

Week 26

IGCSE Biology

Homework bundle for this week

本周作业合集

exercises.lol

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IGCSE Biology

Name: _____ Score: _____

1. The original source of energy for almost all ecosystems is the:
 - ☐ Sun
 - ☐ soil
 - ☐ wind
 - ☐ water
2. In a food chain, the arrows show the direction of:
 - ☐ energy flow (from food to eater)
 - ☐ energy flow (from eater to food)
 - ☐ water movement
 - ☐ oxygen flow
3. A trophic level is:
 - ☐ a feeding stage in a food chain
 - ☐ a type of producer
 - ☐ a decomposer
 - ☐ a habitat
4. Which process removes carbon dioxide from the air?
 - ☐ photosynthesis
 - ☐ respiration
 - ☐ combustion
 - ☐ decomposition
5. Why can't plants use nitrogen gas from the air directly?
 - ☐ it is unreactive
 - ☐ it is poisonous
 - ☐ there is too little of it
 - ☐ it is too heavy
6. Roughly what percentage of energy is passed to the next trophic level?

7. Which are limiting factors on a population? (Select all that apply.)

- ☐ food supply
- ☐ space
- ☐ predators
- ☐ sunlight on the Moon

Tick every correct option.

8. How is energy lost between trophic levels? (Select all that apply.)

- ☐ heat from respiration
- ☐ movement
- ☐ undigested waste
- ☐ photosynthesis

Tick every correct option.

9. Energy flows through an ecosystem and is lost, rather than being recycled.

- ☐ True ☐ False

10. Decomposers break down dead matter and recycle nutrients.

- ☐ True ☐ False

IGCSE Biology

1. **Sun**

Producers capture the Sun's energy.

2. **energy flow (from food to eater)**

Arrows point from the eaten to the eater.

3. **a feeding stage in a food chain**

Each feeding stage is a trophic level.

4. **photosynthesis**

Photosynthesis fixes CO₂ into glucose.

5. **it is unreactive**

N₂ is unreactive; it must be turned into nitrates.

6. **10**

About 10% is passed on; the rest is lost.

7. **food supply; space; predators**

Food, space and predators limit growth.

8. **heat from respiration; movement; undigested waste**

Photosynthesis captures energy; the others lose it.

9. **True**

Energy must be resupplied by the Sun; only nutrients cycle.

10. **True**

Bacteria and fungi recycle nutrients back to the soil.

19.1 Energy flow

Name: _____ Class: _____ Date: _____

Total: 7 marks

KEY WORDS energy 能量 • trophic levels 营养级 • energy flow 能量流动 • respiration 呼吸作用 • food chain 食物链

Objective

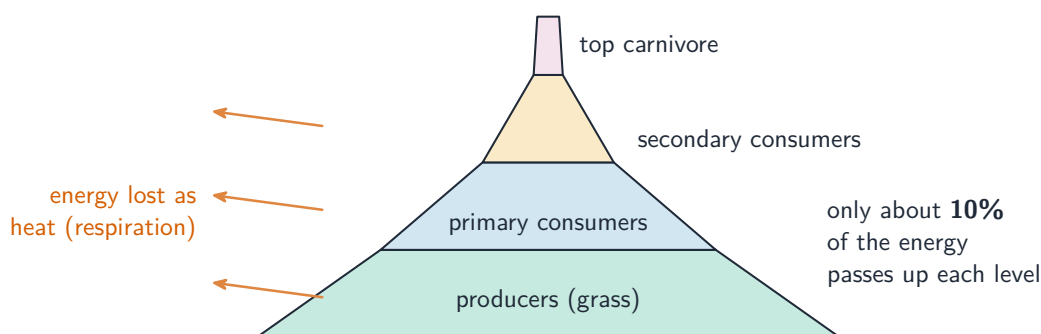
Build the skills to answer exam questions on **energy flow** 能量流动 — the Sun as the source, **trophic levels** 营养级, energy loss, and pyramids.

You must be able to:

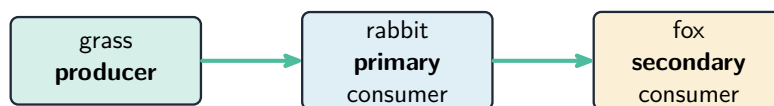
- describe how energy enters and flows through a food chain
- explain why only ~10% of energy passes up each level
- interpret pyramids of numbers, biomass and energy

1 Worked examples

■ Energy loss



Energy enters from the Sun, flows one way, and is lost as heat at each level (~10% passes up)



each arrow shows energy flowing to the next organism

Energy flows along a food chain

- the rest is lost as heat (respiration), in movement and in waste.

- so chains have fewer than ~5 levels; eating plants directly wastes less energy.

2 Practice

2.1 State the main source of energy for almost all food chains. [1]

2.2 State the form in which most energy is lost at each trophic level. [1]

3 Exam-style questions

3.1 Roughly what percentage of energy passes from one trophic level to the next? [1]

- **A** 1%
 - **B** 10%
 - **C** 50%
 - **D** 90%
-

3.2 Energy is lost along a food chain.

(a) Explain why food chains usually have fewer than five trophic levels. [2]

(b) Explain why it is more efficient for people to eat crop plants than meat. [2]

Solutions

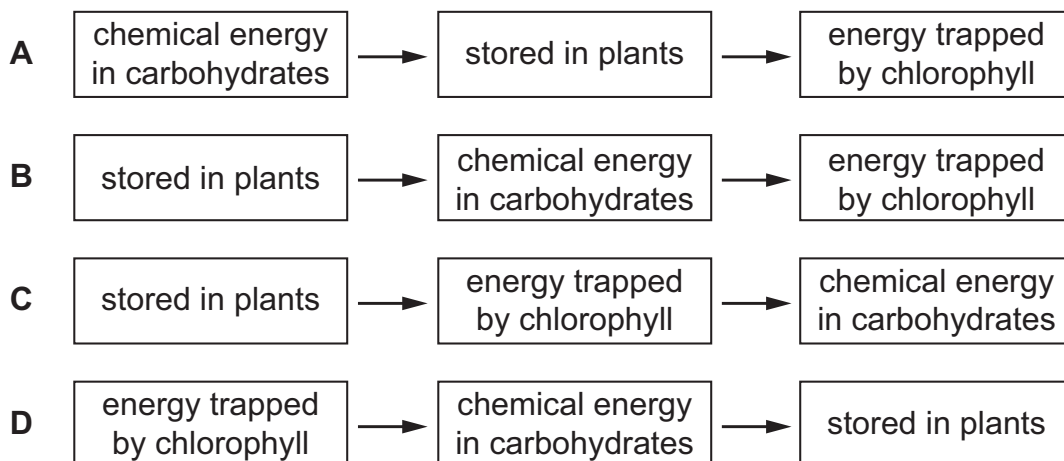
2.1 the Sun.

