

Name:

Date:

B7

ADAPTATIONS & ECOLOGY

TEST 2

**GCSE**

**BIOLOGY**

**AQA - COMBINED SCIENCE**

Mark

Score (%)

### Materials

For this paper you must have:

- Ruler
- Pencil, Rubber, Protractor and Compass
- Scientific calculator, which you are expected to use when appropriate

### Instructions

- Answer all questions
- Answer questions in the space provided
- All working must be shown
- Do all rough work in this book. Cross out any rough work you don't want to be marked

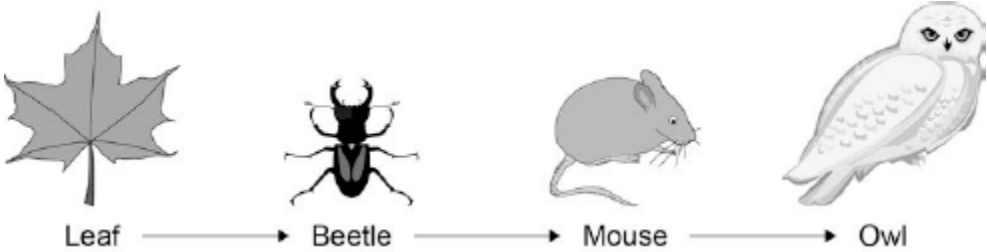
### Information

- The marks for the questions are shown in brackets

1

Feeding relationships can be shown using food chains.

The figure below shows a food chain for organisms in a habitat.



(a) What is the **producer** in the food chain?

Tick **one** box.

- Beetle
- Leaf
- Mouse
- Owl

(1)

(b) Name the **primary consumer** in the food chain.

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(1)

(c) What is the group of leaves, beetles, mice and owls in a habitat called?

Tick **one** box.

Community

Ecosystem

Population

Species

(1)

(d) What are two **abiotic** factors that can affect the food chain?

Tick **two** boxes.

Availability of food

Light intensity

New diseases

New predators

Wind direction

(2)

(Total 5 marks)

**2**

Ragwort is a plant that often grows as a weed in grassland.

The image below shows a ragwort plant.



© Difydave/iStock

Some students estimated the number of ragwort plants growing in a field on a farm.

The students:

- placed a quadrat at 10 random positions in the field
- counted the number of ragwort plants in each quadrat.

The quadrat measured 1 metre  $\times$  1 metre. The area of the field was 80 000 m<sup>2</sup>.

The table below shows the students' results.

<b>Quadrat number</b>	<b>Number of ragwort plants</b>
1	1
2	0
3	3
4	0
5	0
6	0
7	5
8	0
9	0
10	2

- (a) Complete the following calculation to estimate the number of ragwort plants in the field.

Use information from the table above.

Total number of ragwort plants in 10 quadrats = \_\_\_\_\_

Mean number of ragwort plants in 1 m<sup>2</sup> = \_\_\_\_\_

Therefore estimated number of ragwort plants in field = \_\_\_\_\_

**(2)**

- (b) What could the students do to get a more accurate estimate?

Tick (✓) **one** box.

Place the quadrat in 100 random positions.

Place the quadrat only in areas where they could see ragwort plants.

Place the quadrat in positions at the edge of the field.

**(1)**

(c) The farmer who owned the field kept horses.

If horses eat ragwort, the ragwort can poison them.

The farmer considered two methods of controlling ragwort in his field.

**Method 1:** Spraying with a selective weed killer

**Method 2:** Pulling out the ragwort plants by hand

In **Method 1:**

- the cost of the weed killer was £420
- the weed killer would not harm the grass but would kill all other plants
- the farmer could apply the weed killer from a sprayer towed by a tractor.

**Method 2** could be done by local volunteers.

What are the advantages and disadvantages of using **Method 2** instead of **Method 1** for controlling ragwort?

