

Name:	Target Grade:	Actual Grade:
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## ECOSYSTEMS MCQ and STRUCTURED QUESTIONS

### READ THESE INSTRUCTIONS FIRST

#### INSTRUCTIONS TO CANDIDATES

1. Find a quiet, comfortable spot free place from distractions.
2. Spend one minute on each mark.
3. Time yourself for every single question.
4. Every chapter has their own question types. Ensure that you know the different question type for each chapter.
5. Make a conscientious effort to remember your mistakes, especially in terms of answering techniques. E.g Take a picture for the mistakes that you made, keep it in a photo album, and revise it over and over again.
6. Highlight question types that you tend to keep making mistakes and review them nearing exams.
7. Always review the common questions and question type that you tend to make mistakes nearing exams.
8. During exams, classify the question type and recall what you have learnt, how you need to analyse the questions for the different question type, what you need to take note of and answer with the correct answering techniques!

✨ Wishing you all the best for this test!

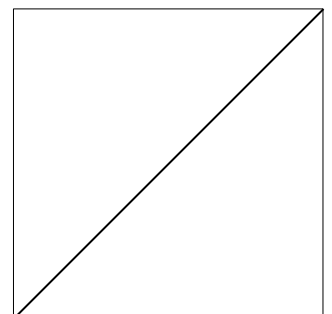
You've got this!

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Bright Culture 🧡

If you are struggling in this paper, means you need to work harder!

If you need any professional guidance and further advice on how to advance, feel free to WhatsApp us at 91870820 or find us at [www.bright-culture.com/](http://www.bright-culture.com/). We are committed to connect you to your future to reach your goals.

**MARKS**



**ECOSYSTEMS MCQ**

- 1 Which of the following human activities and their effects have disrupted the biodiversity in nature?

Deforestation  
Excessive use of pesticides and fertilisers  
Maintaining nature reserves  
Overhunting and overfishing  
Pollution

- II, IV and V only  
I, II, IV and V only  
II, III, IV and V only  
All of the above

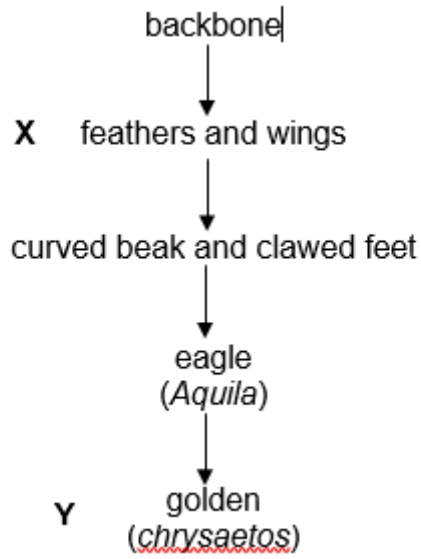
Why do scientists classify living organisms?

- A** to determine the number of species  
**B** to determine their potential uses only  
**C** to describe each organism on earth  
**D** to study them systematically

- 2 2 Bacteria are unicellular organisms that may bring about beneficial or harmful effects to humans. Which row is correct?

	action by bacteria	effects on humans
<b>A</b>	bacteria breaking down milk sugar during the making of yoghurt	harmful
<b>B</b>	bacteria growing and multiplying on cooked food	beneficial
<b>C</b>	bacteria in soil breaking down dead organisms	harmful
<b>D</b>	bacteria in the digestive tract digesting food	beneficial

3 The diagram shows features used in classifying the golden eagle.



Which classification groups do **X** and **Y** refer to?

	<b>X</b>	<b>Y</b>
<b>A</b>	class	genus
<b>B</b>	class	species
<b>C</b>	genus	class
<b>D</b>	species	genus

Fig. 4.1 shows five different beetles **A**, **B**, **C**, **D**, and **E**.



**(A)**

- long feelers
- hairless feelers
- hair on body



**(B)**

- short feelers
- spots on body



**(C)**

- long feelers
- hairless feelers
- no hair on body



- long feelers
- hair on feelers
- no hair on body



**(E)**

**(D)**

**Fig. 4.1**

Using **only** the information given in Fig. 4.1, draw a dichotomous key to classify the five different beetles. [4]

The giant panda is in danger of becoming extinct. List two ways which can save this species from extinction. [2]

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**Total [6]**

**4** Please refer to the news article on genetic testing in Singapore below.

"The National Cancer Centre Singapore (NCCS) and the Singapore Cancer Society (SCS) have announced a partnership that aims to make cancer detection, prevention and treatment more accessible to patients who require financial aid.

Under the agreement signed on 27 Feb 2019, NCCS and SCS will launch a genetic testing programme to identify patients with genetic tendencies to cancer, said NCCS medical director William Hwang.

Prof Hwang said the programme would extend subsidised screenings and prevention measures to patients' families.

"The cancer genetics team at NCCS sees about a hundred patients a week, but the needs are far more than that," he said.

An estimated 500 patients seen at NCCS each year have a genetic likelihood for cancer. The programme is expected to benefit more than 400 patients this year and almost 800 patients in 2021, about a quarter of whom are expected to require financial aid.

Associate Professor Joanne Ngeow, who heads the Cancer Genetics Service at NCCS, said: "In one in 10 cancer patients, regardless of the sub-type, the genetic factor is the main reason why they have a significantly higher risk of cancer compared to the generation population, a six to tenfold increased risk."

There are more than 400 known cancer syndromes that are linked genetically, Prof Ngeow said."

How would the genetic testing of cancer that is provided to the patients help them? [2]

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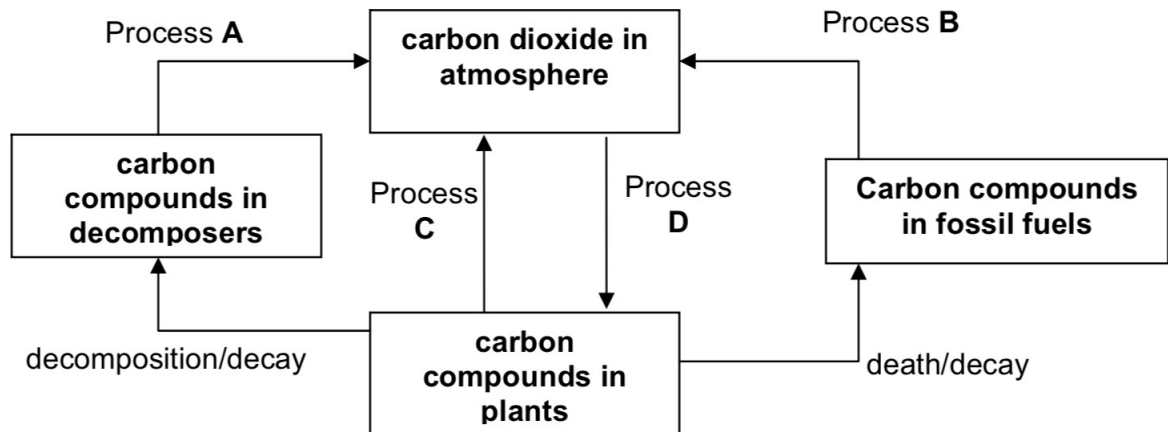
What is a possible disadvantage of compulsory genetic testing for diseases? [1]

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**Total [3]**

For Questions **29** and **30**, refer to the carbon cycle given below.



- 5** Which process **A**, **B**, **C** or **D** is combustion?
- 6** Which process **A**, **B**, **C** or **D** converts carbon forms in the air into carbon forms in living organisms?

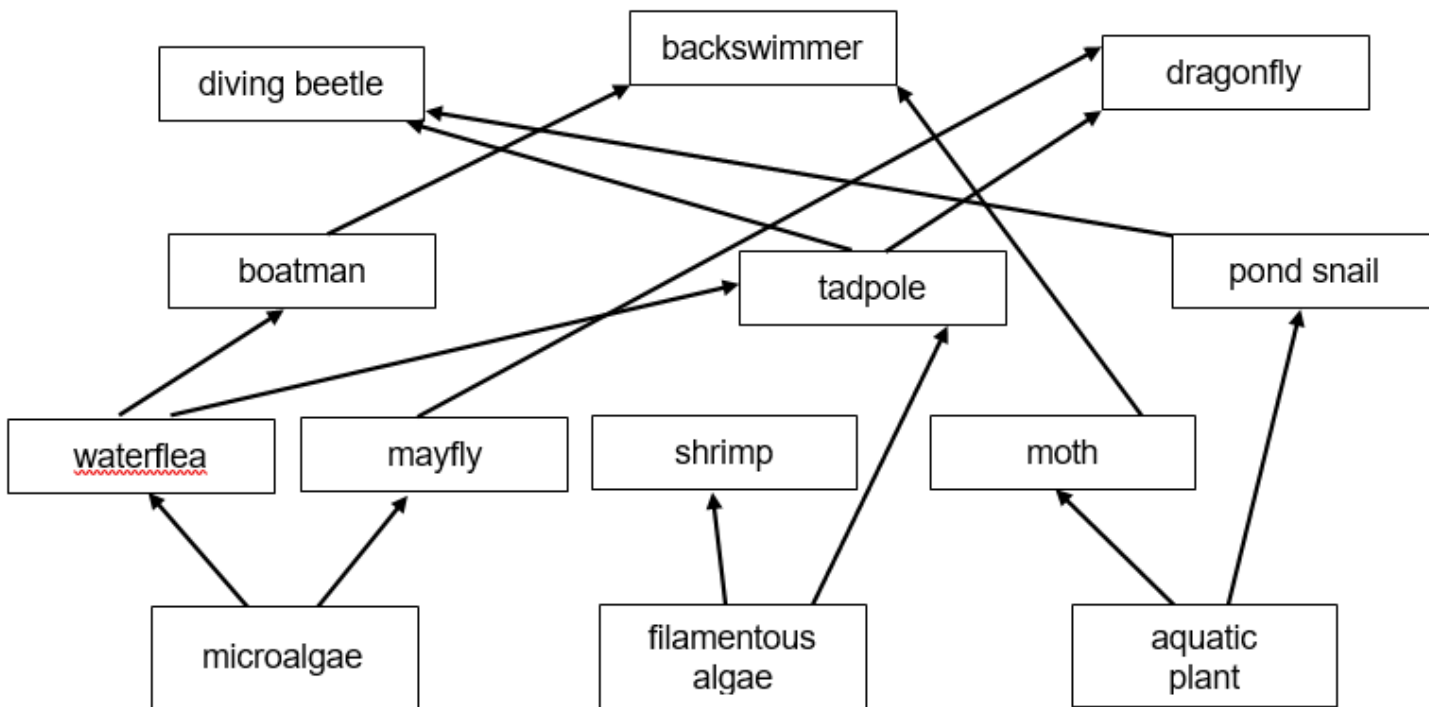
7 Read the following paragraph.

*The ostrich always moves with a herd of zebras since it has a poor sense of hearing and smell, whereas zebras have very sharp senses. The ostrich has a keen sense of sight, which the zebra lacks.*

What is the relationship between the ostrich and zebras?

