AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.6.1.6

Sex determination

Past-paper questions

Tier	**Foundation**
Question groups	**3**
Available paper years	**2019–2025**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.6.1.6 Sex determination

Question 01

June 2019 | 8464/B/2F | Original Q4

0 4 A cat breeder noticed that four kittens from one Siamese cat mother had a new blue colour at the tip of their tails.

0 4 . 1 What has caused the new colour to appear?

[1 mark]

Tick (✓) **one** box.

- Fertilisation ☐
- Mitosis ☐
- Mutation ☐

0 4 . 2 The cat breeder wants to use selective breeding so that all new kittens have blue tail tips.

Describe the process of selective breeding the cat breeder could use.

[3 marks]

0 4 . 3 Suggest **one** reason why the cat breeder wants to have all new kittens with the blue tail tips.

[1 mark]

4.6.1.6 Sex determination

Question 01 · continued

0 4 . 4 Siamese cats can suffer from heart defects.

Why might there be more Siamese cats with heart defects amongst the kittens with blue tail tips?

[1 mark]

Tick (✓) **one** box.

They are clones ☐

They are formed by mitosis ☐

They are formed by sexual reproduction ☐

They are produced by inbreeding ☐

With each pregnancy, the cat breeder expected that:

- 50% of the kittens would be male
- 50% of the kittens would be female.

The sex chromosomes in cats are inherited in the same way as in humans.

The sex chromosomes are X and Y.

0 4 . 5 Give the combination of sex chromosomes present in a male cat and in a female cat.

[1 mark]

Male cat _____

Female cat _____

4.6.1.6 Sex determination

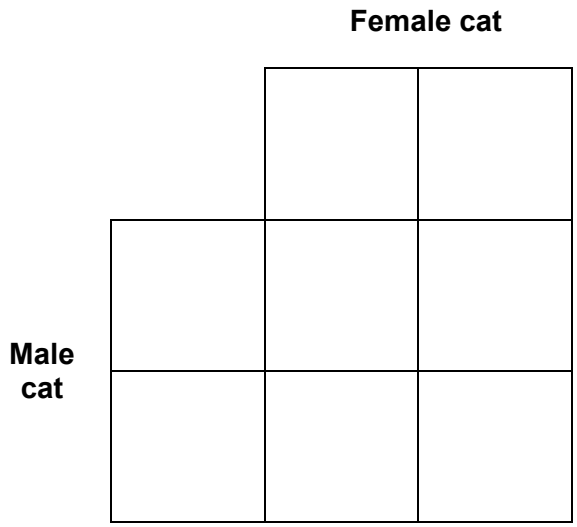
Question 01 · continued

0 4 . 6 The cat breeder expected 50% male kittens and 50% female kittens.

Complete the Punnett square in **Figure 3** to show why.

[2 marks]

Figure 3



0 4 . 7 In the first pregnancy there was one male kitten and three female kittens.

Give the reason why there were **not** two kittens of each sex.

[1 mark]

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4.6.1.6 Sex determination

Question 02

November 2020 | 8464/B/2F | Original Q1

0 1 This question is about reproduction.

0 1 . 1 Which **two** statements are true for sexual reproduction in humans?

[2 marks]

Tick (✓) **two** boxes.

- Gametes are formed. ☐
- Offspring are clones. ☐
- Offspring are genetically identical to parents. ☐
- Only one parent is involved. ☐
- Sperm and egg fuse. ☐

0 1 . 2 Humans reproduce by sexual reproduction.

Complete **Figure 1** to show the inheritance of sex.

[3 marks]

Figure 1

		Mother	
		X	**X**
Father	**X**	XX	

4.6.1.6 Sex determination

Question 02 · continued

0 1 . 3 Draw a ring around the genotype of all male children in **Figure 1**.

[1 mark]

0 1 . 4 When children reach puberty, reproductive hormones cause changes in their bodies.

Draw **one** line from each hormone to the change the hormone causes at puberty.

[2 marks]

Hormone	Change the hormone causes at puberty
	Breasts develop
Oestrogen	
	Skin turns lighter
	Voice becomes deeper
Testosterone	
	Wisdom teeth appear

Question 1 continues on the next page

4.6.1.6 Sex determination

Question 02 · continued

A woman does **not** want to become pregnant.

She considers two methods of contraception.

0 1 . 5 Draw **one** line from each method of contraception to how the method prevents pregnancy.

[2 marks]

Method of contraception	How the method prevents pregnancy
Condom	Embryos do not implant in the uterus
Oral contraceptive (the pill)	Hormones stop eggs maturing
	Sperm are killed
	Sperm do not reach the egg

4.6.1.6 Sex determination

Question 02 · continued

0 1 . 6 Give **one** advantage and **one** disadvantage of taking oral contraceptives to prevent pregnancy.

