

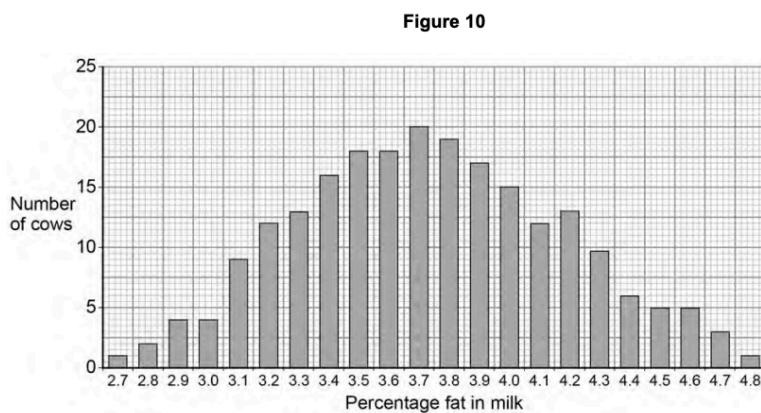
(Variation and evolution)

Q1.a)(2018)

Scientists want to breed cows that produce milk with a low concentration of fat.

Figure 10 shows information about the milk in one group of cows.

The cows were all the same type.



In **Figure 10** the mean percentage of fat in the milk is equal to the modal value.

Give the mean percentage of fat in the milk of these cows.

[1 mark]

Mean percentage = _____

Q1.b)(2018)

A student suggested:

'The percentage of fat in milk is controlled by one dominant allele and one recessive allele.'

How many different phenotypes would this produce?

[1 mark]

Tick **one** box.

2	☐
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3	☐
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22	☐
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46	☐
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Q1.c)(2018)

Give the evidence from **Figure 10** which shows the percentage of fat in the milk is controlled by several genes.

[1 mark]

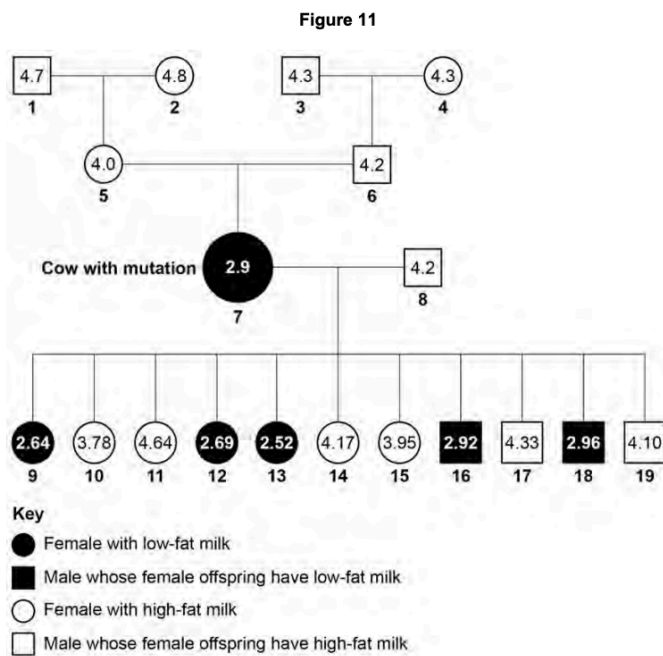
Q1.d)(2018)

The scientists found one cow with a mutation.

The cow's milk contained only 2.9% fat.

Figure 11 shows the percentage of fat in the milk of cattle related to the cow with the mutation.

The values for male cattle are the mean values of their female offspring.



Animal **8** is homozygous.

The mutation in animal **7** produced a dominant allele for making low-fat milk.

Give evidence from **Figure 11** that animal **7** is heterozygous.

[1 mark]

Q1.e)(2018)

Animals **7** and **8** produced 11 offspring. These offspring were produced by in vitro fertilisation (IVF).

The embryos from IVF were transferred into 11 other cows.

Suggest why IVF and embryo transfer were used rather than allowing animals **7** and **8** to mate naturally.

[1 mark]

Q1.f)(2018)

Draw a Punnett square diagram to show a cross between animals **7** and **8**.

Identify which offspring produce low-fat milk and which offspring produce high-fat milk.

[4 marks]

Use the following symbols:

D = dominant allele for making low-fat milk

d = recessive allele for making high-fat milk

Q1.g)(2018)

The scientists want to produce a type of cattle that makes large volumes of low-fat milk.

The scientists will selectively breed some of the animals shown in **Figure 11**.

Describe how the scientists would do this.

[4 marks]

Q2.a)(2018)

Figure 12 shows a ring-tailed lemur.

Figure 12



Table 5 shows part of the classification of the ring-tailed lemur.

Table 5

Classification group	Name
Kingdom	<i>Animalia</i>
Phylum	<i>Chordata</i>
	<i>Mammalia</i>
	<i>Primates</i>
	<i>Lemuroidea</i>
Genus	<i>Lemur</i>
	<i>catta</i>

Complete Table 5 to give the names of the missing classification groups.

[2 marks]

Q2.b)(2018)

Give the binomial name of the ring-tailed lemur.

Use information from Table 5.

[1 mark]

Q2.c)(2018)

Lemurs are only found on the island of Madagascar.

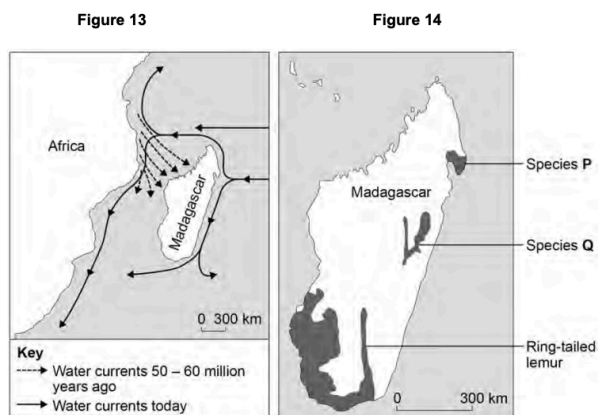
Madagascar is off the coast of Africa.