- A commensalism
- B mutualism
- C parasitism
- D predator-prey

8 The diagram shows a food web in a fresh water pond.

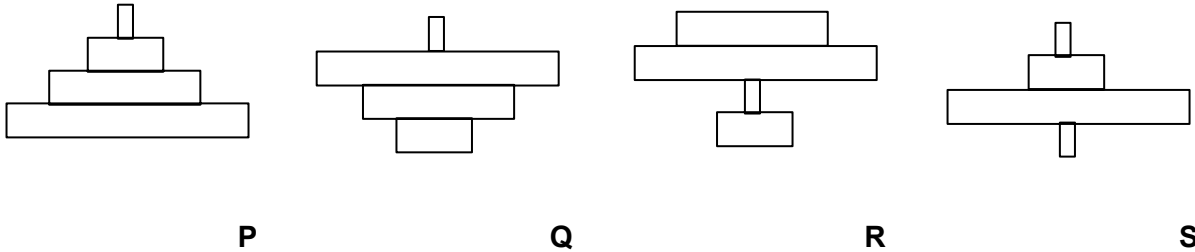


Which organism is a both primary and a secondary consumer?

- A boatman
- B diving beetle
- C moth
- D tadpole

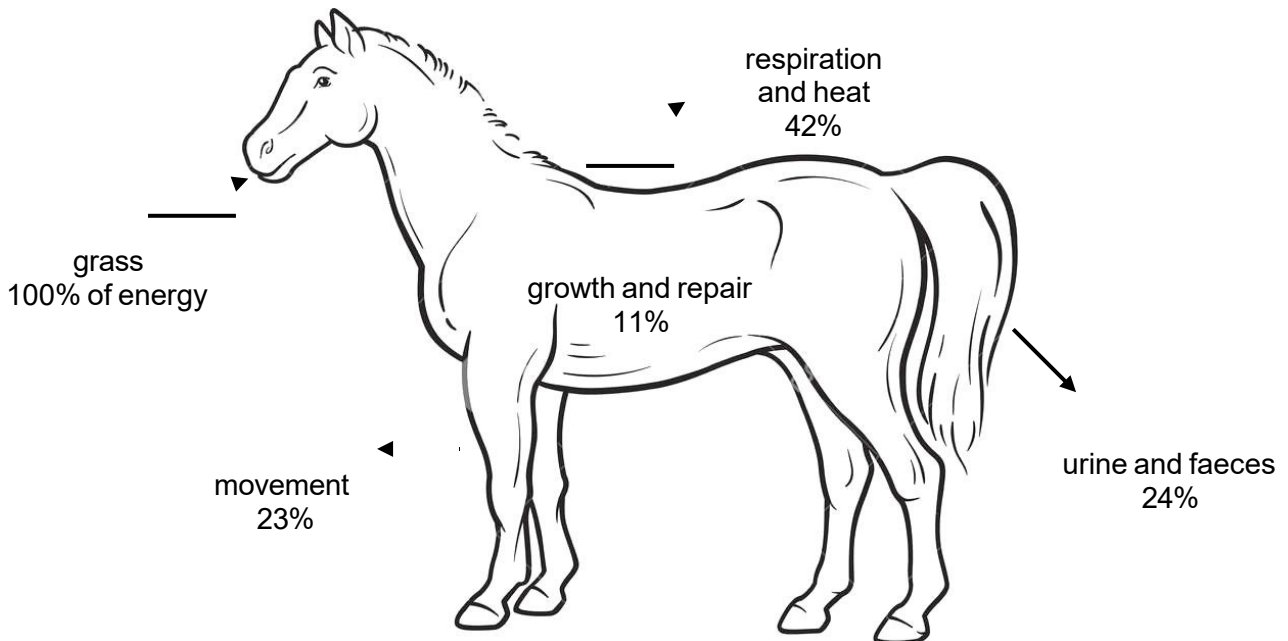
- 9 In a particular community, a rambutan tree provides food for many caterpillars. These caterpillars become food for a few sparrows, and these sparrows become food for a hawk.

Which pyramids accurately represent the pyramid of numbers and pyramid of biomass for the food chain described above?



	pyramid of numbers	pyramid of biomass
<b>A</b>	<b>P</b>	<b>S</b>
<b>B</b>	<b>Q</b>	<b>R</b>
<b>C</b>	<b>R</b>	<b>Q</b>
<b>D</b>	<b>S</b>	<b>P</b>

- 10 The diagram shows how energy from grass is used by a horse.



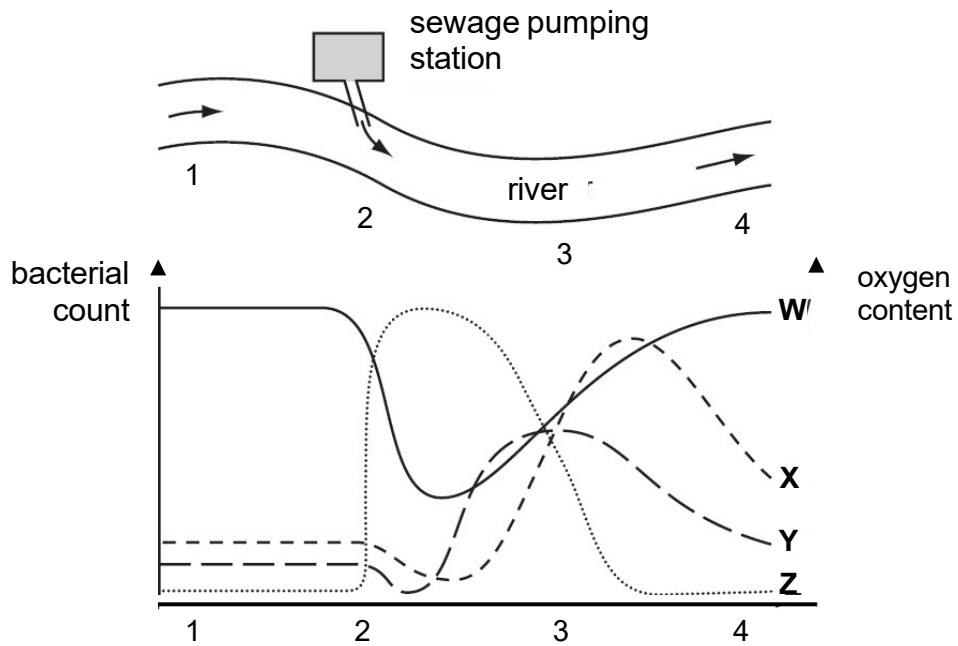
What percentage of this energy is available to consumers and decomposers?

- A** 11%
- B** 24%
- C** 35%
- D** 77%



11 The diagram shows part of a river which sewage is being pumped.

The effect of adding sewage to the river on bacterial count and oxygen content of the water are plotted in the graph.

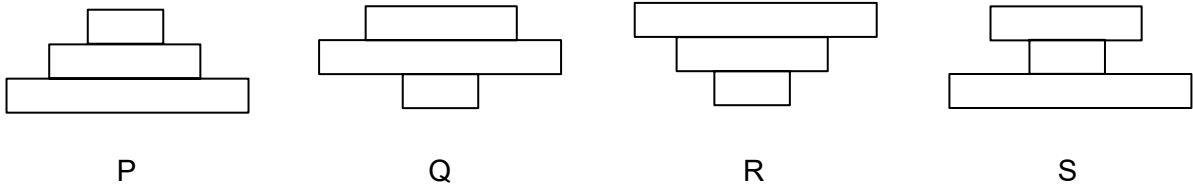


Which graphs represent the bacterial count and the oxygen content of the water?

	bacterial count	oxygen content
<b>A</b>	<b>W</b>	<b>Z</b>
<b>B</b>	<b>X</b>	<b>Y</b>
<b>C</b>	<b>Y</b>	<b>X</b>
<b>D</b>	<b>Z</b>	<b>W</b>

**12** In a particular community, a mango tree provides food for many caterpillars, and these caterpillars in turn become food for a few birds.

Which of the following pyramids accurately represent the pyramid of numbers and pyramid of biomass for the food chain described above?



	pyramid of numbers	pyramid of biomass
<b>A</b>	P	R
<b>B</b>	Q	P
<b>C</b>	R	Q
<b>D</b>	S	S

**13** Two species of animals, X and Y, are found in the same area of forest and grassland. In spring and summer, they eat the same plant food. However, in autumn and winter, species X eats nuts in the forest and species Y eats roots on the grassland.

Both species are preyed upon by the same predator. The number of species Y is reduced most by this, but they recover faster since they reproduce faster.

What can be concluded about these two species of animals?

- 1 They are part of the same community.
- 2 They are at different trophic levels.
- 3 They occupy different habitats.
- 4 They have different reproductive abilities.

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

14 The diagram shows how energy from grass is used by a deer.

What percentage of this energy is available to consumers and decomposers?

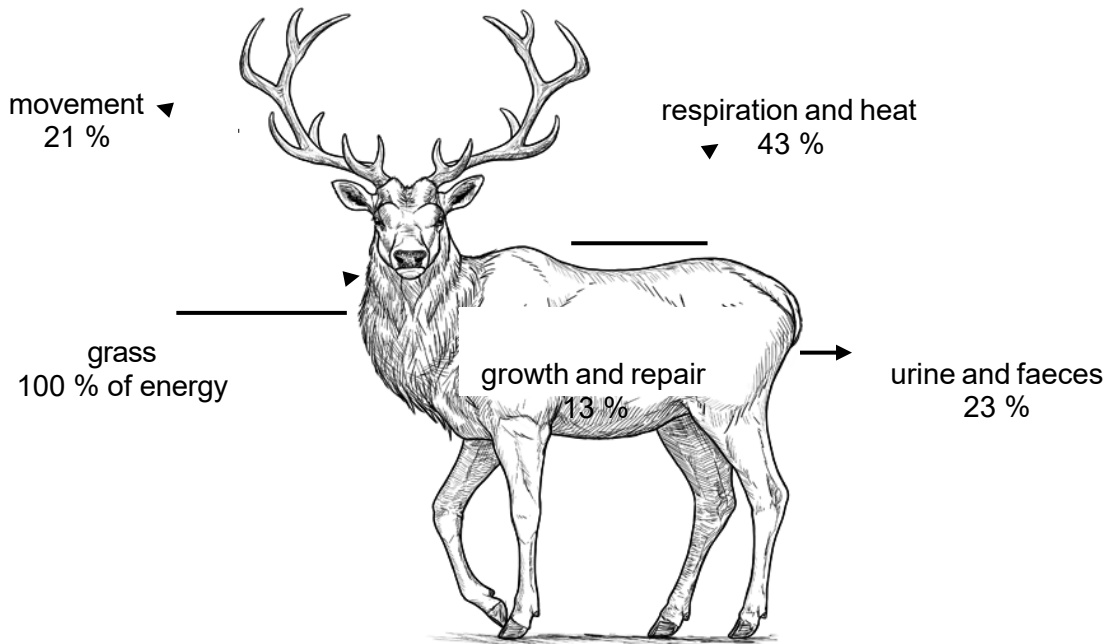
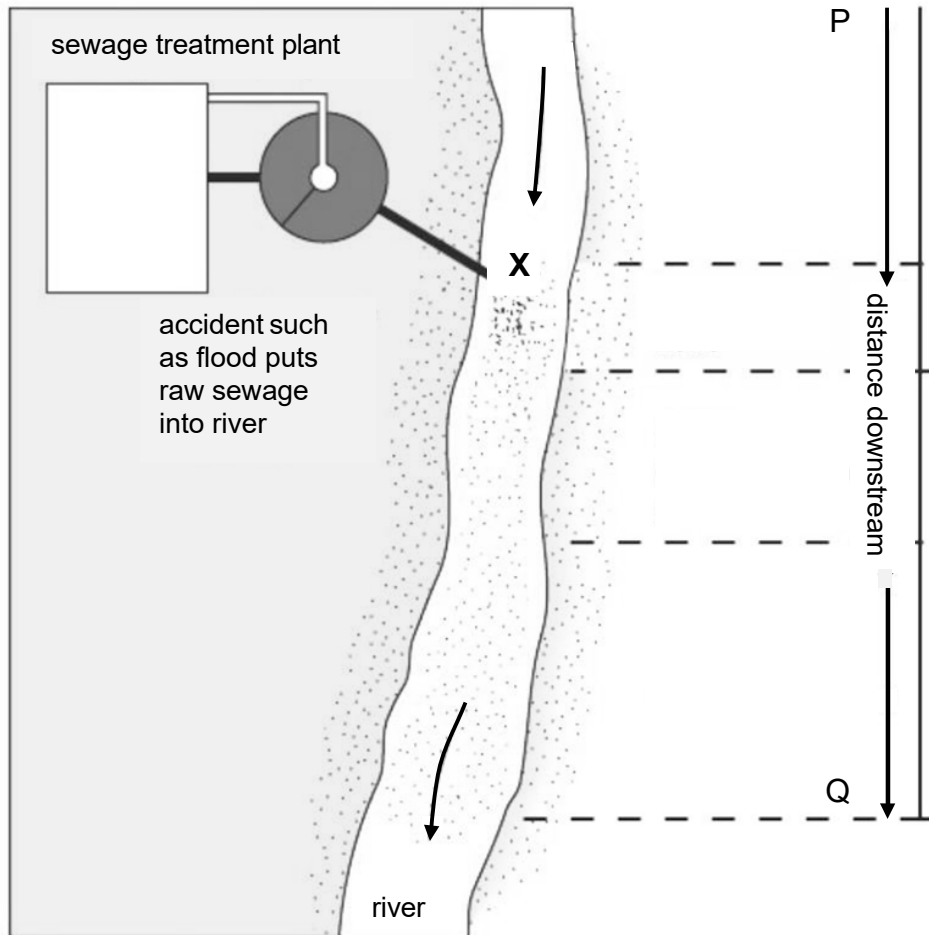


