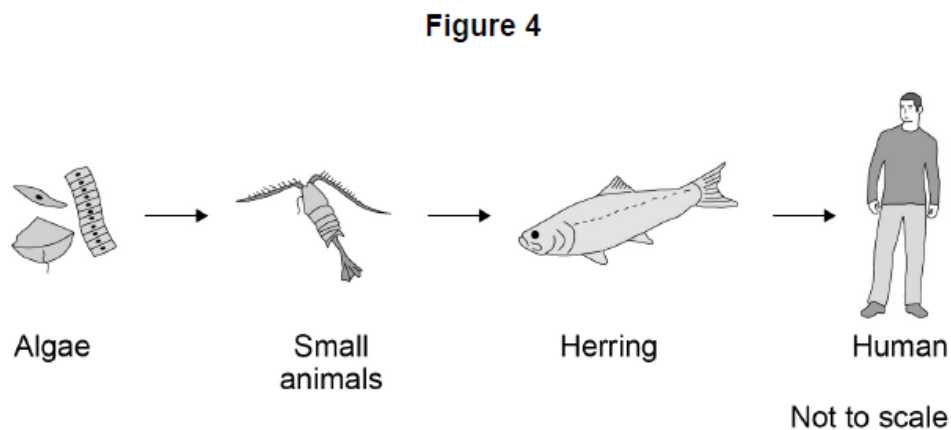# AQA - Ecology – GCSE Biology Paper_2

1. June/2021/Paper_2F/No.3

0	3

People eat fish caught in the North Sea.

Figure 4 shows a food chain.

Figure 4

Algae → Small animals → Herring → Human

Not to scale

0	3	.	1

The algae make glucose by photosynthesis.

Which **two** substances do the algae need for photosynthesis?

[2 marks]

Tick (✓) **two** boxes.

Carbon dioxide ☐

Nitrogen ☐

Oxygen ☐

Starch ☐

Water ☐

0 3 . 2 What is the source of energy for photosynthesis?

[1 mark]

Tick (✓) **one** box.

Light ☐

Mineral ions ☐

Protein ☐

Water ☐

0 3 . 3 Which pyramid of biomass is correct for the food chain shown in **Figure 4**?

