Relationships of organisms with one another and with the environment – 2021 O Level 5090

1. Nov/2021/Paper_11/No.28

In a pyramid of biomass, the mass of producers is 800 g / m^2.

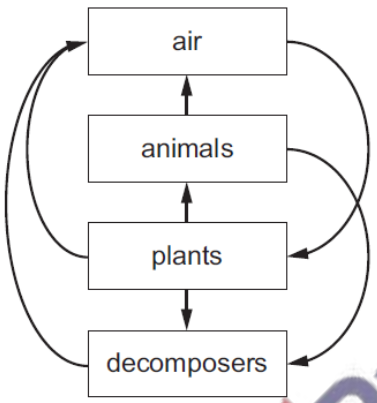
What are the likely masses of the carnivores and the herbivores?

	carnivores g / m^2	herbivores g / m^2
A	4	40
B	40	4
C	40	40
D	400	40

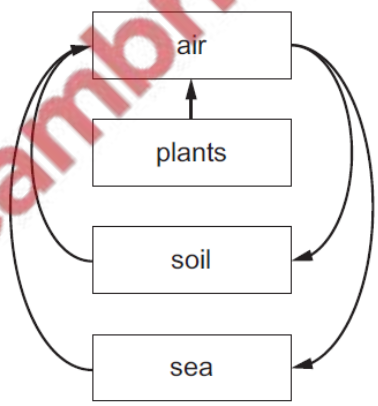
2. Nov/2021/Paper_11/No.29

Which diagram represents the flow of carbon atoms in an ecosystem?

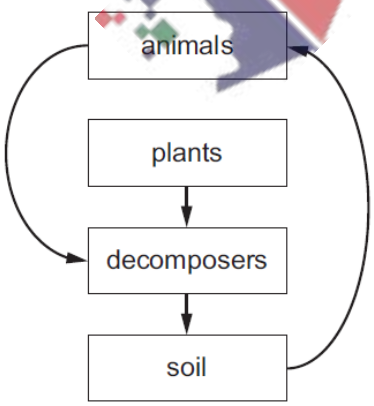
A



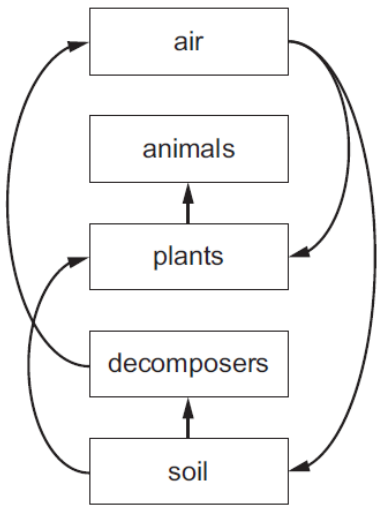
B



C

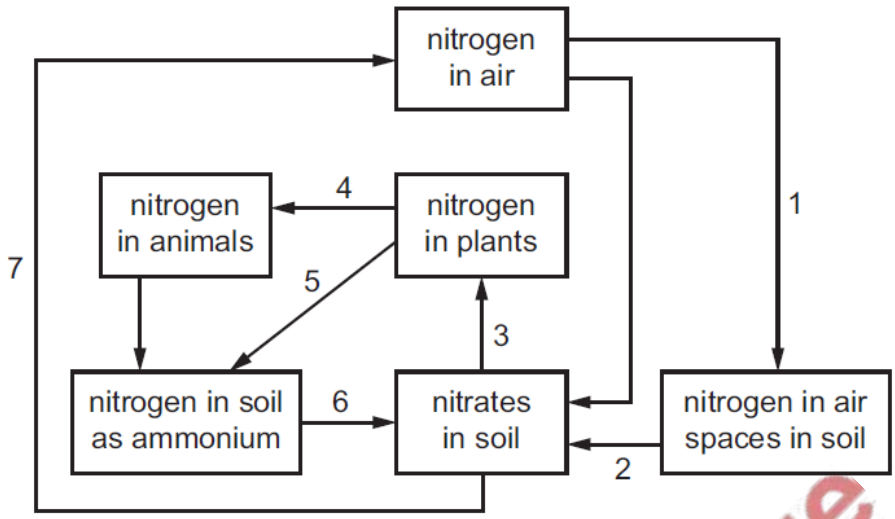


D



3. Nov/2021/Paper_11/No.30

The diagram shows the nitrogen cycle.