Advantages of **Method 2** \_\_\_\_\_

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Disadvantages of **Method 2** \_\_\_\_\_

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(3)  
(Total 6 marks)

**3**

Global warming may reduce biodiversity in some areas.

(a) What is biodiversity?

Tick **one** box.

The different habitats in an ecosystem

The interaction of living and non-living factors in a habitat

The interdependence of organisms on Earth

The total number of organisms in an ecosystem

The variety of different species on Earth

**(1)**

(b) What gases cause global warming?

Tick **two** boxes.

Carbon dioxide

Methane

Nitrogen

Oxygen

Water vapour

**(2)**

(c) Give **two** effects of global warming that could reduce biodiversity in an area.

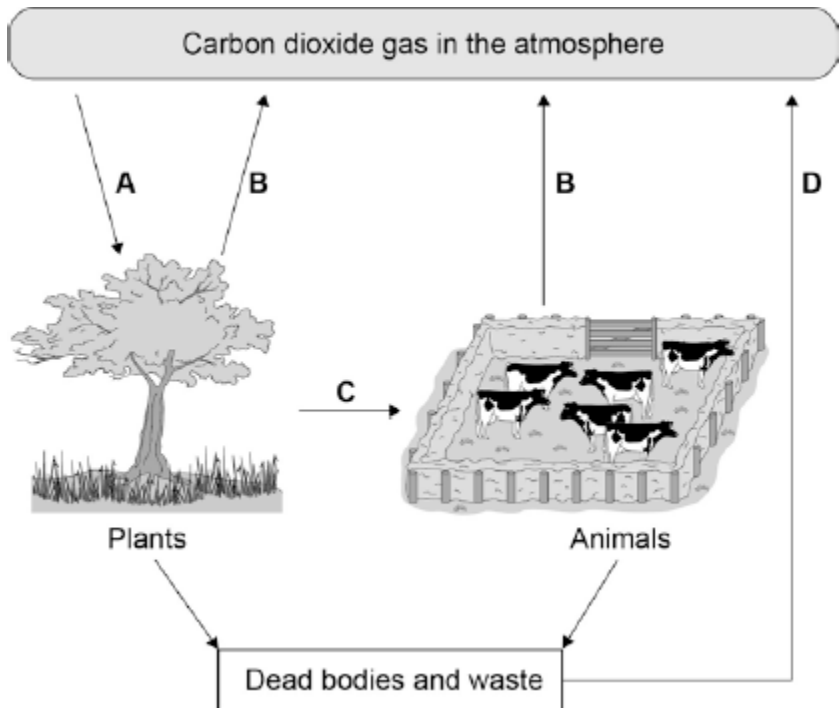
1. \_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_

**(2)**  
**(Total 5 marks)**



4

The figure below shows the carbon cycle.



Use the information from the figure above to answer the questions.

(a) In process **A**, carbon dioxide in the atmosphere is taken into plants.

What is process **A**?

Tick **one** box.

- Evaporation
- Fossilisation
- Photosynthesis
- Respiration

(1)

(b) In process **B**, carbon dioxide is released from plants and animals into the atmosphere.

What is process **B**?

Tick **one** box.

Burning

Feeding

Photosynthesis

Respiration

(1)

(c) In which process is carbon passed from one organism to another?

Tick **one** box.

**A**

**B**

**C**

**D**

(1)

(d) What will happen to the concentration of carbon dioxide in the atmosphere if lots of trees are cut down?

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(1)

(e) Greenhouse gases cause global warming.

Carbon dioxide is a greenhouse gas.

Name **two** other greenhouse gases.

1. \_\_\_\_\_

2. \_\_\_\_\_

**(2)**

(f) When living organisms die the dead material decays and is broken down.

The process of decay returns carbon dioxide to the atmosphere.

What type of organism causes decay?

\_\_\_\_\_

**(1)**

**(Total 7 marks)**

5

Peat can be burnt as a fuel.