2.2 as heat (from respiration).

3.1 B. About 10% passes up each level.

3.2 (a) energy is lost at each level, so after a few levels too little is left to support another.
(b) eating plants directly is one trophic level; eating meat adds a level, where energy is lost, so it is less efficient.

32 Which flowchart shows how energy is transferred from the Sun to an organism?



35 Which unit could be used for the measurements needed to construct a pyramid of energy?

- A** kJ per g per m²
- B** kJ per kg per year
- C** kJ per m² per year
- D** kJ per kg

4 Steppe ecosystems are large areas of grasslands found in central Asia.

(a) Fig. 4.1 is a food web from a steppe ecosystem.

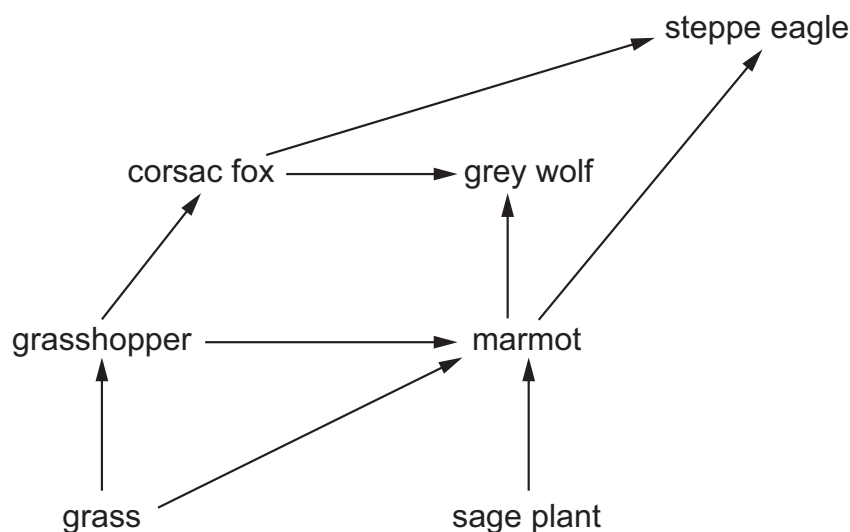


Fig. 4.1

(i) State the name of **one** primary consumer from Fig. 4.1.

..... [1]

(ii) Use the information in Fig. 4.1 to construct **one** food chain with four trophic levels that includes the steppe eagle.

[1]

(iii) There are fewer grey wolves than marmots in this ecosystem.

Explain why the population size of organisms decreases from one trophic level to the next trophic level in this ecosystem.

.....
.....
.....
.....
..... [2]

- (b) Fig. 4.2 is a photograph of a wild horse. Przewalski's horse is a type of wild horse that nearly became extinct.



Fig. 4.2

After a captive breeding programme, they have been successfully reintroduced to the steppe ecosystem.

The captive breeding programme started with 12 wild horses.

- (i) Explain the risks to a species of a captive breeding programme that uses such a small number of individuals.

.....

.....

.....

.....

.....

.....

..... [3]

- (ii) Suggest ways of maintaining a population of Przewalski's horse in the wild after their reintroduction to the steppe ecosystem.

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..... [4]

- (c) *In vitro* fertilisation (IVF) can be used in captive breeding programmes.

Fig. 4.3 shows some of the stages involved in IVF.

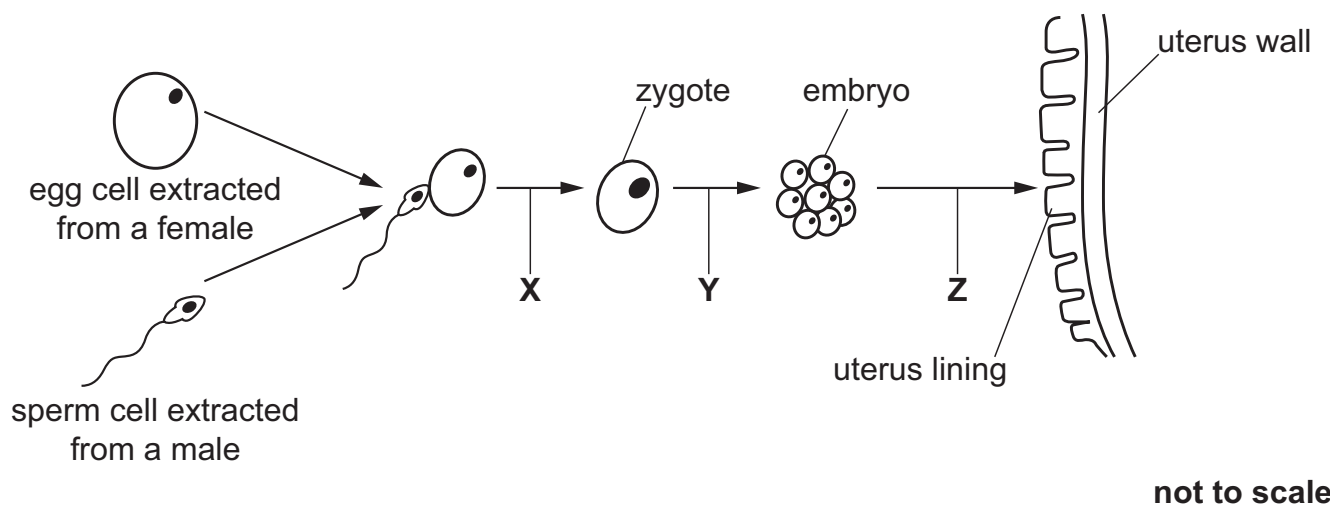


Fig. 4.3

State the names of the processes occurring at X, Y and Z in Fig. 4.3.

X

Y

Z

[3]

[Total: 14]

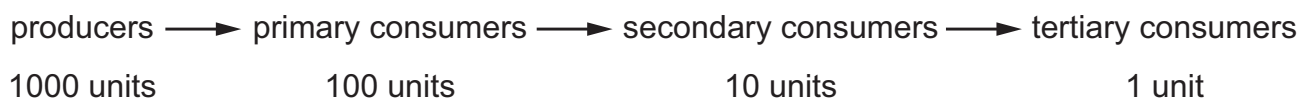
34 Which statement about a pyramid of energy for a food chain is correct?

- A** It shows how energy is lost at each trophic level.
- B** It shows the energy stored at each trophic level.
- C** It shows the input of energy from the principal source.
- D** It shows the total energy stored within an ecosystem.