Which stages involve bacteria?

A 1, 2, 5 and 6

B 2, 5, 6 and 7

C 3, 5, 6 and 7

D 3, 4, 5 and 6

4. Nov/2021/Paper_11/No.31

Draining stagnant water is one method of controlling the malarial mosquito.

Which stages in the mosquito life cycle does this method affect?

A egg, larva, adult

B egg, larva, pupa

C egg, pupa, adult

D larva, pupa, adult

5. Nov/2021/Paper_11/No.32

Which gas contributes to acid rain?

A methane

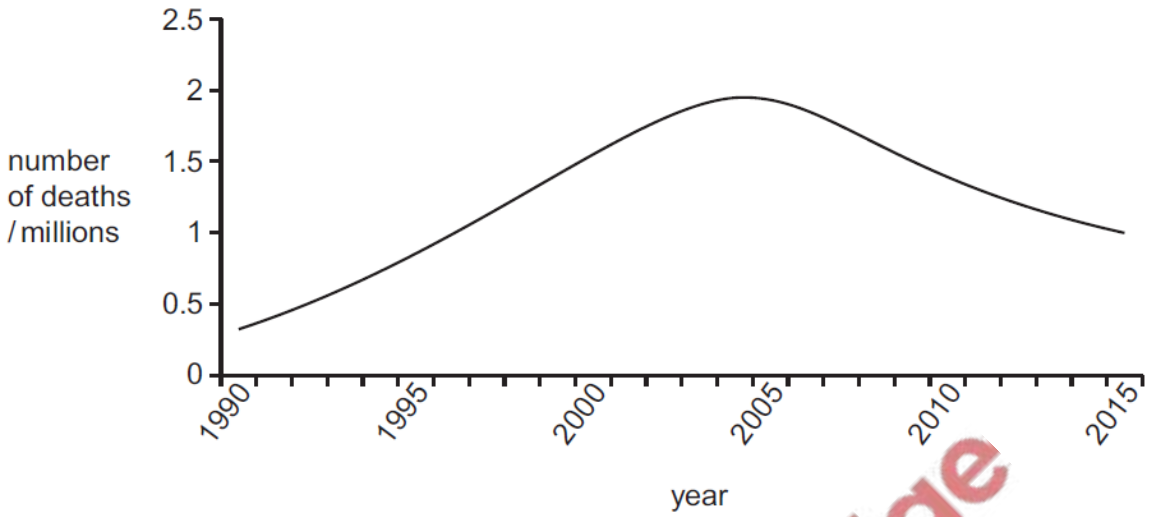
B nitrogen

C oxygen

D sulfur dioxide

6. Nov/2021/Paper_11/No.36

Infection with HIV can result in death from AIDS. The graph shows AIDS-related deaths from 1990 to 2015 in a country.



What is the best explanation for the trend in the number of AIDS-related deaths after 2005?

A More HIV-infected individuals were using natural methods of birth control.

B More HIV-infected men were using spermicides for birth control.

C More HIV-infected mothers were breastfeeding their babies.

D There was better education about HIV infection.

7. Nov/2021/Paper_12/No.28

What is a food chain?

A a diagram showing an organism getting its energy by feeding on other organisms

B a diagram showing an organism's diet

C a diagram showing the flow of energy through a chain of organisms

D a diagram showing the names of trophic levels

8. Nov/2021/Paper_12/No.29

Why is it important that carbon is cycled in nature?

A Carbon compounds needed by living organisms are produced in respiration.