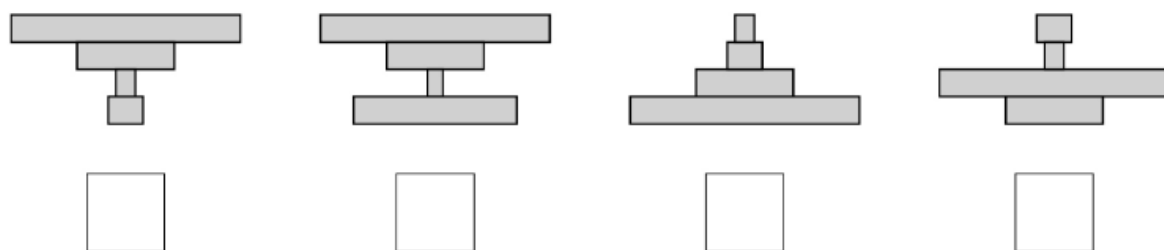**[1 mark]**

Tick (✓) **one** box.
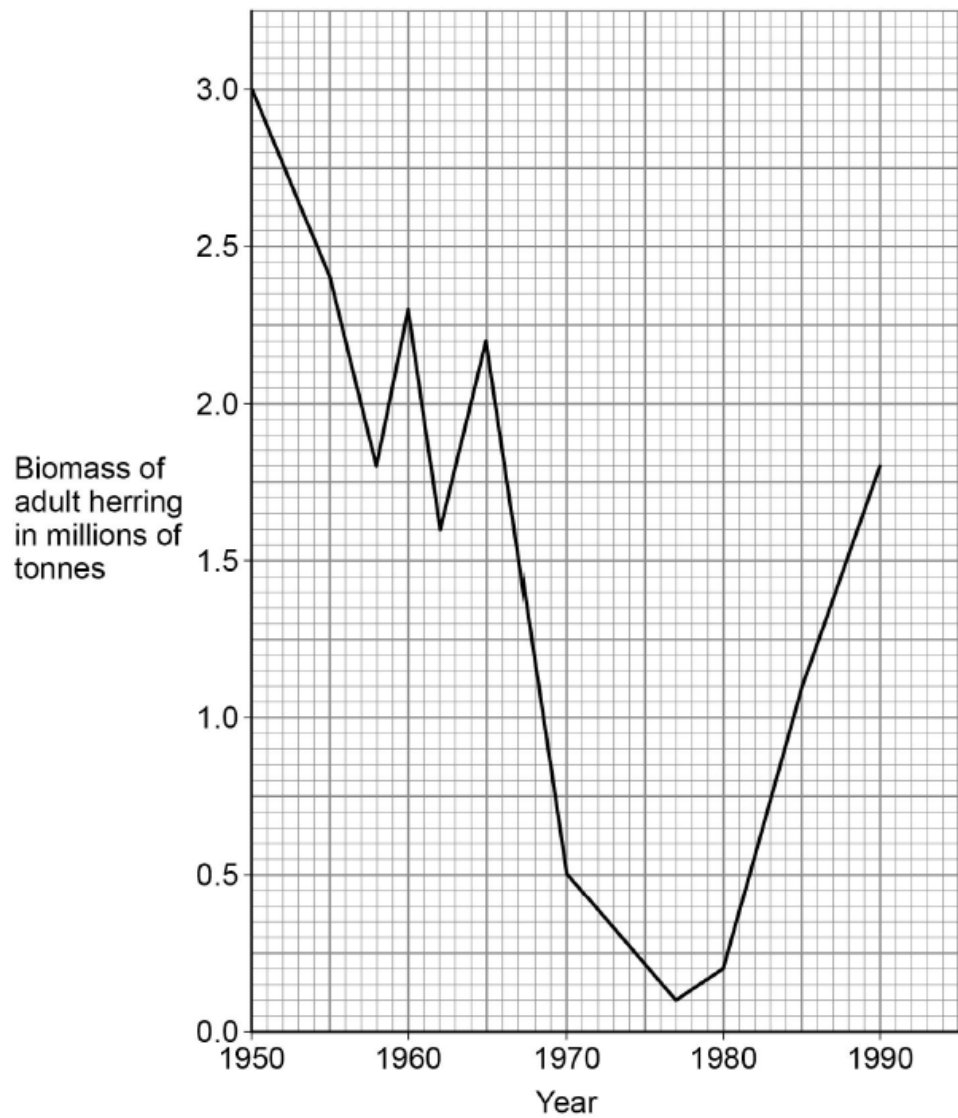

☐　　　☐　　　☐　　　☐

Figure 5 shows the biomass of adult herring in the North Sea between 1950 and 1990.

Figure 5

0 3 . 4 Too many herring were caught in the 1960s.

Calculate the percentage decrease in the biomass of adult herring between 1960 and 1970.

Use the equation:

$$\text{percentage decrease} = \frac{(\text{biomass in 1960} - \text{biomass in 1970})}{\text{biomass in 1960}} \times 100$$

Give your answer to the nearest whole number.

[4 marks]

_____

_____

_____

_____

_____

_____

Percentage decrease = _____ %

From 1977, laws were introduced to help conserve herring.

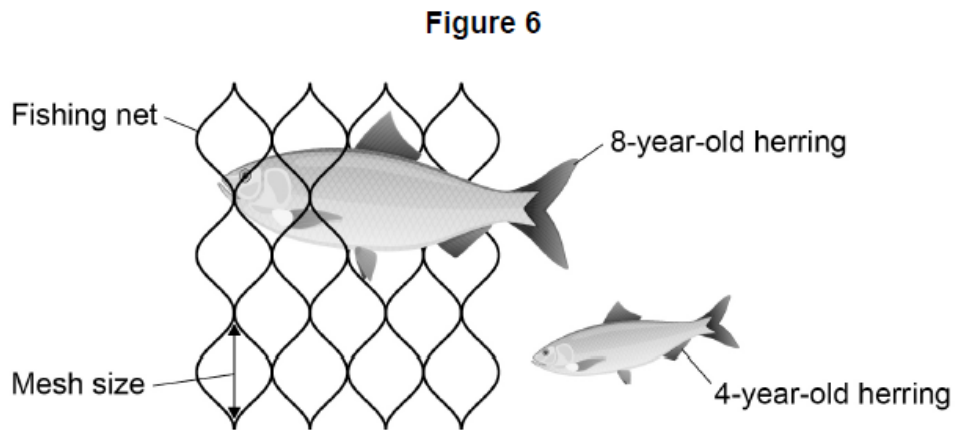0 3 . 5 Describe the change in biomass of adult herring from 1977 to 1990.

Use data from **Figure 5** in your answer.

[2 marks]

_____

_____

_____

_____

| 0 | 3 | . | 6 | One of the laws was to control mesh size of fishing nets.

Figure 6 shows a fishing net with a legal mesh size.

Figure 6

Fishing net

8-year-old herring

Mesh size

4-year-old herring

Herring can live for up to 12 years.

Herring start to reproduce when they are 3 to 4 years old.

Explain how the control of mesh size of fishing nets has helped to conserve stocks of herring.

