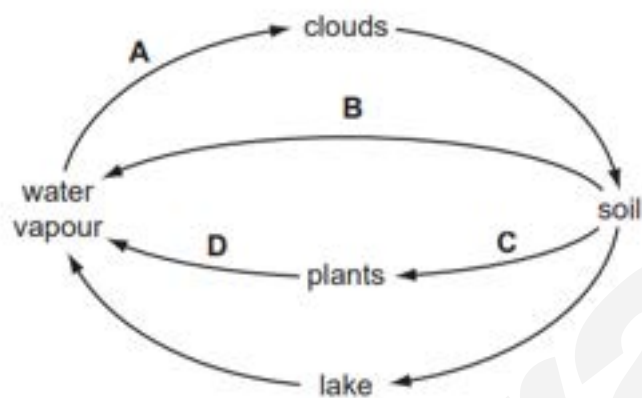


Which process occurs at Y?

- A combustion
- B decay
- C photosynthesis
- D respiration

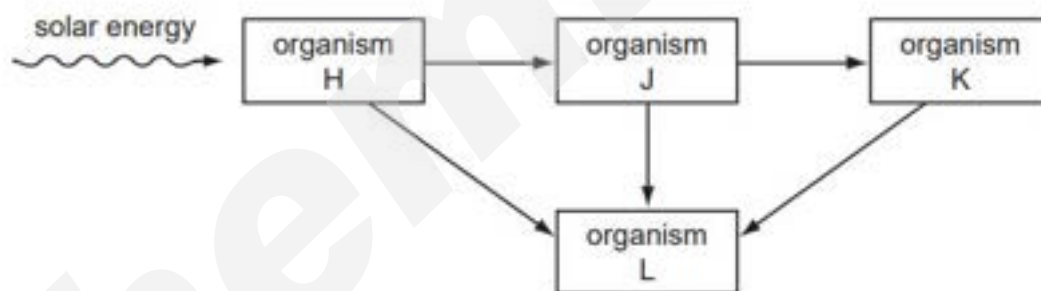
36 The diagram shows part of the water cycle.

Where is osmosis occurring?



Oct/Nov 2010 (11)

33 The diagram shows a simple food web.



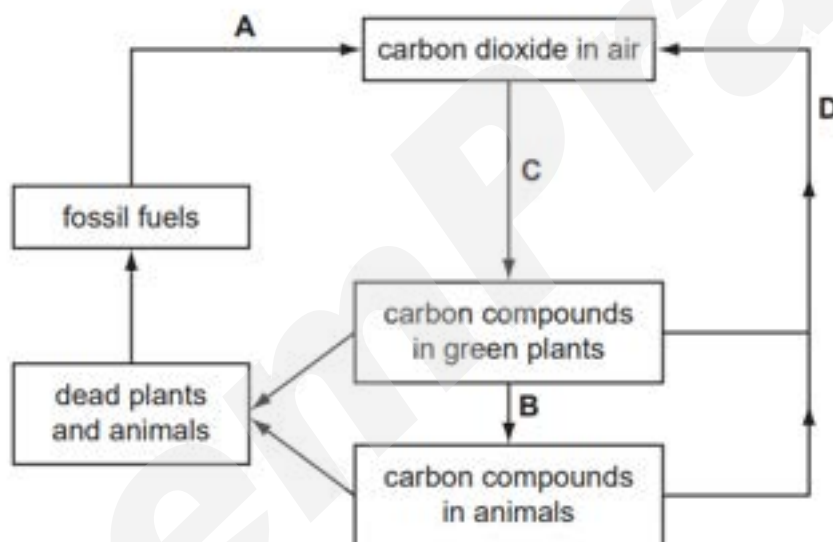
What must organism J be?

- A a carnivore
- B a decomposer
- C a herbivore
- D a producer

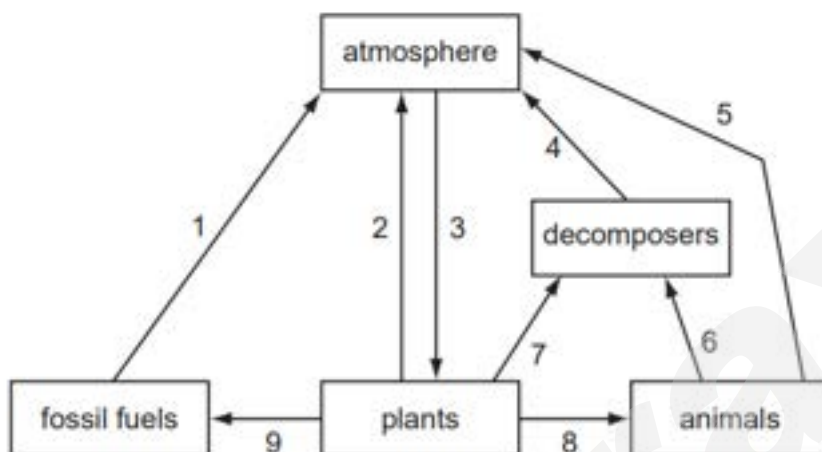
34 At each stage in a food chain, energy is lost.

What is a result of this?

- A** All living organisms respire.
 - B** Food chains always begin with green plants.
 - C** Plants are called producers and animals consumers.
 - D** There are very few food chains with more than five organisms.
- 35** Which part of the carbon cycle involves the release of energy from food substances in all living cells?

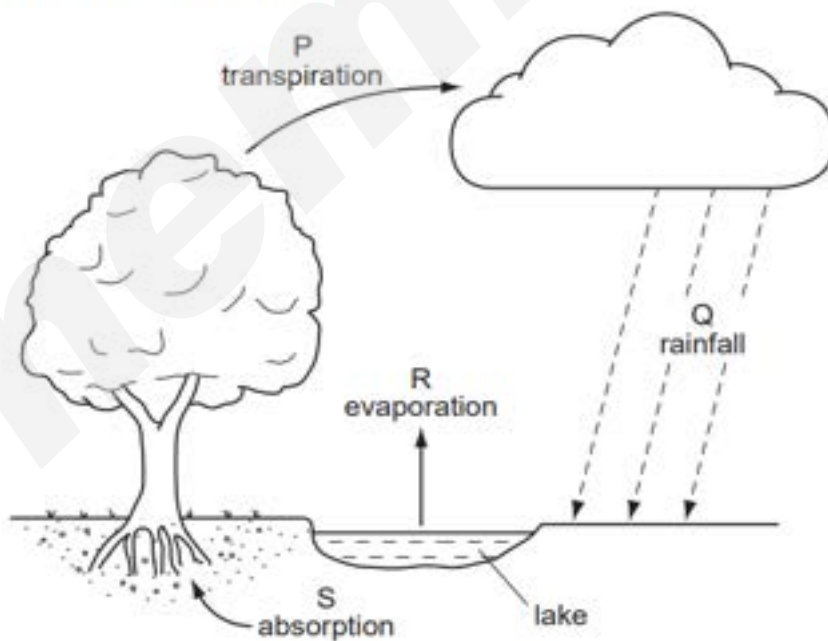


- 36 The diagram represents the carbon cycle. Processes involved in the circulation of carbon are numbered 1 to 9.



Which processes are parts of a food web?

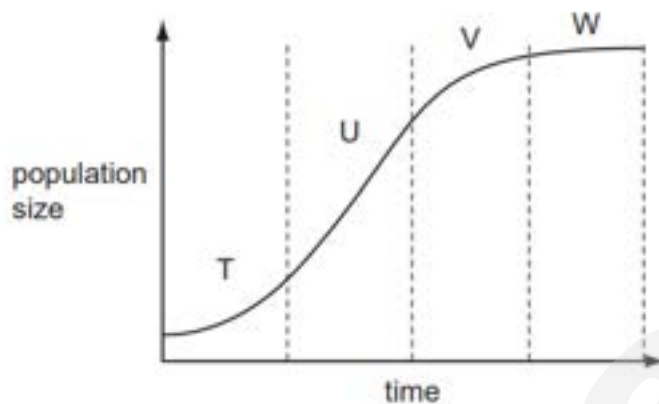
- A 1, 2 and 3 B 1, 5 and 8 C 2, 4 and 9 D 6, 7 and 8
- 37 The diagram shows part of the water cycle.



Which processes will be slowed down by an increase in humidity?

- A P and Q B P and R C Q and R D Q and S

38 The graph shows the growth of a population in a suitable environment.

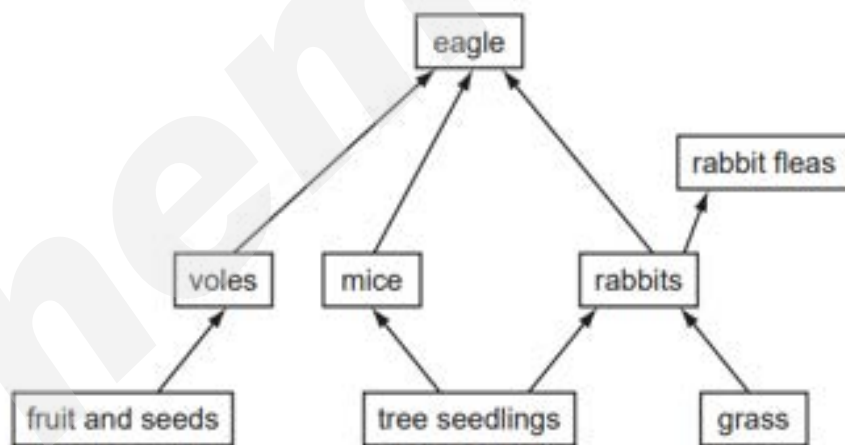


During which two stages is the population affected by lack of resources as a limiting factor?

- A** T and U **B** U and V **C** V and W **D** W and T

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32 The diagram shows a food web.



Which of the following is a food chain in this web?

- A** grass → rabbits → eagle
B grass → voles → eagle
C rabbit fleas → rabbits → grass

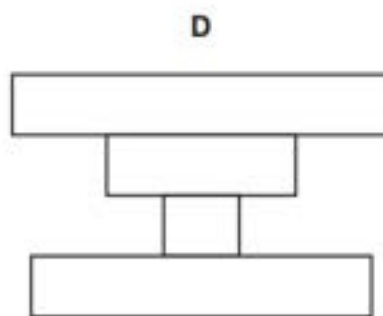
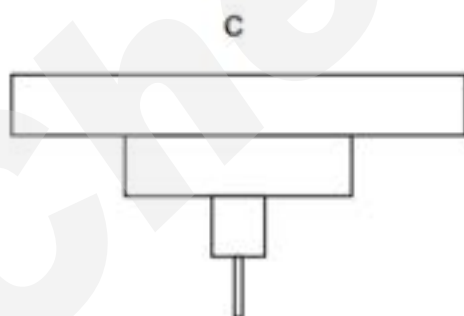
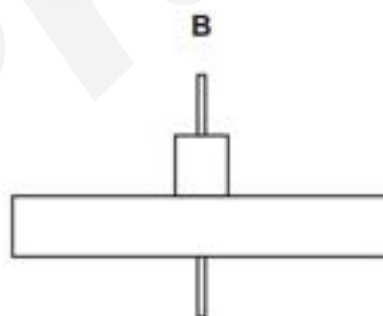
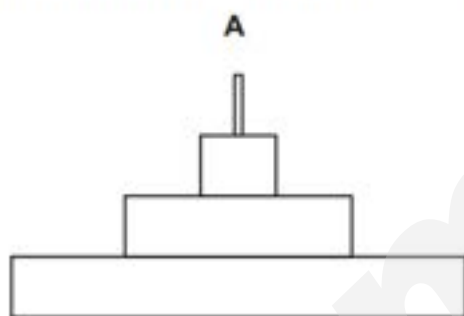
33 In one habitat, hyaenas eat antelopes and antelopes eat grass.

What is the source of energy for the grass?

