

GCSE Biology

Worksheet: Theory of evolution

TIME 30 min	TOTAL 30 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Theory of evolution

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

Charles Darwin proposed the theory of evolution by natural selection.

0 1 . 1

In which year did Darwin publish *On the Origin of Species*?

Tick (✓) **one** box.

1759

☐

1859

☐

1909

☐

1959

☐

[1 mark]

0 1 . 2

Which **two** of the following did Darwin use to develop his theory?

Tick (✓) **two** boxes.

Comparing the DNA of different species

☐

Knowledge of geology and fossils

☐

Observations made on a round-the-world expedition

☐

Studying the structure of chromosomes

☐

Testing bacteria for resistance to antibiotics

☐

[2 marks]

0 1 . 3

Darwin's theory was only gradually accepted.
Give **two** reasons why.

.....

.....

.....

.....

[2 marks]

0 1 . 4

Complete the sentence.

Individuals with characteristics most suited to the environment are more likely to

.....

.....

.....

[1 mark]

0 2

The statements describe how natural selection could change a population of rabbits living in a cold area.

A Rabbits with thicker fur are more likely to survive the cold winters and breed.

B Over many generations, most rabbits in the population have thick fur.

C The rabbits in the population show variation in the thickness of their fur.

D The alleles for thick fur are passed on to the offspring.

0 2 . 1

Write the letters **A**, **B**, **C** and **D** in the correct order.

.....

.....

.....

.....

[2 marks]

0 2 . 2

Which statement about natural selection is correct?

Tick (✓) **one** box.

Characteristics gained during an organism's life are passed on to its offspring

☐

All the individuals in a species are identical

☐

Individuals best suited to their environment are more likely to survive and breed

☐

Individuals change their genes to suit their environment

☐

[1 mark]

0 2 . 3

Name the scientist who proposed the theory of evolution by natural selection after a round-the-world expedition.

.....

.....

.....

[1 mark]

0 3

Charles Darwin's ideas changed the way scientists explain the variety of living things.

0 3 . 1

Complete the sentences. Choose answers from the list.

breed · environment · generation · learn · mutate · variation

Individual organisms within a species show a wide range of

Individuals with characteristics most suited to the are more likely to survive and successfully.

The characteristics that helped these individuals to survive are passed on to the next

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[4 marks]

0 3 . 2

Darwin published his theory in 1859.

Give the title of the book in which he published it.

.....

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.....

[1 mark]

0 3 . 3

Darwin's theory was only gradually accepted. One reason was that there was not enough evidence at the time to convince many scientists.
Give **one** other reason why the theory was only gradually accepted.

.....

.....

[1 mark]

0 4

Birds eat grasshoppers. Scientists studied a population of grasshoppers in an area of dry, brown grassland. The grasshoppers are either brown or green, and colour is inherited. The scientists marked each grasshopper with a small dot of paint and released the grasshoppers. They caught grasshoppers with sweep nets three days later. Table 1 shows the results.

Table 1

Form	Number released	Number recaptured
Brown	260	78
Green	360	72

0 4 . 1

Calculate the percentage of the released brown grasshoppers that were recaptured.

.....

.....

.....

Percentage = %

[1 mark]

0 4 . 2

Calculate how many times more likely a brown grasshopper was to be recaptured than a green grasshopper.
Give your answer to 2 significant figures.

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.....

Number of times =

[2 marks]

0 4 . 3

Explain how these results provide evidence for natural selection.

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[3 marks]

.....

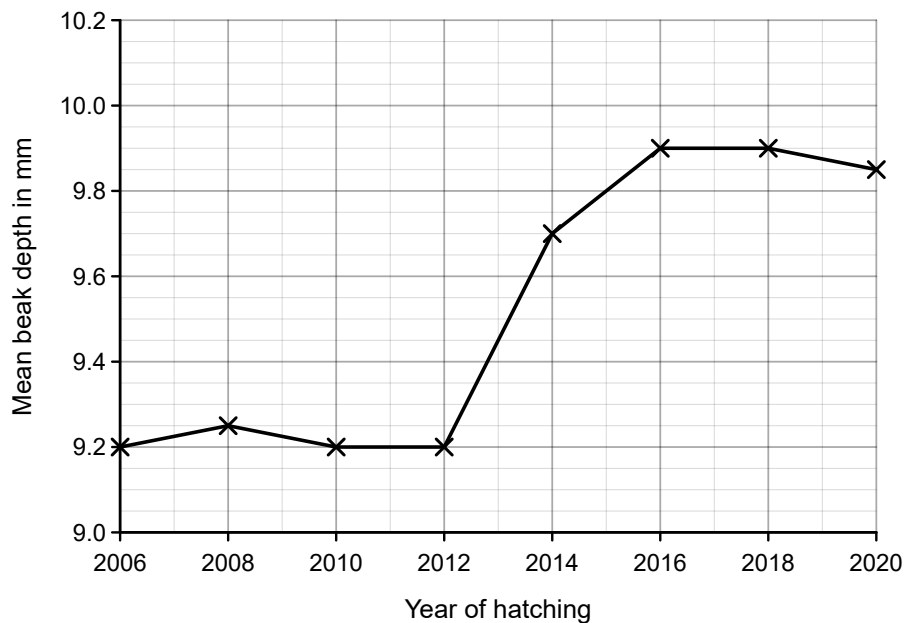
0 5

A species of seed-eating bird lives on a small island. Birds with deeper beaks can crack larger, harder seeds. Beak depth is an inherited characteristic.