[2 marks]

_____

_____

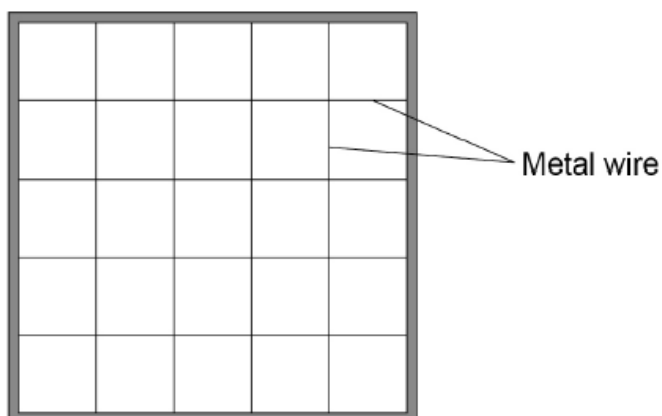_____

_____

2. June/2021/Paper_2F/No.6

| 0 | 6 |

A student estimated the percentage cover of buttercup plants in a field.

The student used a quadrat.

The quadrat was divided into 25 equal squares.

Figure 10 shows the quadrat.

Figure 10

Metal wire

This is the method used.

1. Place the quadrat on the ground.

2. Record how many squares in the quadrat contain buttercup plants.

3. Place the quadrat in a new position in the field.

4. Record how many squares in the quadrat contain buttercup plants.

5. Repeat steps 3 and 4 another three times.

0 6 . 1 What method should the student have used for placing the quadrat?

[1 mark]

Tick (✓) **one** box.

Place the quadrat where there are many buttercup plants. ☐

Place the quadrat only where there are no trees. ☐

Place the quadrat using random coordinates. ☐

Use the same person to place all the quadrats. ☐

The student calculated the percentage cover of buttercup plants for each quadrat.

Table 1 shows the student's results.

Table 1

Quadrat number	Number of squares containing buttercup plants	Percentage cover of buttercup plants
1	10	40
2	13	52
3	22	88
4	20	80
5	10	40
Mean		**X**

0 6 . 2 Calculate mean value **X** in **Table 1**.

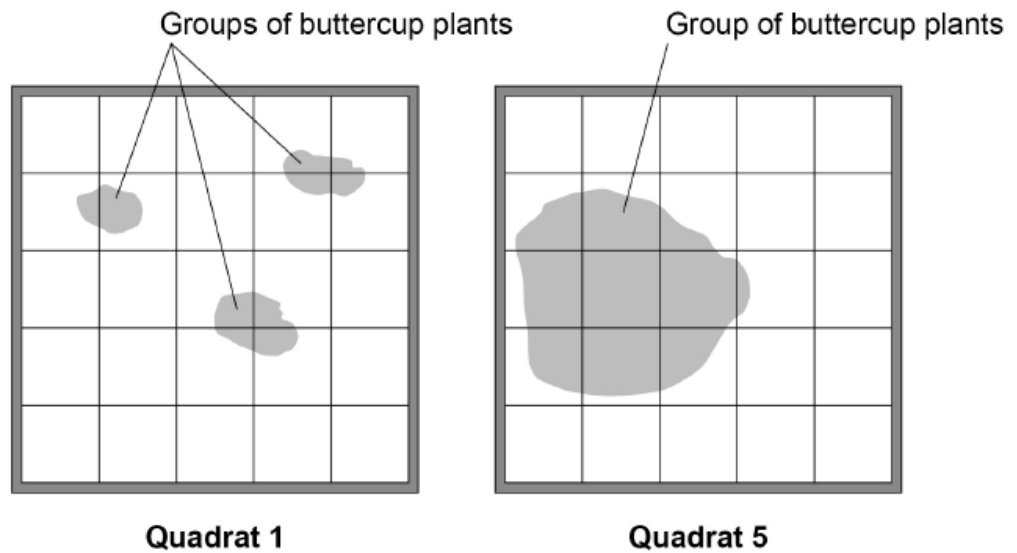[2 marks]

_____

_____

X = _____ %

Table 1 shows that quadrat **1** and quadrat **5** each had 40% cover of buttercup plants.

Figure 11 shows the results for quadrat **1** and quadrat **5**.

Figure 11

Groups of buttercup plants   Group of buttercup plants

Quadrat 1   Quadrat 5

0 6 . 3   The student's method of estimating the percentage cover of buttercup plants is **not** accurate.

How does **Figure 11** show this?

[1 mark]

Tick (✓) **one** box.

Quadrat 1 has more groups of buttercup plants. ☐

The area of buttercup plants in quadrat 5 is much larger. ☐

The buttercup plants are in ten squares in both quadrats. ☐

0 6 . 4   The student wanted to get a more valid estimate of the percentage cover of buttercup plants in the field.

Suggest **two** improvements to the method to make the results more valid.

[2 marks]

1 _____

_____

2 _____

_____

0 6 . 5   Give **three** environmental factors that would affect the growth of buttercup plants in a field.