diagram modified from <https://design.tutsplus.com/tutorials/>

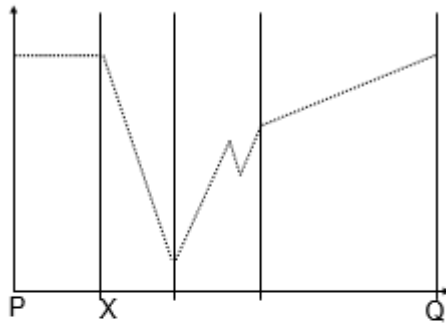
- A 13%
- B 23%
- C 36%
- D 79%

**15** The diagram shows a sewage treatment plant and site of accidental flood putting raw sewage into river marked X.

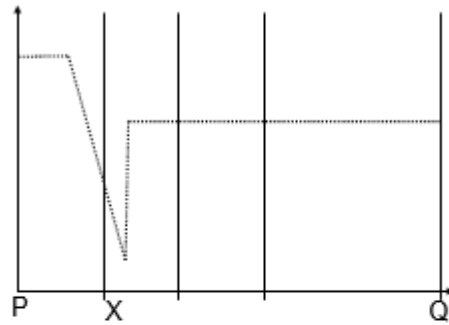


Which graph shows the concentration of dissolved oxygen from P to Q along the river?

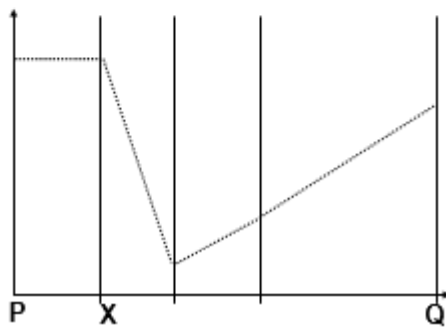
A



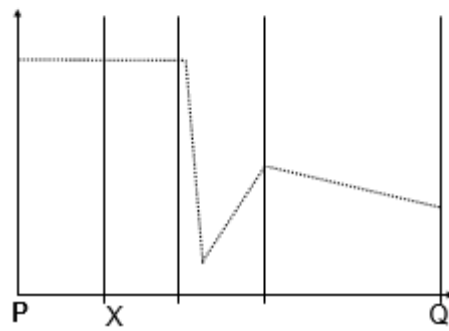
B



C



D



- 16 The diagram shows a snow leopard, *Panthera uncia*. The habitat of the snow leopard is the high mountains of Central Asia.



Diagram from <https://www.google.com/search?q=snow+leopard,&source>

Snow leopards usually live and hunt alone. Their main prey is grazing herbivores, such as wild sheep and wild goats. They also hunt domesticated animals and livestock.

The number of snow leopards has decreased dramatically in the last 40 years.

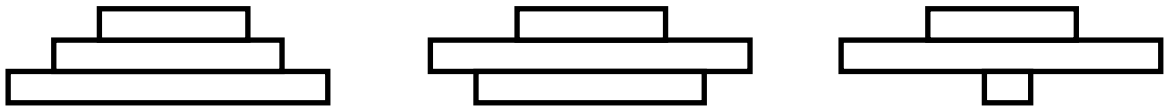
Which of the following are consequences to the ecosystem if the number of snow leopards continues to decrease?

	number of herbivores	number of plants	competition for plants	biodiversity
<b>A</b>	decrease	decrease	increase	increase
<b>B</b>	decrease	increase	decrease	increase
<b>C</b>	increase	decrease	increase	decrease
<b>D</b>	increase	increase	decrease	decrease

17 Which statement about carbon sinks is **correct**?

- A All carbon sinks are fossil fuels.
- B Carbon sinks emit more carbon dioxide than they absorb.
- C Carbon sinks remove carbon dioxide permanently from the atmosphere.
- D Oceans are important carbon sinks.

18 Three pyramids of numbers are shown below.



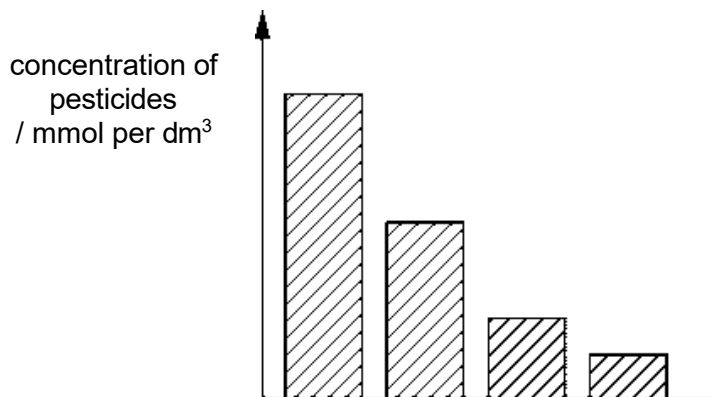
Which of the following food chains **cannot** be represented by any of these pyramids?

- A algae → pond snail → nematode parasites
- B grass → rabbit → fox
- C oak tree → caterpillar → bird
- D phytoplankton → zooplankton → fish

19 The diagram shows part of a food chain in a lake.  
plankton → small fish → frog → bird

The lake was polluted with pesticides from the farm nearby.  
The bar graph below shows the concentration of the pesticides in the bodies of each organism in the chain.

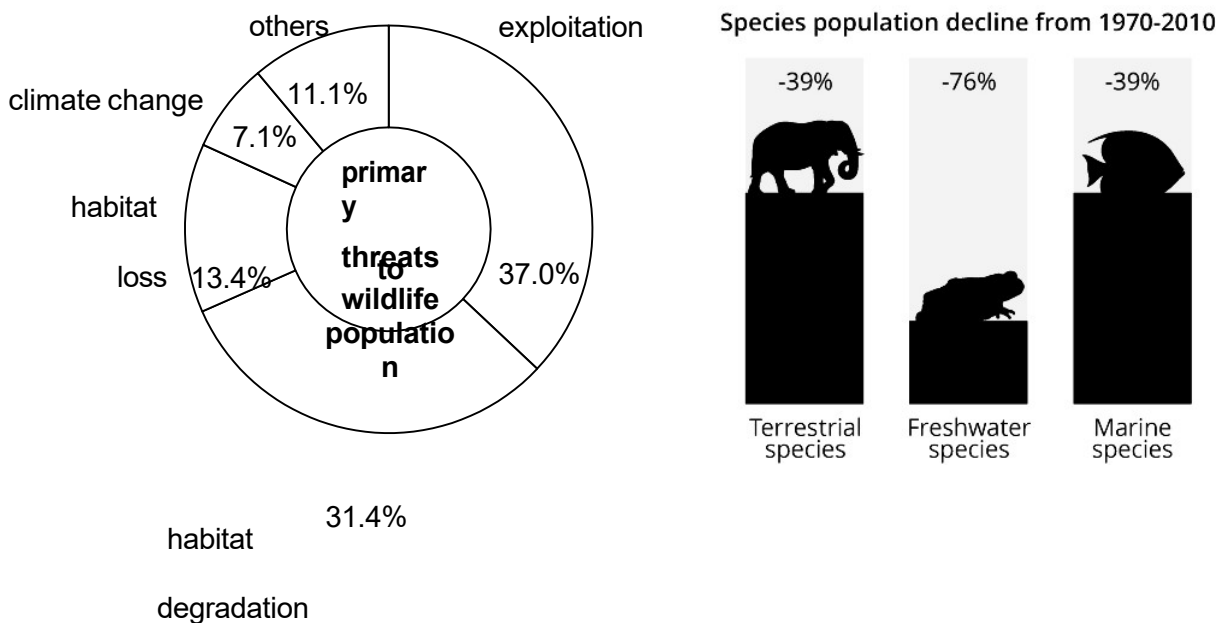
Which organism on the graph represents the frog?



20 The diagram shows how the different primary threats affect the different wildlife populations from 1970 to 2010.

### Wildlife Populations Worldwide Have Plummeted

#### Threats to wildlife and population decline from 1970-2010

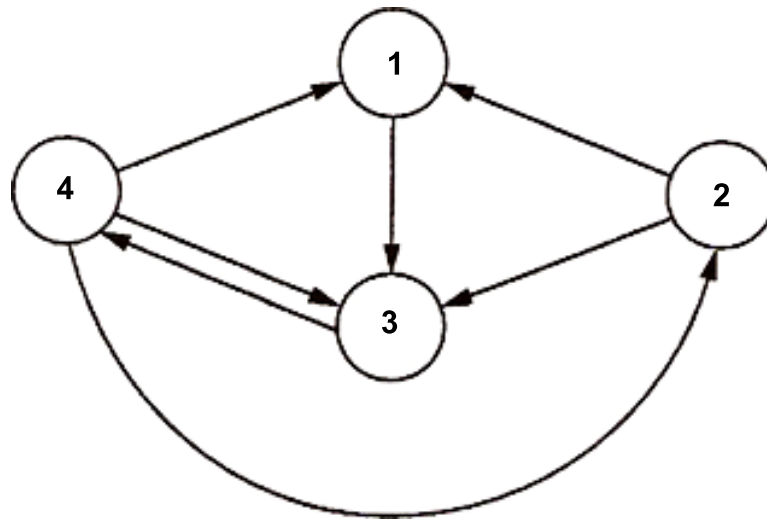


Which statement about the impacts on wildlife population is **false**?

