

Genetic inheritance (dominant/recessive alleles, Punnett squares, family trees)

Q1. (2018)

0 5

Variation in individual organisms can be caused by:

- genes
- the environment
- a combination of both genes and the environment.

Figure 7 shows variations in a woman.

Figure 7



A)

0 5 . 2

The allele for blue eyes is recessive (**b**).The allele for brown eyes is dominant (**B**).

A woman has blue eyes.

What are the woman's alleles?

[1 mark]

Tick **one** box.

BB

☐

Bb

☐

bb

☐

B)

0 5 . 3

The woman marries a man with the alleles **Bb** for eye colour.

What colour eyes does the man have?

[1 mark]

C)

0 5 . 4

Complete the Punnett square diagram in Figure 8 for this man and woman.

[1 mark]

Figure 8

		Woman	
Man	B		
	b		

D)

0 5 . 5

What is the probability that a child of this man and woman will have brown eyes?

[1 mark]

Q2. (2018)

0 5 . 6 What is the scientific term used for the child's eye colour?

[1 mark]

Tick **one** box.

Chromosome

☐

Condition

☐

Genotype

☐

Phenotype

☐

Q3. (2019)

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 . 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]

Q4. (2021)

Only people with a dominant allele **T** can taste PTC.

People with **only** the allele **t** cannot taste PTC.

A)

0 1 . 4 A person has the genotype **Tt**.

What word describes the person's genotype?

[1 mark]

Tick (✓) **one** box.

Heterozygous

☐

Phenotype

☐

Recessive

☐

B)

0 1 . 5 Give the genotype of a person who **cannot** taste PTC.

[1 mark]

C)

0 1 . 6

A woman and a man plan to have a child.

The woman and the man both have the genotype **Tt**.

Complete **Figure 1** to show the possible genotypes of the child.

[2 marks]

Figure 1

		Woman	
		T	t
Man	T	T T	
	t		

D)

0 1 . 7

What is the chance of the child being able to taste PTC?

Use **Figure 1**.

[1 mark]

Tick (✓) **one** box.

25% ☐ 50% ☐ 75% ☐ 100% ☐

Q5. (2022)

Cystic fibrosis (CF) is an inherited disorder.

The allele for having CF is recessive (**h**).

The allele for **not** having CF is dominant (**H**).

A)

0 1 . 5

What is a recessive allele?

[1 mark]

Tick (✓) **one** box.

An allele that is always expressed.

☐

An allele that is expressed if only one copy is present.

☐

An allele that is only expressed if two copies are present.

☐

B)

A man and a woman do **not** have CF. The man has the alleles **Hh**.

0 1 . 6

What word describes the alleles of the man?

[1 mark]

Tick (✓) **one** box.

Heterozygous

☐

Homozygous

☐

Phenotype

☐

C)

01.7

The man and the woman want to have a child.

Complete **Figure 1** to show the possible genotypes of the child.

Draw a ring around the genotype of a child who will have CF.

[3 marks]

Figure 1

		Woman	
		H	h
Man	H		
	h		hh

D)

01.8

What is the chance that a child of the man and the woman will have CF?

[1 mark]

Tick (✓) **one** box.

25%

☐

50%

☐

75%

☐

100%

☐

Q6. (2023)

Polydactyly is an inherited disorder.

The allele for polydactyly is dominant, **D**.A person with two copies of the allele **d** will **not** have polydactyly.

A)

06.3

A person with the genotype **DD** is homozygous.What word describes the genotype **Dd**?

[1 mark]

B)

0 6 . 4 A person with the genotype **Dd** and a person with the genotype **dd** plan to have a child.

Determine the probability that the child will have polydactyly.

You should:

- complete the Punnett square diagram
- identify any offspring genotype that would have polydactyly.

[5 marks]

Probability that the child will have polydactyly = _____

Q7. (2024)

0 1 . 1 Cystic fibrosis affects the movement of substances into and out of cells.

Which part of a cell controls the movement of substances into and out of the cell?

[1 mark]

Tick (✓) **one** box.

Cell membrane	☐
Cytoplasm	☐
Mitochondria	☐

Q8. (2024)

Cystic fibrosis is caused by a recessive allele, **b**.

A)

0 1 . 2 What name is given to the allele **B**?

[1 mark]

Tick (✓) **one** box.

DNA	☐
Dominant	☐
Gene	☐

B)

0 1 . 3 Which term describes the genotype **Bb**?

[1 mark]

Tick (✓) **one** box.

Chromosome

☐

Heterozygous

☐

Phenotype

☐

C)

0 1 . 4 Two people plan to have a child.

Both people have the genotype **Bb**.

Complete **Figure 1** to show the possible genotypes of the child.

[3 marks]

Figure 1

		Parent 1	
		B	b
Parent 2	B	BB	Bb
	b	Bb	bb

D)

0 1 . 5 What is the chance that a child of these parents will have cystic fibrosis?

Use **Figure 1**.

[1 mark]

Tick (✓) **one** box.

0% ☐

25% ☐

50% ☐

75% ☐