35 Which row describes the energy flow into and through a food chain that starts with a plant?

	energy entering a food chain	energy transferred between organisms in a food chain
A	chemical	chemical
B	chemical	heat
C	light	chemical
D	light	heat

36 The diagram shows the flow of energy, in units of energy, through a food chain.



Which percentage of energy is lost between the producers and secondary consumers?

- A** 1%
- B** 10%
- C** 90%
- D** 99%

1 (a) Fig. 1.1 shows a pyramid of energy for an ecosystem.

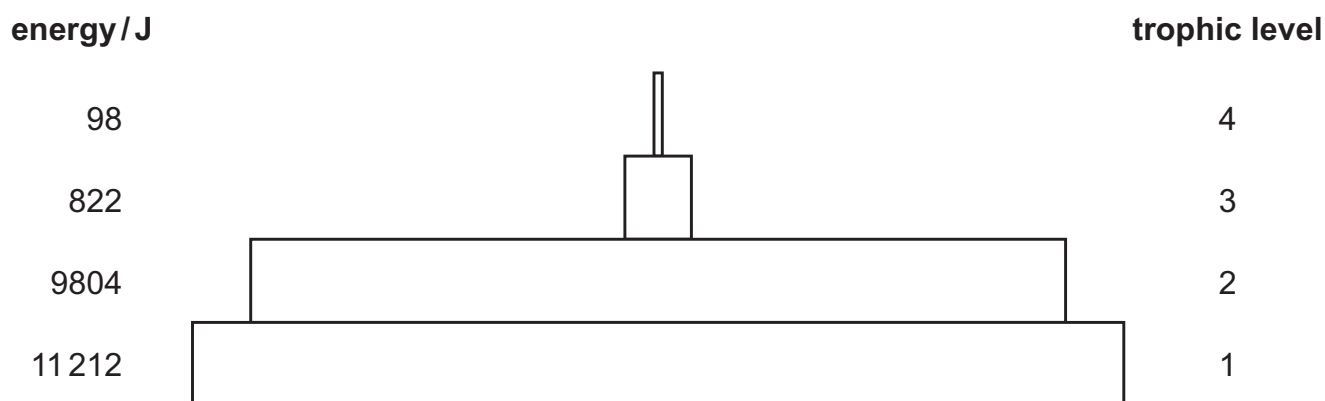


Fig. 1.1

(i) State where the organisms in trophic level 1 in Fig. 1.1 get their energy from.

..... [1]

(ii) Calculate the percentage of energy transferred between trophic levels 2 and 3 in Fig. 1.1.

Give your answer to **one** significant figure.

..... [2]

(iii) State **two** reasons why the energy decreases between trophic levels 1 and 4, as shown in Fig. 1.1.

1

2

[2]

(iv) Describe the advantages of representing food chains using a pyramid of energy compared with a pyramid of biomass.

.....

.....

.....

.....

..... [2]

34 The food chain shows how energy is transferred to a human.

lettuce → snails → duck → human

Where did the energy in the lettuce come from?

- A** snails
- B** soil
- C** the Sun
- D** water

19.2 Food chains and food webs

Name: _____ Class: _____ Date: _____

Total: 6 marks

KEY WORDS food chain 食物链 • consumer 消费者 • food web 食物网 • species 物种 • herbivore 食草动物

Objective

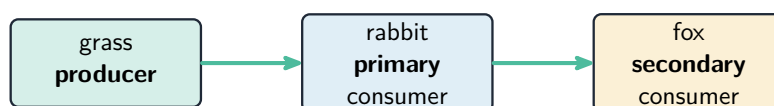
Build the skills to answer exam questions on **food chains and food webs** 食物链与食物网 — the terms, reading a web, and human impact.

You must be able to:

- define producer, consumer, herbivore, carnivore, decomposer
- read a food chain/web and the direction of energy flow
- explain the effect of overharvesting and introduced species

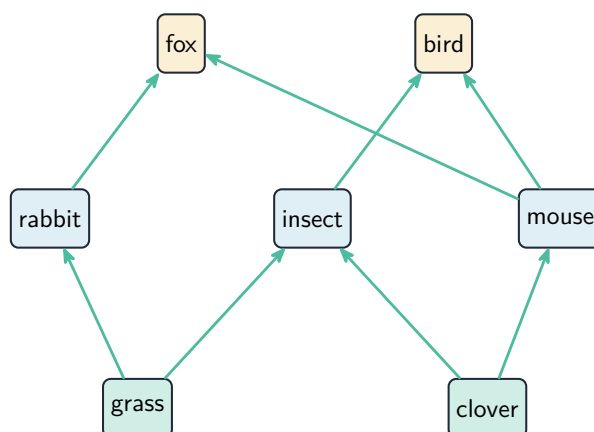
1 Worked examples

■ Food chains and webs



each arrow shows energy flowing to the next organism

Arrows show energy flow; a chain starts with a producer



A food web is several food chains linked together

- **producer:** makes its own food; **consumer:** feeds on others; **decomposer:** feeds on dead matter.

2 Practice

2.1 Define a producer. [1]

2.2 State what the arrows in a food chain show. [1]

3 Exam-style questions

3.1 In the chain grass $\rightarrow$ rabbit $\rightarrow$ fox, the rabbit is a: [1]

- A producer
 - B primary consumer
 - C secondary consumer
 - D decomposer
-

3.2 A food web links several chains.

(a) Explain what could happen to the other organisms if all the rabbits were removed. [2]

(b) State one way humans can damage a food web. [1]

Solutions

2.1 an organism that makes its own food (usually by photosynthesis).

2.2 the direction of energy flow (from one organism to the next).

3.1 B. The rabbit eats the producer, so it is a primary consumer.

3.2 (a) animals that ate rabbits (e.g. foxes) would have less food and may decrease; plants the rabbits ate may increase.

(b) overharvesting (e.g. overfishing) or introducing a foreign species.

33 Which statements about a food chain are correct?

- 1 Between trophic level 1 and trophic level 2, energy is passed from a herbivore to a carnivore.
- 2 Between trophic level 2 and trophic level 3, energy is passed from a primary consumer to a secondary consumer.
- 3 Between trophic level 3 and trophic level 4, energy is passed from a secondary consumer to a tertiary consumer.