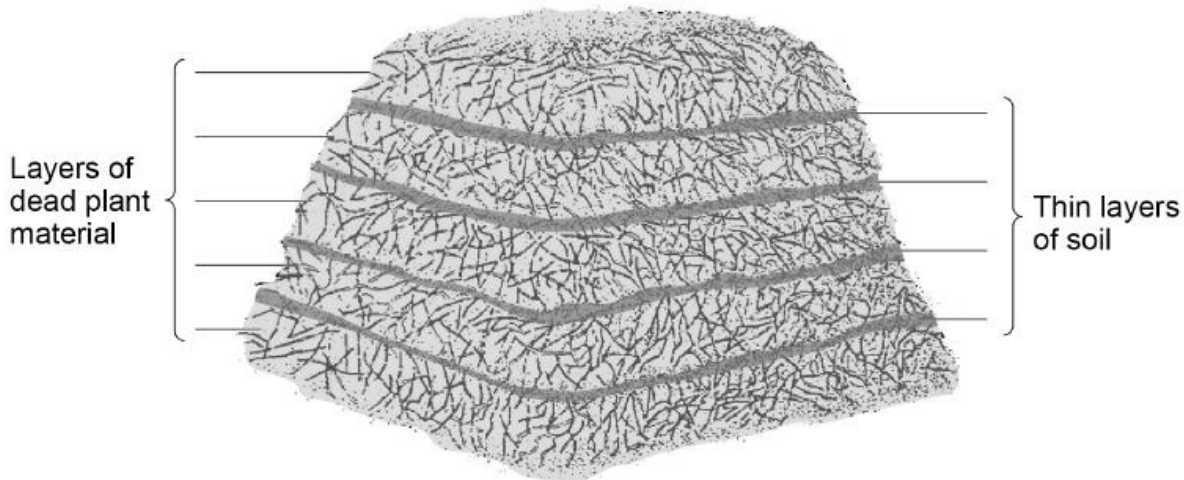**[3 marks]**

1 _____

2 _____

3 _____

3. June/2021/Paper_2H/No.4

0	4

Decay occurs in a compost heap.

Figure 7 shows a compost heap.

Figure 7

Layers of dead plant material

Thin layers of soil

Describe:

- how microorganisms in the layers of soil help to recycle chemicals in the dead plants
- how the chemicals are used again by living plants.

[6 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

4. June/2021/Paper_2H/No.5

| 0 | 5 |

The growth of daisy plants on a lawn is affected by biotic factors and by abiotic factors.
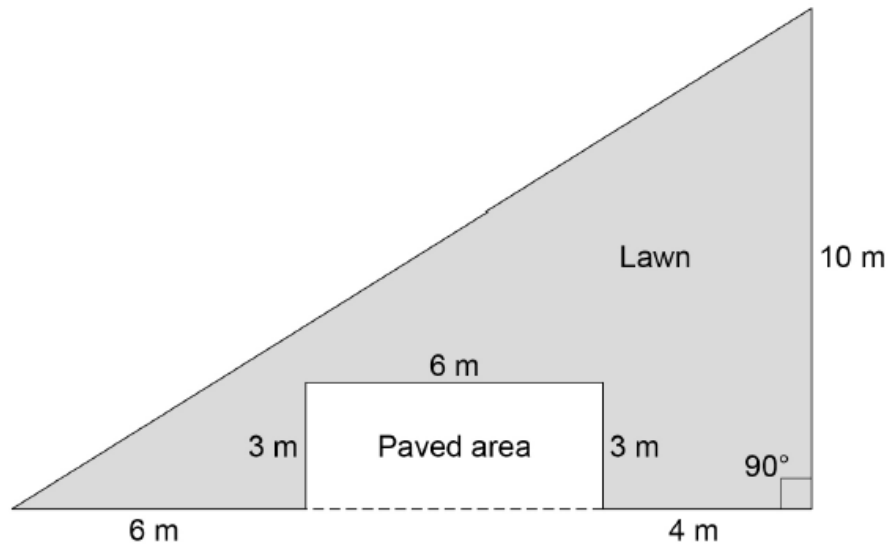
| 0 | 5 |.| 1 |

Table 2 shows six factors.

Tick (✓) **one** box in each row to show whether the factor is biotic or abiotic.

[3 marks]

Table 2

Factor	Biotic	Abiotic
Nitrates in the soil		
Rabbits eating the plants		
Shading by a building		
Soil pH		
Temperature		
Trampling by people		

Figure 8 shows a plan of a garden.

Figure 8

A student estimates the number of daisy plants growing on the lawn.

The student places a quadrat at 10 different positions on the lawn.

The quadrat measures 50 cm × 50 cm.

The student counts the number of daisy plants in each quadrat.

| 0 | 5 |.| 2 | How should the student decide where to place the quadrat?

Give the reason for your answer.

[2 marks]

_____

_____

_____

_____

0 5 . 3 The mean number of daisy plants in each quadrat is 6.

Calculate the number of daisy plants on the lawn.

Give your answer to 3 significant figures.

[6 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Number of daisy plants on the lawn = _____

0 5 . 4 Using the mean from this investigation to calculate the number of daisy plants on the lawn may **not** be accurate.