- A Among the major primary threats, climate change had the least impact on the wildlife population.
- B Changes to and destruction of habitats had no significant impact on the wildlife population.
- C Terrestrial and marine species were decreasing at a slower rate than freshwater species.
- D The threats to wildlife had the most impact on freshwater organisms.



21 In the diagram, arrows represent the transfer of carbon compounds in the carbon cycle. The circles represent carbon compounds in animals, decomposers, plants and the atmosphere.

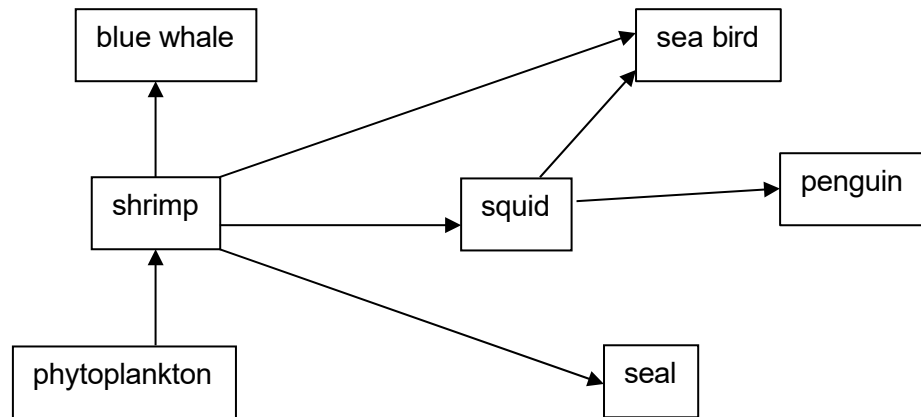


What does each circle represent?

	1	2	3	4
<b>A</b>	animals	decomposers	plants	atmosphere
<b>B</b>	atmosphere	plants	decomposers	animals
<b>C</b>	decomposers	animals	atmosphere	plants
<b>D</b>	plants	atmosphere	animals	decomposers

**ECOSYSTEMS STRUCTURED QUESTIONS**

1 Fig. 12.1 below shows some organisms in a food web in the South Pole region.



**Fig. 12.1**

In the South Pole region, the period of daylight becomes much shorter in winter. Describe and explain **two** effects on the food web during winter.

.....

.....

.....

.....

.....

.....

.....

[2]

- 2 Freshwater lakes have a natural pH range between 6.0 and 8.0. When acid rain falls into a lake, the pH of the water is affected, threatening the survival of animal and plant life.

Table 9.1 shows the names of organisms found in and organisms found near a lake, and the range of pH values in which they are naturally found. A tick indicates the presence of the organism in the specific pH stated.

**Table 9.1**

name of organism	pH 6.5	pH 6.0	pH 5.5	pH 5.0	pH 4.5	pH 4.0
bass	✓	✓	✓			
gar	✓	✓	✓	✓		
perch	✓	✓	✓	✓	✓	
frog	✓	✓	✓	✓	✓	✓
salamander	✓	✓	✓	✓		
snails	✓	✓	✓			
clam	✓	✓	✓			
crayfish	✓	✓	✓			
mayfly	✓	✓	✓			

- (a) State and explain whether a lake is a carbon source or carbon sink.

.....  
 ..... [1]

- (b) Which two organisms can survive under the most acidic conditions?

..... [1]

- (c) Frogs eat small insects such as mayflies, and mayflies eat aquatic plants.

Describe how the frogs would be affected in the lake if the pH falls from 6.0 to 5.0.

.....  
 ..... [1]

---

(d) When severe drought hits a lake, the water can dry up, causing plants and fishes to die, and lead to decomposition.

(i) List an example of a decomposer.

..... [1]

(ii) List an example of a scavenger and explain how the role of a scavenger in decomposition is different from (d)(i).

..... [2]

**Total [ 6 ]**

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3 Palm oil is an edible vegetable oil that comes from the fruit of oil palm trees. Some facts about palm oil:

- Palm oil is relatively cheap compared to other oils.
- It is the world's most widely used vegetable oil.
- The yield of oil per hectare from oil palm trees is thirty times more than that of oil from maize.
- Around 85% of the world's palm oil is now produced in Indonesia.

Table 10.1 shows the change in forest cover for palm oil plantation on the three main Indonesian islands between 2000 and 2010.

**Table 10.1**

	island		
	Sumatra	Borneo	Java
area of island / million hectares forest cover in 2000 / million	42	72	12
hectares forest cover in 2010 / million	15	33	3
hectares loss of forest cover between 2000 and 2010 / million hectares	12	27	1
percentage loss of forest cover between 2000 and 2010	3	<b>x</b>	2
	<b>y</b>	18	67

a. Study Table 10.1 and determine the values for **x** and **y**. [2]

**x** :

**x**..... million hectares

**y** :

**y**.....%

- b. The Sumatran forest is the natural habitat for the Sumatran orangutan, *Pongo abelii*. It is classified as critically endangered on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species. Fig. 10.1 shows a Sumatran orangutan.



**Fig. 10.1**

- i. State how the change in forest cover for palm oil plantation affects orangutans.

.....  
.....  
[1]

- ii. The diet of orangutan consists mainly of fruits and others like young leaves, shoots and insects. The orangutans would enter the palm oil plantations to find food. When farmers find orangutans at the plantations, they would kill them.

Explain why the farmers would kill the orangutans.

.....  
.....  
[1]

- iii. The female orangutan has gestation period (the period of time between conception and birth) similar to human, which lasts about nine months. It will give birth to only one offspring at a time and this occurs every 6 to 7 years.

Explain how the female orangutan reproductive rate will affect the increase in population growth.

.....

.....

[1]

- iv. Describe how zoo can play a role in influencing the population growth of orangutan.

.....

.....

[1]

**Total [ 6 ]**

4. When investigating ecosystems, food chains and food webs are constructed.

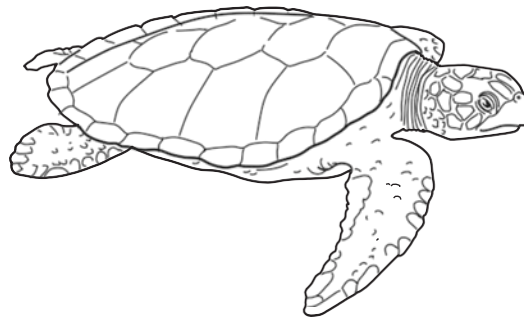
Read the passage below about trophic relationships on one of the Galapagos Islands.

Marine iguanas feed on kelp, which grows attached to rocks in shallow waters. Kelp is a photosynthetic organism. Further inland, xerophytes (hardy plants) are grazed upon by land iguanas. A great diversity of herbivorous insects, including many species of short-horned grasshoppers, feed on the xerophytes. An analysis of the gut contents of lava lizards reveals that these insects are prey for the lizards. The lava lizards are preyed upon by Galapagos snakes. The snakes also hunt short-horned grasshoppers and newly hatched land and marine iguanas. The Galapagos hawk has a varied diet and catches animals such as Galapagos snakes, short-horned grasshoppers, lava lizards and newly hatched land and marine iguanas.[3]

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5. The flat back turtle, *Natator depressus*, is an endangered species that nests on northern Australian beaches. Fig. 5.1 shows a flat back turtle.



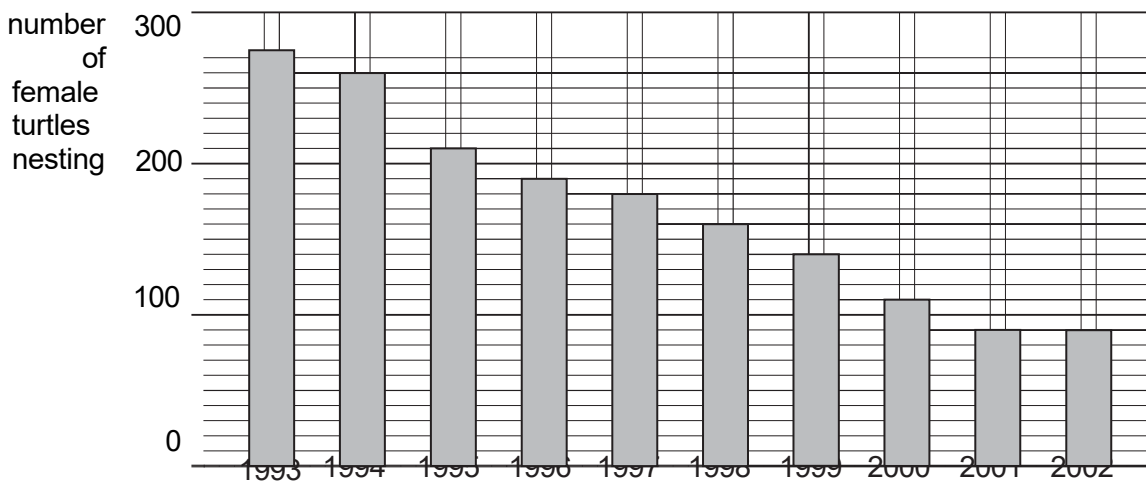
**Fig. 5.1**

image modified from <http://clipart-library.com/>

The habitats where the female turtles were nesting were found to be destroyed due to oil and plastic pollution. Changes in the climate and illegal poaching decreased the number of female turtles nesting. There seemed to be an increase in the numbers of saltwater crocodiles and sharks in water and beaches near the habitats of these turtles.

Fig. 5.2 shows the numbers of female flat back turtles nesting on a beach in northern Australia between 1993 and 2002.

Each female lays approximately 50 eggs per nest, which is a smaller number than all other species of marine turtle. The eggs are buried in the sand and when the hatchlings emerge each has a mass of approximately 43 g. Unlike most marine turtles, flat back turtles spend most of their time in coastal waters. This is where they feed and mate.



**Fig. 5.2**

- a. Describe one abiotic factor and one biotic factor that led to the decrease in the number of female turtles nesting.

Abiotic factor:

.....  
.....  
.....

Biotic factor:

.....  
.....  
.....

[2]

- b. Calculate the mean rate of decrease in the number of female turtles nesting from 1993 to 2002.

Show your working clearly.

mean rate of decrease

.....

[2]

- c. Suggest two ways in which the flat back turtle could be protected.

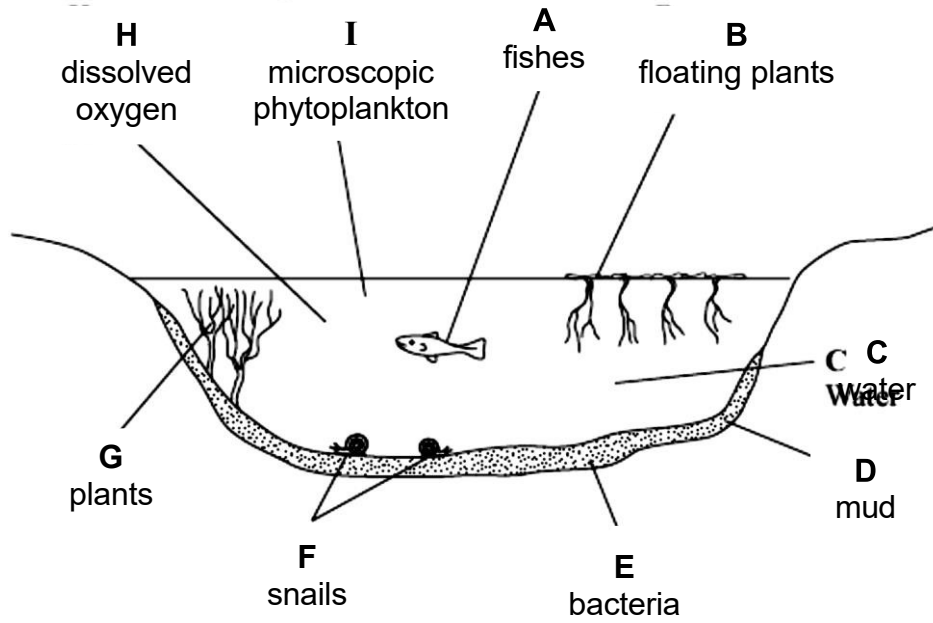
.....  
.....  
.....  
.....  
.....  
.....

