

GCSE
BIOLOGY

Biology Test 4: Inheritance, variation and evolution (Foundation)

Total number of marks: 34

0 2

The shape of a person's earlobes is controlled by a gene.

Figure 3 shows two types of earlobe.

Figure 3



Free earlobe



Attached earlobe

A dominant allele codes for free earlobes.

0 2 . 1

What is a dominant allele?

[1 mark]

Tick (✓) **one** box.

An allele expressed even if a person only has one copy of the allele

An allele expressed only if a person has two copies of the allele

An allele expressed only if a person has no recessive allele

An allele expressed only if it is inherited from the male parent

0 2 . 2 A man with free earlobes and a woman with attached earlobes have children together.

Complete **Figure 4** to show the possible genotypes of the children.

Use the symbols:

E = allele for free earlobes

e = allele for attached earlobes

[2 marks]

Figure 4

		Woman	
		e	e
Man	E	Ee	Ee
	e	ee	ee

0 2 . 3 What is the probability that one of the children would have attached earlobes?

Use **Figure 4**.

[1 mark]

Tick (✓) **one** box.

0.125

0.25

0.5

0.75

0 2 . 4 **Figure 5** shows the inheritance of the sex chromosomes, X and Y.

Complete **Figure 5** to show the sex chromosomes in the gametes of the man and the woman.

[2 marks]

Figure 5

		Woman	
		X	X
Man	X	XX	XX
	Y	XY	XY

0 2 . 5 Calculate the probability that the man and the woman's next child will be a girl with attached earlobes.

[2 marks]

Use the equation:

probability of a girl with attached earlobes

= probability of attached earlobes × probability of being a girl

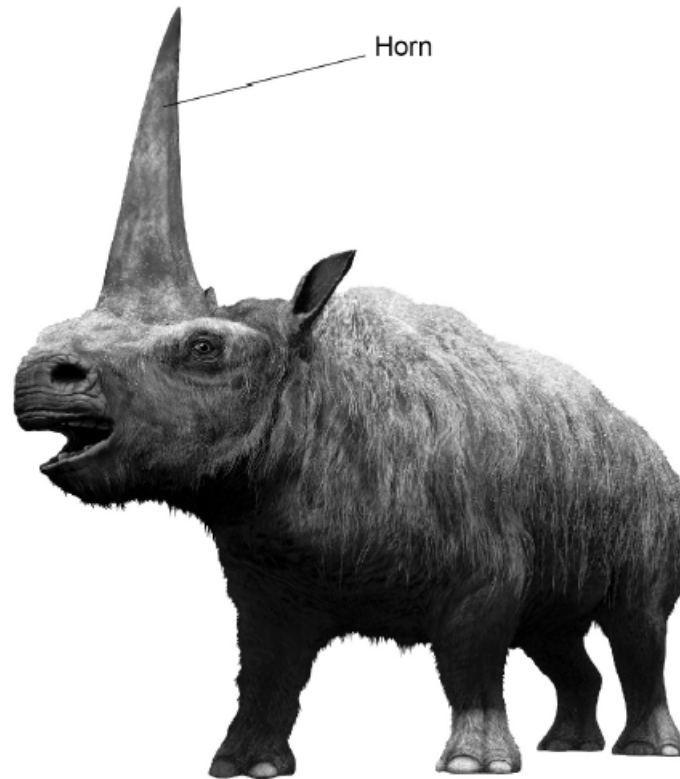
$$0.5 \times 0.5 = 0.25$$

Probability of a girl with attached earlobes = 0.25

0 6

Figure 8 shows what the extinct Siberian rhinoceros (*Elasmotherium sibiricum*) might have looked like.

Figure 8



0 6 . 1

What is the genus of the Siberian rhinoceros?

[1 mark]

Tick (✓) **one** box.

Elasmotherium

Elasmotherium sibiricum

sibiricum

The 'three-domain system' of classification places all living organisms in one of three domains.

0 6 . 2 Which domain was the Siberian rhinoceros in?

[1 mark]

Tick (✓) **one** box.

Archaea

Eukaryota

Prokaryota

0 6 . 3 Who developed the 'three-domain system' of classification?

[1 mark]

Tick (✓) **one** box.

Carl Woese

Charles Darwin

Gregor Mendel

0 6 . 5 The only parts of the Siberian rhinoceros that have been found are fossilised bones.

Give **one** reason why **only** the bones of the body of the Siberian rhinoceros became fossils.

Bones do not decay easily and are replaced by minerals as they decay.