Give **two** reasons why.
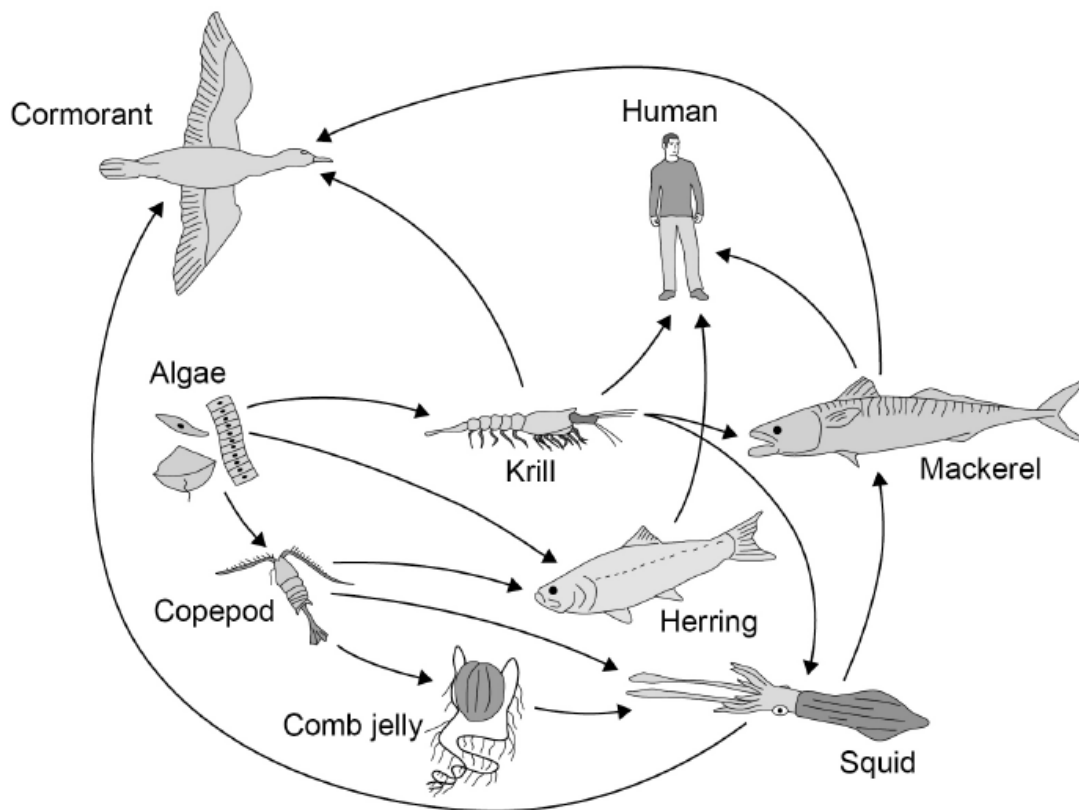
[2 marks]

1 _____

_____

2 _____

_____

14

5. June/2021/Paper_2H/No.7

| 0 | 7 | A food web contains several food chains.

Figure 9 shows a food web.

Figure 9

Not to scale

| 0 | 7 |. | 1 | The animals in **Figure 9** get their energy by eating other organisms.

Describe how the algae get energy.

[2 marks]

_____

_____

_____

_____

| 0 | 7 |. | 2 | Name **one** primary consumer in **Figure 9**.

[1 mark]

_____

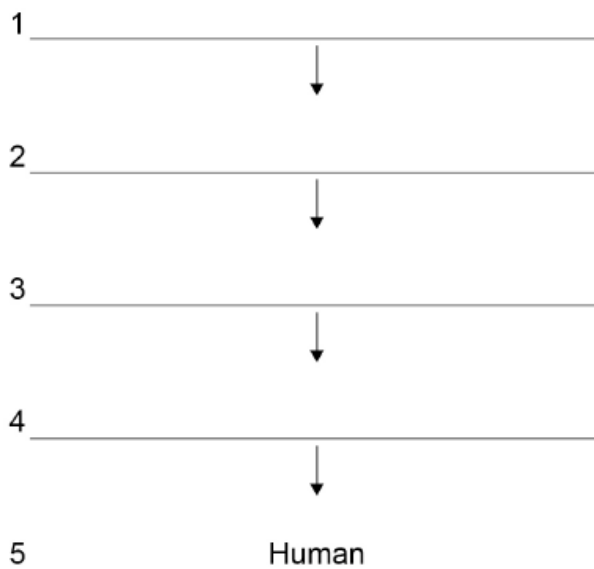**0 7 . 3** Name **one** producer in **Figure 9**.

[1 mark]

_____

0 7 . 4 The different food chains in **Figure 9** have different numbers of organisms.

Complete **Figure 10** to show a food chain in **Figure 9** with **five** organisms, including the human.