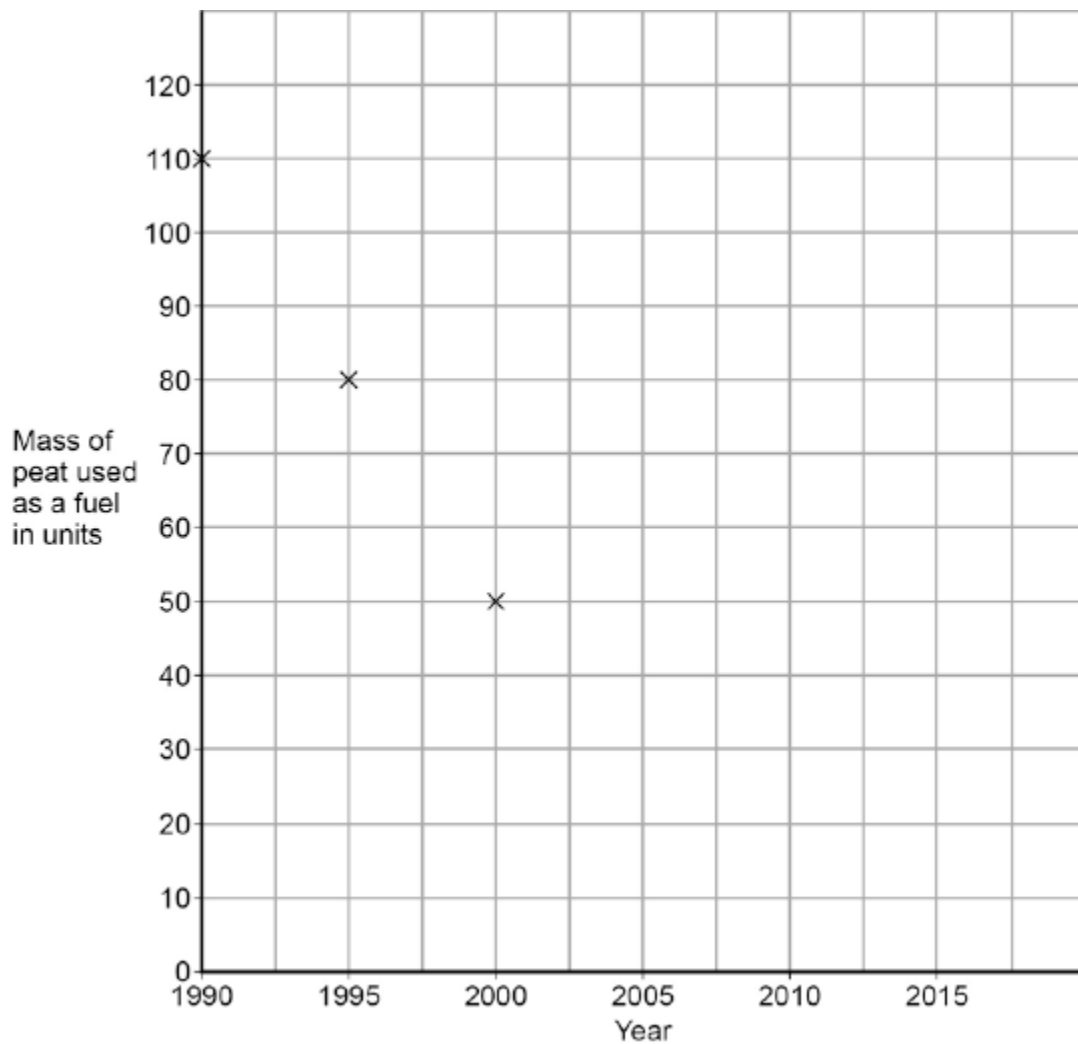
Table 1 shows the amount of peat used as a fuel in the UK over 20 years.

Table 1

Year	Mass of peat used as a fuel in units
1990	110
1995	80
2000	50
2005	20
2010	10

Figure 1 shows some of the information from Table 1.

