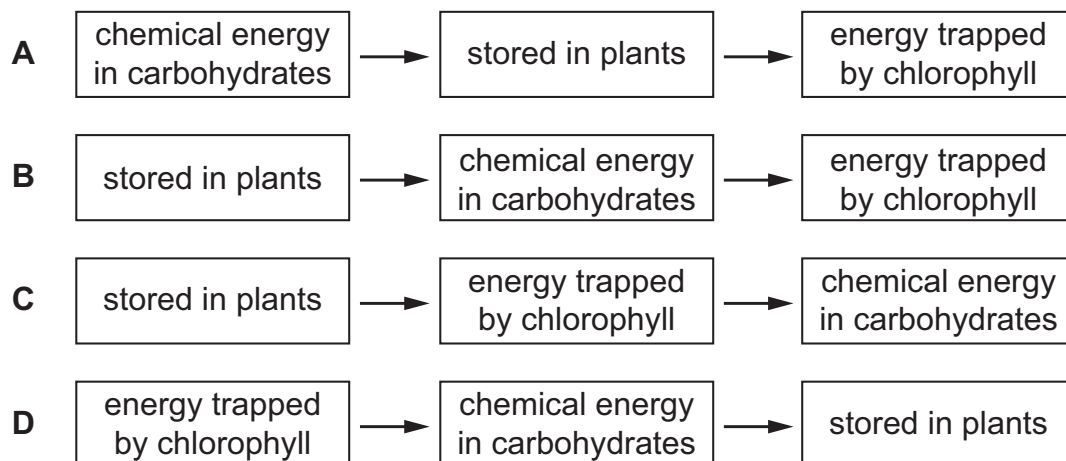


**32** Which flowchart shows how energy is transferred from the Sun to an organism?



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

- A** kJ per g per m<sup>2</sup>
- B** kJ per kg per year
- C** kJ per m<sup>2</sup> 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.