[1 mark]

Figure 10

1 _____

↓

2 _____

↓

3 _____

↓

4 _____

↓

5 _____ Human _____

0 7 . 5 **Figure 9** shows that mackerel eat krill and squid.

The biomass of mackerel is much less than the combined biomass of krill and squid.

One reason for this is that the mackerel cannot digest all parts of the krill and squid.
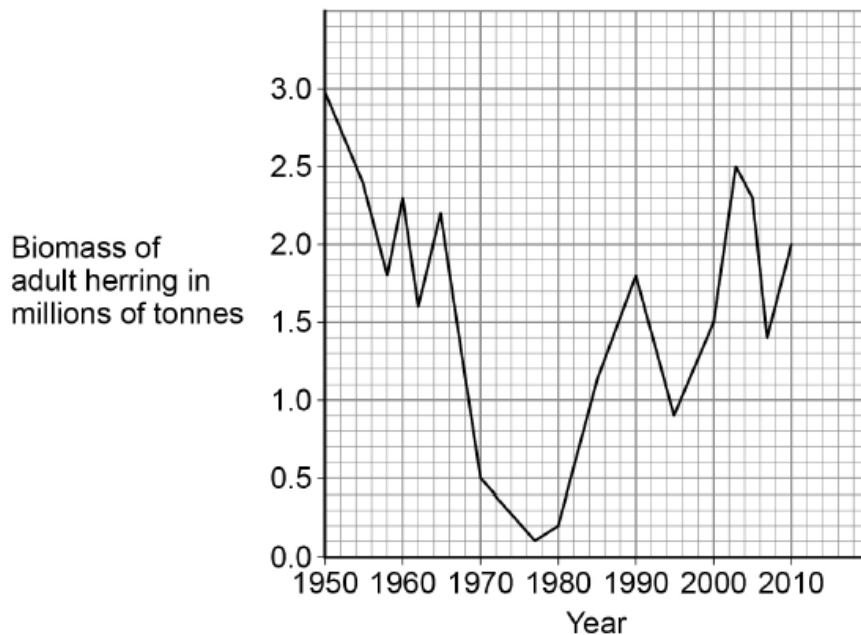
Give **two** other reasons.

[2 marks]

1 _____

_____

2 _____

_____

Figure 11 shows how the biomass of adult herring in the North Sea has changed between 1950 and 2010.

Figure 11

Biomass of adult herring in millions of tonnes

Year

| 0 | 7 |. | 6 | Calculate the percentage decrease in the biomass of herring between 1960 and 1977.

Give your answer to the nearest whole number.

[4 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

Percentage decrease = _____ %

0 7 . 7 Too many herring were caught by fishermen between 1960 and 1977.

Herring can live for up to 12 years and begin to reproduce when 3 to 4 years old.

Laws have been introduced to help conserve herring:

- 1977 to 1981 – herring fishing was banned in the North Sea
- 1984 to present day – control of mesh size of fishing nets
- 1997 to present day – fishing quotas were introduced
- 1998 to present day – herring fishing was banned in breeding grounds during the breeding season.

Figure 12 shows how a minimum mesh size helps to conserve herring.
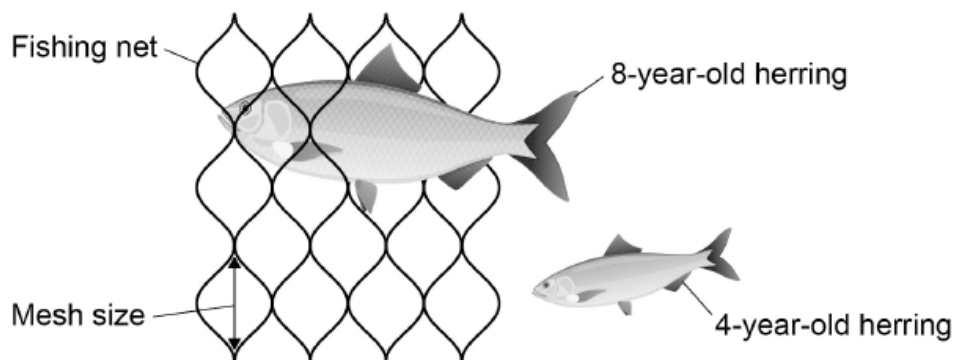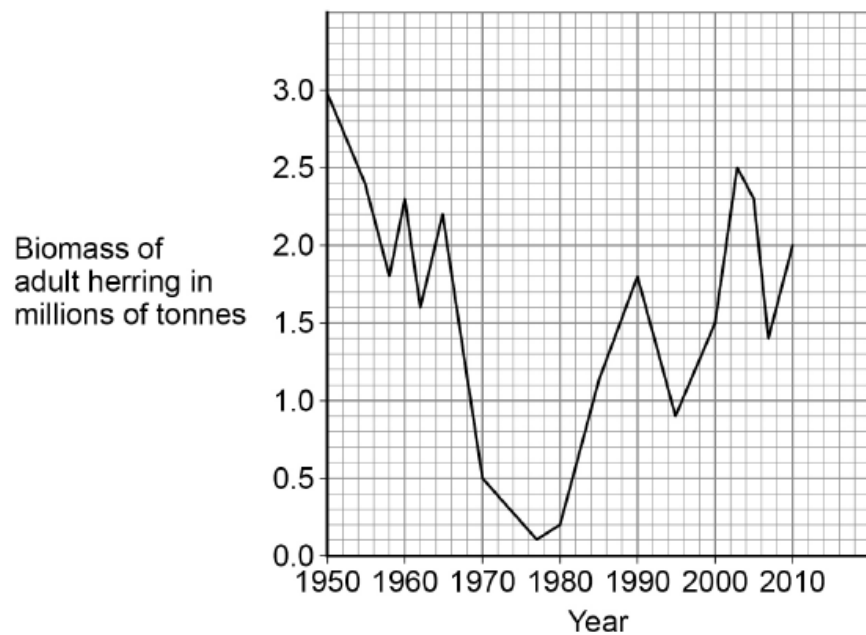
Figure 12