[2]

**Total [6]**

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6 Fig. 1.1 shows some of the components of a lake ecosystem.



**Fig. 1.1**

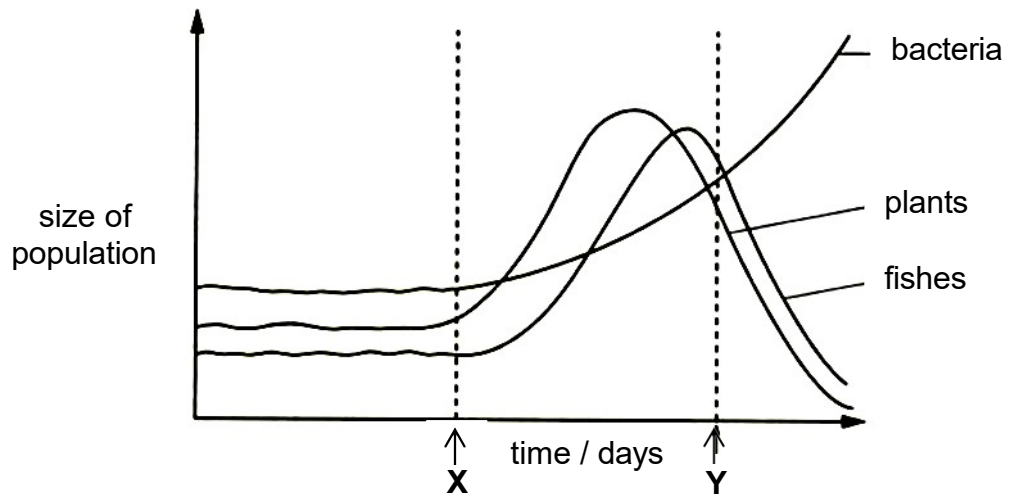
(a) (i) Define *an ecosystem*.

.....  
 ..... [1]

(ii) With reference to Fig. 1.1, list the letters (A to I) that represent the components that are part of the lake community.

..... [1]

- (b) Three different populations in the lake are linked in a food chain. Fig. 1.2 shows the changes in the size of these populations over a period of time.



**Fig. 1.2**

- (ii) Suggest what may have entered the lake at time X.

[1]

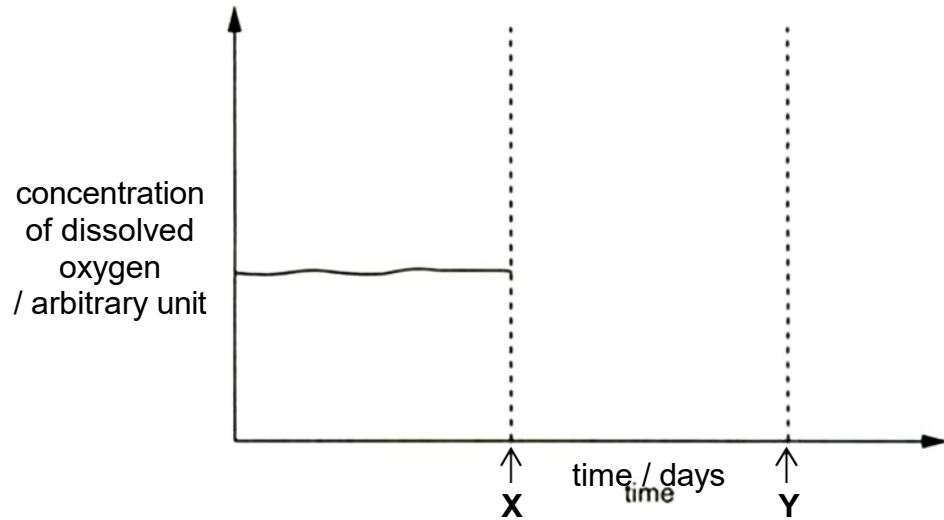
- (iii) With reference to Fig. 1.2, explain your answer in b(i) above.

[3]

- (iv) Fig. 1.3 is a graph that shows the concentration of dissolved oxygen in the same lake before time X.

Using a blue or black pen, complete the graph to show how the concentration of dissolved oxygen will change over the same time period shown in Fig. 1.2.

[2]



**Fig. 1.3**

- (c) In an attempt to control the huge numbers of an insect pest, low doses of dichlorodiphenyltrichloroethane (DDT) were sprayed on the lake. After a few months, diving birds which fed on small fish in the lake were found to be dying. The concentration of DDT in these dead birds was found to be much higher than the concentration of DDT in the water.

Explain why DDT was present in such a high concentration in the diving birds.

.....

.....

.....

.....

[2]

**ANSWER FOR ECOSYSTEMS MCQ**

1 Which of the following human activities and their effects have disrupted the biodiversity in nature?

- Deforestation
- Excessive use of pesticides and fertilisers
- Maintaining nature reserves
- Overhunting and overfishing
- Pollution

- II, IV and V only
- I, II, IV and V only**
- II, III, IV and V only
- All of the above

**(Nanyang Girl High School 2018 P1)**

Why do scientists classify living organisms?

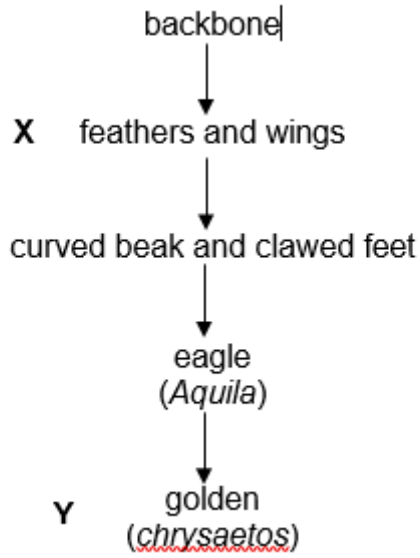
- A to determine the number of species
- B to determine their potential uses only
- C to describe each organism on earth
- D to study them systematically**

2 Bacteria are unicellular organisms that may bring about beneficial or harmful effects to humans. Which row is correct?

	action by	effects on humans
<b>A</b>	bacteria	harmful
<b>B</b>	bacteria breaking down milk sugar during the making of yoghurt	beneficial
<b>C</b>	bacteria growing and multiplying on cooked food	harmful
<b>D</b>	bacteria in soil breaking down dead organisms bacteria in the digestive tract digesting food	beneficial

**Ans D**

3 The diagram shows features used in classifying the golden eagle.

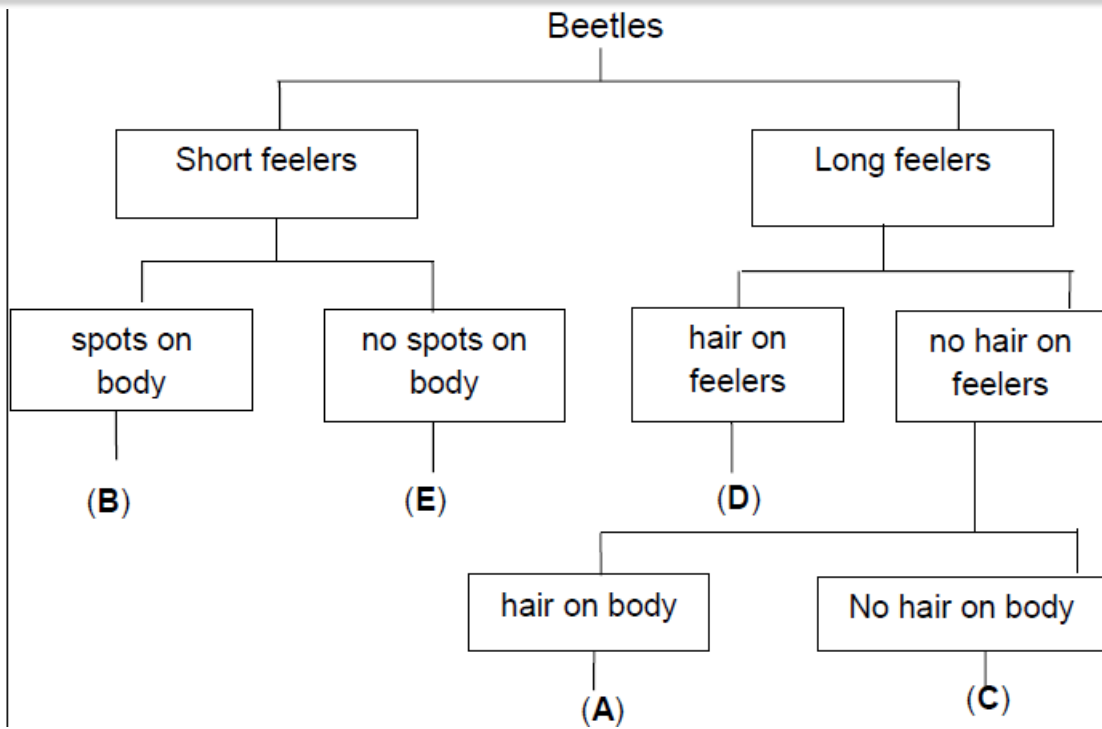


Which classification groups do **X** and **Y** refer to?

	<b>X</b>	<b>Y</b>
<b>A</b>	class	genus
<b>B</b>	class	species
<b>C</b>	genus	class
<b>D</b>	species	genus

**Ans B**

4(a)



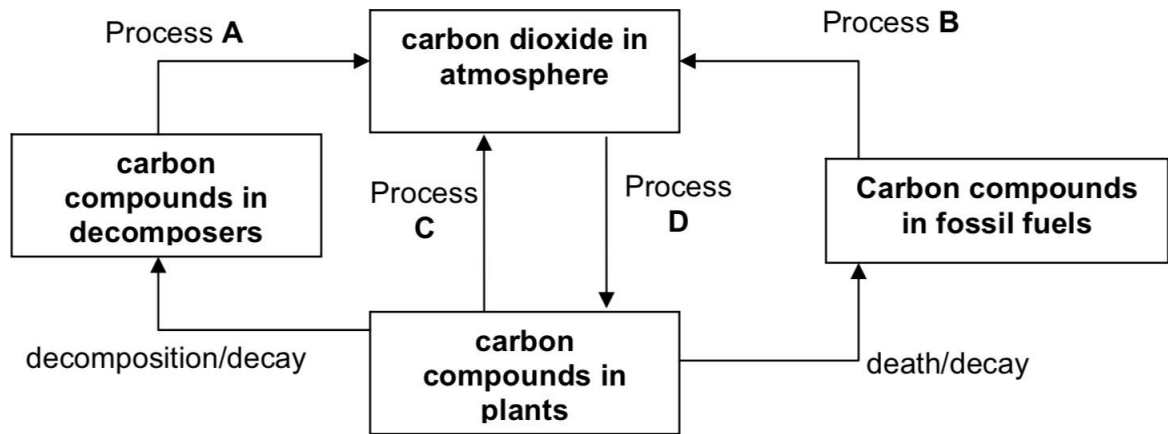
- q4b) **Artificial breeding of animals to increase population**  
**Preserve their habitats (forests)**  
**Provide sanctuaries**  
**Enforce laws to stop poaching**  
**Be an advocate for protection and conservation**

- q6a) **Help patients make lifestyle decisions such as diet to lower risks for developing cancer**  
**Treat any forms of cancer early or to receive more targeted treatment for higher chance of recovery**

- q6b) **Invasion of privacy**  
**Require substantial funding and resources**  
**May go against the religious or cultural beliefs of different groups of people in the community**



For Questions 29 and 30, refer to the carbon cycle given below.



