

GCSE Combined Science: Trilogy

Worksheet: Evidence for evolution

TIME 30 min	TOTAL 27 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Evidence for evolution

NAME _____ **CLASS** _____ **DATE** _____

- 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

The theory of evolution by natural selection is now widely accepted.

0 1 . 1

Which **two** of the following provide evidence for evolution by natural selection?

Tick (✓) **two** boxes.

Antibiotic resistance in bacteria

☐

The fossil record

☐

The inheritance of characteristics gained during an organism's life

☐

The naming of organisms using the binomial system

☐

The use of a fungus to make mycoprotein

☐

[2 marks]

0 1 . 2

Complete the sentence.

We now know that characteristics are passed on from parents to offspring in

.....

.....

.....

.....

[1 mark]

0 1 . 3

Bacteria can evolve rapidly.
Give the reason why.

[1 mark]

0 2

The theory of evolution by natural selection is now widely accepted because there is evidence from several sources.

0 2 . 1

Complete the sentences. Choose answers from the list.

genes · hormones · quickly · rocks · slowly · the air

Characteristics are passed on from parents to offspring in

Fossils found in show how much or how little organisms have changed as life developed on Earth.

Bacteria can evolve because they reproduce at a fast rate.

[3 marks]

0 2 . 2

Which observation from the fossil record provides evidence for evolution?

Tick (✓) **one** box.

Fossils in older rocks are generally of simpler organisms than fossils in younger rocks.

☐

All fossils are of species that are still alive today.

☐

Fossils show that organisms have never changed.

☐

Fossils are found only in rocks that are less than 1000 years old.

☐

[1 mark]

0 3

A new insecticide was used to control a species of beetle that damages potato crops. Every year, scientists exposed a sample of beetles from one farm to a standard dose of the insecticide and recorded the percentage that survived.

Table 1 shows the results.

Table 1

Year	Percentage of beetles that survived the standard dose
1	1
2	3
3	9
4	24
5	51
6	78

0 3 . 1

Describe the trend shown in Table 1.

.....

.....

.....

.....

[2 marks]

0 3 . 2

Explain why these results are evidence for evolution by natural selection.

.....

.....

.....

.....

.....

.....

[3 marks]

0 3 . 3

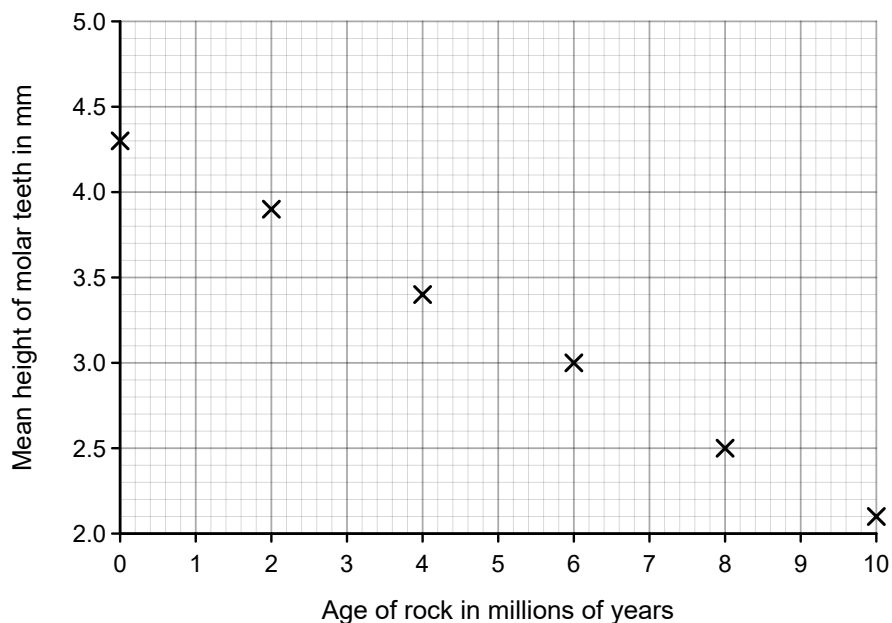
This species of beetle produces two generations each year. The birds that feed on the beetles produce one generation every two years.
Suggest why the beetles could evolve a new characteristic much faster than the birds.