Figure 11 is repeated below.

Figure 11

Evaluate the effect of these laws on the conservation of herring stocks.

Use data from **Figure 11** and information from **Figure 12** in your answer.

[6 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

6. June/2021/Paper_2H/No.9

| 0 | 9 |

The Galapagos Islands are located in the Pacific Ocean.

Several species of birds called finches live on the Galapagos Islands.

These finches are very similar to each other.

Figure 15 shows two modern species of Galapagos finch and their classification.

Figure 15

Medium ground finch   **Small ground finch**

Classification group	Medium ground finch	Small ground finch
Kingdom	Animalia	Animalia
	Chordata	Chordata
Class	Aves	Aves
	Passeriformes	Passeriformes
	Thraupidae	Thraupidae
Genus	Geospiza	Geospiza
	fortis	fuliginosa

| 0 | 9 | . | 1 | Complete **Figure 15** to give the names of the missing classification groups.

[2 marks]

| 0 | 9 | . | 2 | Give the binomial name of the medium ground finch.

Use information from **Figure 15**.

[1 mark]

_____

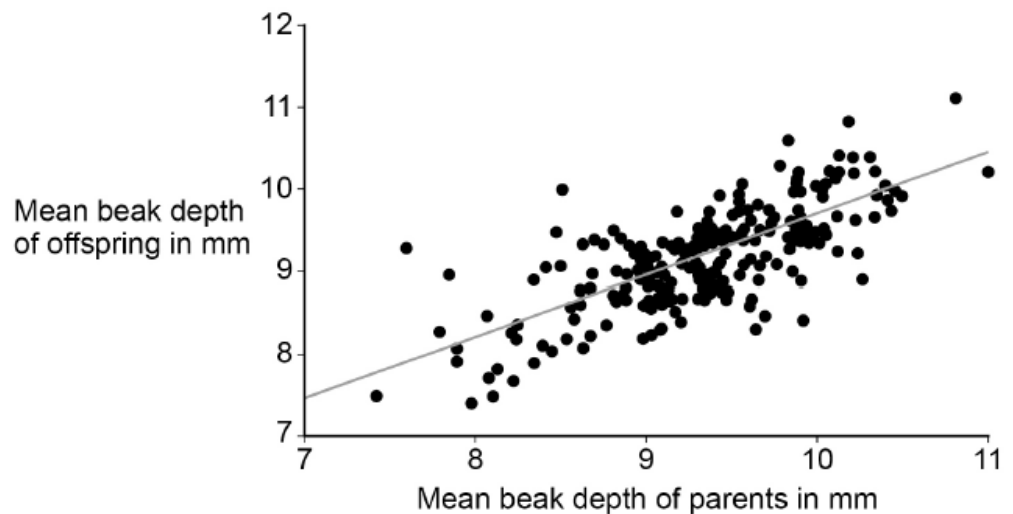In each species of finch, there is a variation in beak depth.

Figure 16 shows how beak depth is measured.

Figure 16

Figure 17 shows the relationship between the beak depth of parent birds and the beak depth of their offspring.

Figure 17

0 9 . 3   Give evidence from **Figure 17** that beak depth is an inherited characteristic.
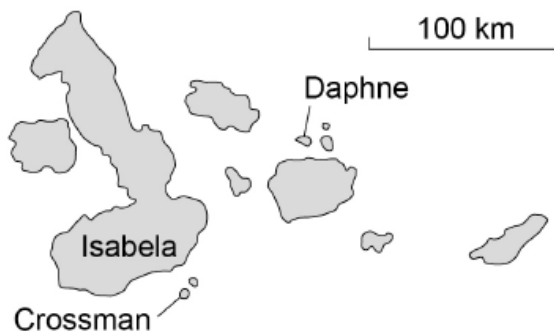
[1 mark]

_____

_____

0 9 . 4   Scientists suggested that more than one gene controls beak depth.