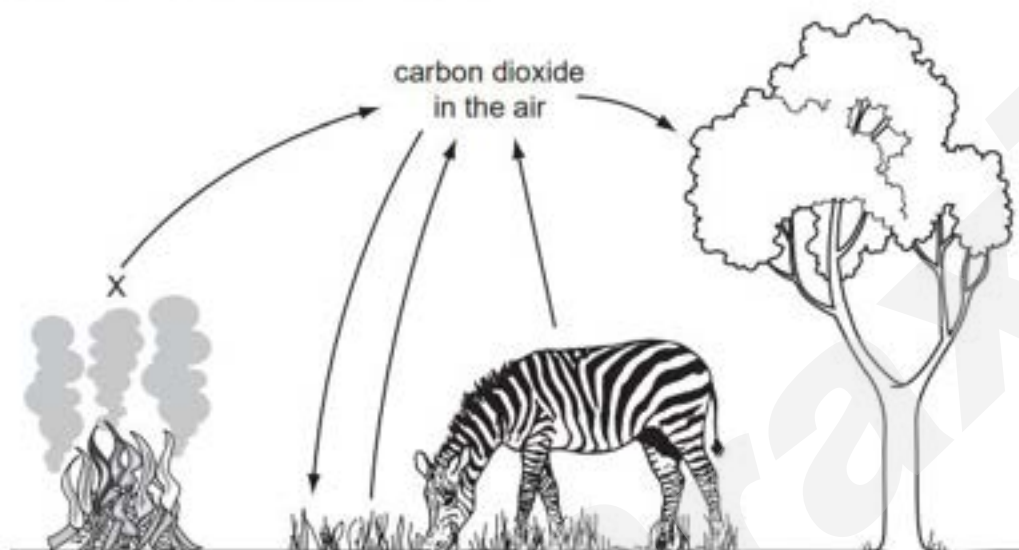
- A** antelopes
- B** carbon dioxide
- C** hyaenas
- D** the Sun

34 A single tree is food for a large population of caterpillars. Several small birds eat the caterpillars. A bird of prey eats the small birds.

Which diagram shows the pyramid of numbers for this food chain?



35 The diagram shows part of the carbon cycle.

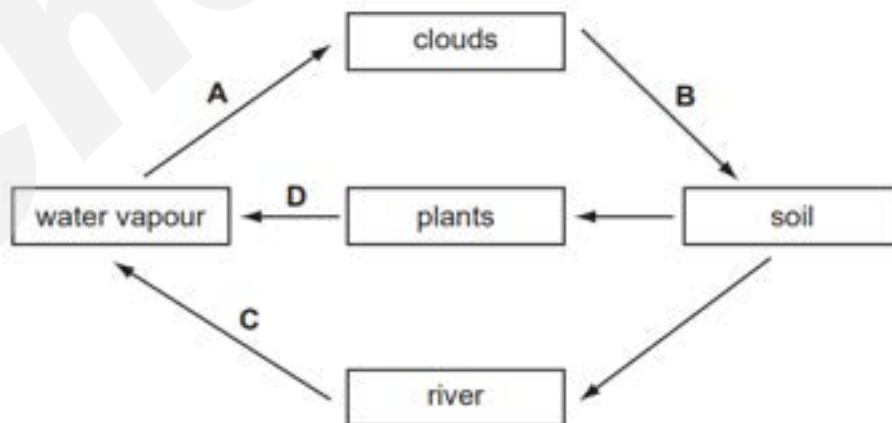


Which process is taking place at X?

- A combustion
- B decomposition
- C photosynthesis
- D respiration

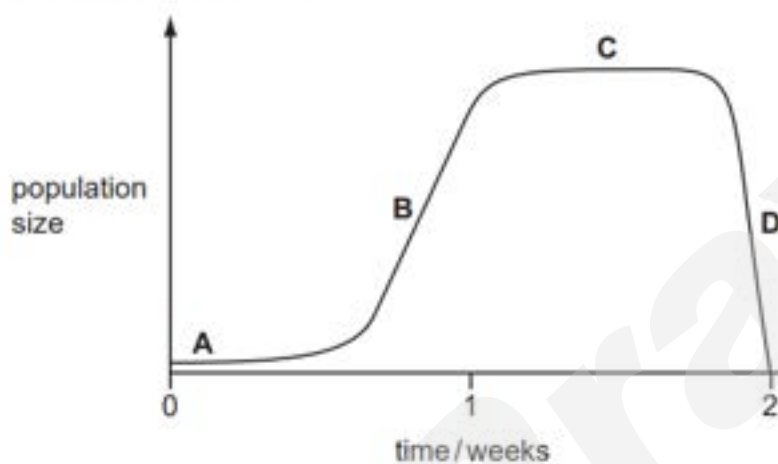
36 The diagram shows part of the water cycle.

Which arrow represents condensation?



37 Some bacteria were grown in a nutrient solution over a period of two weeks. The graph shows how the population of bacteria changed during this time.

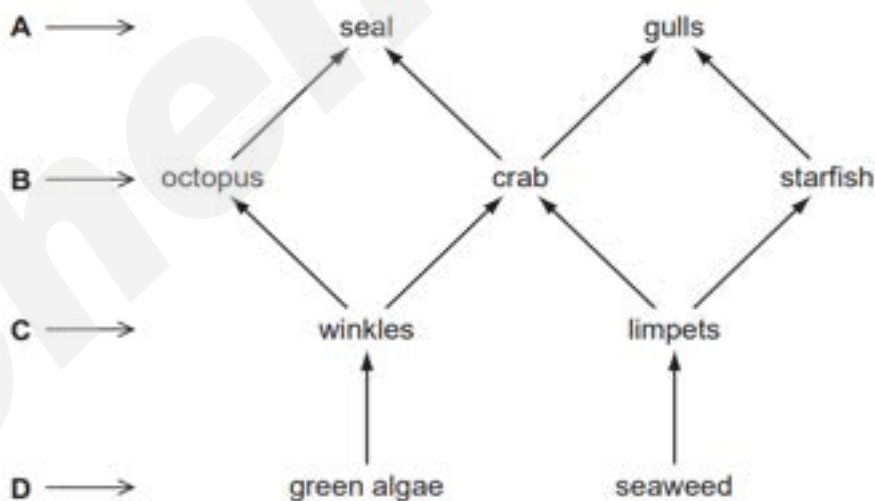
Which is the lag phase in the growth of this population?



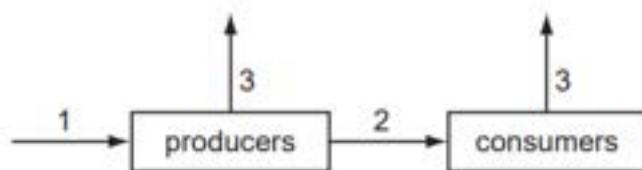
Oct/Nov 2011 (11)

33 The diagram shows a food web.

At which level does energy from the Sun enter the food web?



34 The diagram gives a simplified scheme for energy flow through an ecosystem.

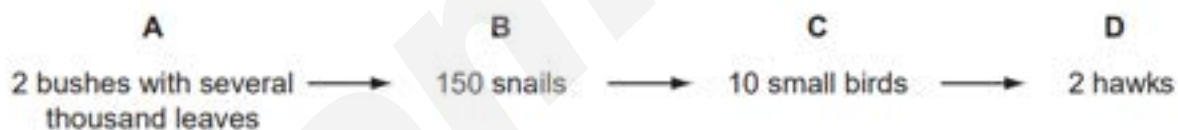


Which processes do the labelled arrows represent?

	1	2	3
A	feeding	photosynthesis	respiration
B	feeding	respiration	photosynthesis
C	photosynthesis	feeding	respiration
D	photosynthesis	respiration	feeding

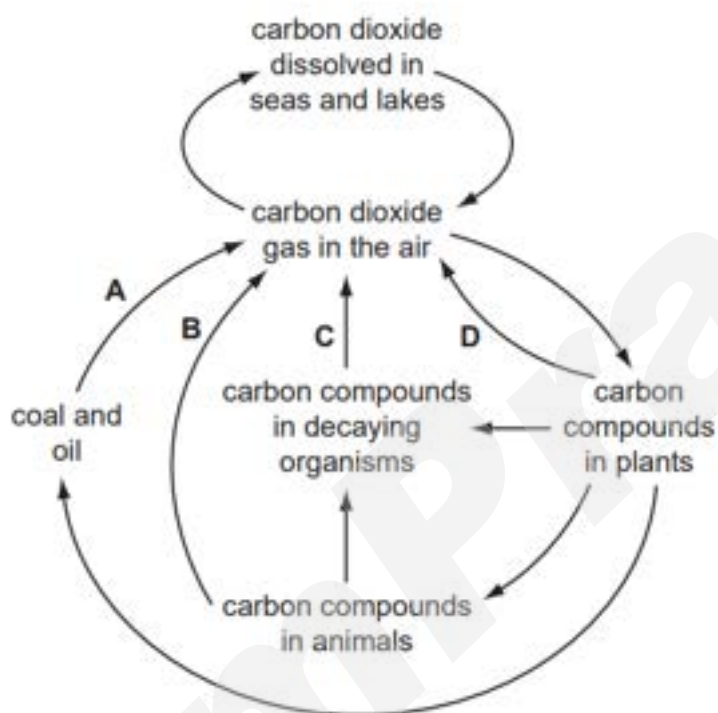
35 The food chain shows the number of animals relying on two bushes for their survival.

At which step in the food chain do the organisms have the greatest amount of energy?

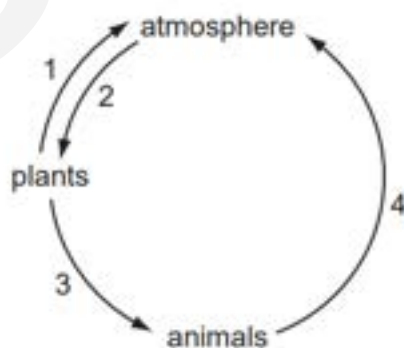


36 The diagram shows the carbon cycle.

Which process produces carbon dioxide from substances made by photosynthesis millions of years ago?



37 The diagram shows part of the carbon cycle.

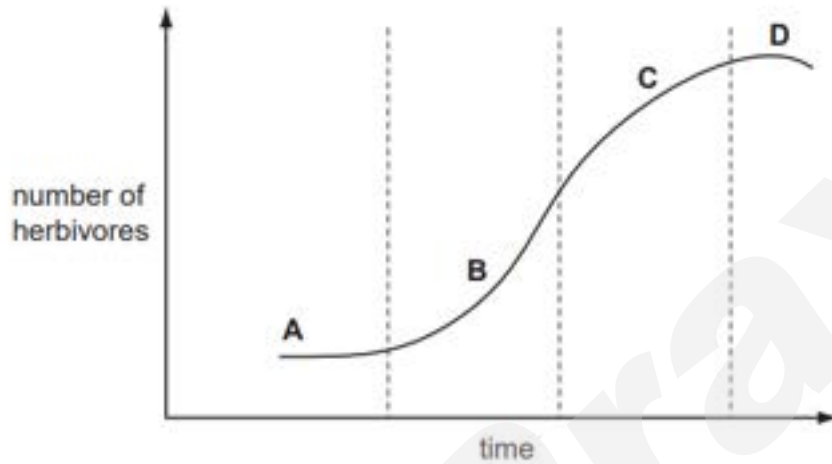


Which numbers represent excretion?

- A 1 and 2 B 1 and 4 C 2 and 3 D 3 and 4

38 The graph shows the rate of growth for a population of herbivores.

Which is the exponential (log) phase in the growth of this population?



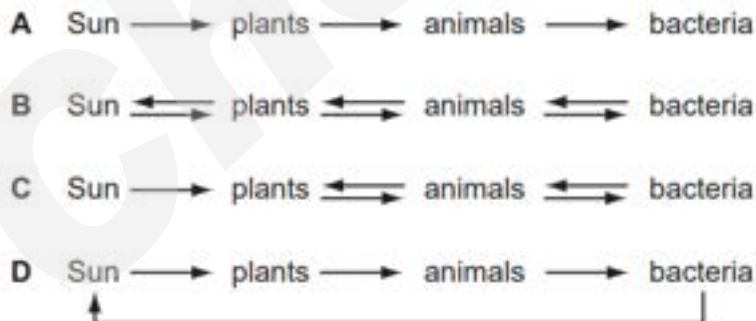
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32 The diagram shows a food chain.