5 Which process A, B, C or D is combustion?

**Ans B**

6 Which process A, B, C or D converts carbon forms in the air into carbon forms in living organisms?

**Ans D**

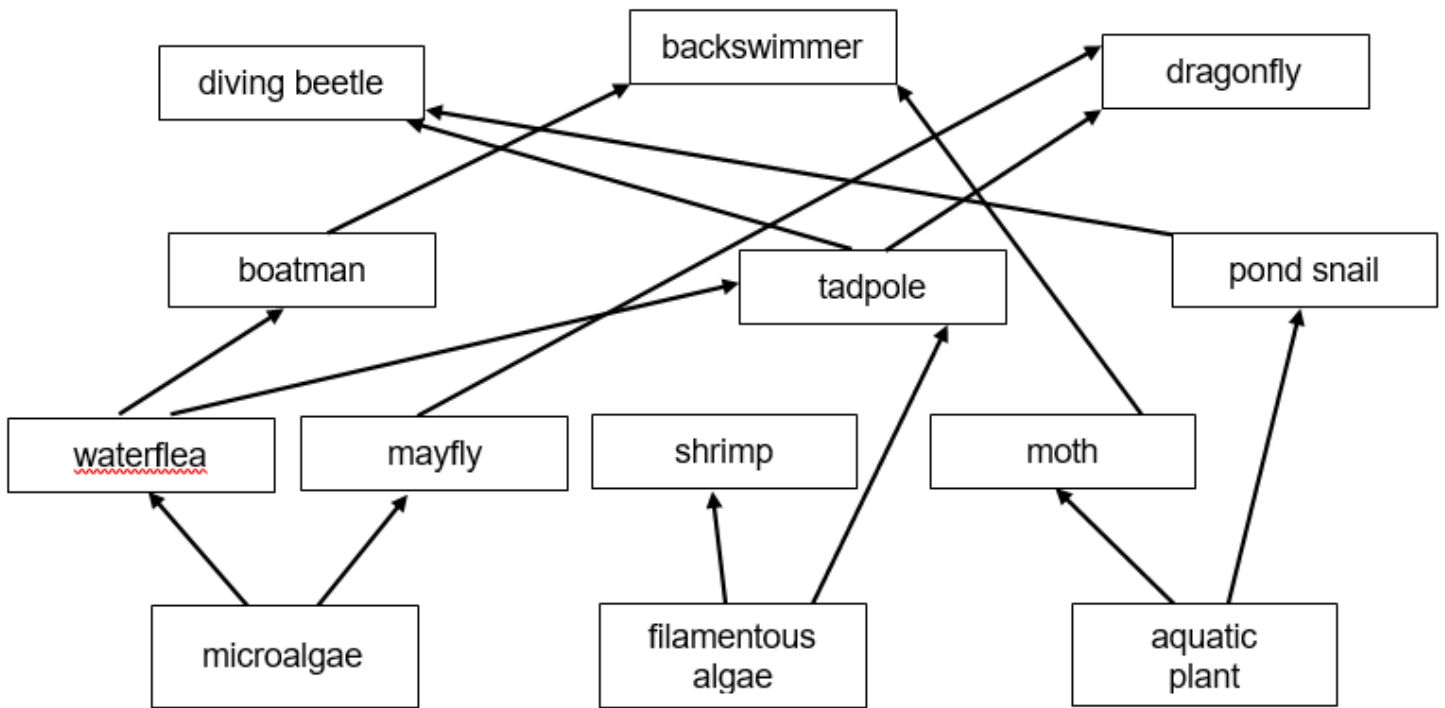
7 Read the following paragraph.

*The ostrich always moves with a herd of zebras since it has a poor sense of hearing and smell, whereas zebras have very sharp senses. The ostrich has a keen sense of sight, which the zebra lacks.*

What is the relationship between the ostrich and zebras?

- A commensalism
- B mutualism**
- C parasitism
- D predator-prey

8 The diagram shows a food web in a fresh water pond.

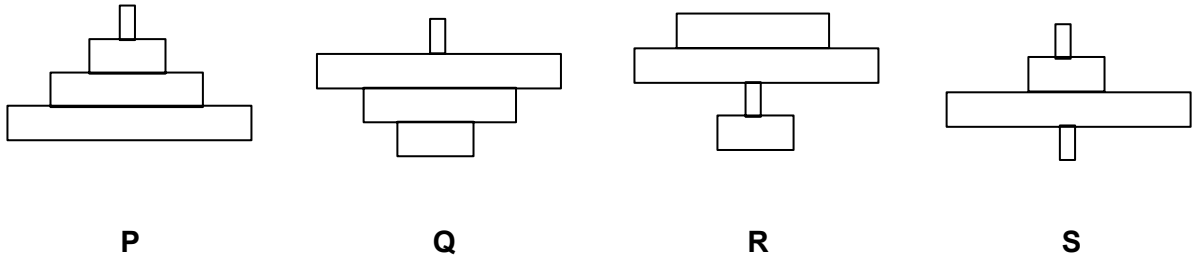


Which organism is both a primary and a secondary consumer?

- boatman
- diving beetle
- moth
- tadpole**

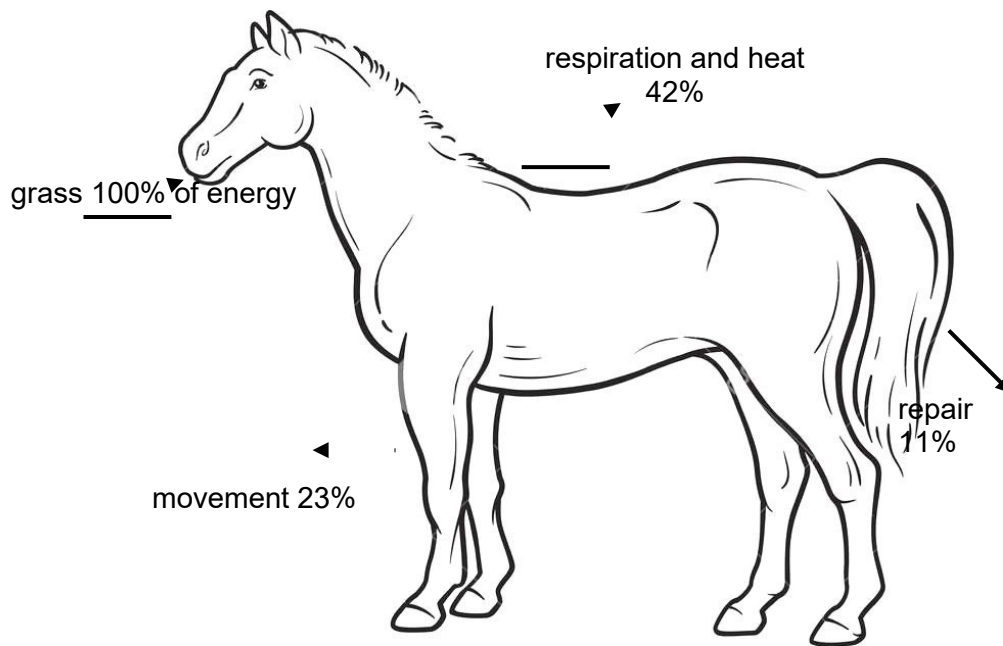
9 In a particular community, a rambutan tree provides food for many caterpillars. These caterpillars become food for a few sparrows, and these sparrows become food for a hawk.

Which pyramids accurately represent the pyramid of numbers and pyramid of biomass for the food chain described above?



	pyramid of numbers	pyramid of biomass
<b>A</b>		<b>S</b>
<b>B</b>	<b>Q</b>	<b>R</b>
<b>C</b>	<b>R</b>	<b>Q</b>
<b>D</b>	<b>S</b>	<b>P</b>

10 The diagram shows how energy from grass is used by a horse.

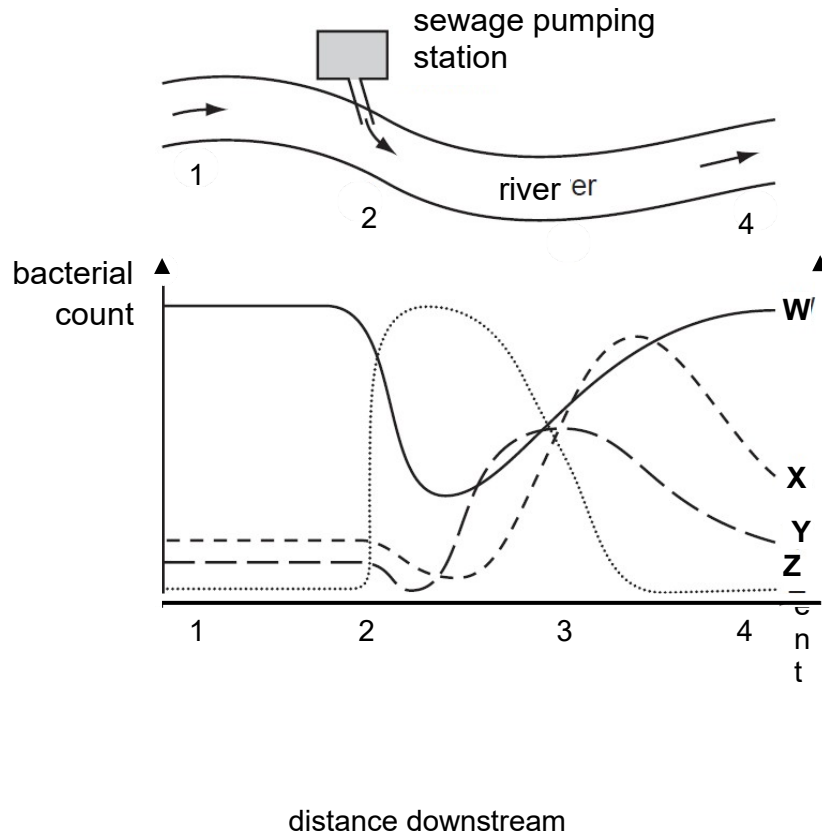


What percentage of this energy is available to consumers and decomposers?

- A** 11%
- B** 24%
- C** 35%
- D** 77%

The diagram shows part of a river which sewage is being pumped.

The effect of adding sewage to the river on bacterial count and oxygen content of the water are plotted in the graph.

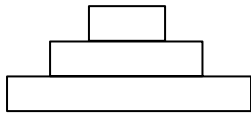


Which graphs represent the bacterial count and the oxygen content of the water?

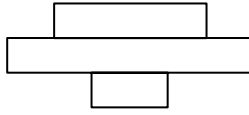
	bacterial count	oxygen content
<b>A</b>	<b>W</b>	<b>Z</b>
<b>B</b>	<b>X</b>	<b>Y</b>
<b>C</b>	<b>Y</b>	<b>X</b>
<b>D</b>	<b>Z</b>	<b>W</b>

- 11 In a particular community, a mango tree provides food for many caterpillars, and these caterpillars in turn become food for a few birds.