Scientists think that ancestors of modern lemurs evolved in Africa and reached Madagascar about 50-60 million years ago.

Today there are many species of lemur living on Madagascar.

Figure 13 shows information about water currents.

Figure 14 shows the distribution of three species of lemur on Madagascar.



Suggest how ancestors of modern lemurs reached Madagascar.

[1 mark]

Q2.d)(2018)

Describe how the ancestors of modern lemurs may have evolved into the species shown in **Figure 14**.

[5 marks]

Q3.(2019)

Table 2 gives the classification of four plant species.

Table 2

Group	Species 1	Species 2	Species 3	Species 4
Kingdom	<i>Plantae</i>	<i>Plantae</i>	<i>Plantae</i>	<i>Plantae</i>
Phylum	<i>Spermatophyta</i>	<i>Spermatophyta</i>	<i>Spermatophyta</i>	<i>Spermatophyta</i>
Class	<i>Monocotyledonae</i>	<i>Dicotyledonae</i>	<i>Monocotyledonae</i>	<i>Dicotyledonae</i>
Order	<i>Poales</i>	<i>Fabales</i>	<i>Poales</i>	<i>Scrophulariales</i>
Family	<i>Cyperaceae</i>	<i>Fabaceae</i>	<i>Poaceae</i>	<i>Scrophulariaceae</i>
Genus	<i>Eriophorum</i>	<i>Pisum</i>	<i>Poa</i>	<i>Antirrhinum</i>
Species	<i>angustifolium</i>	<i>sativum</i>	<i>annua</i>	<i>majus</i>

Species 1 and 3 are the most closely related.

What information in **Table 2** gives evidence for this?

[1 mark]

Q4.a)(2021)

The Galapagos Islands are located in the Pacific Ocean.

Several species of birds called finches live on the Galapagos Islands.

These finches are very similar to each other.

Figure 15 shows two modern species of Galapagos finch and their classification.

Figure 15

Medium ground finch

Small ground finch



Classification group	Medium ground finch	Small ground finch
Kingdom	<i>Animalia</i>	<i>Animalia</i>
	<i>Chordata</i>	<i>Chordata</i>
Class	<i>Aves</i>	<i>Aves</i>
	<i>Passeriformes</i>	<i>Passeriformes</i>
	<i>Thraupidae</i>	<i>Thraupidae</i>
Genus	<i>Geospiza</i>	<i>Geospiza</i>
	<i>fortis</i>	<i>fuliginosa</i>

Complete **Figure 15** to give the names of the missing classification groups.

[2 marks]

Q4.b)(2021)

Give the binomial name of the medium ground finch.

Use information from **Figure 15**.

[1 mark]

Q5.a)(2021)

In each species of finch, there is a variation in beak depth.

Figure 16 shows how beak depth is measured.

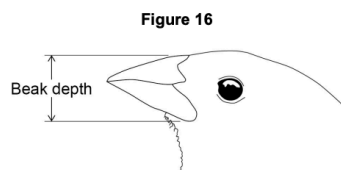
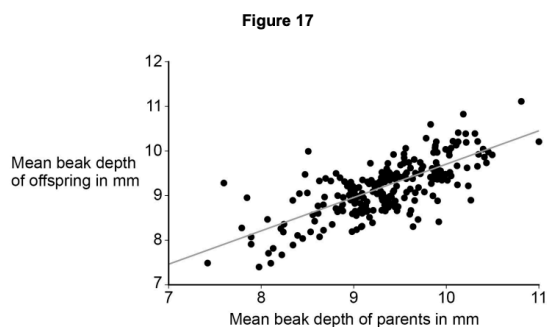


Figure 17 shows the relationship between the beak depth of parent birds and the beak depth of their offspring.



Give evidence from **Figure 17** that beak depth is an inherited characteristic.

[1 mark]

Q5.b)(2021)

Scientists suggested that more than one gene controls beak depth.

Give evidence from **Figure 17** to support the scientists' suggestion.

[1 mark]

Q6.(2022)

A scientist found a polluted pond which had a new type of blue algae in the water.

The blue colour of the algae was caused by a mutation.

What is a mutation?

[1 mark]

Q7.a)(2023)

Figure 1 shows four species of bird from the same habitat in the UK.

Figure 1



Brambling (*Fringilla montifringilla*)

Bullfinch (*Pyrrhula pyrrhula*)



Chaffinch (*Fringilla coelebs*)



Goldfinch (*Carduelis carduelis*)

Which species of bird in **Figure 1** do scientists think are most closely related?

[1 mark]

Tick (✓) **one** box.

Brambling and chaffinch

☐

Brambling and goldfinch

☐

Bullfinch and chaffinch

☐

Bullfinch and goldfinch

☐

Q7.b)(2023)

Scientists think the brambling and the bullfinch belong to different species.

What evidence is used by scientists to classify the brambling and the bullfinch as different species?

[1 mark]

Tick (✓) **one** box.

The brambling and the bullfinch are different sizes.

☐

The brambling and the bullfinch cannot breed together to give fertile offspring.

☐

The brambling and the bullfinch live in different parts of the habitat.

☐

The brambling eats mainly seeds and the bullfinch eats mainly insects.

☐

Q8.(2024)

Evolution of new species occurs by mutation and natural selection.

What is a mutation?

[1 mark]