Figure 1



(a) Complete **Figure 1** by plotting the points for 2005 and 2010.

(2)

(b) Predict the amount of peat used as a fuel in the UK in 2015.

Use information from **Figure 1**.

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(1)

(c) Plants in the UK are often grown in compost.

Compost usually contains peat.

The coconut fibre shown in **Figure 2** is a waste product of coconut farming.

Coconut fibre can be used to produce peat-free compost.

**Figure 2**



© afe207/Thinkstock

**Table 2** shows features of peat-free compost made using coconut fibre.

Complete **Table 2** to show if each feature is an advantage **or** disadvantage.

Put a tick in each row.

**Table 2**

Feature compared to peat compost	Advantage	Disadvantage
Coconut fibre is transported longer distances		
Coconut fibre is a waste product		
Coconut fibre traps less air in the soil, so roots absorb fewer mineral ions		

(2)

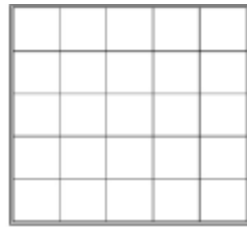
(Total 5 marks)

6

A student investigated the number of ribwort plants in a field.

The student used the apparatus shown in **Figure 1**.

**Figure 1**



Quadrat



Tape measure

Not drawn to scale

This is the method used.

1. Place the quadrat in an area where there are lots of ribwort plants in the field.
  2. Count the number of ribwort plants inside a quadrat.
  3. Repeat steps 1 and 2 four more times.
- (a) How could the student improve his method so that he can collect valid results?

Tick **two** boxes.

Count the leaves of each ribwort plant

Place more quadrats in the field

Place the quadrats randomly

Use a smaller quadrat

Weigh the ribwort plants

(2)

(b) The student calculated that the mean number of ribwort plants per  $\text{m}^2$  was 3.2

The area of the field was  $8250 \text{ m}^2$ .

Calculate the total number of ribwort plants in the field.

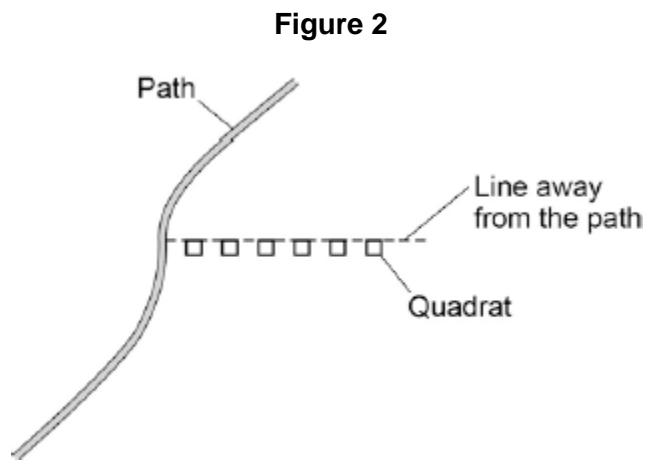
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Total number of ribwort plants = \_\_\_\_\_

(1)

(c) Another group of students did an investigation in the field.