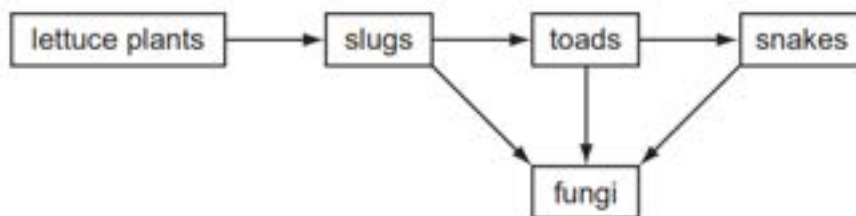
Which organism is the producer?



33 Which diagram shows the flow of energy in an ecosystem?



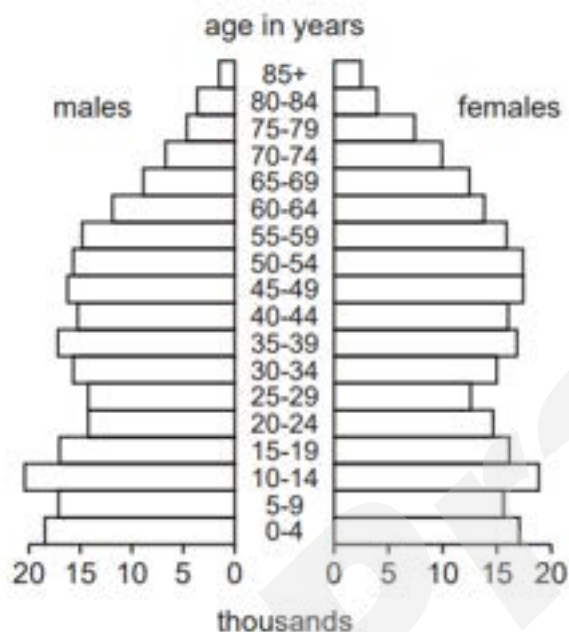
34 The diagram shows a food web.



Fungi are decomposers. What is their importance in this food web?

- A They control the number of toads.
 - B They provide energy for plant growth.
 - C They provide food for snakes.
 - D They release minerals for plant growth.
- 36 In an ecosystem, which are the only organisms to remove carbon dioxide from the atmosphere?
- A carnivores
 - B decomposers
 - C herbivores
 - D producers

37 What name is given to the diagram below?



- A a food web pyramid
- B a population pyramid
- C a pyramid of biomass
- D a pyramid of energy

May/June 2012 (12)

33 The diagram shows a food chain.

grass → wildebeest → lion

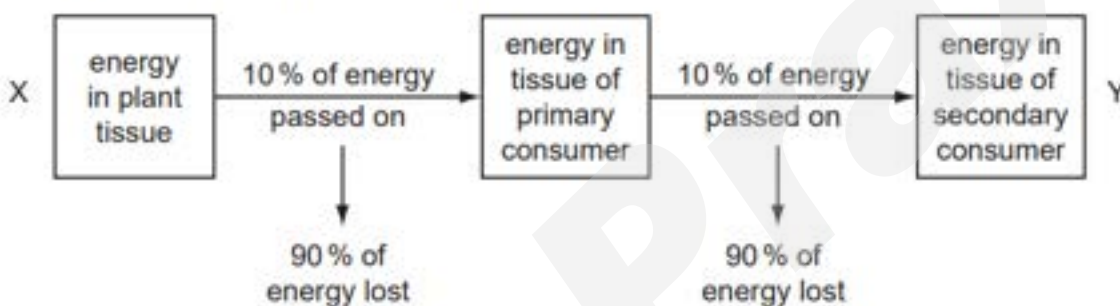
What is the original source of energy used in this food chain?

- A grass
- B lion
- C sunlight
- D wildebeest

34 What may happen to the Sun's energy that reaches the Earth?

- A converted to chemical energy by animals
- B recycled by bacteria
- C stored in fossil fuels
- D used by plants for absorbing water

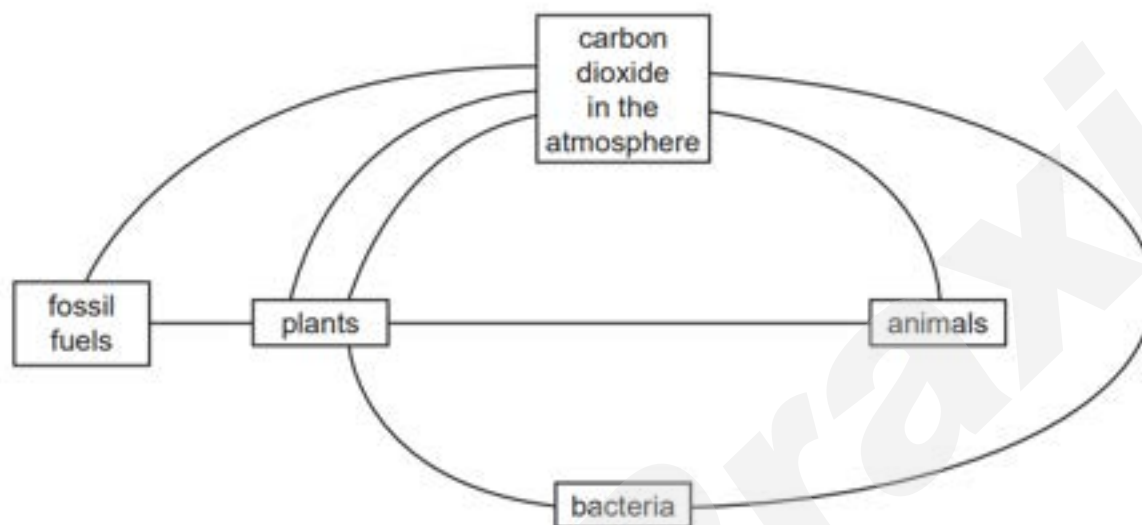
35 The diagram shows energy flow through a food chain from X to Y.



By which processes is energy lost between X and Y?

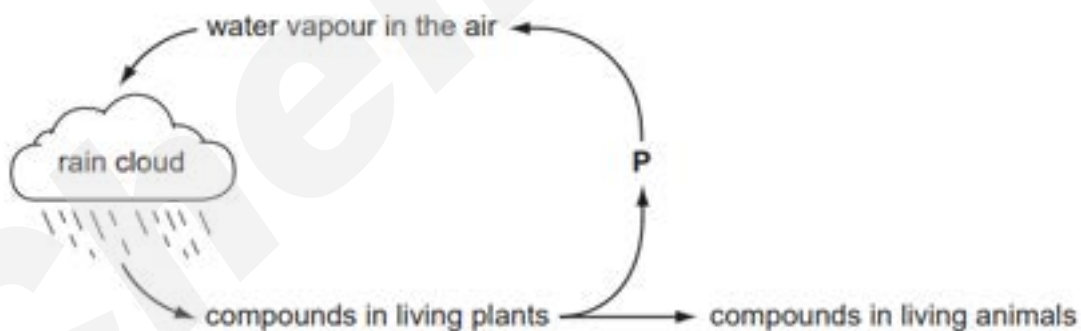
- A excretion and respiration
- B growth and excretion
- C growth and photosynthesis
- D photosynthesis and respiration

- 36 The diagram shows the movement of carbon atoms in part of the carbon cycle. The directions of movement are not shown.



How many of the groups of living organisms in the diagram return carbon dioxide to the atmosphere?

- A 1 B 2 C 3 D 4
- 37 The diagram shows part of the water cycle.



Which process in living plants is responsible for returning water vapour to the air at P?

- A combustion
 B condensation
 C evaporation
 D photosynthesis

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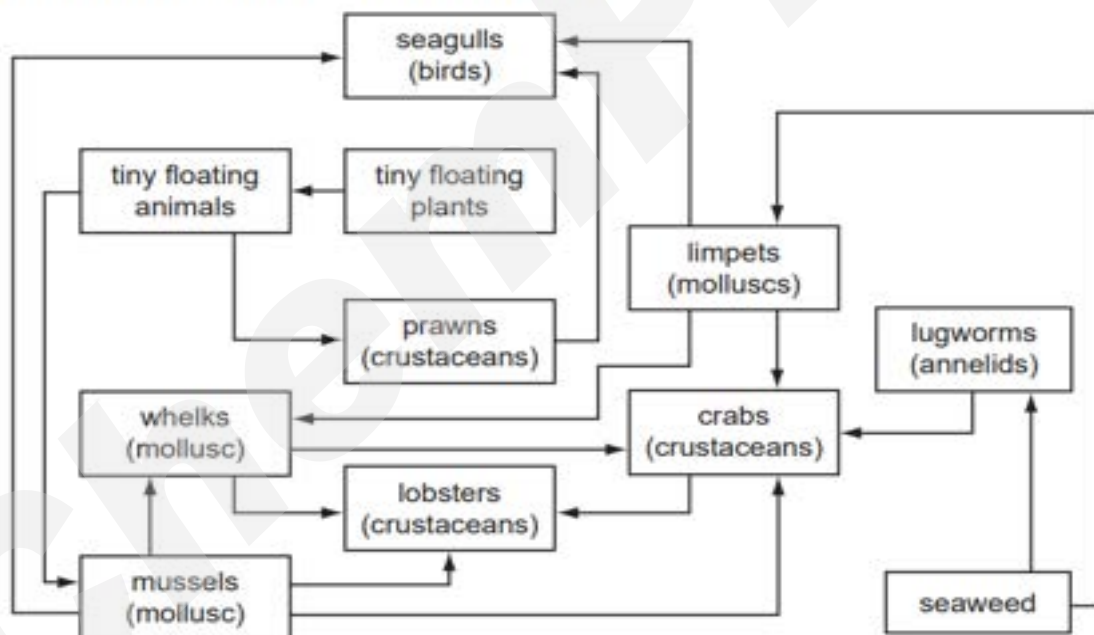
32 The diagram shows a food chain.

mahogany tree → caterpillar → small bird → owl

In this food chain, which population has the largest biomass and which has the largest population size?

	largest biomass	largest population size
A	owl	mahogany tree
B	owl	small bird
C	mahogany tree	caterpillar
D	mahogany tree	owl

33 The diagram shows a food web near a sea shore.



Which animals have the most varied food, as shown in **this** food web?

- A** crabs
- B** limpets
- C** lobsters
- D** seagulls

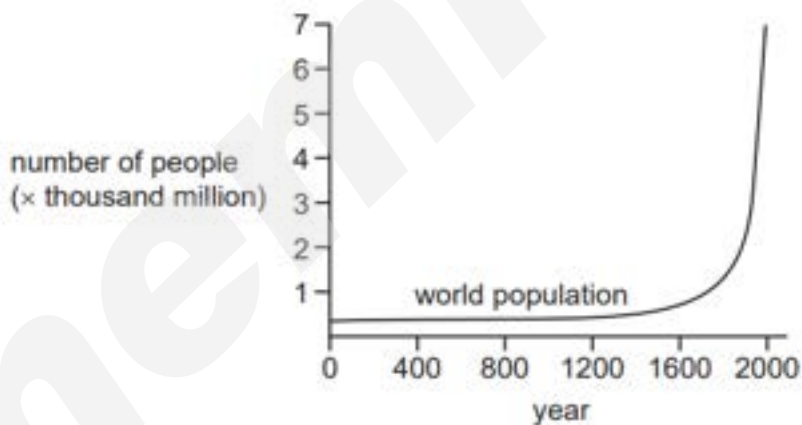
34 In the carbon cycle, what is the simple substance absorbed by producers?