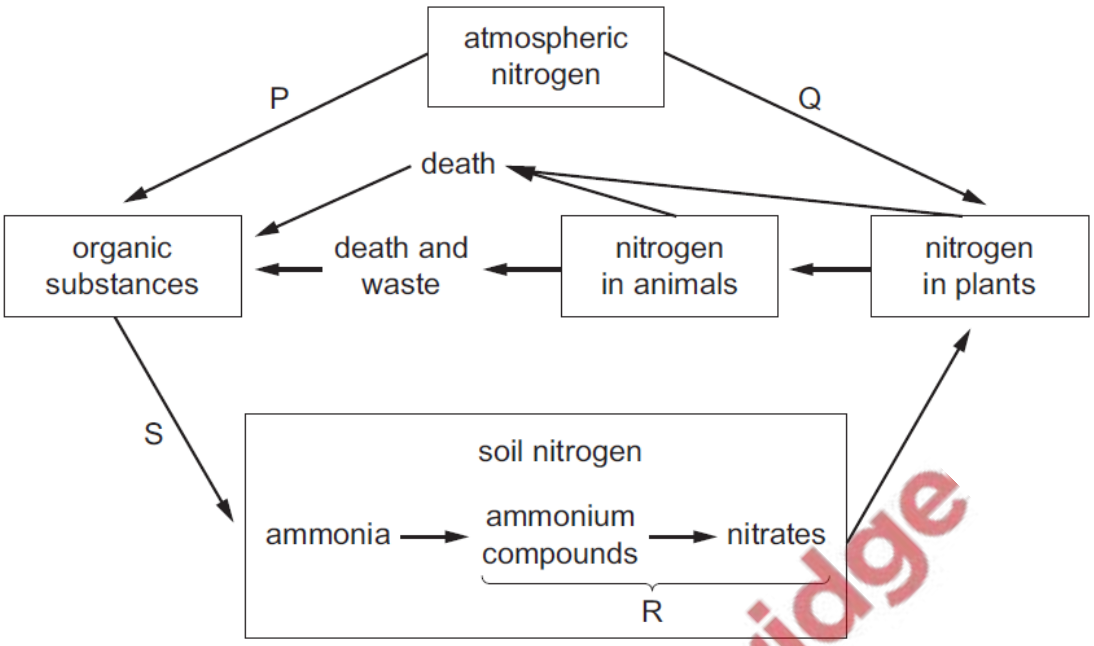
B Carbon dioxide is needed by animals for respiration.

C Living organisms need carbon compounds to make new proteins.

D Trees take in less carbon dioxide for photosynthesis than they produce in respiration.

9. Nov/2021/Paper_12/No.30

The diagram shows part of the nitrogen cycle.



What are processes P, Q, R and S?

	P	Q	R	S
A	nitrification	nitrification	decomposition	nitrogen fixation
B	nitrification	nitrogen fixation	nitrification	decomposition
C	nitrogen fixation	nitrification	decomposition	nitrogen fixation
D	nitrogen fixation	nitrogen fixation	nitrification	decomposition

10. Nov/2021/Paper_12/No.31

Draining stagnant water is one method of controlling the malarial mosquito.

Which stages in the mosquito life cycle does this method affect?

A egg, larva, adult

B egg, larva, pupa

C egg, pupa, adult

D larva, pupa, adult

11. Nov/2021/Paper_12/No.32

The table shows the source and the effect of four air pollutants.

air pollutant	source	effect
1	fossil fuels	acid rain
2	fossil fuels	greenhouse effect
3	rice fields	greenhouse effect
4	motor vehicles	acid rain

What are the four pollutants?

	1	2	3	4
A	carbon dioxide	methane	nitrogen oxides	sulfur dioxide
B	sulfur dioxide	carbon dioxide	methane	nitrogen oxides
C	methane	sulfur dioxide	nitrogen oxides	carbon dioxide
D	sulfur dioxide	carbon dioxide	nitrogen oxides	methane

12. Nov/2021/Paper_21/No.4

The kapok tree is a flowering plant that grows rapidly to become one of the tallest trees in a tropical rainforest ecosystem. Climbing plants wind up its stem and the tree provides a habitat for insect-eating birds and frogs. Bats feed on the nectar from its flowers and pollinate them so they can produce small, light seeds. Insects feed on its leaves and when the leaves fall to the ground they will come into contact with soil bacteria and fungi.