Give evidence from **Figure 17** to support the scientists' suggestion.

[1 mark]

_____

_____

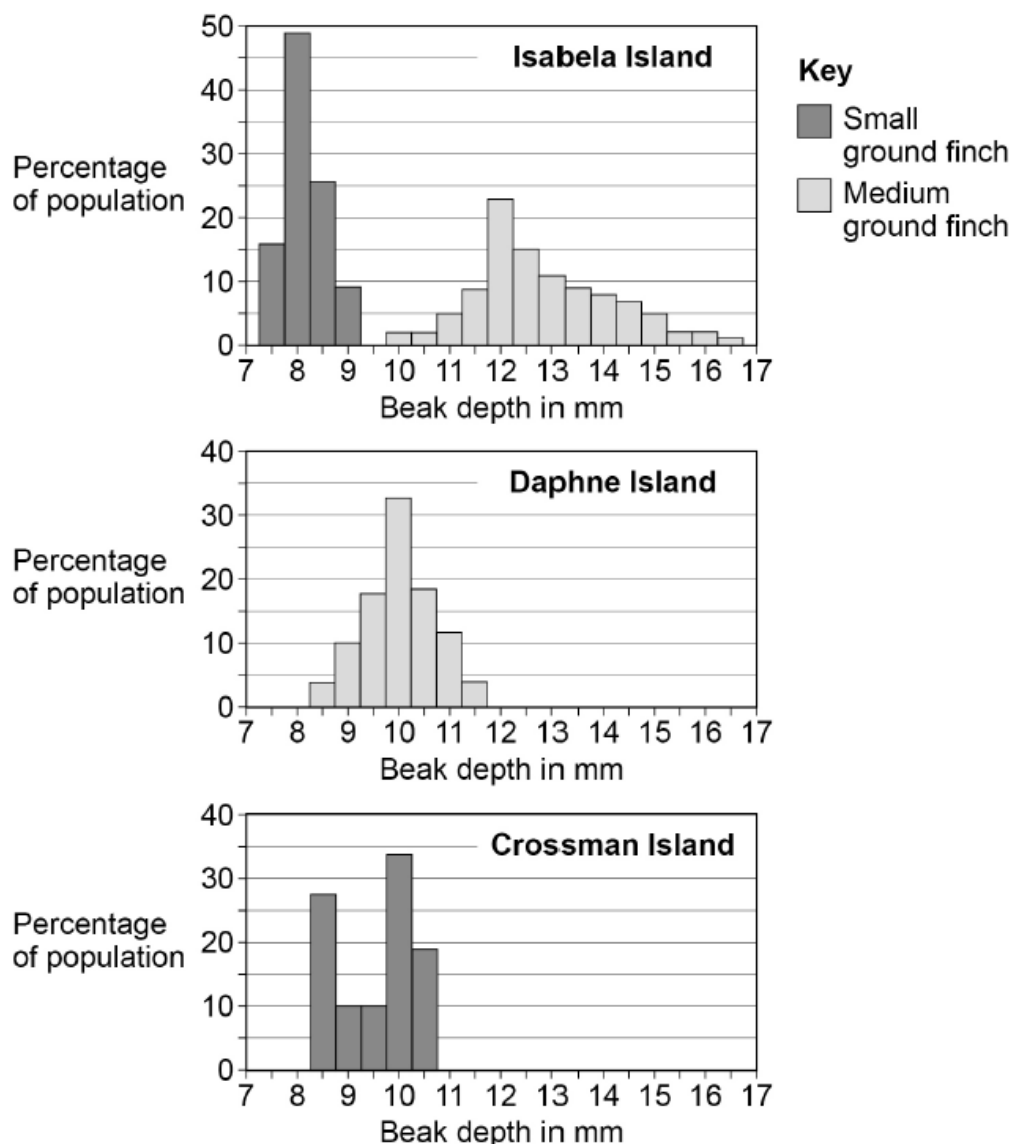**Figure 18** is a map of the Galapagos Islands.

Figure 18

On Isabela Island, the medium ground finch **and** the small ground finch are found.
On Daphne Island, only the medium ground finch is found.
On Crossman Island, only the small ground finch is found.

Figure 19 shows how the beak depth of each species varies on each island.

Figure 19

24

The medium ground finch and the small ground finch both feed on seeds.

The size of seeds eaten by each bird depends on the depth of the bird's beak.

0 9 . 5 The range of beak depth of **medium ground finches** on Isabela Island is different from the range on Daphne Island.

Explain what might have caused this difference.

[6 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

0 9 . 6 **Figure 19** shows:

- the **two** species of finch live on Isabela Island

- only **one** of the species lives on Daphne Island

- only **one** of the species lives on Crossman Island.

Suggest why both species of finch are able to live on Isabela Island.

[2 marks]

_____

_____

_____

_____

_____

_____