[1 mark]

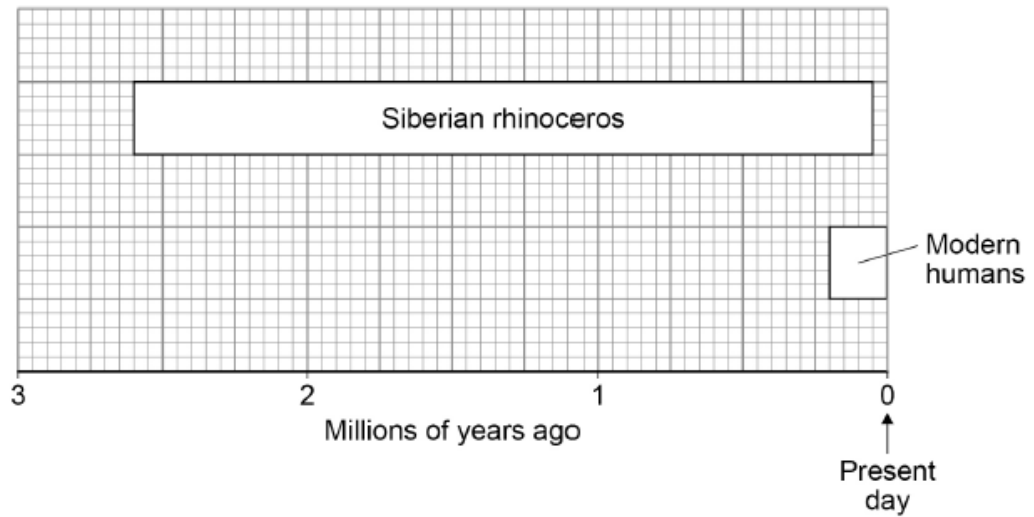
0 6 . 6 Suggest how scientists can estimate when the Siberian rhinoceros was alive.

By studying the fossil and the age of Stone the fossil was found in.

[1 mark]

Figure 9 shows when the Siberian rhinoceros existed and when modern humans existed.

Figure 9



06.7

How many million years ago did the Siberian rhinoceros become extinct?

[1 mark]

0.05 million years ago

06.8

Determine the time in years when both the Siberian rhinoceros and modern humans existed together.

Use Figure 9 and your answer to Question 06.7.

[3 marks]

Modern humans started existing 0.2 million years ago. Siberian rhinoceros became extinct 0.05 million years ago.

$0.2 - 0.05 = 0.15$ million

Time = 150,000 years

0 3

Fossils give evidence about organisms that lived a long time ago.

0 3 . 1

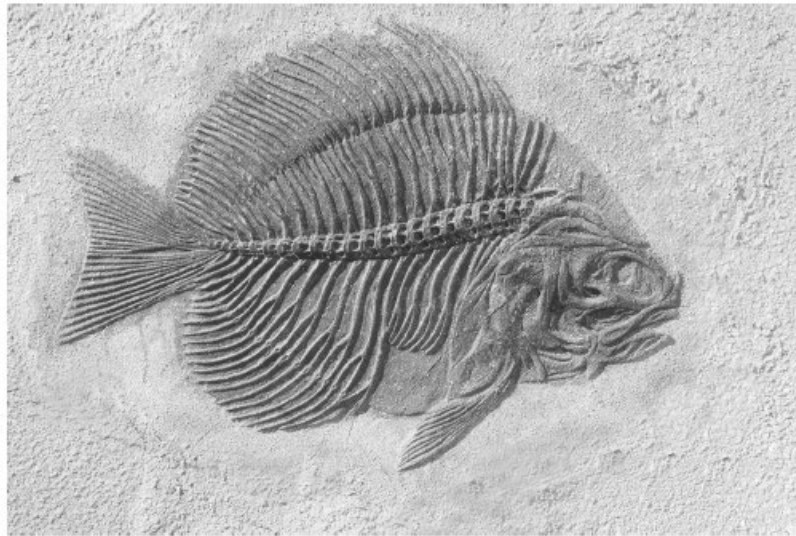
Scientists have found very few fossils of the earliest life forms.

Give **one** reason why.

Most early life forms have soft body and do not leave behind fossils [1 mark]

Figure 3 is a photograph of a fossilised fish.

Figure 3



0 3 . 2

Suggest how the fossil in **Figure 3** was formed.

When the fish bones decayed, they are replaced by minerals. [2 marks]

0 3 . 3

The species of fish shown in **Figure 3** is now extinct.