- A carbohydrate
- B carbon dioxide
- C nitrate
- D protein

35 Which process forms part of both the carbon and water cycles?

- A condensation
- B fossilisation
- C photosynthesis
- D transpiration

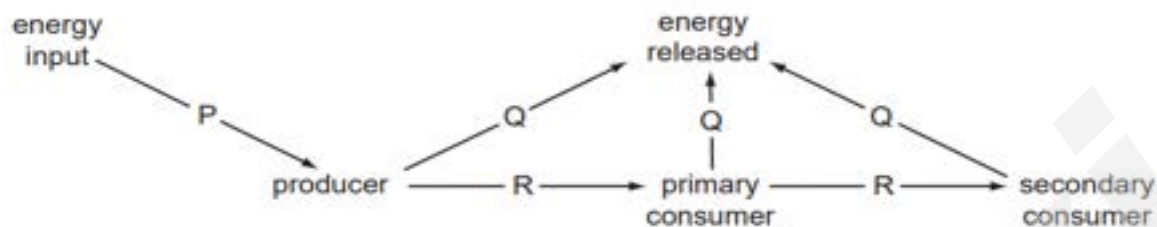
37 The graph shows the growth of the human population of the world.



Between which years did the population grow fastest?

- A 0 – 800
- B 800 – 1200
- C 1200 – 1800
- D 1800 – 2000

39 The diagram shows the flow of energy in a food chain.

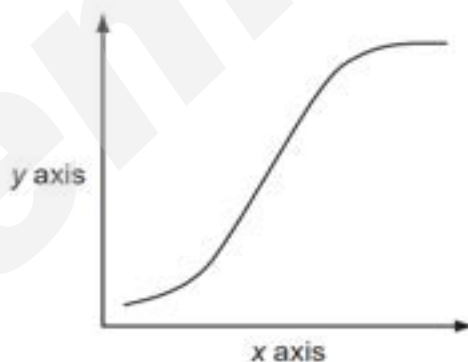


What are the forms of energy P, Q and R?

	P	Q	R
A	chemical	light	heat
B	heat	chemical	light
C	light	heat	chemical
D	light	chemical	heat

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28 The graph shows the growth of a child into an adult.



What should be the labels on the axes?

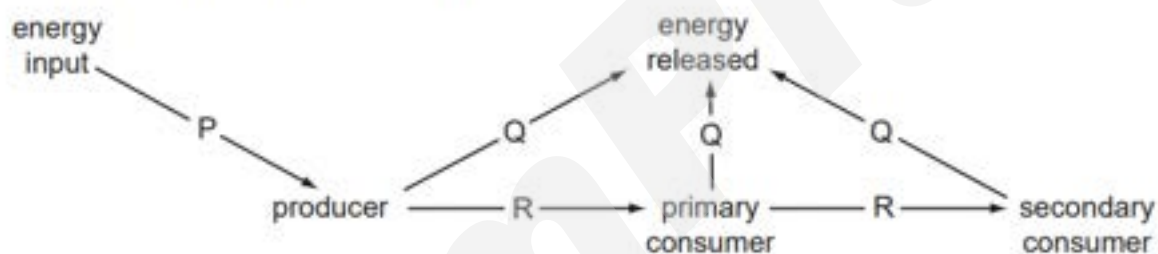
	x axis	y axis
A	age	date
B	age	mass
C	mass	age
D	mass	time

32 In a pond, the biomass at each trophic level is measured. The results are shown in the table.

Which trophic level contains herbivores?

trophic level	mass / gm ⁻³
A	0.1
B	0.6
C	1.2
D	17.9

33 The diagram shows the flow of energy in a food chain.



What are the forms of energy P, Q and R?

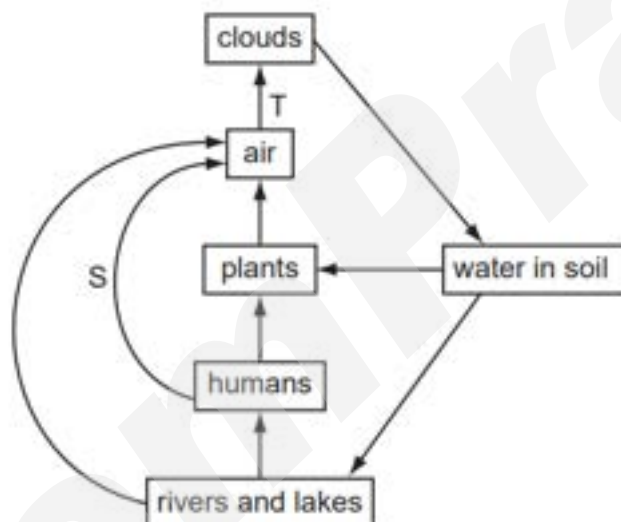
	P	Q	R
A	chemical	light	heat
B	heat	chemical	light
C	light	heat	chemical
D	light	chemical	heat

34 Carbon is essential to life.

Which process provides a carbon-containing compound for all life forms?

- A eating
- B gaseous exchange
- C photosynthesis
- D respiration

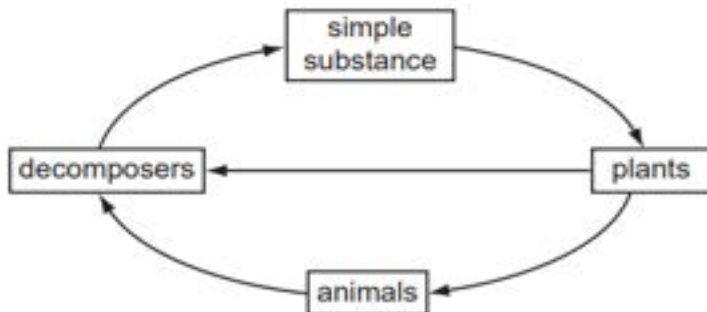
35 The diagram shows part of the water cycle.



What are processes S and T?

	S	T
A	evaporation	precipitation
B	condensation	drainage
C	evaporation	condensation
D	condensation	evaporation

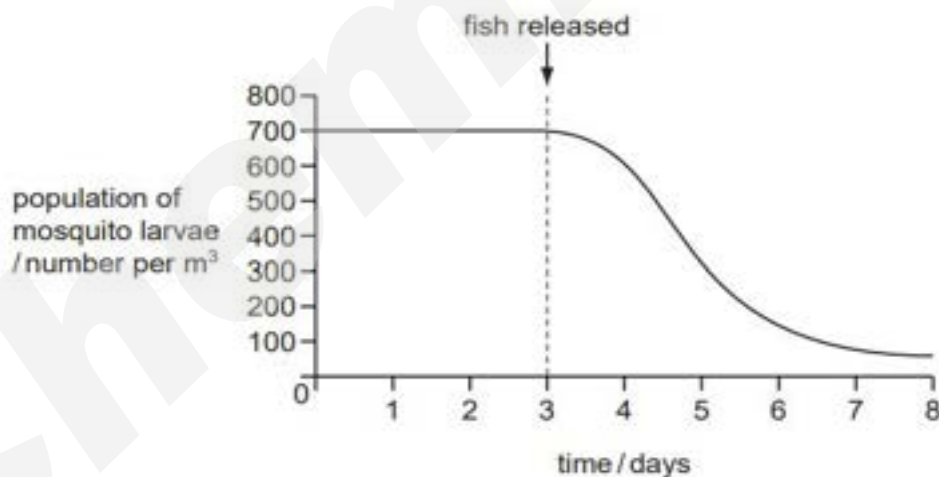
36 The diagram shows part of the carbon cycle.



What is the simple substance?

- A carbohydrate
- B carbon dioxide
- C chlorophyll
- D light

37 The graph shows the population of mosquito larvae in a pond. On day 3, mosquito fish, which eat mosquito larvae, are released into the pond.

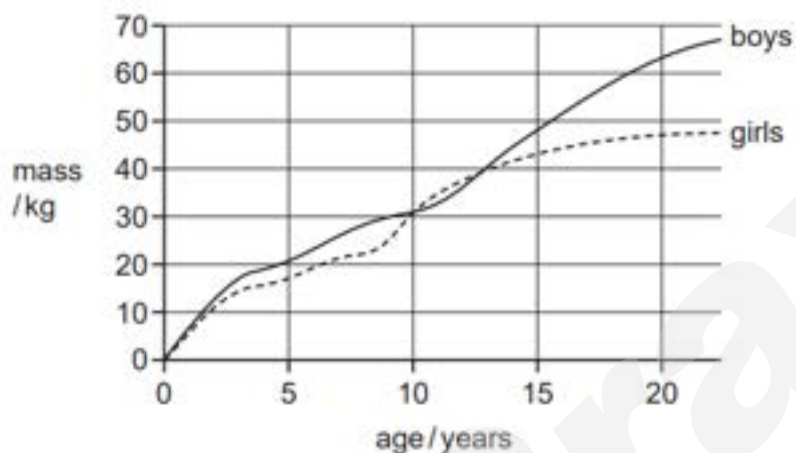


What is the most likely reason for the decline in the population of larvae after day 3?

- A disease
- B lack of food
- C old age
- D predation

May/June 2013 (11)

29 The graph shows the growth curves for boys and girls.



What is the approximate average growth rate of boys between 10 and 15 years old?

- A 3.5 kg per year
- B 18 kg per year
- C 32 kg per year
- D 50 kg per year

33 Which statement explains why the energy flow in a food chain is in one direction?

- A Decomposers recycle nutrients for plants.
- B Energy is not recycled.
- C Plants convert light energy to chemical energy.
- D The number of organisms decreases at each level in the food chain.

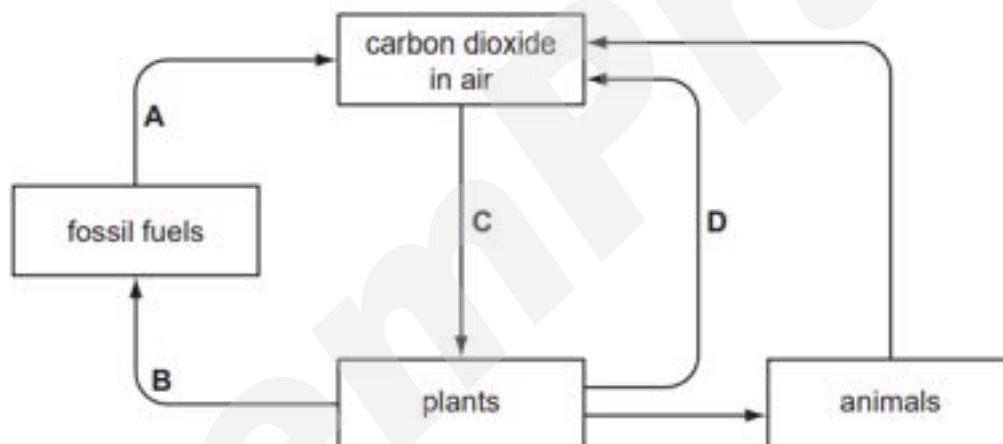
34 Which organisms do **not** get their energy by eating other organisms?

- A consumer
- B decomposer
- C herbivore
- D producer

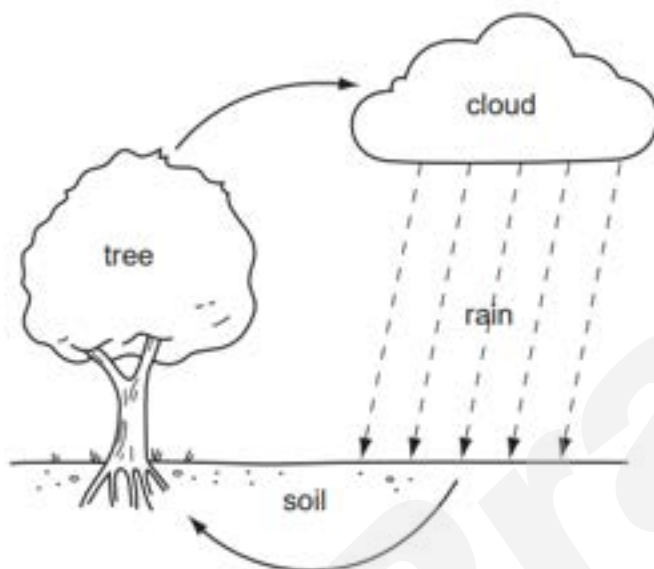
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36 The diagram shows part of the carbon cycle.