A 1 and 3

B 1 only

C 2 and 3

D 2 only

38 In which trophic level are herbivores found?

- A** primary consumers
- B** quaternary consumers
- C** secondary consumers
- D** tertiary consumers

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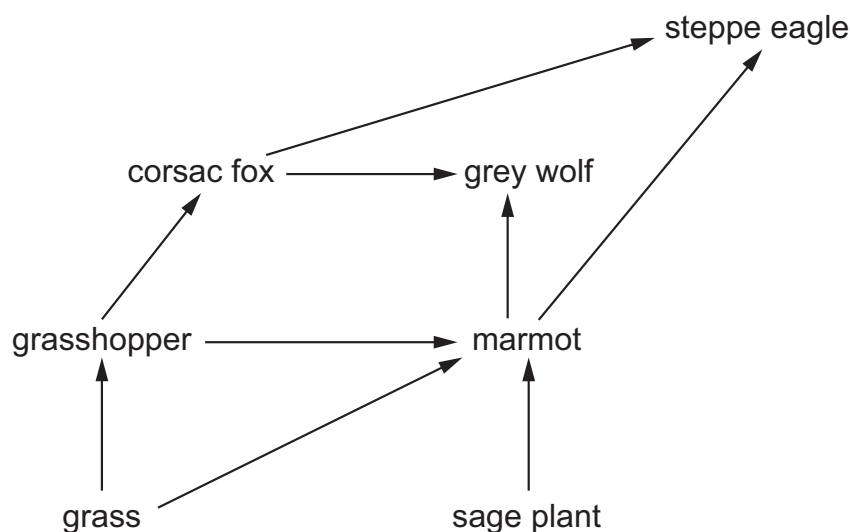


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Explain why the population size of organisms decreases from one trophic level to the next trophic level in this ecosystem.

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- (b) Fig. 4.2 is a photograph of a wild horse. Przewalski's horse is a type of wild horse that nearly became extinct.



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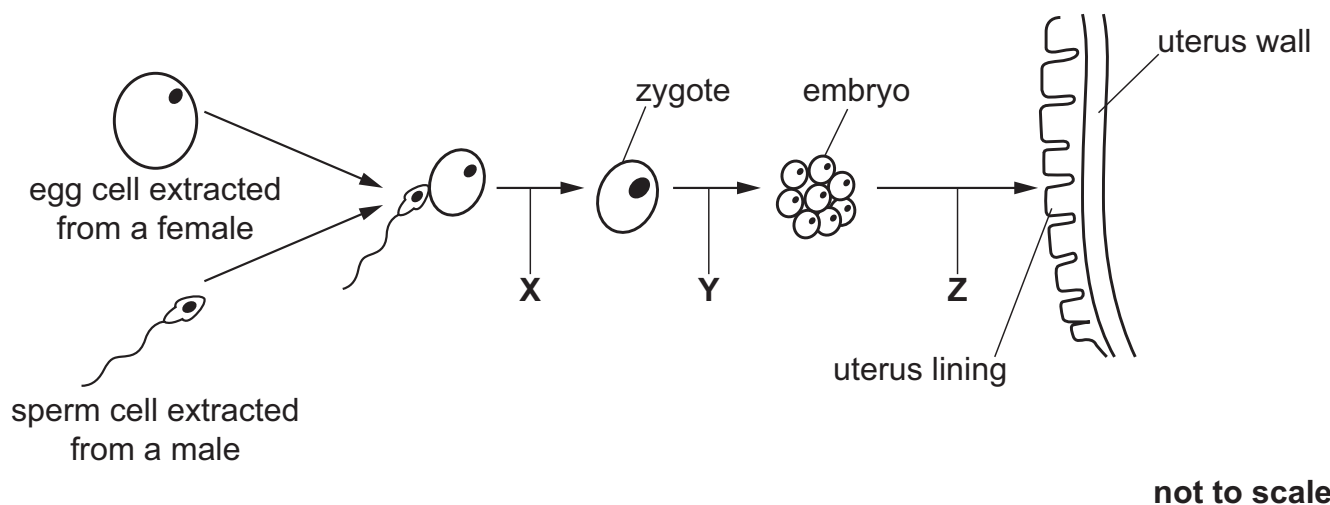


Fig. 4.3

State the names of the processes occurring at X, Y and Z in Fig. 4.3.

X

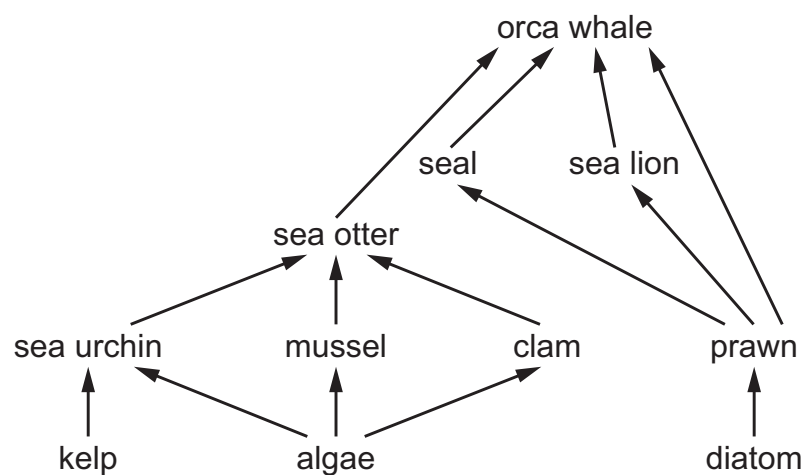
Y

Z

[3]

[Total: 14]

35 The food web shows part of an ocean ecosystem.

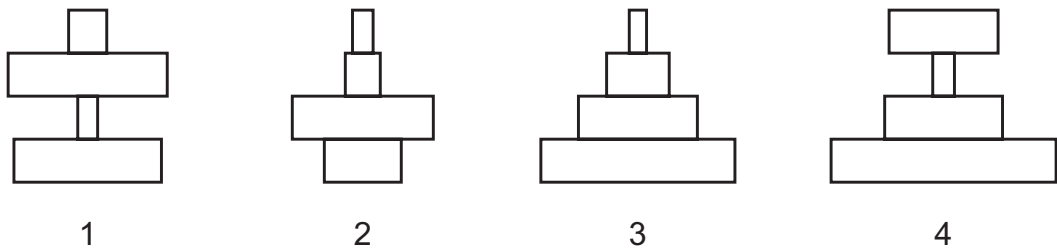


Which row shows the number of secondary consumers and the number of tertiary consumers in the food web?

	number of secondary consumers	number of tertiary consumers
A	three	one
B	four	one
C	three	two
D	four	two

36 In a food chain, zebras are large mammals that eat grass. The zebras have many insects living on them which suck their blood. Birds eat the insects.

The diagrams show some biological pyramids.