**Figure 2** shows how the students placed their quadrats in this investigation.



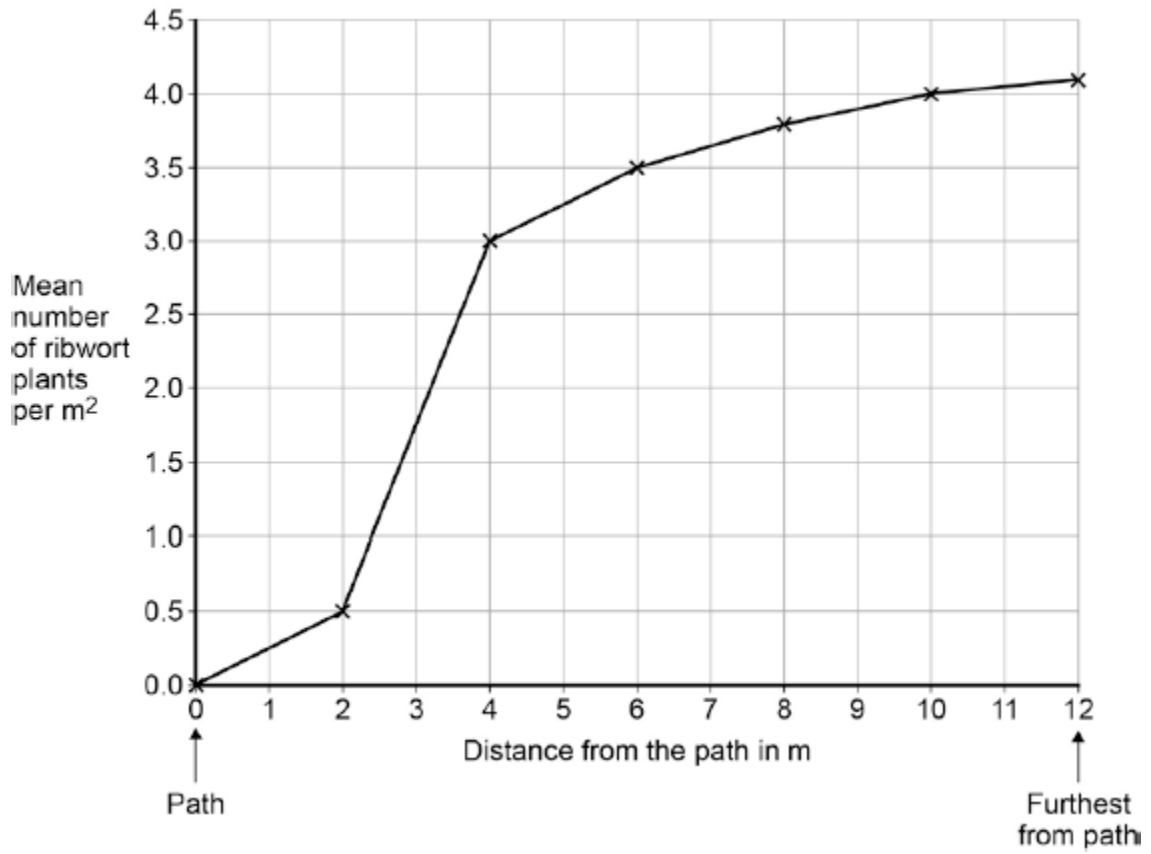
What is the name given to the line in **Figure 2**?

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(1)

(d) **Figure 3** shows the students' results.

**Figure 3**



Describe the relationship shown in **Figure 3**.

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(2)



(e) What is one reason why there are no ribwort plants next to the path?

Tick **one** box.

There is less light near the path

The ribwort plants get walked on

There are more nutrients in the soil near the path

There are fewer animals near the path

(1)

(Total 7 marks)

**7**

Students used quadrats to estimate the population of dandelion plants on a field.

(a) Describe how quadrats should be used to estimate the number of dandelion plants in a field.

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(4)

(b) The field measured 40 m by 145 m.

The students used 0.25 m<sup>2</sup> quadrats.

The students found a mean of 0.42 dandelions per quadrat.

Estimate the population of dandelions on the field.

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Estimated population of dandelions = \_\_\_\_\_

(2)

(c) In one area of the field there is a lot of grass growing in the same area as dandelions.

Suggest why the dandelions may **not** grow well in this area.