Which letter represents photosynthesis?



37 The diagram shows part of the water cycle.



How is water lost from the tree?

- A condensation
- B respiration
- C translocation
- D transpiration

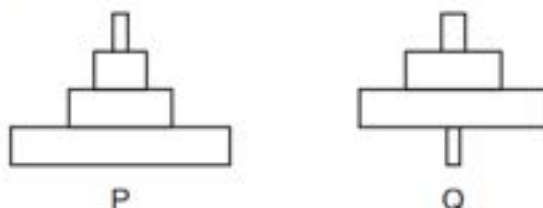
38 Rabbits eat grass and foxes eat rabbits.

What would cause the highest increase in the number of rabbits?

- A less grass and fewer foxes
- B less grass and more foxes
- C more grass and fewer foxes
- D more grass and more foxes

May/June 2013 (12)

32 The diagram shows two pyramids based on food chains in which the producer is a large tree.



What do the two pyramids represent?

	P	Q
A	biomass	biomass
B	biomass	numbers
C	numbers	biomass
D	numbers	numbers

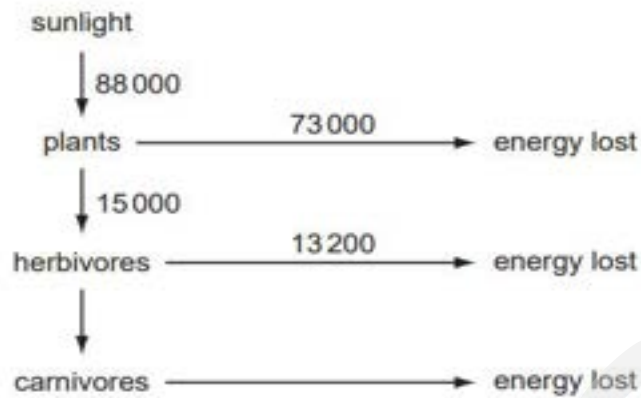
33 The diagram shows a food chain.

rice plant → caterpillar → song bird → hawk

How many decomposers are shown in this food chain?

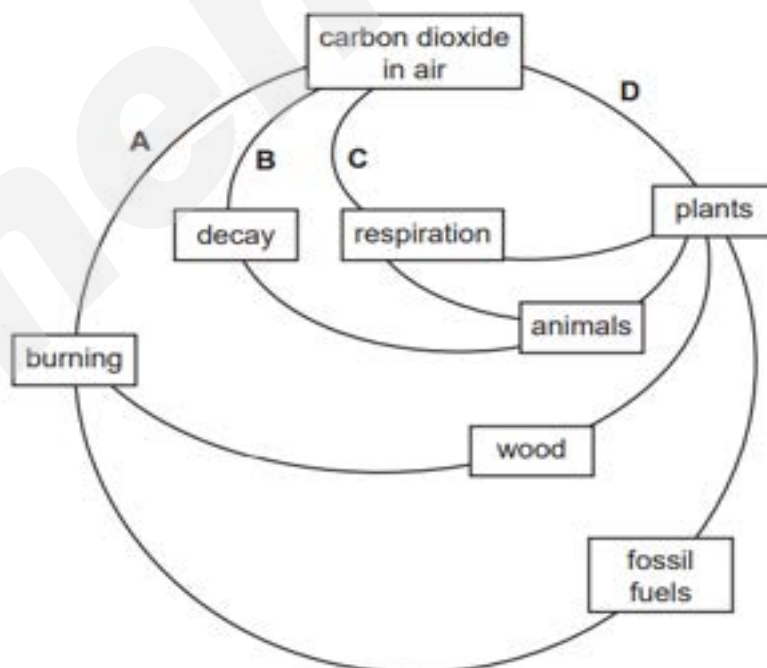
- A** 0 **B** 1 **C** 3 **D** 4

- 34** The numbers in the diagram below show the amount of energy, in kJ, transferred through a part of an ecosystem.

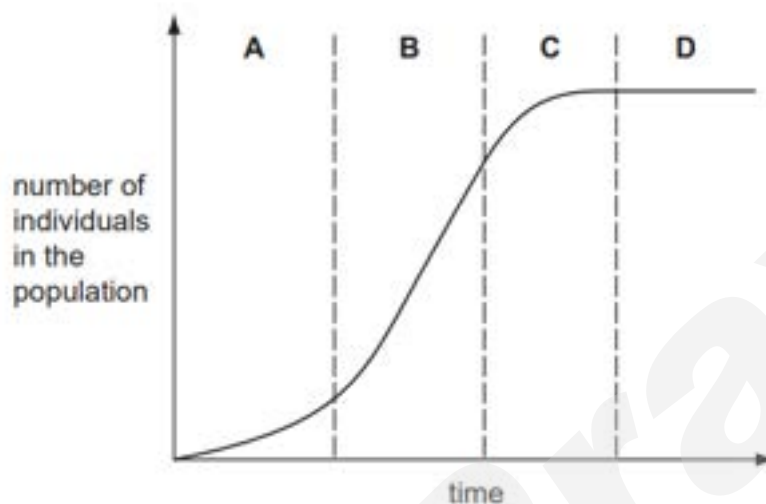


How much energy, in kJ, is transferred from herbivores to carnivores?

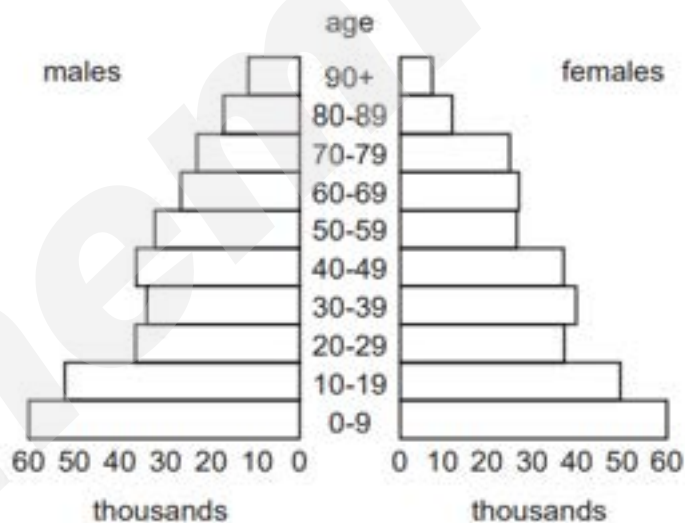
- A** $15\,000 + 13\,200$
B $15\,000 - 13\,200$
C $88\,000 + 15\,000$
D $88\,000 - 15\,000$
- 35** The diagram shows part of the carbon cycle without the arrows.
 Which labelled line should have an arrow head on its lower end?



36 Which letter represents the lag phase in the population graph shown?



38 The diagram shows a population pyramid for a city.

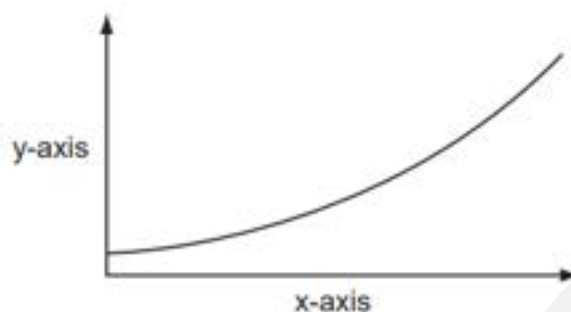


What feature of the population is shown in the diagram?

- A A quarter of the population is aged above 70.
- B The greater proportion of the population is aged below 40.
- C There are more females over 80 than males over 80.
- D There is a low birth rate.

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29 The graph is a record of the growth of a plant.



Which labels should be used for the x-axis and the y-axis?

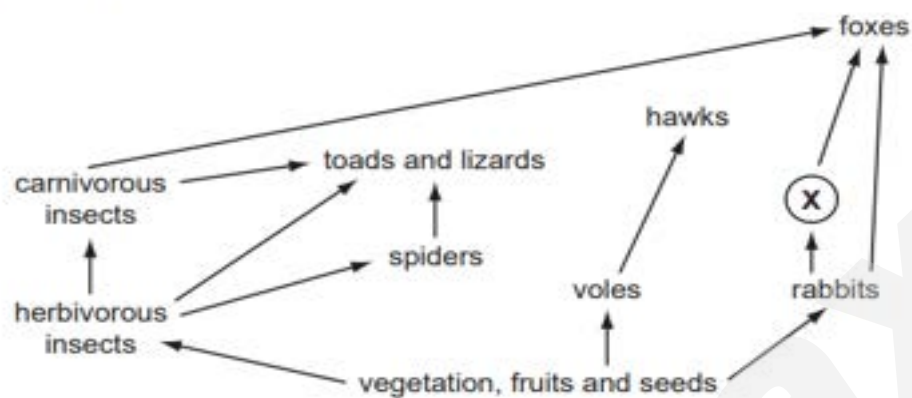
	x-axis	y-axis
A	dry mass	number of cells
B	time	cell size
C	time	dry mass
D	total mass	time

34 A food chain shows how organisms depend on each other for their sources of energy, but all energy comes ultimately from one source.

What is this energy source?

- A** leaves of plants
- B** meat
- C** sunlight
- D** water

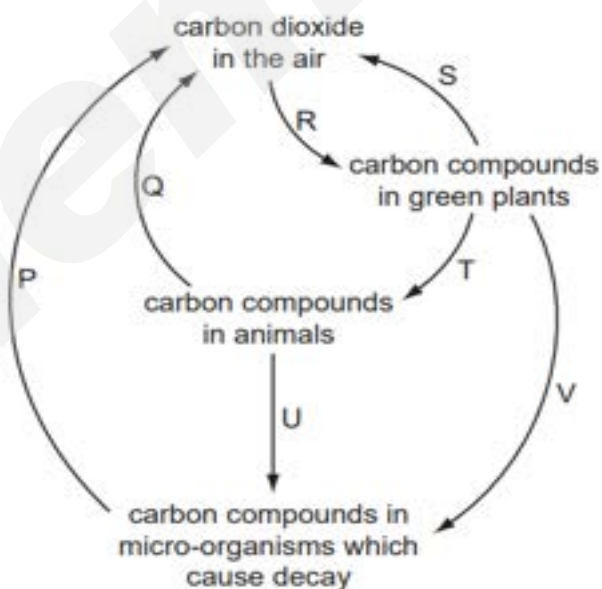
35 The diagram shows a food web.



What type of organism is X?

- A a carnivore
- B a decomposer
- C a herbivore
- D a producer

36 The diagram shows the carbon cycle.



Which three letters represent respiration?

- A P, Q and R
- B P, Q and S
- C T, S and V
- D T, U and V

37 In which natural cycles do photosynthesis and respiration **both** play a part?

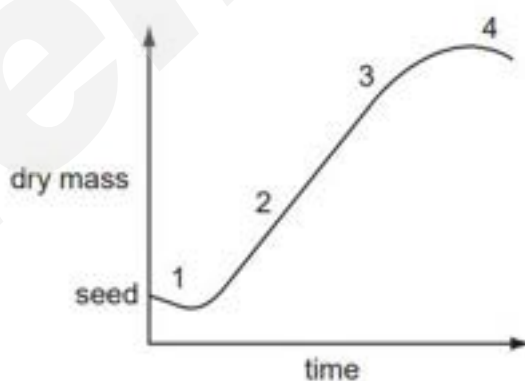
	carbon cycle	water cycle
A	✓	✓
B	✓	x
C	x	✓
D	x	x

38 What is the correct sequence for the stages in a sigmoid population growth curve?

- A** lag → log → stationary
- B** log → lag → stationary
- C** stationary → lag → log
- D** stationary → log → lag

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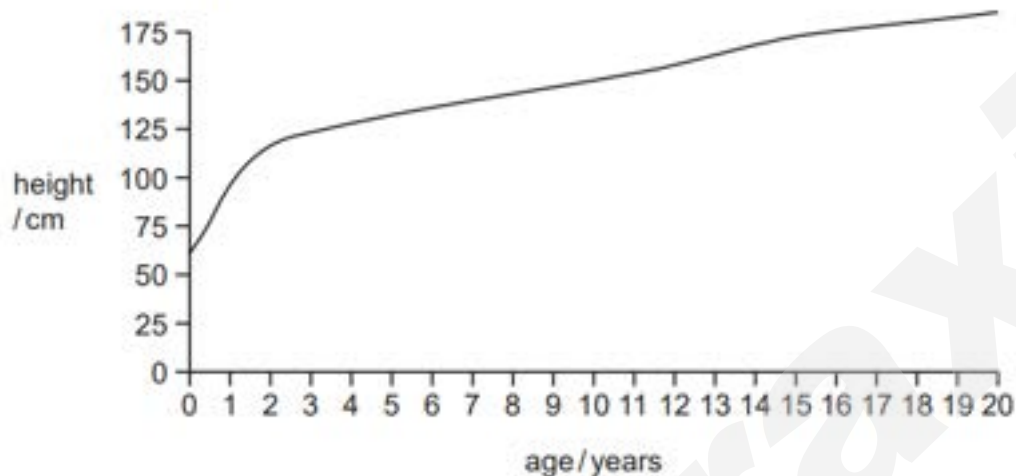
28 The graph shows the growth curve of a plant.