(a) (i) Use the information provided to draw a food chain for this tropical rainforest in the space provided.
The chain should contain **three** organisms.

[2]

(ii) Suggest and explain ways in which being tall may be helpful for the survival of this tree species.

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..... [3]

(iii) Explain why the bacteria and fungi found in the rainforest soil are important in this ecosystem.

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..... [3]

(b) Every year large areas of tropical rainforest are destroyed by burning.
A large percentage of the mass of a kapok tree is made of the element carbon.

(i) Name **one** substance, found in plants but not in animals, that contains carbon.

..... [1]

(ii) Explain how burning trees contributes to global warming.

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..... [2]

[Total: 11]

13. Nov/2021/Paper_22/No.7

Costa Rica is a small country that covers approximately 0.03% of the Earth's surface.

Approximately 5% of the world's plant and animal species can be found in Costa Rica.

The table shows the percentage of Costa Rica's land surface covered in forest at different times between 1940 and 2010.

year	percentage forest cover
1940	75
1950	72
1961	53
1977	31
1983	26
1987	21
1997	42
2000	47
2005	51
2010	53

(a) Describe, with reference to data in the table, how the percentage of forest cover changed between 1940 and 2010.

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..... [2]

(b) Explain the possible negative effects of the change in forest cover between 1940 and 1987.

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(c) Suggest reasons for the change in forest cover between 1987 and 2010.

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..... [3]

[Total: 10]

14. Jun/2021/Paper_11/No.28

These processes occur in living organisms in a food chain.

1 excretion

2 photosynthesis

3 respiration

Which processes would result in a loss of energy from a food chain?

A 1 and 2 **B** 1 and 3 **C** 2 only **D** 3 only

15. Jun/2021/Paper_11/No.29

Which statements are correct?

1 Energy cannot be recycled in food webs.

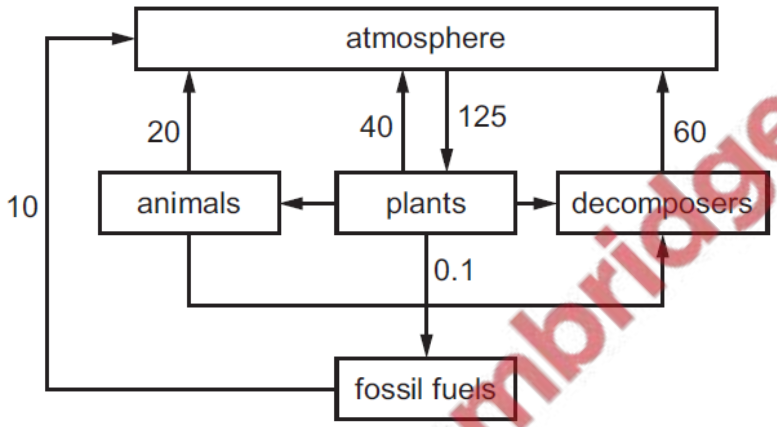
2 Producers make their own organic nutrients.

3 The Sun is the principal source of energy input to biological systems.

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

16. Jun/2021/Paper_11/No.30

The diagram shows the movement of carbon in the carbon cycle, in gigatonnes per year.



How many gigatonnes of carbon are moved by respiration each year?

A 120 **B** 125 **C** 130 **D** 255

17. Jun/2021/Paper_11/No.32

Which human activity will make the greatest contribution to global warming?

A cutting down established trees and replanting with young trees

B cutting down established trees and using the cleared land to raise cattle

C reducing the use of diesel fuel in public transport vehicles

D using fewer insecticides and herbicides on farms

18. Jun/2021/Paper_12/No.27

Which microorganisms are involved in the decomposition of dead plant material?

	bacteria	fungi	viruses
A	yes	no	yes
B	yes	yes	no
C	no	yes	yes
D	yes	no	no

19. Jun/2021/Paper_12/No.28

What is the reason for describing the flow of energy through an ecosystem as non-cyclic?