Which row identifies the types of pyramids for this food chain?

	pyramid of energy	pyramid of numbers
A	4	2
B	3	2
C	3	1
D	4	1

36 Which organisms can be sources of energy for decomposers?

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

key
✓ = yes
✗ = no

19.3 Nutrient cycles

Name: _____ Class: _____ Date: _____

Total: 7 marks

KEY WORDS nitrogen cycle 氮循环 • nitrate ions 硝酸根离子 • carbon dioxide 二氧化碳 • nitrogen fixation 固氮作用
 • fossil fuels 化石燃料

Objective

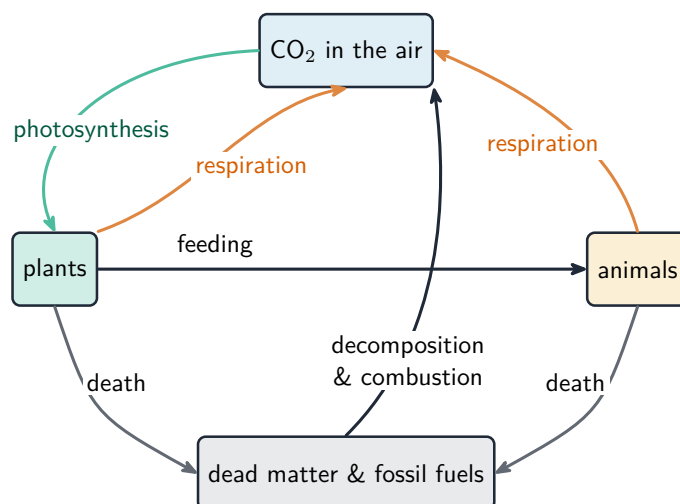
Build the skills to answer exam questions on **nutrient cycles** 营养循环 — the **carbon cycle** 碳循环 and the **nitrogen cycle** 氮循环.

You must be able to:

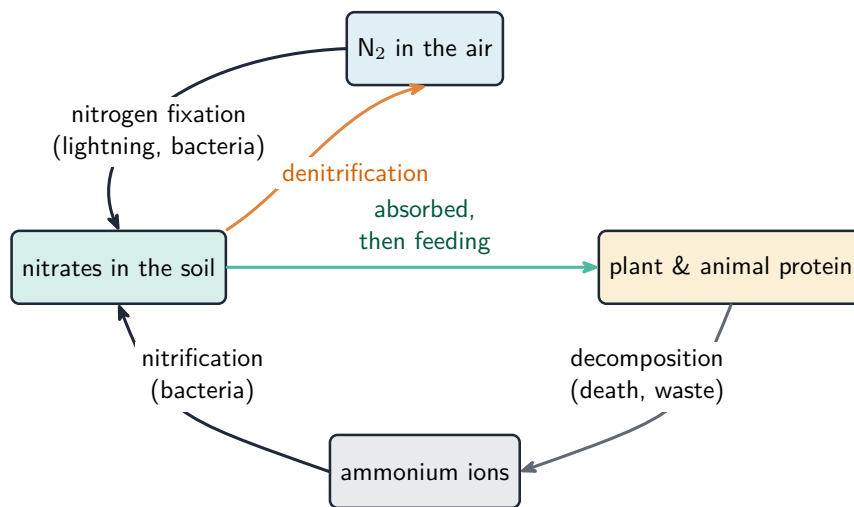
- describe the carbon cycle (photosynthesis, respiration, combustion, decay)
- describe the nitrogen cycle and the roles of microorganisms
- contrast nutrient recycling with one-way energy flow

1 Worked examples

■ Carbon and nitrogen cycles



Photosynthesis removes CO₂; respiration, combustion and decay return it



Microorganisms: decomposition, nitrification, nitrogen fixation, denitrification

2 Practice

2.1 Name the process that removes carbon dioxide from the air. [1]

2.2 Name two processes that return carbon dioxide to the air. [2]

3 Exam-style questions

3.1 In the nitrogen cycle, bacteria that turn ammonium ions into nitrate ions carry out:[1]

- **A** nitrogen fixation
 - **B** nitrification
 - **C** denitrification
 - **D** decomposition
-

3.2 The carbon cycle keeps carbon moving.

(a) Describe how carbon passes from a plant to a consumer. [1]

(b) Explain how burning fossil fuels affects the carbon cycle. [2]

Solutions

2.1 photosynthesis.

2.2 respiration; combustion (burning).

3.1 B. Turning ammonium into nitrate is nitrification.

3.2 (a) the consumer eats the plant (feeding).

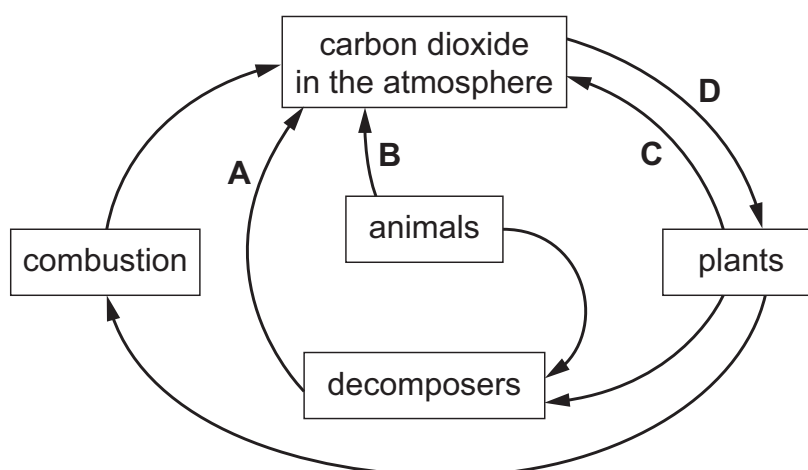
(b) it releases carbon dioxide into the air, adding to the amount in the atmosphere.

34 Which process in the nitrogen cycle is involved in the breakdown of amino acids in living organisms?

- A** deamination
- B** decomposition
- C** denitrification
- D** digestion

35 The diagram shows part of the carbon cycle.

Which arrow represents photosynthesis?



