2021 ASSESSMENT MATERIALS

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**	
	e		

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	
Man		**XX**	**XX**
		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

Probability of a girl with attached earlobes = _____

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.

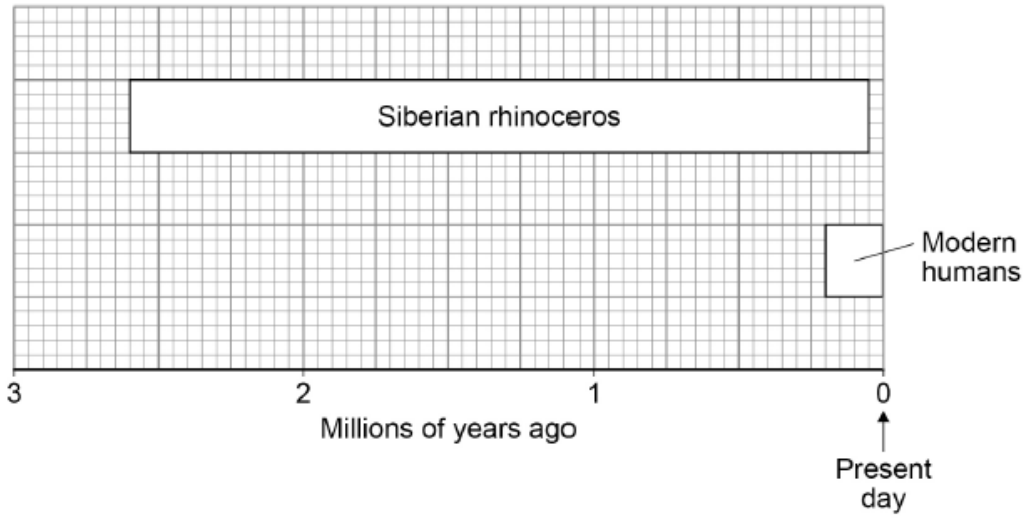
[1 mark]

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

[1 mark]

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

Figure 9



0 6 . 7 How many million years ago did the Siberian rhinoceros become extinct?

[1 mark]

_____ million years ago

0 6 . 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]

_____

_____

_____

_____

Time = _____ years

0 3 Fossils give evidence about organisms that lived a long time ago.

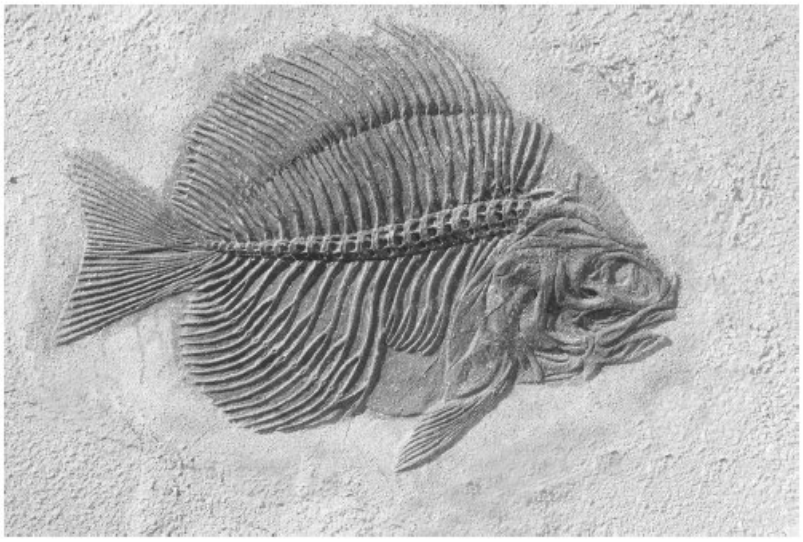
0 3 . 1 Scientists have found very few fossils of the earliest life forms.

Give **one** reason why.

[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.

[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 _____

_____

2 _____

_____

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]

0 8 Genetic material is made of DNA.

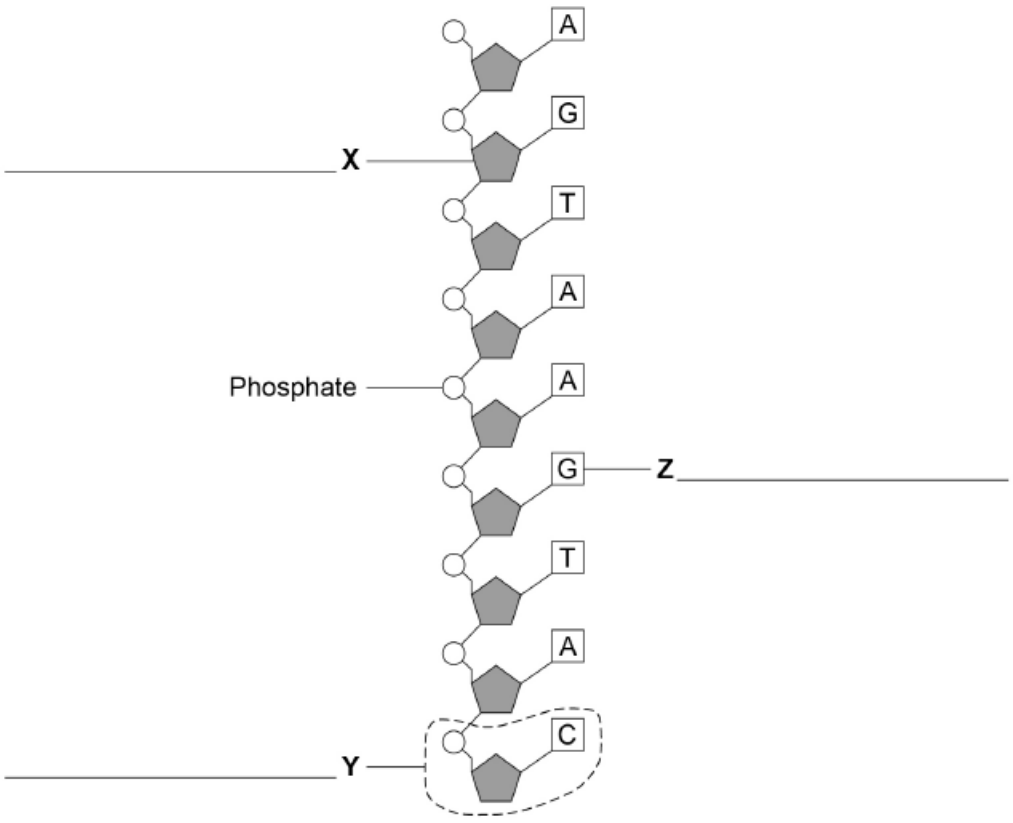
0 8 . 1 Which structures in the nucleus of a human cell contain DNA?

[1 mark]

_____

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

Figure 16



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**

0 8 . 3 A complete DNA molecule is made of two strands twisted around each other.

What scientific term describes this structure?

[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 _____

_____

2 _____

_____