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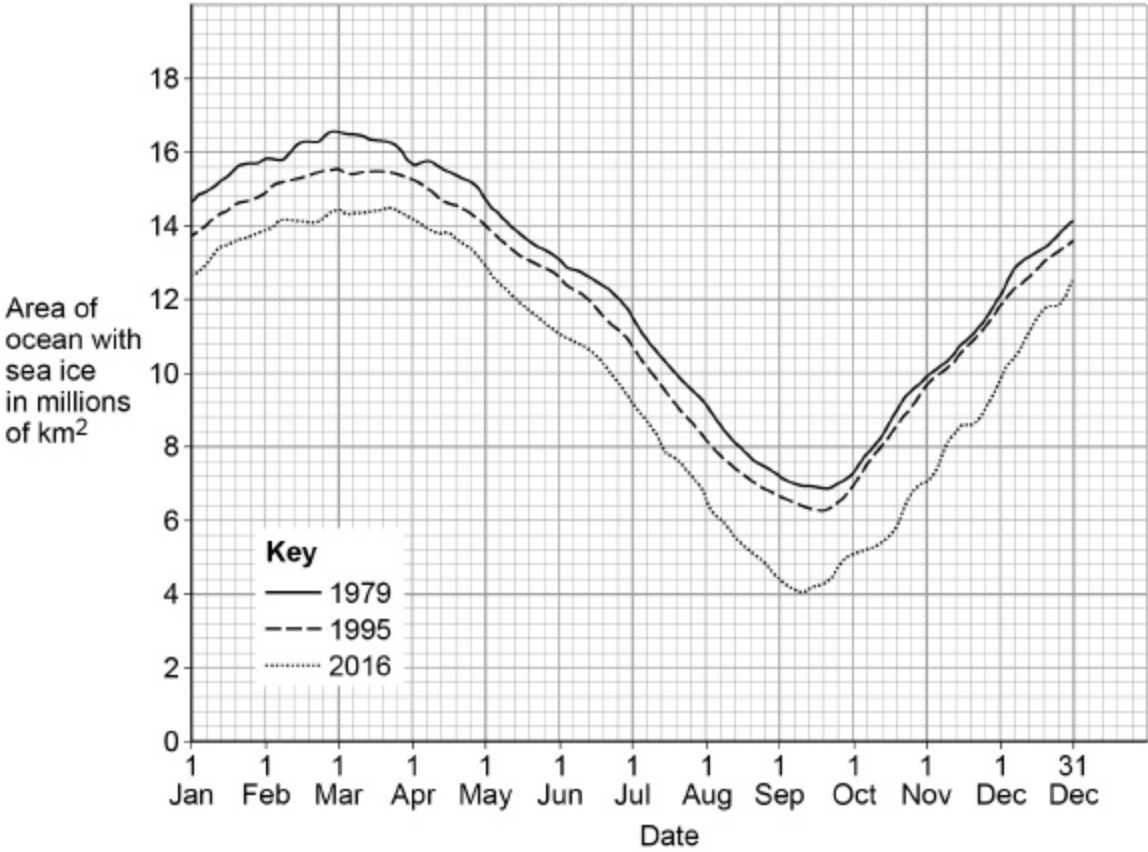
(4)

(Total 10 marks)

8

Human activities can affect our ecosystem.

The graph shows information about how the area of ocean with sea ice in the arctic has changed between 1979 and 2016.



(a) Give **two** conclusions you can make from the data shown in the graph.

- 1. \_\_\_\_\_
- \_\_\_\_\_
- 2. \_\_\_\_\_
- \_\_\_\_\_

(2)

(b) The area of ocean with sea ice in the arctic has changed.

Most scientists believe this is due to the activities of humans.

Explain the activities of humans that have led to the changes in sea ice from 1979 to 2016.

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**(6)**  
**(Total 8 marks)**

9

In the last 200 years the concentration of carbon dioxide in the Earth's atmosphere has risen.

Explain how a rise in carbon dioxide concentration in the atmosphere can decrease biodiversity.