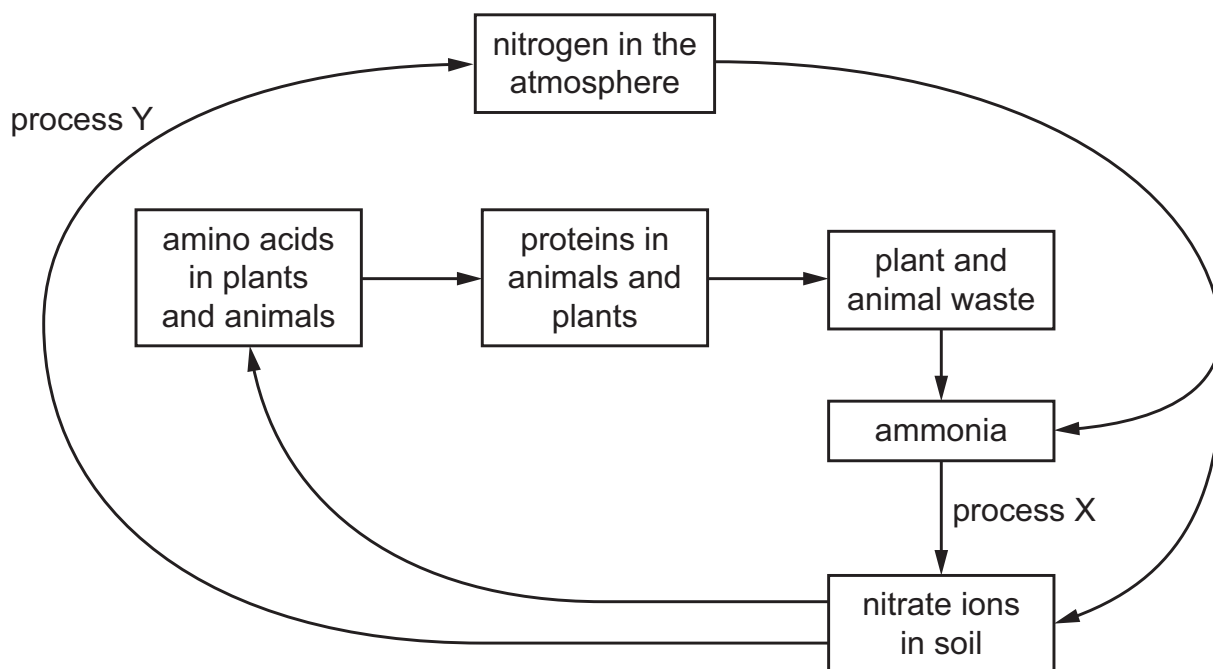
36 Which process needs microorganisms to break down protein to produce ammonium ions?

- A** decomposition
- B** denitrification
- C** nitrification
- D** nitrogen fixation

35 Which process removes carbon dioxide from the atmosphere?

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

36 The diagram shows part of the nitrogen cycle.



What are the names of process X and process Y?

	X	Y
A	deamination	denitrification
B	nitrogen fixation	deamination
C	nitrogen fixation	nitrification
D	nitrification	denitrification

3 Fig. 3.1 is a diagram of the nitrogen cycle.

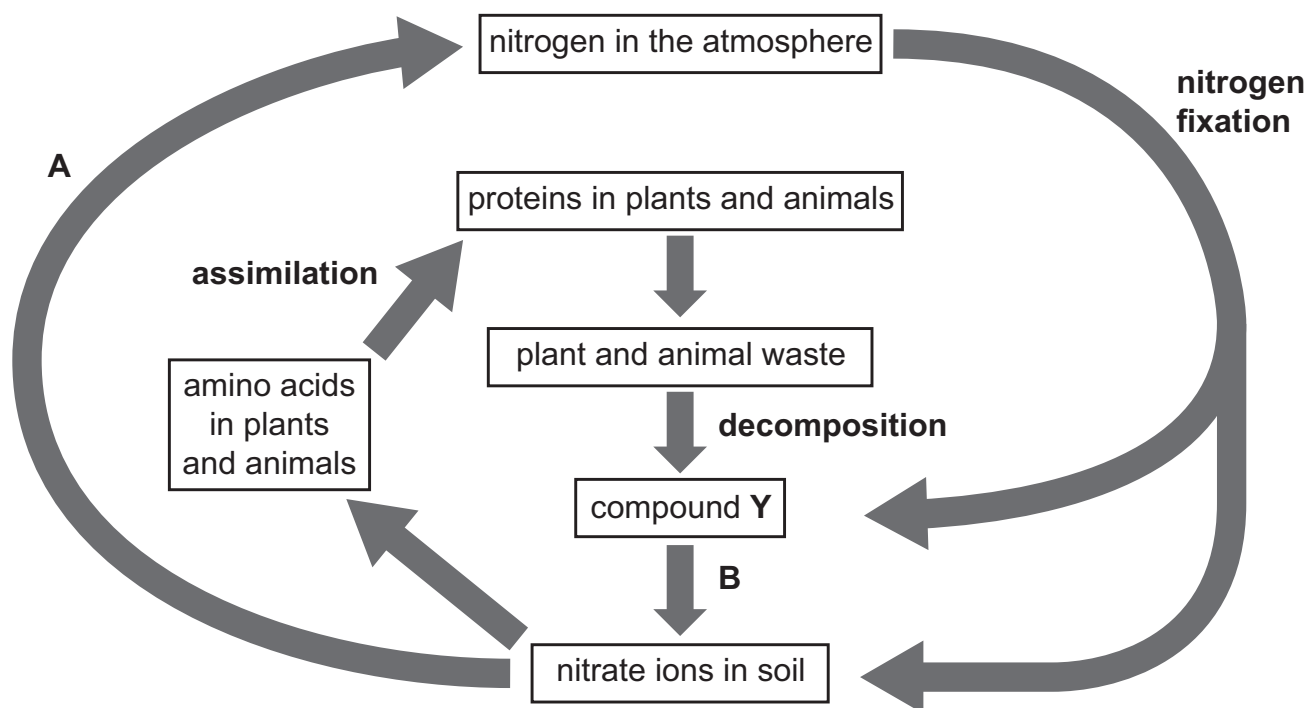


Fig. 3.1

(a) (i) State the names of processes **A** and **B** in Fig. 3.1.

A

B

[2]

(ii) State **two** ways that nitrogen fixation can occur.

1

2

[2]

(iii) State the name of compound **Y** in Fig. 3.1.

..... [1]

(iv) State the name of an organ in animals, where assimilation **and** deamination of amino acids occurs.

..... [1]

(v) Describe the process of deamination.

.....

.....

.....

.....

..... [2]

(b) Complete the sentences about pollution of the air by writing the appropriate words or phrases in the spaces provided.

Methane is a pollutant gas that contributes to the enhanced
and climate change. Methane is released into the atmosphere from cattle and from the
farming of crops.

..... is a gas that is absorbed by trees in the process
of This gas is released into the atmosphere by the
..... of fossil fuels, where it also contributes to climate change. [5]

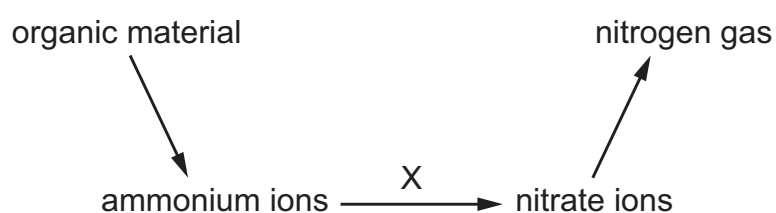
(c) Explain the process of eutrophication in aquatic ecosystems.

[6]

[6]

[Total:19]

37 The diagram shows part of the nitrogen cycle.



What is the process labelled X in the diagram?