A The energy cannot be returned to its original source.

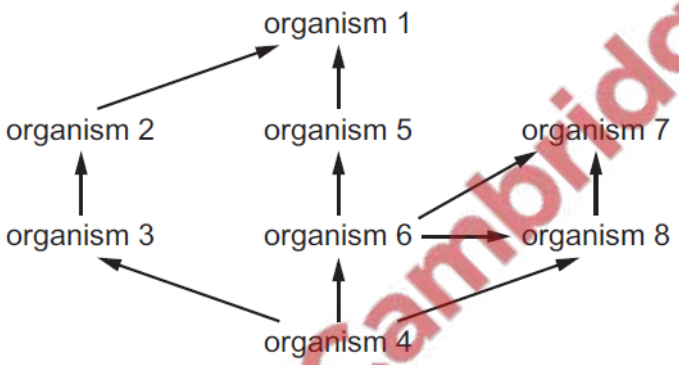
B The energy cannot have its form changed within an organism.

C The energy can only be passed on in its original form.

D The energy can only be transferred to a larger organism.

20. Jun/2021/Paper_12/No.29

The diagram shows a complete food web.

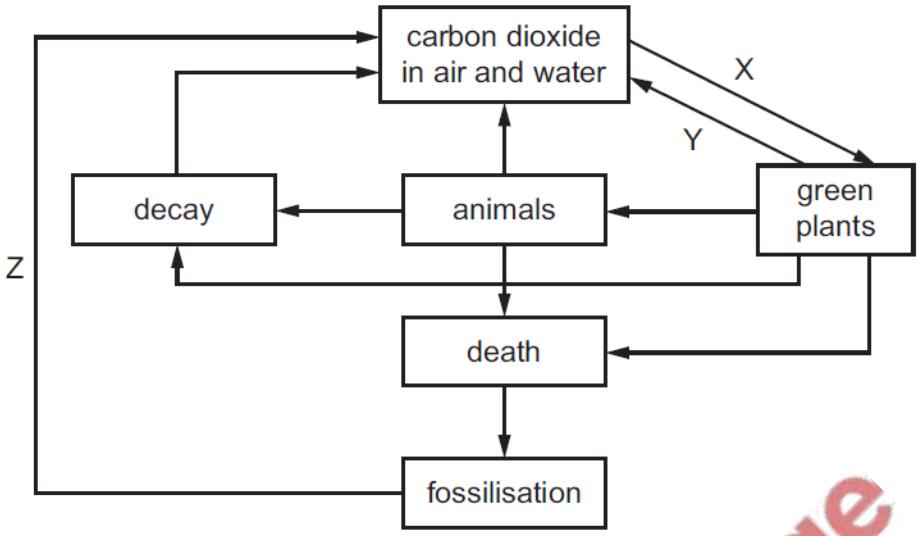


Which row identifies examples of the types of organisms in this food web?

	carnivore	consumer	herbivore	producer
A	2	7	8	4
B	4	2	3	1
C	6	4	8	1
D	7	3	2	4

21. Jun/2021/Paper_12/No.30

The diagram shows part of the carbon cycle.



What do X, Y and Z represent?

	X	Y	Z
A	combustion	respiration	ingestion
B	combustion	ingestion	respiration
C	photosynthesis	respiration	combustion
D	photosynthesis	combustion	respiration

22. Jun/2021/Paper_12/No.31

Coastal marine regions are environments with a rich plant and animal diversity.

Which process would reduce the biodiversity of these environments?

A banning fishing during the fish breeding season

B increasing the mesh size for any fishing nets used

C stopping the release of raw sewage into the sea

D allowing fishing methods that disturb the seabed

23. Jun/2021/Paper_12/No.32

Hardwood trees in tropical rainforests are often harvested for timber. A single quick-growing crop, such as palm oil, is then grown on the same land.

What effect will removing the rainforest have on the environment?