In 2012 a drought killed most of the plants that produce small, soft seeds. Plants that produce large, hard seeds survived.

Figure 1 shows the mean beak depth of the birds that hatched on the island in different years.

Figure 1



0 5 . 1

Give the mean beak depth of the birds that hatched in 2016.

.....

.....

.....

Mean beak depth = mm

[1 mark]

0 5 . 2

Calculate the percentage increase in the mean beak depth between 2012 and 2016.

.....

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.....

Percentage increase = %

[2 marks]

0 5 . 3

Explain how natural selection caused the change in mean beak depth after the drought.

.....

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.....

[4 marks]

0 5 . 4

Suggest why the mean beak depth changed very little after 2016.

.....

.....

[1 mark]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Biology · Worksheet: Theory of evolution · 30 marks

Question 1 (6 marks)

01.1 [1 mark]

Correct: 1859

01.2 [2 marks]

Correct: Knowledge of geology and fossils; Observations made on a round-the-world expedition

01.3 [2 marks]

- the theory challenged the idea that God made all the animals and plants that live on Earth (1)
- there was insufficient evidence at the time to convince many scientists (1)
- the mechanism of inheritance and variation was not known (until about 50 years later) / genes had not been discovered (1)

Any 2 of the points above.

Notes: Allow 'religious objections' for the first point.

01.4 [1 mark]

Answer: survive and breed (reproduce)

- survive and breed / survive and reproduce (1)

Notes: Allow 'survive' or 'breed / reproduce' on its own.

Question 2 (4 marks)

02.1 [2 marks]

Answer: C, A, D, B

- two letters in the correct position (1)
- all four letters in the correct position: C, A, D, B (1)

Notes: C, A, D, B scores 2 marks.

02.2 [1 mark]

Correct: Individuals best suited to their environment are more likely to survive and breed

02.3 [1 mark]

Answer: Charles Darwin

- (Charles) Darwin (1)
-

Question 3 (6 marks)

03.1 [4 marks]

Answer: variation; environment; breed; generation

- variation (1)
- environment (1)
- breed (1)
- generation (1)

Notes: Each word must be in the correct gap.

03.2 [1 mark]

Answer: *On the Origin of Species*

- *On the Origin of Species* (1)
-

03.3 [1 mark]

- the theory challenged the idea that God made all the animals and plants that live on Earth (1)
- the mechanism of inheritance and variation was not known (until about 50 years after the theory was published) (1)

Any 1 of the points above.

Notes: Allow 'religious objections' or 'genes had not been discovered'. Do not accept 'not enough evidence' (given in the question).

Question 4 (6 marks)

04.1 [1 mark]

Answer: 30%

- $78 \div 260 \times 100 = 30\%$ (1)

04.2 [2 marks]

Answer: 1.5

- green: $72 \div 360 \times 100 = 20\%$ (1)
- $30 \div 20 = 1.5$ (1)

Notes: Allow $(78 \div 260) \div (72 \div 360)$ for 2 marks. Allow ECF from the previous part.

04.3 [3 marks]

- the brown grasshoppers are camouflaged against the brown grass / the green grasshoppers are easier for birds to see (1)
- so fewer of the brown grasshoppers were eaten / more of them survived to be recaptured (1)
- brown grasshoppers are more likely to survive and breed (1)
- so they pass on the alleles for brown colour, and over many generations the brown form becomes more common (1)

Any 3 of the points above.

Question 5 (8 marks)

05.1 [1 mark]

Answer: 9.9 mm

- 9.9 (mm) (1)

05.2 [2 marks]

Answer: 7.6%

- $(9.9 - 9.2) \div 9.2 \times 100$ (1)
- 7.6 (%) (1)

Notes: An answer of 7.6 scores 2 marks. Allow 7.61 or 8. Allow ECF from the value given in the previous part.

05.3 [4 marks]

- (there was) variation in beak depth in the population (1)
- (variation) caused by differences in genes / alleles / mutation (1)
- after the drought most of the seeds available were large and hard (1)
- birds with deeper beaks could crack these seeds, so got more food / were more likely to survive (1)
- (so) birds with deeper beaks were more likely to breed (1)
- (and) pass on the alleles for deeper beaks to their offspring (so the mean beak depth increased) (1)

Any 4 of the points above.

Notes: Do not accept Lamarckian ideas, e.g. 'the birds' beaks grew deeper so they could crack the seeds'.

05.4 [1 mark]

- most birds already had deep beaks, so there was little variation left for natural selection to act on (1)
- the drought ended / plants with small, soft seeds returned, so deeper beaks were no longer a (big) advantage (1)
- very deep beaks may have disadvantages, e.g. they are less good at handling small seeds (1)

Any 1 of the points above.