- A** decomposition
B denitrification
C nitrification
D nitrogen fixation

37 Which process in the nitrogen cycle can be caused by lightning and bacteria?

- A** deamination
- B** denitrification
- C** nitrification
- D** nitrogen fixation

35 The processes listed affect the concentration of carbon dioxide in the atmosphere.

- 1 increased deforestation
- 2 increased tree planting
- 3 decreased fossil fuel combustion
- 4 increased fossil fuel combustion

Which processes increase the concentration of carbon dioxide in the atmosphere?

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

19.4 Populations

Name: _____ Class: _____ Date: _____

Total: 7 marks

KEY WORDS population 种群 • death phase 衰亡期 • stationary phase 稳定期 • competition 竞争
• predation 捕食

Objective

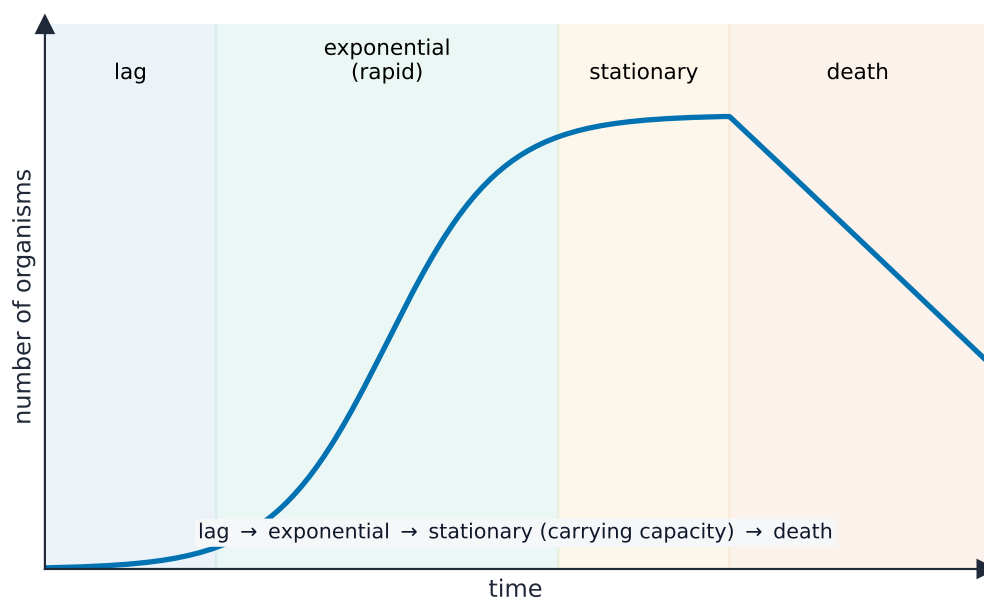
Build the skills to answer exam questions on **populations** 种群 — the terms, and the **S-shaped growth curve** S 形增长曲线.

You must be able to:

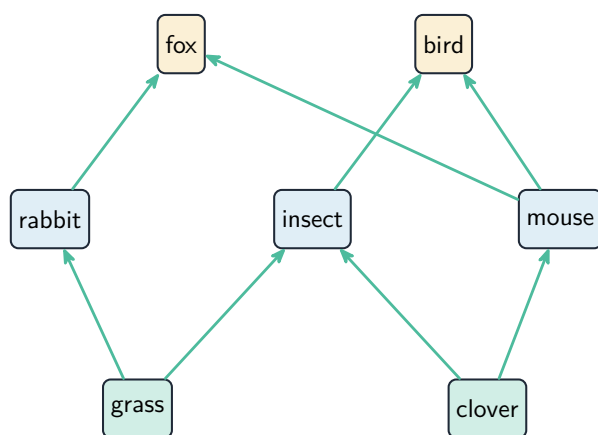
- define population, community and ecosystem
- describe the factors that affect population growth
- name and explain the phases of the S-shaped growth curve

1 Worked examples

■ Population growth



Four phases: lag (slow), exponential (fast), stationary (births $\approx$ deaths), death (numbers fall)



Populations interact in a food web

- **population:** one species, one area, one time.
- growth depends on food, competition, predation and disease.

2 Practice

2.1 Define a population.

[1]

2.2 Name the phase of fastest growth.

[1]

3 Exam-style questions

3.1 In the stationary phase of population growth:

[1]

- **A** the population is growing fastest
- **B** births roughly equal deaths
- **C** the population is dying out
- **D** there are no organisms

3.2 A population grows in a place with limited resources.

(a) State two factors that limit population growth.

[2]

(b) Explain why the population enters a death phase.

[2]

Solutions

2.1 a group of organisms of one species, living in the same area at the same time.

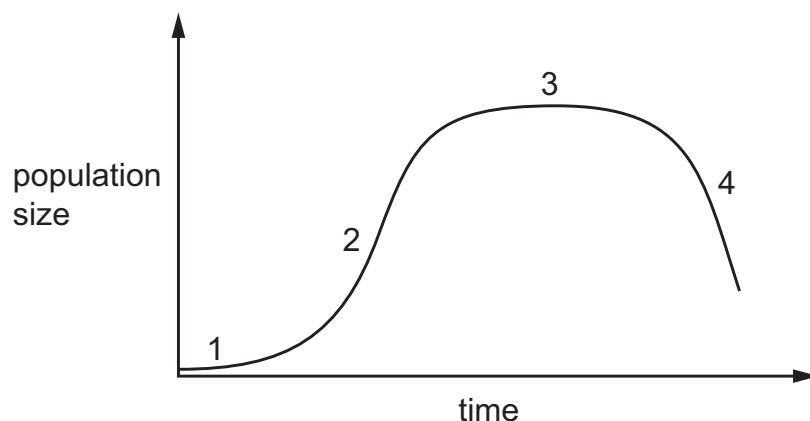
2.2 the exponential (log) phase.

3.1 B. In the stationary phase births roughly equal deaths.

3.2 (a) any two of: food supply; competition; predation; disease.

(b) food runs out (or wastes build up / disease spreads), so deaths exceed births and numbers fall.

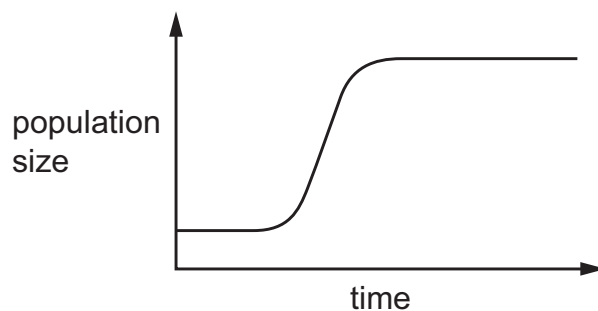
36 The graph shows how the size of a population changes over time.