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(Total 6 marks)

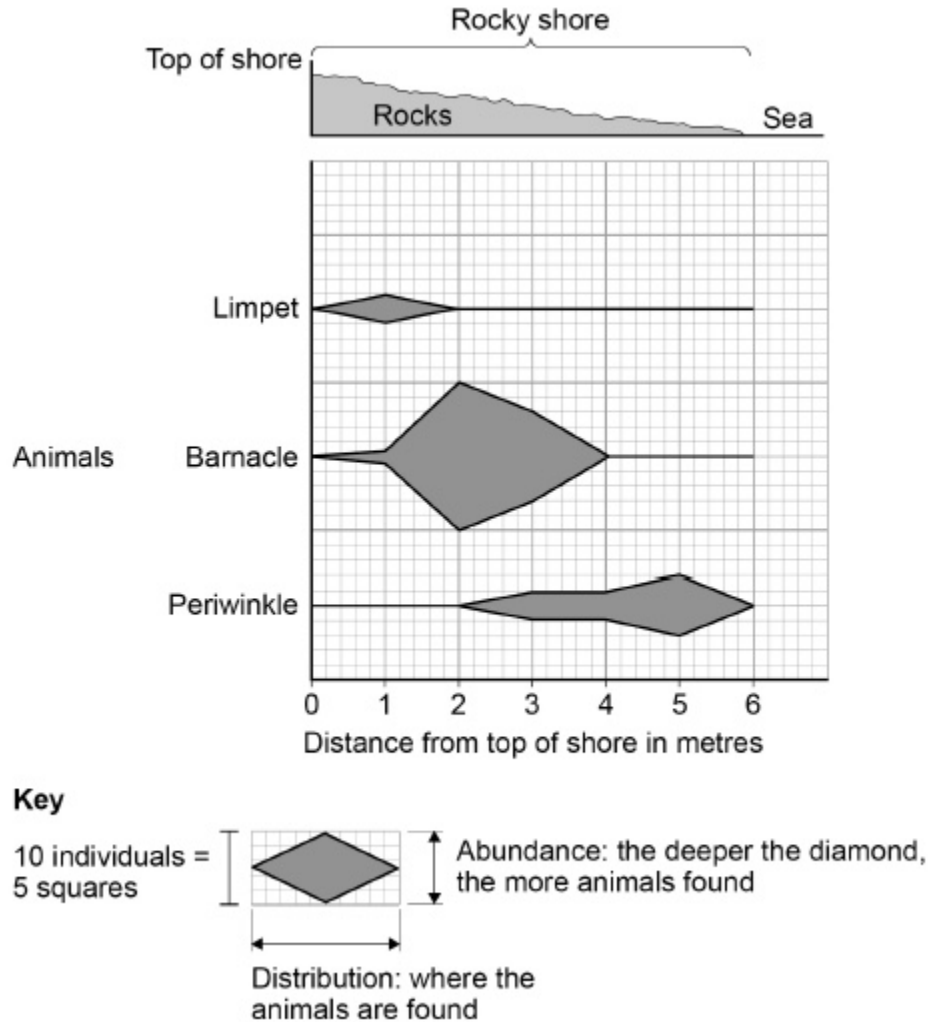
10

Rocky shores are a type of coastal habitat.

Limpets, barnacles and periwinkles are animals that live on rocky shores.

Students investigated the distribution of these animals on one rocky shore.

The figure shows their results.



The edge of the sea was six meters from the top of the shore.

(a) Calculate the total number of animals found one metre from the top of the shore.

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Total number of animals = \_\_\_\_\_

(1)

(b) The greatest number of animals was found two metres from the top of the shore.

One student said that this was **not** the most biodiverse part of the shore.

Give the reason for this statement.

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(1)

(c) Give **one** abiotic factor and **one** biotic factor that could affect the distribution of these animals on the shore.

Abiotic factor \_\_\_\_\_

Biotic factor \_\_\_\_\_

(2)

(d) Describe the method the students could have used to collect the data shown in the figure.

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(4)

(Total 8 marks)