A decreased run off into rivers and flooding

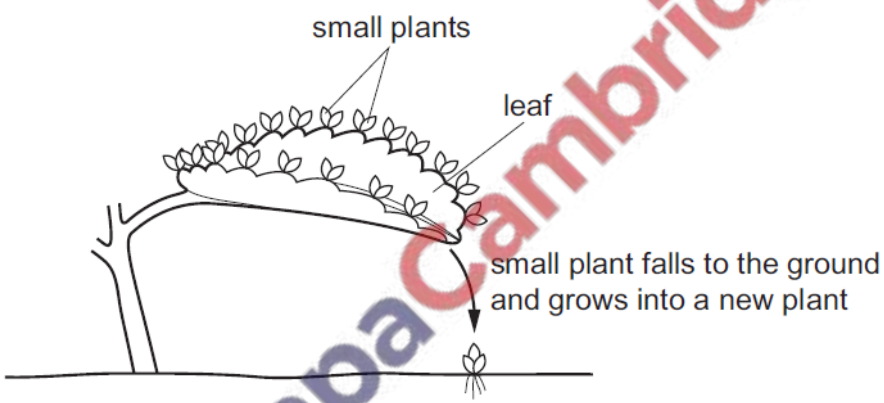
B improved soil structure and soil nutrients

C reduced soil erosion by wind and rain

D reduced biodiversity of the area

24. Jun/2021/Paper_12/No.33

The diagram shows part of a *Bryophyllum* plant.



Which best describes how the new plants are produced?

	type of reproduction		type of cell division	
	asexual reproduction	sexual reproduction	meiosis	mitosis
A	✓	✗	✓	✗
B	✓	✗	✗	✓
C	✗	✓	✓	✗
D	✗	✓	✗	✓

key

✓ = yes

✗ = no

25. Jun/2021/Paper_21/No.3

A sycamore tree is a producer for many food chains in a forest ecosystem.

(a) Explain what is meant by:

(i) a producer

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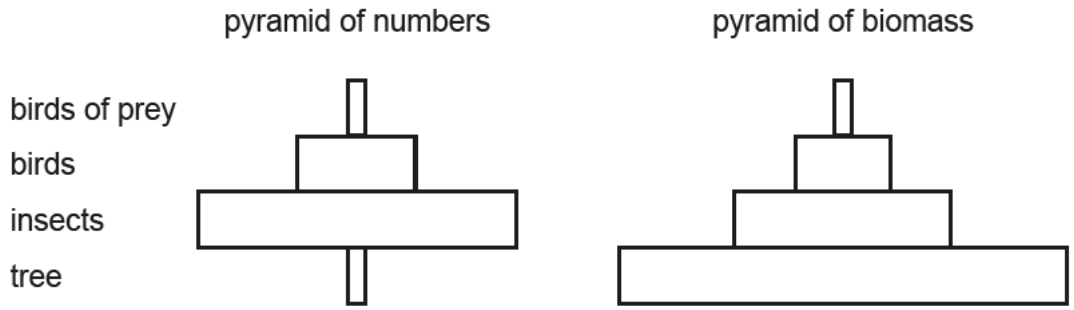
..... [1]

(ii) a food chain.

.....

..... [1]

(b) The diagrams show a pyramid of numbers and a pyramid of biomass for a sycamore tree.



Explain the different shapes of the two pyramids.

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..... [4]

(c) Sycamore trees produce flowers that are insect-pollinated.
Suggest **two** features of flowers which adapt them for insect-pollination.

1 .....

2 .....

[2]

(d) State the type of cell division that produces pollen grains.

..... [1]

[Total: 9]

26. Jun/2021/Paper_21/No.8

(a) Rice, maize and wheat plants are the main carbohydrate source for more than 60% of the human population.

Describe how plants like these produce carbohydrates using materials from the environment.

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..... [5]

(b) Many scientists predict that, as the world's human population increases, there will be a shortage of food.

Suggest and explain why an increase in human population is predicted to lead to a global human food shortage.

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..... [5]

[Total: 10]