Give **two** possible causes of extinction.

[2 marks]

1 they are poorly adapted to their environment.

2 disease

0 3 . 4 What is a mutation?

[1 mark]

Tick **one** box.

A change in a gene

Accidental damage to an organism

An organism with a new characteristic

The loss of a species

0 3 . 5 Describe the process of natural selection.

[3 marks]

Organisms of the same species have a wide range of variation for their characteristics. The organisms with characteristics most suitable for the environment they live in will have a higher chance of survival and are more likely to breed pass on their genes. These characteristics will be passed on to the offsprings.

0 8

Genetic material is made of DNA.

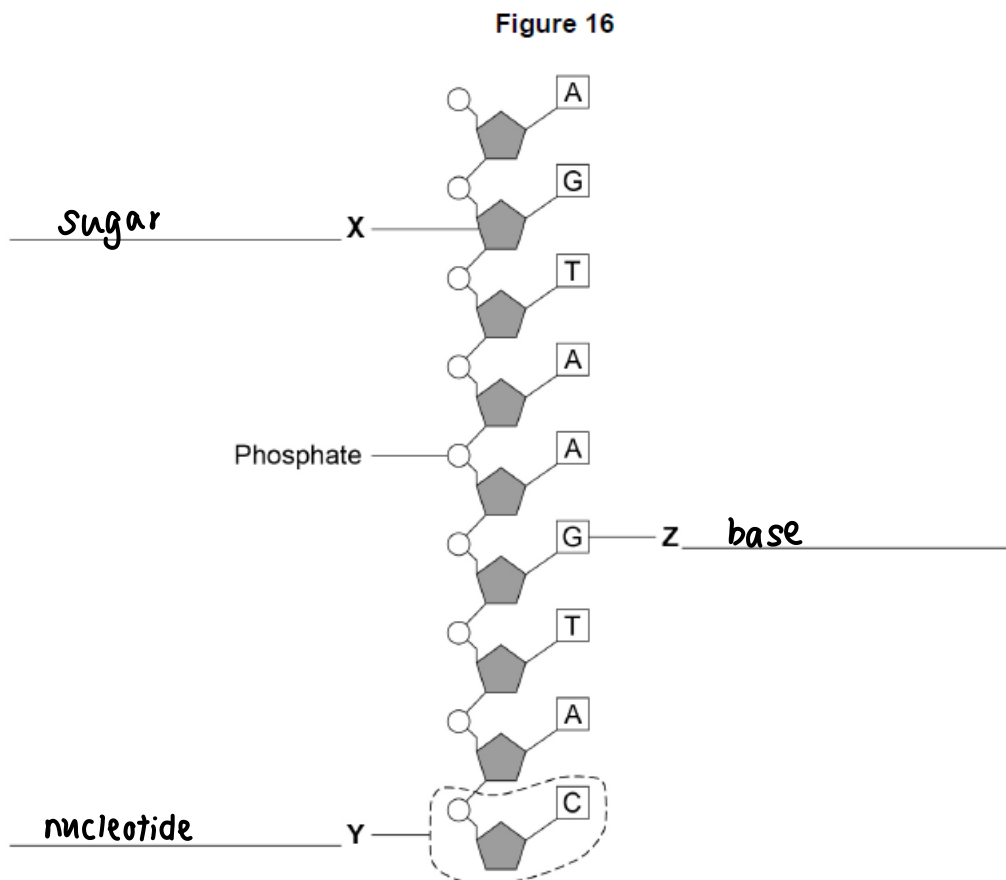
0 8 . 1

Which structures in the nucleus of a human cell contain DNA?

[1 mark]

chromosomes

Figure 16 shows part of one strand of a DNA molecule.



0 8 . 2

Label parts X, Y and Z on Figure 16.

[3 marks]

Choose answers from the box.

Base	Fatty acid	Nucleotide	Sugar	Glycerol
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0 8 . 3 A complete DNA molecule is made of two strands twisted around each other.

What scientific term describes this structure?

double-helix

[1 mark]

0 8 . 4 DNA codes for the production of proteins.

A protein molecule is a long chain of amino acids.

How many amino acids could be coded for by the piece of DNA shown in **Figure 16**?

[1 mark]

Tick (✓) **one** box.

2

3

9

18

0 8 . 5 Scientists have now studied the whole human genome.

Give **two** benefits of understanding the human genome.

[2 marks]

1 enables us to search for genes linked to different diseases

2 allows understanding of inherited disorders and their treatment