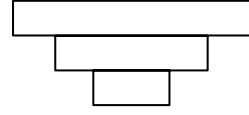
Which of the following pyramids accurately represent the pyramid of numbers and pyramid of biomass for the food chain described above?



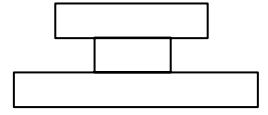
P



Q



R



S

	pyramid of numbers	pyramid of biomass
A	P	R
<b>B</b>	Q	P
C	R	Q
D	S	S

12 Two species of animals, X and Y, are found in the same area of forest and grassland. In spring and summer, they eat the same plant food. However, in autumn and winter, species X eats nuts in the forest and species Y eats roots on the grassland.

Both species are preyed upon by the same predator. The number of species Y is reduced most by this, but they recover faster since they reproduce faster.

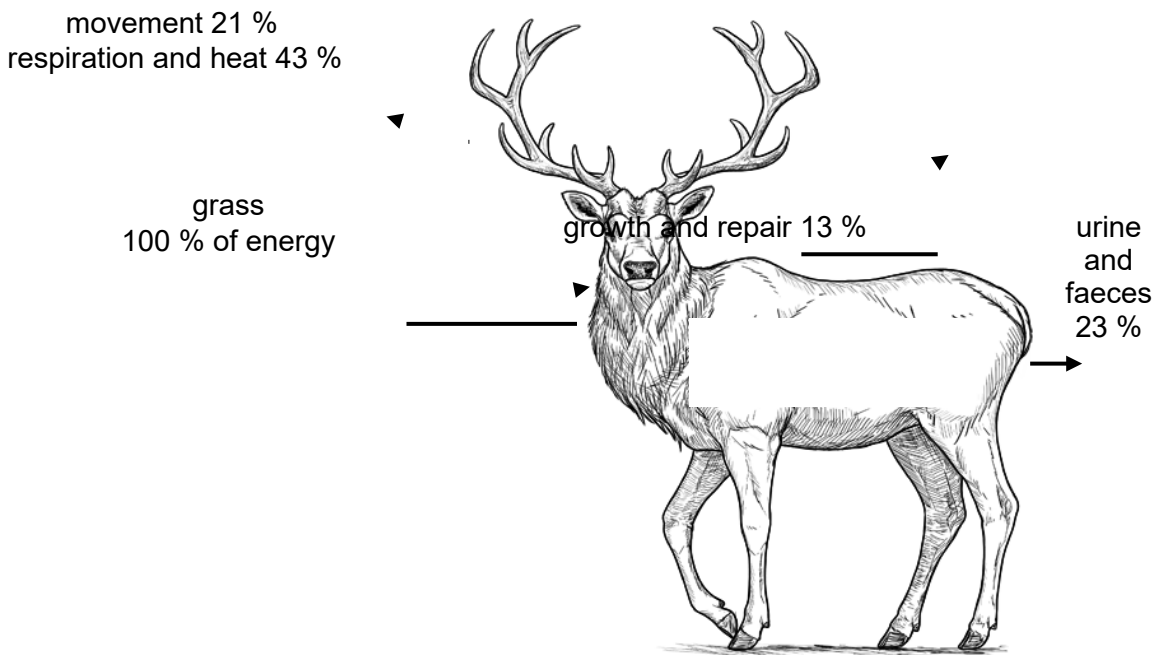
What can be concluded about these two species of animals?

- 1 They are part of the same community.
- 2 They are at different trophic levels.
- 3 They occupy different habitats.
- 4 They have different reproductive abilities.

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

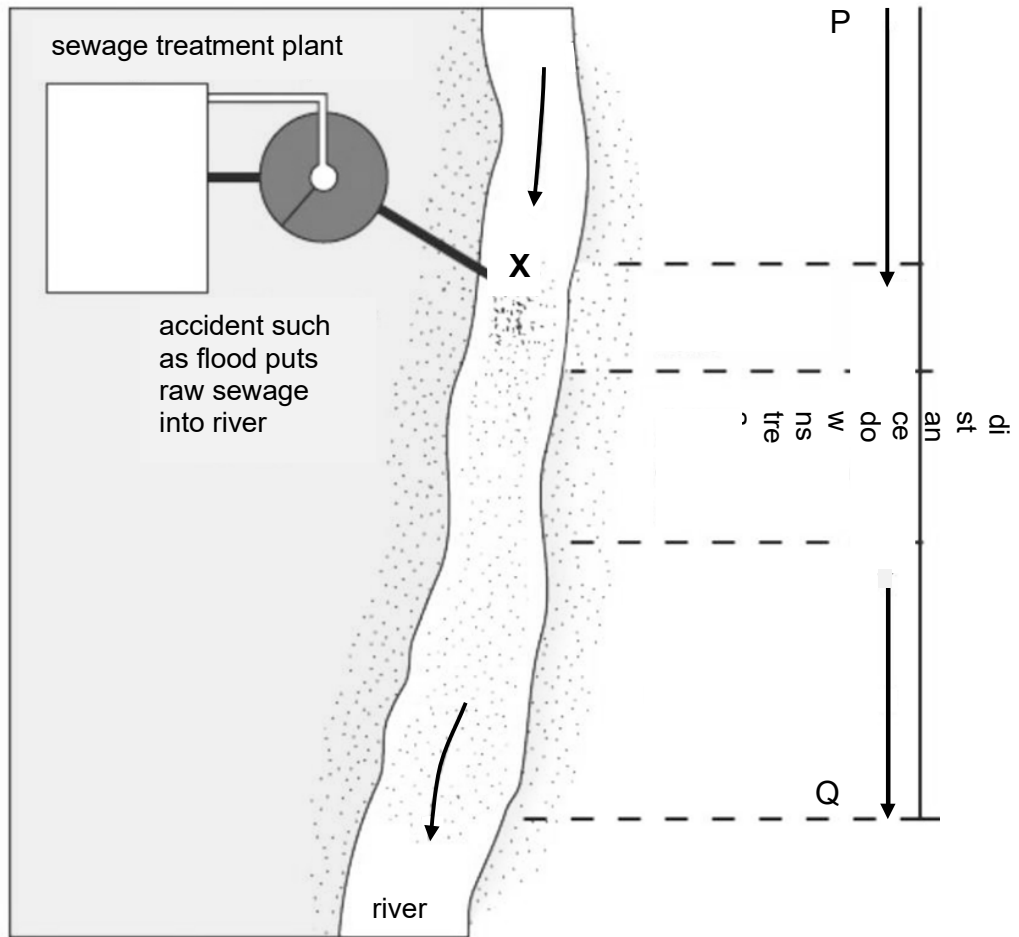
13 The diagram shows how energy from grass is used by a deer.

What percentage of this energy is available to consumers and decomposers?



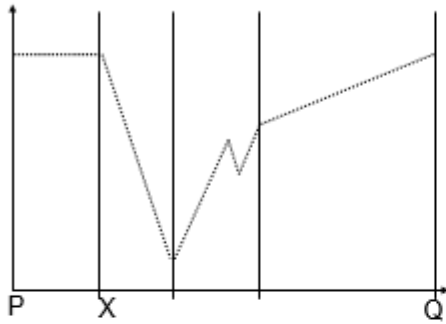
- A 13%
- B 23%
- C 36%**
- D 79%

- 14 The diagram shows a sewage treatment plant and site of accidental flood putting raw sewage into river marked X.

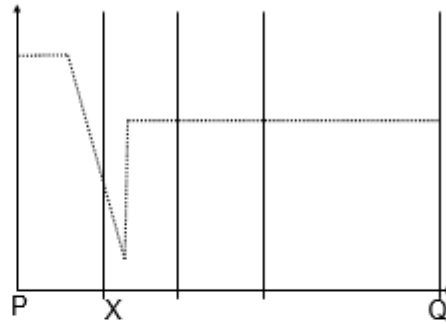


Which graph shows the concentration of dissolved oxygen from P to Q along the river?

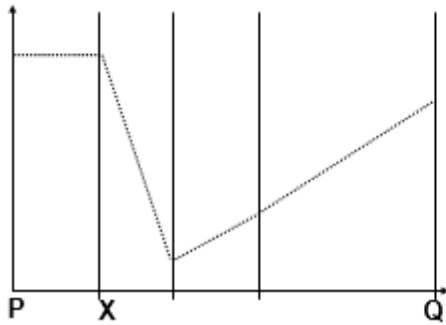
**A**



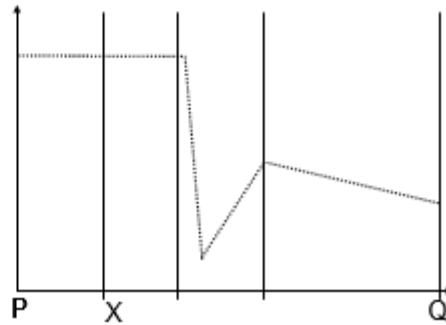
**B**



**C**



**D**



**Ans : C**



- 15 The diagram shows a snow leopard, *Panthera uncia*. The habitat of the snow leopard is the high mountains of Central Asia.



Diagram from <https://www.google.com/search?q=snow+leopard,&source>

Snow leopards usually live and hunt alone. Their main prey is grazing herbivores, such as wild sheep and wild goats. They also hunt domesticated animals and livestock.

The number of snow leopards has decreased dramatically in the last 40 years.

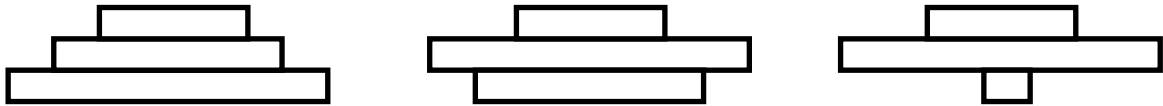
Which of the following are consequences to the ecosystem if the number of snow leopards continues to decrease?

	number of herbivores	number of plants	competition for plants	biodiversity
<b>A</b>	decrease	decrease	increase	increase
<b>B</b>	decrease	increase	decrease	increase
<b>C</b>	increase	decrease	increase	decrease
<b>D</b>	increase	increase	decrease	decrease

16 Which statement about carbon sinks is **correct**?

- A All carbon sinks are fossil fuels.
- B Carbon sinks emit more carbon dioxide than they absorb.
- C Carbon sinks remove carbon dioxide permanently from the atmosphere.
- D Oceans are important carbon sinks.**

17 Three pyramids of numbers are shown below.



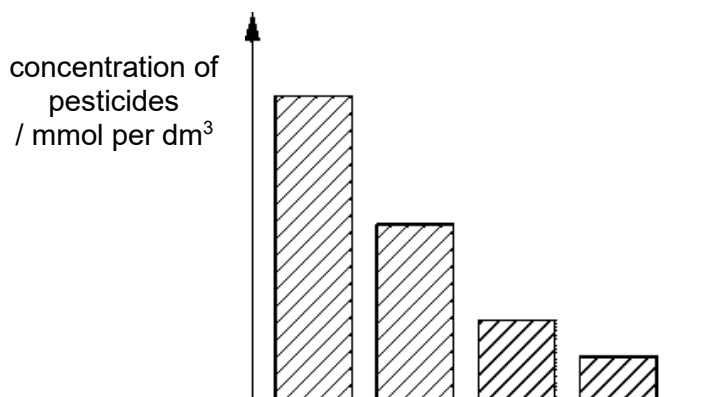
Which of the following food chains **cannot** be represented by any of these pyramids?