At which two stages is growth **not** occurring?

- A** 1 and 4
- B** 2 and 3
- C** 3 and 4
- D** 1 and 2

29 The diagram shows a typical human growth curve from birth to 20 years.



During which years is the growth rate greatest?

- A 0 – 2 years
- B 8 – 10 years
- C 12 – 14 years
- D 18 – 20 years

Oct/Nov 2013 (13)

33 In an ecosystem, what happens to most of the chemical energy in the decomposers?

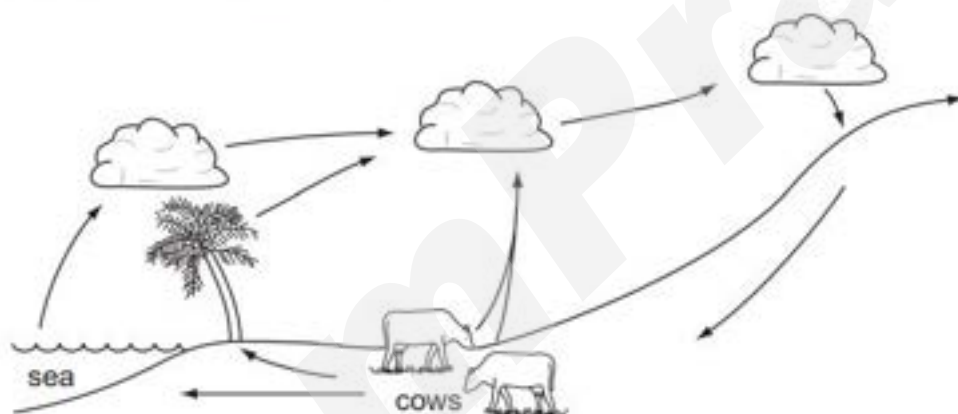
- A It becomes heat.
- B It is transferred back to the producers.
- C It is transferred back to both producers and consumers.
- D It is destroyed.

34 The three-toed sloth is a mammal that lives in the forests of Central America. Sloths are eaten by wild cats such as jaguars and also by snakes. The sloths mainly eat leaves.

What is the original source of the energy supplied to the jaguars?

- A** leaves
- B** sloths
- C** snakes
- D** Sun

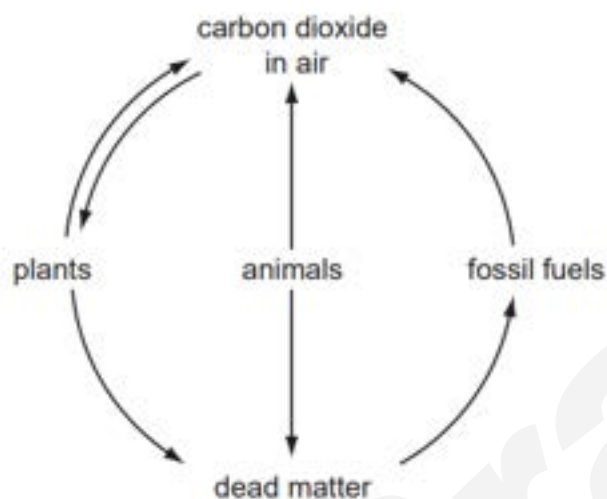
36 The diagram shows part of the water cycle.



What must occur for water in the sea to reach the cows?

- A** condensation only
- B** condensation, then evaporation
- C** evaporation, then condensation
- D** evaporation only

37 The diagram represents part of the carbon cycle.

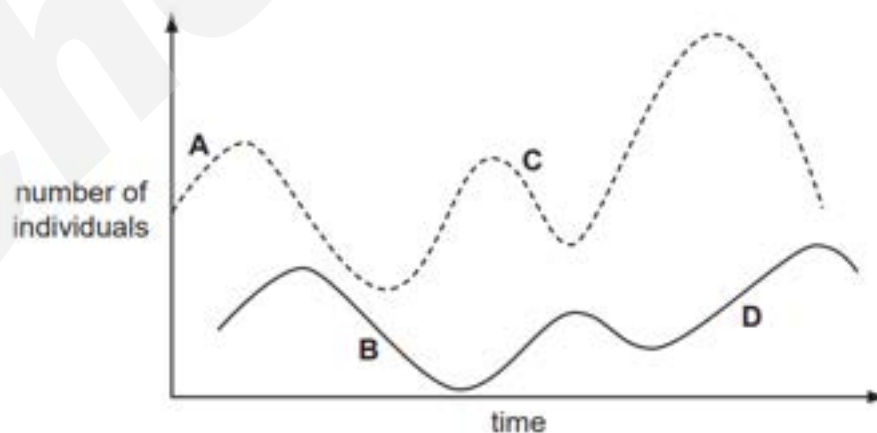


What is missing from this diagram?

- A an arrow from animals to plants
- B an arrow from carbon dioxide in the air to animals
- C an arrow from carbon dioxide in the air to fossil fuels
- D an arrow from plants to animals

38 The graphs show the changes in the populations of predator and prey over a period of time.

Which point on the graph shows a decrease in predator population?

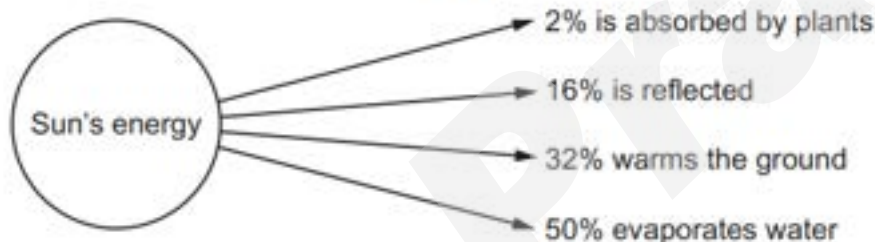


40 In a pyramid of numbers, what does the top of the pyramid represent?

- A carnivores
- B decomposers
- C herbivores
- D Sun

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31 The diagram shows what happens to the energy that enters the atmosphere from the Sun.



How much of the Sun's energy is **not** used for photosynthesis?

- A less than 2%
- B about 32%
- C about 66%
- D more than 98%

32 The diagram shows a food chain.



If the carnivores in trophic level 3 suddenly die out as a result of disease, in which trophic levels will the number of organisms be likely to **decrease**?

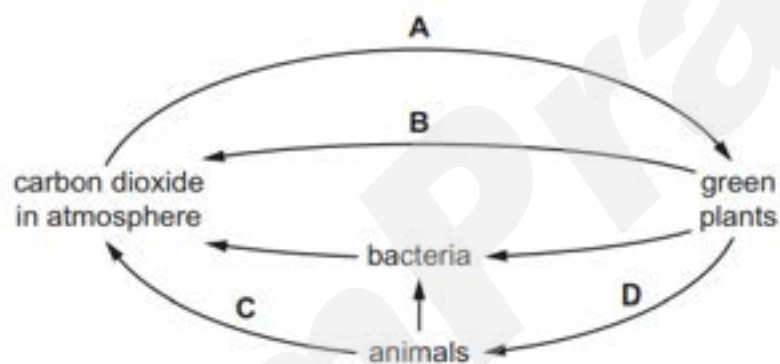
- A 1 and 2
- B 1 and 4
- C 2 and 4
- D 4 only

34 By which process does water enter the atmosphere?

- A condensation
- B photosynthesis
- C precipitation
- D transpiration

35 The diagram shows part of the carbon cycle.

Which labelled arrow represents photosynthesis?



37 In 2005, fifteen mice were set free on an island where mice had never lived before. The table shows how their population changed over the next three years.

year	mouse population
2005	15
2006	62
2007	237
2008	965

What caused the population change shown in the table?

- A lack of food
- B lack of predators
- C lack of space
- D lack of water

39 The diagram shows a food chain.

A farmer sprays his cabbages with pesticide.

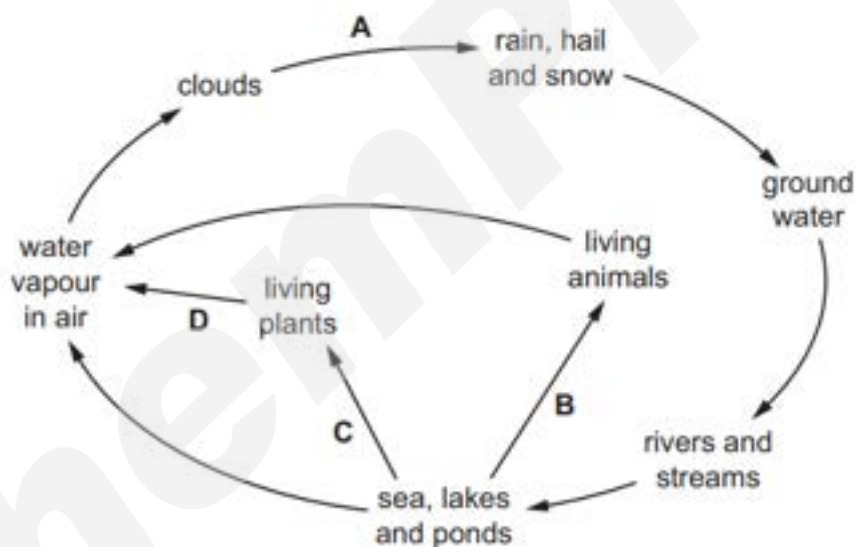
Which organisms does the farmer want to kill?



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34 The diagram shows the water cycle.

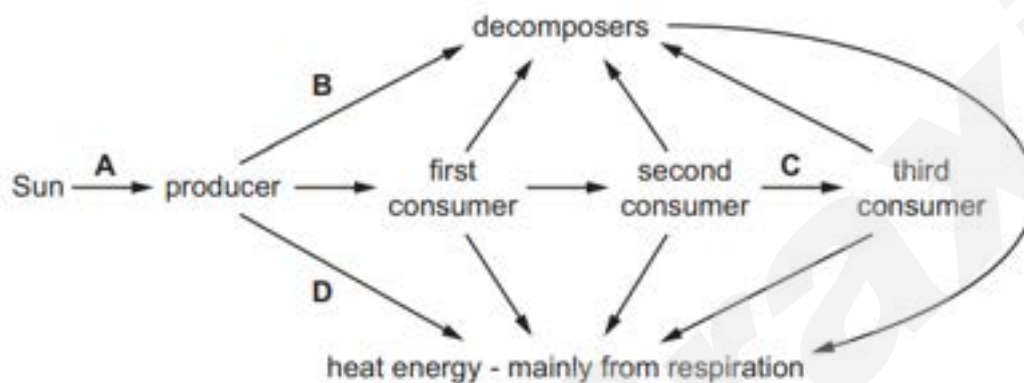
Which letter represents transpiration?