[2 marks]

Advantage _____

_____

Disadvantage _____

_____

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Turn over for the next question

4.6.1.6 Sex determination

Question 03

June 2025 | 8464/B/2F | Original Q5

0 5 This question is about genetics.

The fur colour of rabbits is controlled by two alleles.

0 5 . 1 Draw **one** line from each term to the meaning of the term relating to genetics in rabbits.

[3 marks]

Term	Meaning of the term
Chromosome	A fur colour that is seen
Gene	A whole strand of DNA found in the nucleus of a rabbit cell
Genome	Codes for a protein that affects fur colour
	The complete genetic composition of a rabbit

Question 5 continues on the next page

4.6.1.6 Sex determination

Question 03 · continued

0 5 . 2 In rabbits:

- the allele for brown fur (**B**) is dominant
- the allele for white fur (**b**) is recessive.

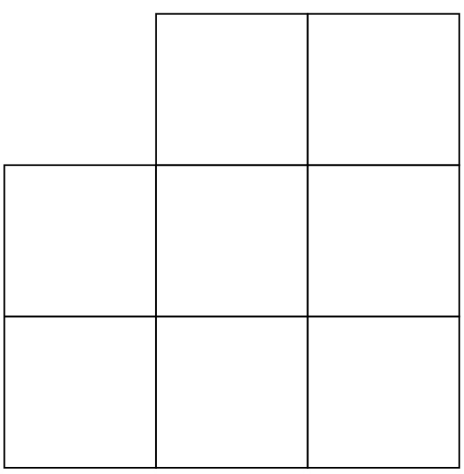
A rabbit with the alleles **Bb** and a rabbit with the alleles **bb** breed together.

Determine the probability that one of the offspring will have white fur.

You should:

- complete the Punnett square diagram
- identify any offspring that will have white fur.

[5 marks]



Probability = _____

4.6.1.6 Sex determination

0 5 . 3 A male rabbit is heterozygous for fur colour.

The rabbit's body cells have the genotype **Bb**.

One of the sperm cells from the rabbit has the allele **b**.

Explain why the alleles in the rabbit's body cells and the allele in the sperm cell are different.

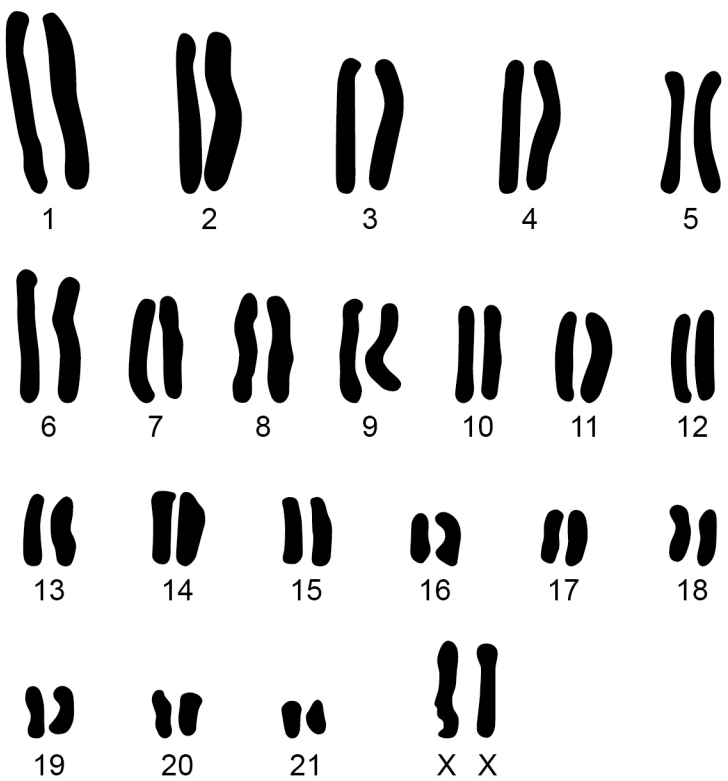
[2 marks]

Question 5 continues on the next page

Question 03 · continued

Figure 7 shows the chromosomes of a rabbit.

Figure 7



0 5 . 4 How many chromosomes would be found in a skin cell of a rabbit?

Use **Figure 7**.

[1 mark]

Number of chromosomes = _____

0 5 . 5 The sex of a rabbit is controlled in the same way as the sex of a human.

Give the evidence from **Figure 7** that the rabbit is female.

[1 mark]

_____

_____

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