- A** algae □ pond snail □ nematode parasites
- B grass □ rabbit □ fox
- C oak tree □ caterpillar □ bird
- D phytoplankton □ zooplankton □ fish

18 The diagram shows part of a food chain in a lake.  
plankton □ small fish □ frog □ bird

The lake was polluted with pesticides from the farm nearby.  
The bar graph below shows the concentration of the pesticides in the bodies of each organism in the chain.

Which organism on the graph represents the frog?



19 The diagram shows how the different primary threats affect the different wildlife populations from 1970 to 2010.

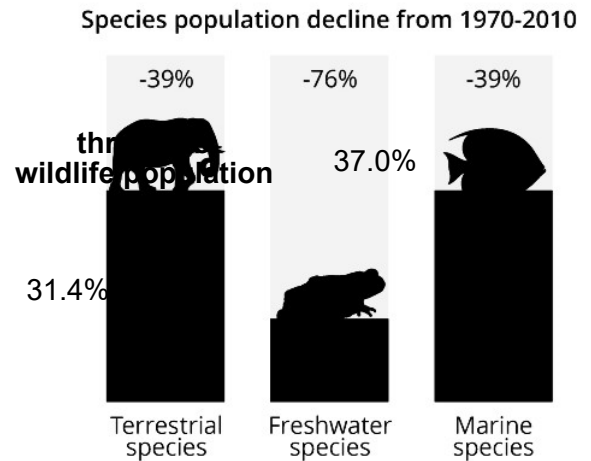
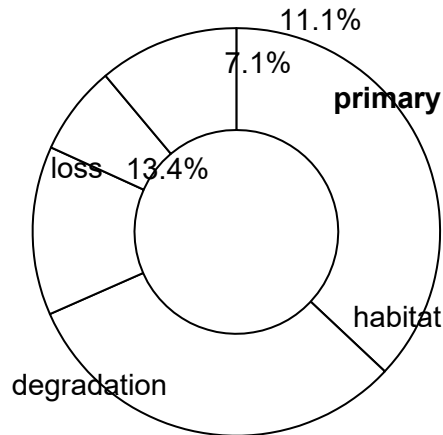
### Wildlife Populations Worldwide Have Plummeted

#### Threats to wildlife and population decline from 1970-2010

climate change habitat

others

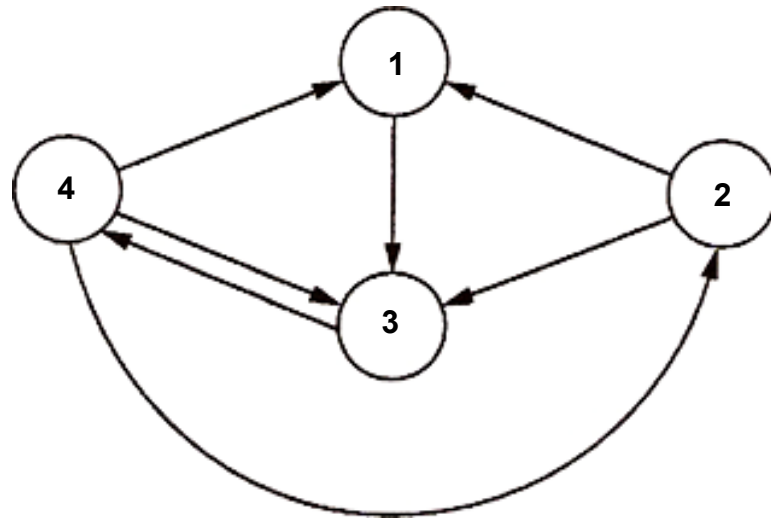
exploitation



Which statement about the impacts on wildlife population is **false**?

- A Among the major primary threats, climate change had the least impact on the wildlife population.
- B Changes to and destruction of habitats had no significant impact on the wildlife population.**
- C Terrestrial and marine species were decreasing at a slower rate than freshwater species.
- D The threats to wildlife had the most impact on freshwater organisms.

20 In the diagram, arrows represent the transfer of carbon compounds in the carbon cycle. The circles represent carbon compounds in animals, decomposers, plants and the atmosphere.

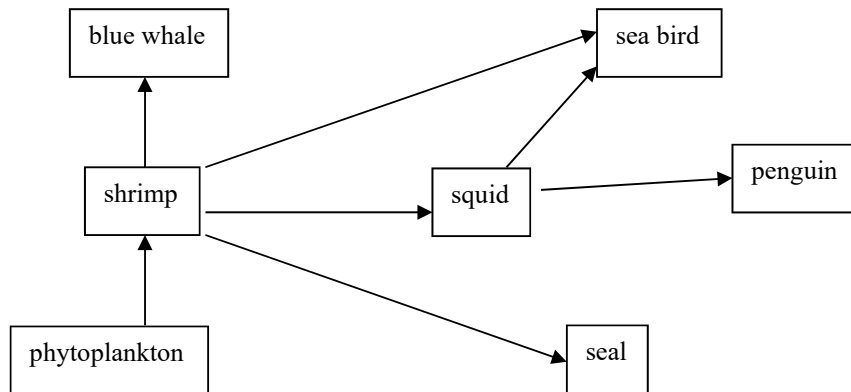


What does each circle represent?

	1	2	3	4
<b>A</b>	animals	decomposers	plants	atmosphere
<b>B</b>	atmosphere	plants	decomposers	animals
<b>C</b>	decomposers	animals	atmosphere	plants
<b>D</b>	plants	atmosphere	animals	decomposers

**ANSWER FOR ECOSYSTEMS STRUCTURED QUESTIONS**

1 Fig. 12.1 below shows some organisms in a food web in the South Pole region.



**Fig. 12.1**

In the South Pole region, the period of daylight becomes much shorter in winter. Describe and explain **two** effects on the food web during winter.

A decrease in the period of daylight would cause a decrease in the rate of photosynthesis in phytoplankton. This would cause a decrease in the phytoplankton population;

As such, the shrimp population would also show a decrease since phytoplankton is their only source of food;

The population of blue whale / seal would drop drastically as shrimp is their only source of food OR and at the same time, shrimp is also being consumed by other organisms);

Populations of all organisms will decrease because of a decrease in the number of phytoplanktons which are the only producer;

[Total = 4 marks]

- 2 (a) Carbon sink as it absorbs carbon dioxide (more than it releases as carbon dioxide). [1]
- (b) Perch and frog [1]
- (c) Mayflies will die. As Mayfly is a food source for the frog, this leads to reduction in food source and the population of frog decreases. [1]
- (d) (i) Fungi / Bacteria [1]  
(ii) Earthworm [1]. [2]

Scavengers are organisms that feed on dead or decaying matter / Scavengers help decomposers break down dead organisms into simple substances faster [1].

Total [ 6 ]

3 (a) [2]

$x$  :

$$\begin{aligned} & \text{forest cover in 2000} - \text{forest cover in 2010} \\ & = 33 - 27 \\ & = 6 \quad [1] \end{aligned}$$

$x$  : 6 million hectares

$y$  :

$$\begin{aligned} & (\text{loss of forest cover between 2000 and 2010} / \text{forest cover in } \mathbf{2000}) \times 100\% \\ & = 3 / 15 \times 100\% \\ & = 20 \% \quad [1] \end{aligned}$$

$y$  : 20 %

(b)

(i) It decreases / destroys their habitat. [1]

(ii) The orangutans are destroying the plantations /  
The farmers viewed the orangutans as agricultural pests. [1]

(iii) It has a low reproductive rate, and the population will take a long time to  
increase. [1]

(iv) Protecting the orangutans to ensure that they reproduce /  
Assist in reproduction (in-vitro fertilisation) [1]

**Total [ 6 ]**

- 5 (a) Abiotic factor:  
Temperature – increased in temperature due to climate change has made it unsuitable for flat back turtle to nest on beach ;  
  
Sand / Oil pollution – oil pollution on the sand decreased the available beach area for nesting ;  
  
Sea level – climate change causes ice caps to melt, raises sea level and covers the beach area for nesting, resulting in less space available for nesting ;  
  
Biotic factor:  
Predator – increase in the number of predators (saltwater crocodile / shark) eats up the female turtles, hence this leads to a decrease in the number of female turtles nesting. [2]
- (b) number at 1993 = 275 number  
at Year 2002 = 90  
number of years = 2002 – 1993 = 9 years  
  
mean rate of decrease =  $(275 - 90) \div (9)$  [1 mark]  
= 20.1 [1 mark] [2]
- (c) (any two)  
1 employ rangers / install surveillance cameras to monitor the beach so as to deter poachers  
  
2 harsher punishments for poachers like higher fines and longer imprisonment than the existing ones  
  
3 implement a trading ban on turtle products ;  
  
4 captive breeding programmes (conservation) ;  
5 organise clean up activity for the beach ;  
  
6 apply bioremediation to the oil pollution

Total [ 6 ]

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- 6 a(i) Made up of different populations of organisms / a community of living organisms (biotic factors) (interacting with one another) and its abiotic environment [1]
- a(ii) A, B, E,F, G, I [1]
- b(i) organic fertilisers OR untreated sewage [1]
- b(ii) This leads to eutrophication.

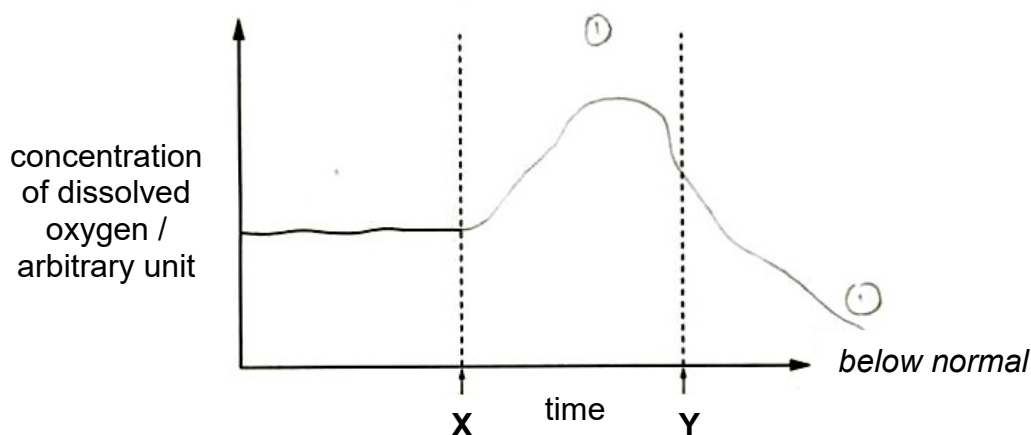
The number of plants increases because of an increase in the concentration of phosphate and nitrates in the water.

The number of fishes increases because of an increase in the number of producers (plants) / increase in concentration of dissolved oxygen produced by the plants.

The number of bacteria increases because of the decomposition of the untreated sewage.

Any 3 of the above [3]

b(iii)



[2]

- c DDT is not biodegradable / cannot be broken down / stored in tissues/fat / remain in the bodies of organisms.

Due to the inefficiency in energy transfer, the diving birds consume more small fishes. (OWTTE)

DDT get passed on from the small fishes to the diving birds leading to bioaccumulation of DDT in the bodies of diving birds.

Any 2 of the above

[2]

**[Total: 8]**

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