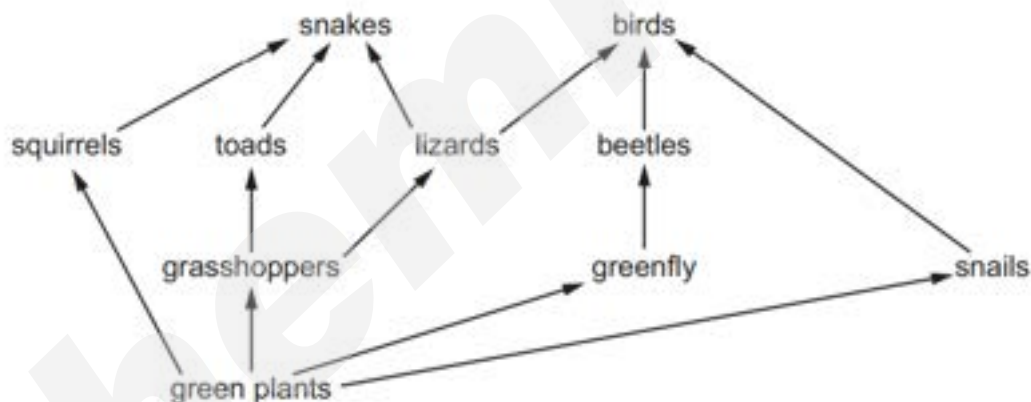
Oct/Nov 2014 (11)

32 The diagram shows energy passing through an ecosystem.

Which arrow shows energy leaving the food web?



33 The diagram shows a food web.

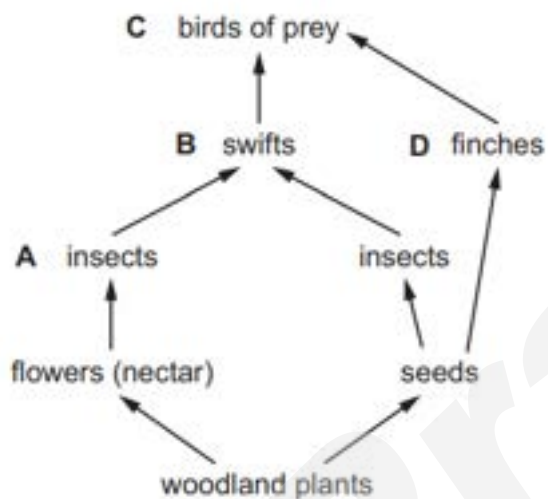


Which organisms will increase in number, if the number of snakes increases?

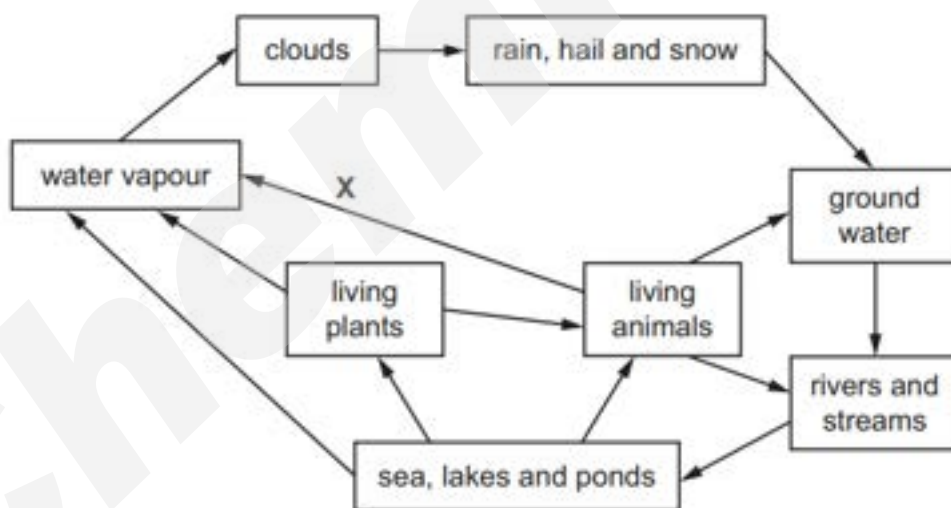
- A birds
- B grasshoppers
- C lizards
- D squirrels

34 The diagram shows some feeding relationships in a woodland area.

Which of the labelled animals are in competition with seed-eating insects for their food?



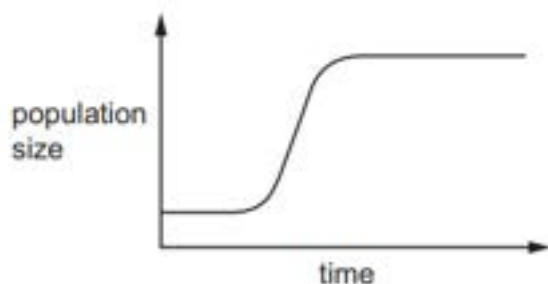
35 The diagram shows the water cycle.



Which process is represented by X?

- A osmosis
- B photosynthesis
- C respiration
- D transpiration

37 The graph shows part of a growth curve for a bacterial population.



What is missing from the graph?

- A the death phase
- B the exponential phase
- C the lag phase
- D the stationary phase

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32 Which diagram shows energy passing along a food chain?

- A producer → primary consumer → secondary consumer → tertiary consumer
- B producer → primary consumer ← secondary consumer ← tertiary consumer
- C producer ← primary consumer ← secondary consumer ← tertiary consumer
- D producer ↔ primary consumer ↔ secondary consumer ↔ tertiary consumer

37 Which statement about population growth is correct?

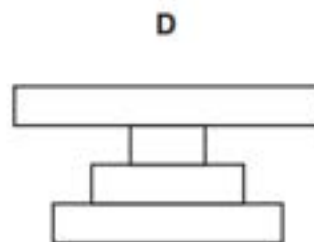
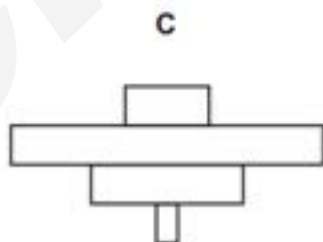
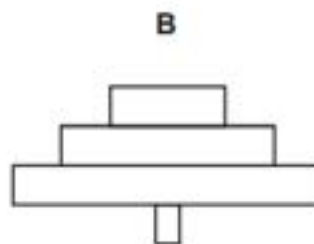
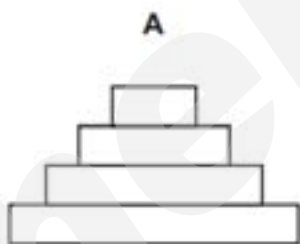
- A The rate of population growth decreases as disease increases.
- B The rate of population growth increases as food supply decreases.
- C The rate of population growth increases when predation increases.
- D The rate of population growth is not affected by social conditions.

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33 What can be continuously recycled in ecosystems?

	carbon	energy	water
A	✓	✓	x
B	✓	x	✓
C	x	x	✓
D	x	✓	x

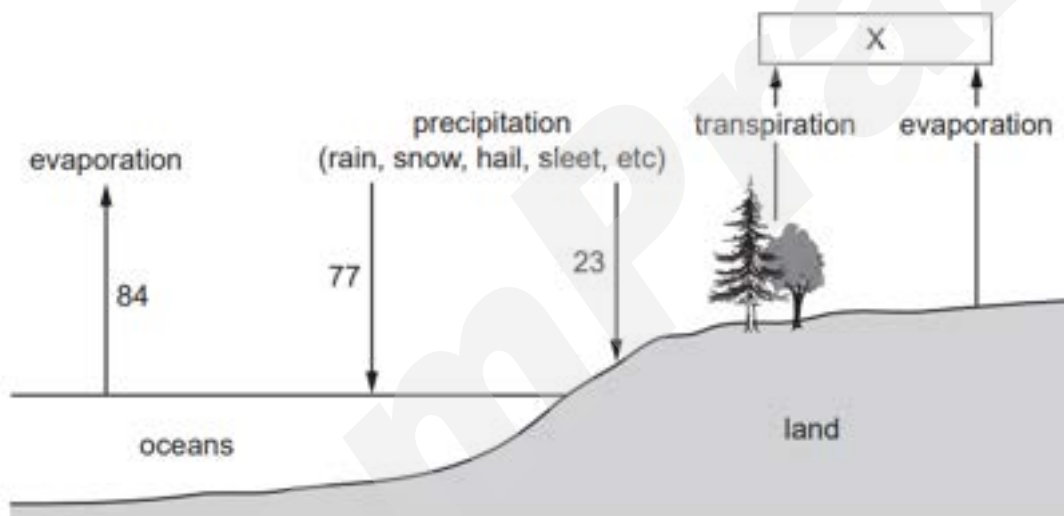
34 Which diagram shows a pyramid of biomass for a woodland?



35 Which of the following is an example of a food chain?

- A carnivore → herbivore → producer
- B flower → fruit → seed
- C grass → antelope → lion
- D starch → maltose → glucose

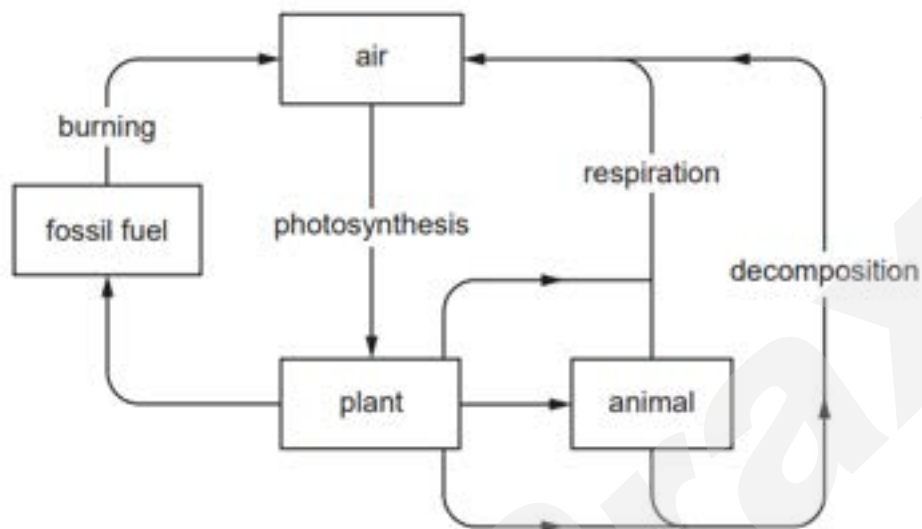
36 The diagram shows the movements of water between oceans, land and the air. The figures are based on an annual mean precipitation of 100 units.



What is the total of evaporation from the land and transpiration from plants at X?

- A 7
- B 13
- C 16
- D 77

37 What is shown in the diagram?



- A a food web
- B non-cyclical energy flow
- C the carbon cycle
- D the water cycle

38 The table shows the birth rates and death rates in four countries.

Which country will double its population most quickly?

	birth rate / % population	death rate / % population
A	5.0	4.0
B	4.5	2.5
C	3.5	2.0
D	3.0	3.0

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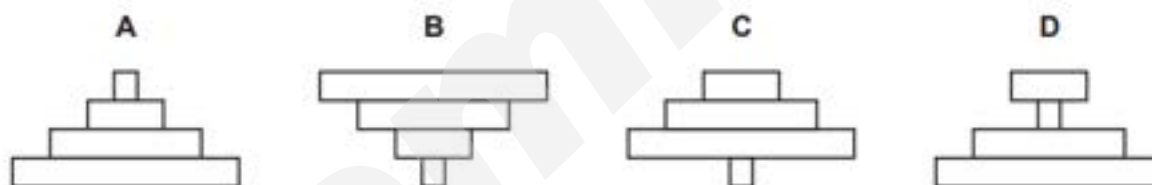
33 Which pair of statements about energy flow in ecosystems is correct?

	energy entering the ecosystem from the Sun	nature of energy flow
A	light and chemical	cyclical
B	light and chemical	non-cyclical
C	light and heat	cyclical
D	light and heat	non-cyclical

34 The diagram shows a food chain based on a tree.



Which diagram shows a pyramid of numbers for this food chain?



