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Charles Darwin proposed the theory of natural selection.

Many people at the time did not accept his theory.

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There was a different theory at the same time as Darwin's theory.

The different theory said that changes in an organism during its life could be inherited.

Who proposed this theory?

[1 mark]

1 0 . **2** Studying fossils helps scientists understand how living things have evolved.

Figure 14 shows a fossilised snake.

Figure 14



Explain how the fossil in **Figure 14** may have formed.



[3 marks]

Question 10 continues on the next page

There are many types of rat snake in the world.

Table 6 shows two types of rat snake.

Table 6

		
Type of snake	Japanese rat snake	Texas rat snake
Colour of snake	Green	Pale brown
Type of environment	Grass	Dry and dusty

1 0 . **3** The different types of rat snake have evolved from similar ancestors.

The rat snakes have evolved to to suit their environments.

Explain how the Japanese rat snake evolved to be different from the Texas rat snake.

[4 marks]

1 0 . **4** Many species of snake have become extinct.

Give **one** reason why a species might become extinct.

[1 mark]

Turn over for the next question

Question 10

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.1	(Jean Baptiste) Lamarck	allow phonetic spelling	1	AO1/1 4.6.3.1
10.2	(snake is) covered in sediment / mud or sinks into the mud (then) the soft parts decay / are eaten or bones / hard parts do not decay (so) minerals enter bones or bones are replaced by minerals		1 1 1	AO2/1 4.6.3.5 AO2/1 4.6.3.5 AO1/1 4.6.3.5

Question 10 continues on the next page

Question 10 continued

Question	Answers	Mark	AO / Spec. Ref.
10.3	Level 3: A detailed and coherent explanation is provided. Logical links between clearly identified, relevant points explain how the rat snake evolved through the process of natural selection.	3–4	AO2/1 4.6.3.1
	Level 2: Simple statements made, but not precisely. The logic is unclear.	1–2	AO1/1 4.6.3.1
	No relevant content	0	
	<p>Indicative content</p> <p>statements:</p> <ul style="list-style-type: none"> • there are lots of different colours of snakes • some shades of green are closer to the colour of the environment (in Japan) than others • survivors (in each generation) will breed and produce offspring <p>explanations:</p> <ul style="list-style-type: none"> • different colours are controlled by different genes / alleles / are caused by mutations • being green means they are best suited to grassy / green environments • being green means they are camouflaged • those that are camouflaged best will be able to catch more food • those that are camouflaged best will be able to avoid being eaten • survivors' offspring will inherit the genes / alleles / mutation for the shade of green colouration <p>additional examiner guidance:</p> <ul style="list-style-type: none"> • allow converse points relating to the Texas rat snake if they clearly identify the reasons why this snake was at an evolutionary disadvantage, ie more likely to be caught and eaten by a predator • a good level 2 answer will clearly link survival and breeding to the passing on of the advantageous genes / alleles / mutations and link the idea of colour (AO2) to a correct explanation of its significance for survival 		

Question 10 continued

Question	Answers	Mark	AO / Spec. Ref.
10.4	any one from: <ul style="list-style-type: none">• changes to the environment• new predators• new diseases• new (more successful) competitors• catastrophic event / described event	1	AO1/1 4.6.3.6
Total		9	