Which row identifies the phases of population growth?

	death phase	exponential phase	lag phase
A	3	1	4
B	3	2	1
C	4	1	3
D	4	2	1

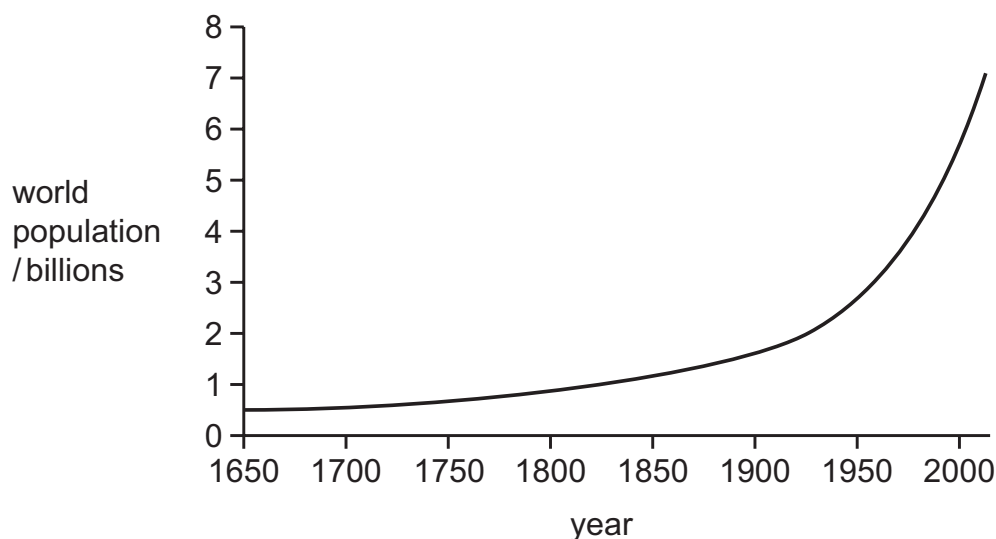
37 The graph shows part of a growth curve for a bacterial population.



What is **not** shown in the graph?

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

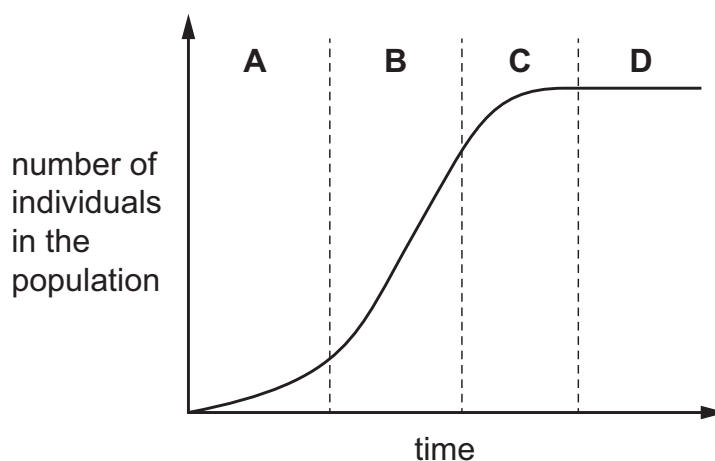
37 The graph shows how the population of the world increased from 1650 until the present day.



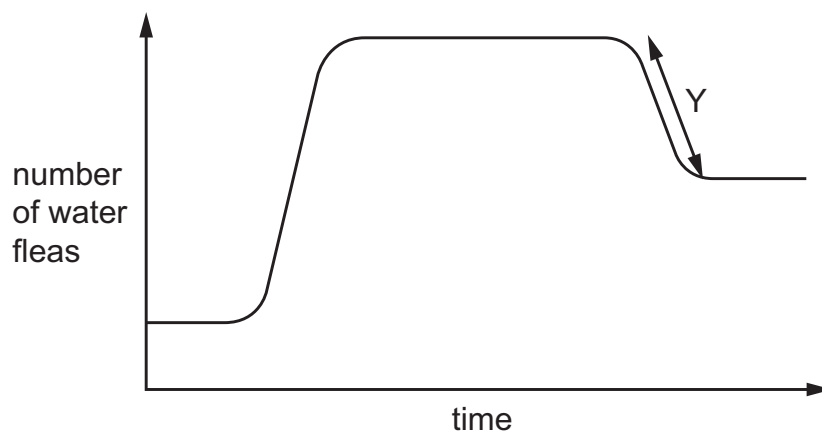
Which phases of a sigmoid curve of population growth are **not** shown on this graph?

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

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



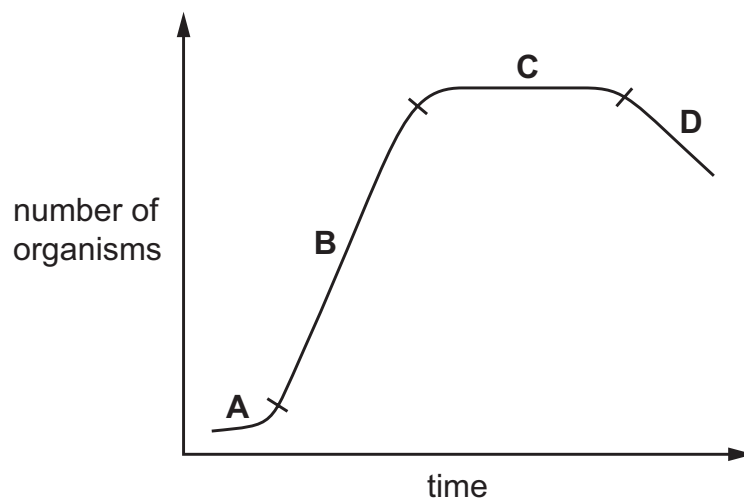
38 The graph shows the number of water fleas in a newly-created pond.



Which event could be responsible for the shape of the graph at Y?

- A** the addition of extra oxygenating plants to the pond
- B** an increase in the birth rate of the water fleas
- C** an increase in the food supply for the water fleas
- D** the addition of predators which feed on water fleas

38 Which phase in the population growth curve shows when death rates are higher than birth rates?



37 A coral reef contains species such as stony corals, sponges, seahorses and whale sharks.

These species interact with each other and are affected by the temperature, salt concentration and oxygen concentration of the water.

Using all the information given, what is being described?

- A** community
- B** ecosystem
- C** food web
- D** population

38 What can cause an increase in the size of a rabbit population?

- A** an increase in a disease that affects rabbits
- B** an increase in available food for the rabbits
- C** an increase in pollution in the habitat of the rabbits
- D** an increase in predation of rabbits