[2 marks]

0 4

Scientists measured the height of the grinding teeth (molars) in fossils of a species of small grazing mammal. The fossils came from rocks of different ages. Figure 1 shows the results.

Figure 1



0 4 . 1

Draw a line of best fit on Figure 1.

[1 mark]

0 4 . 2

Use your line to estimate the mean height of the molar teeth of this species 5 million years ago.

.....

.....

.....

Height = mm

[1 mark]

0 4 . 3

Calculate the mean rate of increase in the height of the molar teeth, in mm per million years, from 10 million years ago to the present day.

.....

.....

.....

.....

Mean rate = mm per million years

[2 marks]

0 4 . 4

Grasses contain hard particles that wear down teeth. Fossils show that grasses became much more common during this period.
Suggest how natural selection caused the change in tooth height.

.....

.....

.....

.....

.....

.....

[3 marks]

0 5

Scientists measured the mean height of the molar teeth of a species of grazing mammal in fossils. In rocks that are 12 million years old, the mean was 29 mm. In rocks that are 2 million years old, the mean was 33 mm.

0 5 . 1

Calculate the percentage increase in the mean.
Give your answer to 3 significant figures.

.....

.....

.....

.....

Percentage increase = %

[2 marks]

0 5 . 2

Calculate the mean rate of change, in mm per million years.

.....

.....

.....

.....

Mean rate = mm per million years

[2 marks]

0 5 . 3

Explain how fossils like these provide evidence for evolution.

.....

.....

[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 Combined Science: Trilogy · Worksheet: Evidence for evolution · 27 marks

Question 1 (4 marks)

01.1 [2 marks]

Correct: Antibiotic resistance in bacteria; The fossil record

01.2 [1 mark]

Answer: genes

- genes (1)

Notes: Allow alleles / DNA / chromosomes / gametes.

01.3 [1 mark]

- they reproduce at a fast rate / very quickly (so there are many generations in a short time) (1)
-

Question 2 (4 marks)

02.1 [3 marks]

Answer: genes; rocks; quickly

- genes (1)
 - rocks (1)
 - quickly (1)
-

02.2 [1 mark]

Correct: Fossils in older rocks are generally of simpler organisms than fossils in younger rocks.

Question 3 (7 marks)

03.1 [2 marks]

- the percentage of beetles that survived increased every year (1)
 - slowly at first and then more rapidly / from 1% to 78% (1)
-

03.2 [3 marks]

- some beetles had a mutation / an allele that made them resistant (1)
- the insecticide killed non-resistant beetles, but resistant beetles survived (1)
- the survivors bred and passed on the allele for resistance (1)
- so the proportion of resistant beetles in the population increased over time (1)

Any 3 of the points above.

03.3 [2 marks]

- the beetles produce many more generations in the same time (four beetle generations for every bird generation) (1)
 - the beetles produce many more offspring / have larger populations, so a useful mutation is more likely to arise (1)
-

Question 4 (7 marks)

04.1 [1 mark]

- a single straight line passing close to all the points, with the points evenly spread on either side (1)

04.2 [1 mark]

Answer: 3.2 mm

- 3.2 (mm) (1)

Notes: Allow 3.1–3.3.

04.3 [2 marks]

Answer: 0.22 mm per million years

- $(4.3 - 2.1) \div 10$ (1)
- 0.22 (mm per million years) (1)

04.4 [3 marks]

- there was variation in tooth height (due to different alleles) (1)
- animals with taller teeth could keep feeding on grass for longer before their teeth were worn down (1)
- so they were more likely to survive and breed (1)
- and pass on the alleles for taller teeth, so the mean tooth height increased over many generations (1)

Any 3 of the points above.

Question 5 (5 marks)

05.1 [2 marks]

Answer: 13.8%

- $(33 - 29) \div 29 \times 100$ (1)
- 13.8 (%) (1)

Notes: An answer of 13.79 (not given to 3 significant figures) scores 1 mark.

05.2 [2 marks]

Answer: 0.4 mm per million years

- $(33 - 29) \div (12 - 2)$ (1)
 - 0.4 (mm per million years) (1)
-

05.3 [1 mark]

- fossils from rocks of different ages show that the characteristics of a species have changed gradually over time (1)
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