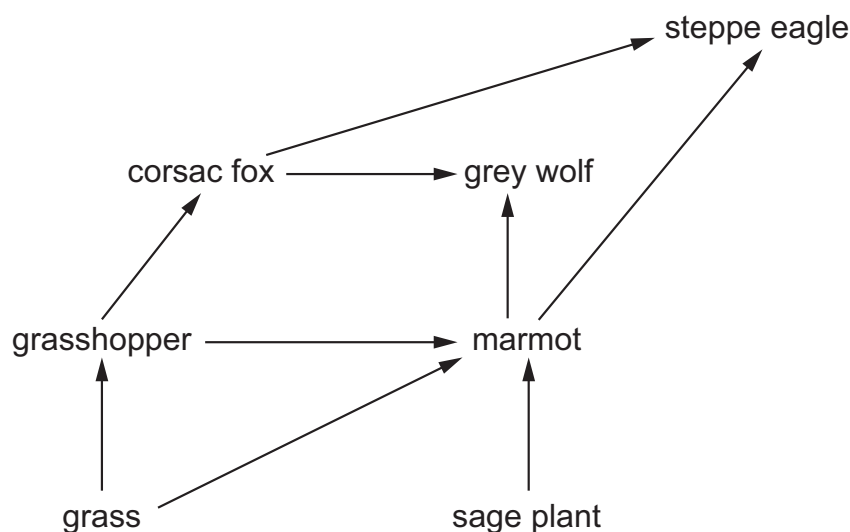


Fig. 4.1

(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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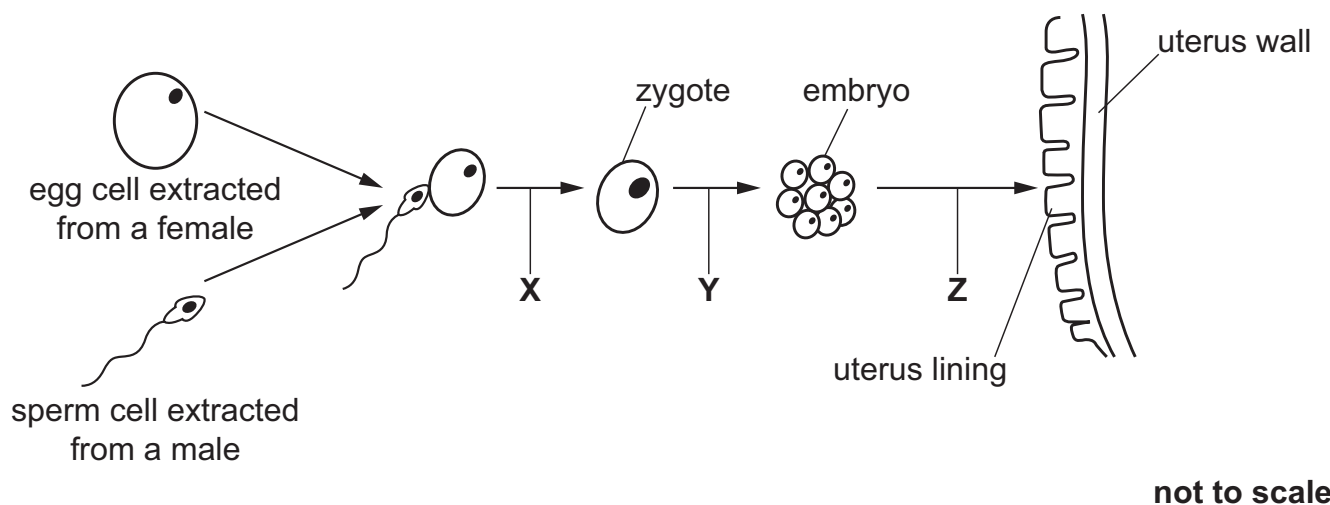
.....

.....

..... [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]

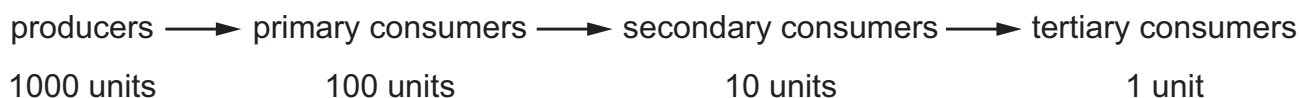
**34** Which statement about a pyramid of energy for a food chain is correct?

- 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<br>a food chain | energy transferred<br>between organisms<br>in a food chain |
|----------|---------------------------------|------------------------------------------------------------|
| <b>A</b> | chemical                        | chemical                                                   |
| <b>B</b> | chemical                        | heat                                                       |
| <b>C</b> | light                           | chemical                                                   |
| <b>D</b> | light                           | heat                                                       |

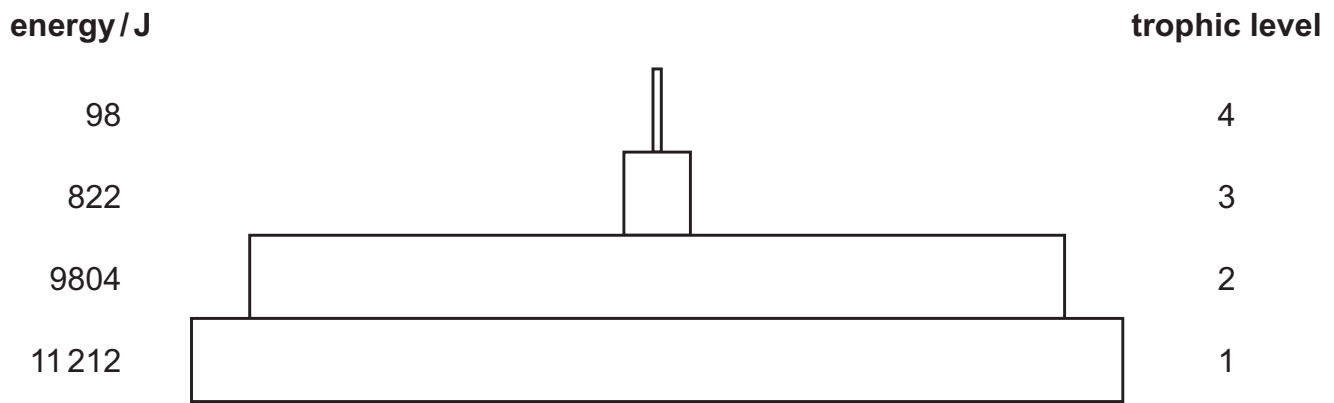
**36** The diagram shows the flow of energy, in units of energy, through a food chain.



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