36 Herbivores take in carbon atoms from plants.

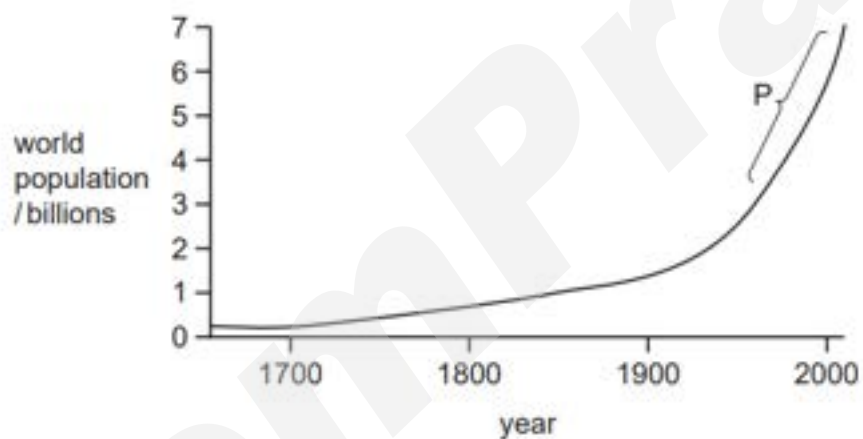
How do carbon atoms leave the herbivores?

	in faeces	in respiration	through death and decay
A	✓	✓	✓
B	✓	x	✓
C	✓	x	x
D	x	✓	✓

37 In which stages in the water cycle is the water in vapour form?

	absorption by plant roots	movement from sea to clouds	precipitation	transpiration
A	✓	✓	x	x
B	✓	x	✓	x
C	x	✓	x	✓
D	x	x	✓	✓

38 The graph shows how the population of the world has increased from 1650 until the present day.



What stage in the sigmoid population growth curve is represented by region P?

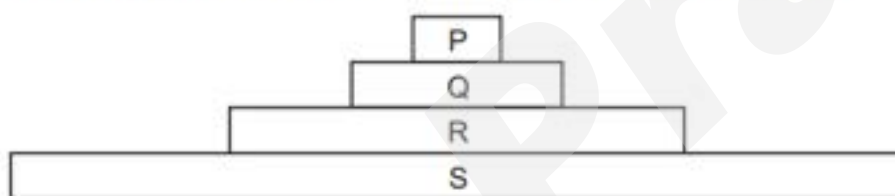
- A** death phase
- B** exponential (log) phase
- C** lag phase
- D** stationary phase

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33 Which organisms can be sources of energy for decomposers?

	producers	herbivores	carnivores
A	✓	✓	✓
B	✓	x	x
C	x	✓	✓
D	x	x	x

34 The diagram shows a pyramid of biomass for all organisms in an ecosystem.



Which organisms are carnivores?

- A** P and Q **B** P and R **C** Q and R **D** R and S

35 The diagram shows a food chain.



A disease reduced the numbers of consumer 3.

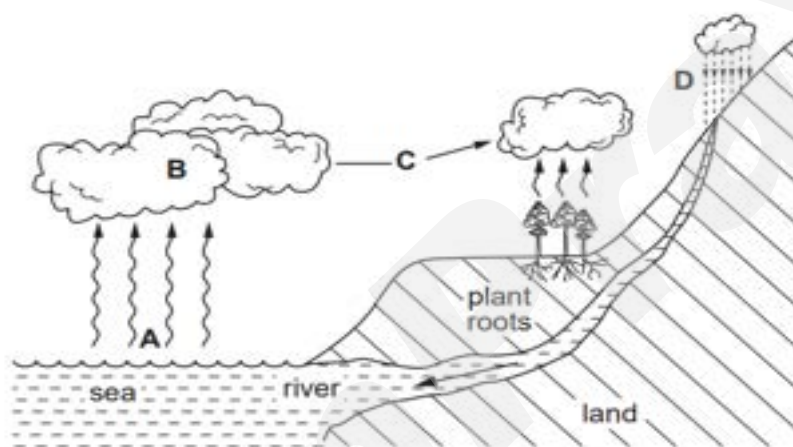
What would be the likely effect of this on the numbers of consumer 1 and consumer 2?

	consumer 1	consumer 2
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

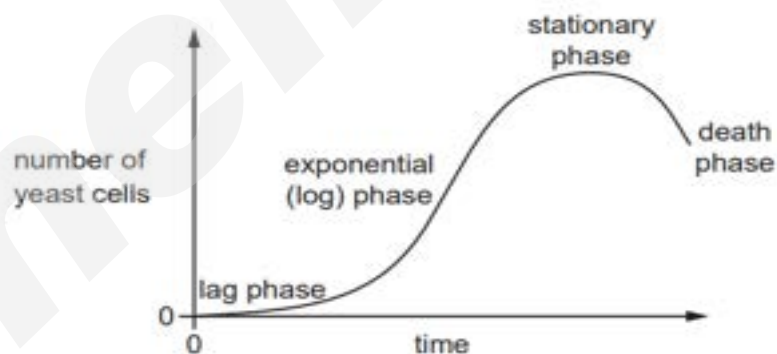
36 Which process removes carbon dioxide from the atmosphere?

- A combustion
- B decomposition
- C photosynthesis
- D respiration

37 In which labelled stage in the water cycle is the water in vapour form?



38 The graph shows a growth curve for a population of yeast.

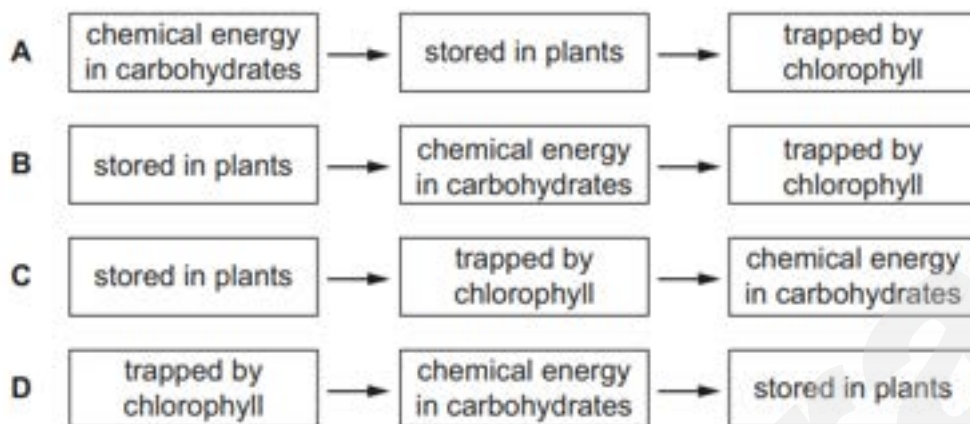


Which two phases of the growth curve are caused by factors such as predation, disease or lack of food?

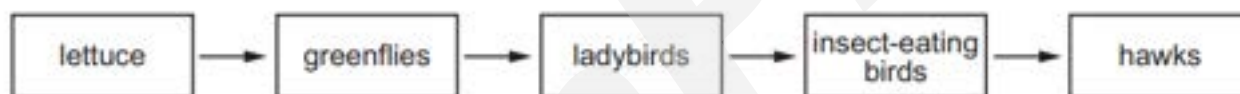
- A exponential (log) and death
- B exponential (log) and stationary
- C lag and exponential (log)
- D stationary and death

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31 Which pathway is taken by energy from the Sun?



32 The diagram shows a food chain.

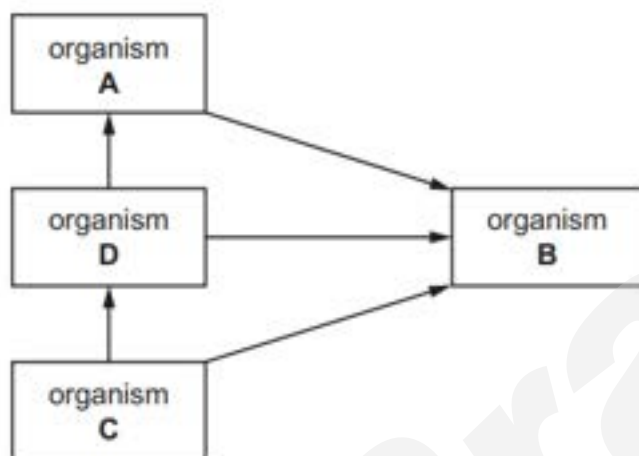


If the hawks are removed from this food chain, what is likely to happen to the numbers of the other organisms in this chain?

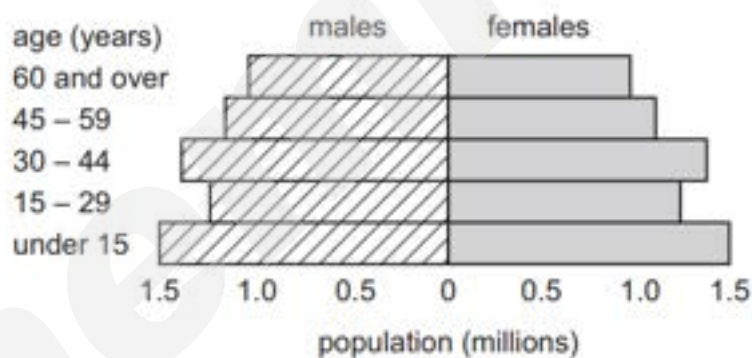
	greenflies	ladybirds	insect-eating birds
A	decrease	increase	decrease
B	decrease	increase	increase
C	increase	decrease	decrease
D	increase	decrease	increase

33 The diagram shows a food web including a producer, consumers and a decomposer.

Which organism is the decomposer?



37 The diagram shows the age structure of a human population.



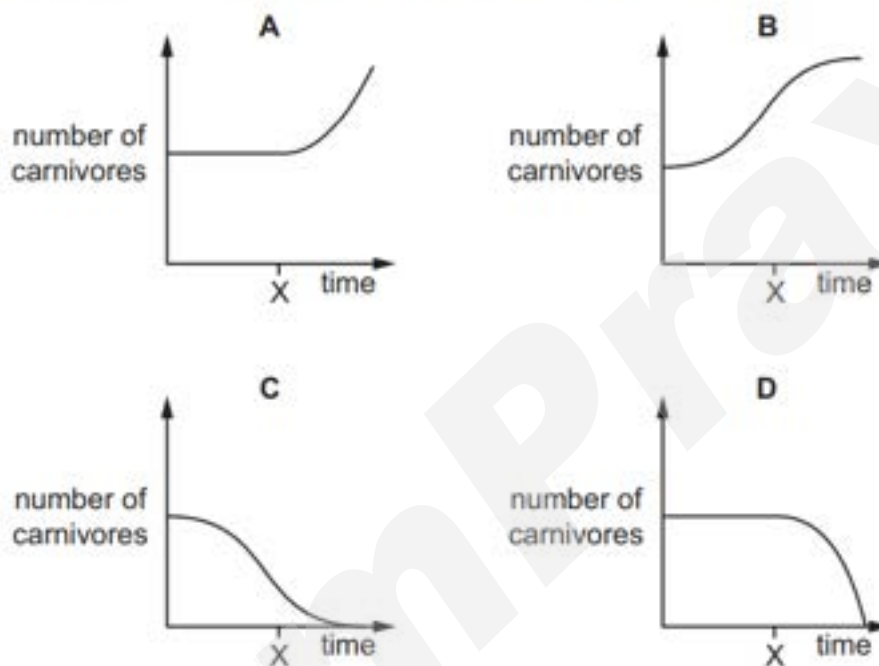
Which age group has the largest number of people?

- A 60 and over
- B 45-59
- C 30-44
- D under 15

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37 The graphs show the number of carnivores in a habitat over a period of time. At time X the herbivores in their food chain are removed from the habitat.

Which graph shows the effect of this on the number of carnivores?



Oct/Nov 2015 (13)

37 Which factors affect the rate of growth of a plant population?

	disease	grazing by herbivores	light intensity
A	✓	✓	✓
B	✓	✓	x
C	✓	x	✓
D	x	✓	✓