Q1. (June 2018)

There are two main types of reproduction, sexual and asexual.

Which is an **advantage** of sexual reproduction?

A Creates more variation

B Produces larger numbers of offspring

C Produces offspring that are all identical so well adapted

D Only needs one parent

Your answer ☐ **[1]**

Q2. (June 2018)

What did Gregor Mendel discover?

A A theory for how life on Earth started

B How characteristics are inherited in pea plants

C The shape of the DNA molecule

D The theory of natural selection

Your answer ☐ **[1]**

Q3. (June 2018)

An organism has the genotype TT.

Which term describes this organism?

A Heterozygous dominant

B Heterozygous recessive

C Homozygous dominant

D Homozygous recessive

Your answer ☐ **[1]**

Q4. (June 2018)

Which process produces gametes?

A Diffusion

B Fertilisation

C Meiosis

D Mitosis

Your answer ☐ **[1]**

Q5. (June 2018)

a)

Characteristics can be examples of continuous or discontinuous variation.

Write the **four** characteristics below in the correct columns of the table.

Sex **Blood group** **Height** **Eye colour**

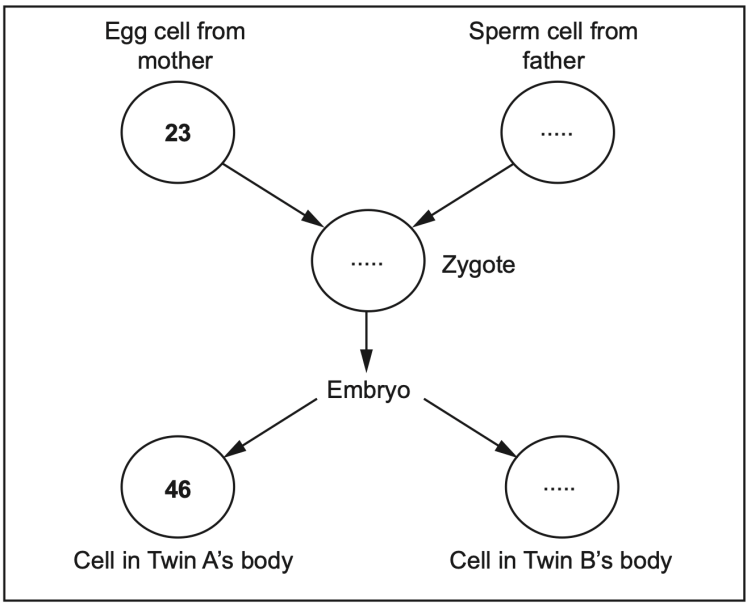
Continuous variation	Discontinuous variation

[2]

b)

Identical twins occur when an embryo splits into two.

In the diagram below, some of the chromosome numbers in the different cells have been given to you.



Complete the diagram to show the number of chromosomes in:

- The sperm cell
- The zygote
- The cell in Twin B's body.

[3]

Q6. (June 2018)

a)

The sex chromosomes determine the sex of a baby.

What are the sex chromosomes of a male and of a female?

Male ..... Female ..... **[2]**

b)

The data in the table shows the ratio of males to females in England and Wales.

	Ratio of males to females in England and Wales
At birth	105 males : 100 females
Average over the whole population	98 males : 100 females

i)

What percentage of babies are male at birth?

Answer = ... % **[1]**

ii)

In a hospital 410 babies are born in a week.

Calculate how many of them are likely to be male.

Answer = ... **[1]**

iii)

On average, men do not live as long as women.

How does the data in the table show this?

.....

.....

.....

..... **[2]**

Q7. (June 2018)

Retinitis pigmentosa is a genetic condition.

It is caused by a mutation to a gene. This mutation produces a recessive allele.

If people have retinitis pigmentosa then the cells in their retina are damaged.

a)

Explain the meaning of these terms.

Mutation .....

.....

Gene .....

.....

[2]

b)

If a person has two alleles for retinitis pigmentosa, they will not be able to see properly.

i)

Why does a person need two affected alleles to have the condition?

.....

..... **[1]**

ii)

Why does the condition affect the ability to see properly?

.....

..... **[1]**

iii)

Two people are heterozygous for retinitis pigmentosa and are expecting a baby.

Complete the genetic diagram to work out the probability that the baby will have the condition.

R is the normal allele and r is the allele for retinitis pigmentosa.

	R	r
R		
r		

Answer = ... **[3]**

Q8. (June 2019)

Which combination of gametes will produce a **male** baby?

A A sperm with **XY** chromosomes and an egg with **XX** chromosomes.

B A sperm with one **X** chromosome and an egg with one **Y** chromosome.

C A sperm with one **Y** chromosome and an egg with one **X** chromosome.

D A sperm with **XX** chromosomes and an egg with **XY** chromosomes.

Your answer ☐ **[1]**

Q9. (June 2019)

Which of these is an example of **discontinuous** variation?

A Body weight

B Hand span

C Height

D Sex

Your answer ☐ **[1]**

Q10. (June 2019)

Cystic fibrosis is a genetic condition caused by a recessive allele **(f)**.

Which is the genotype of a person **with** cystic fibrosis?

A Heterozygous and **ff**

B Heterozygous and **Ff**

C Homozygous and **ff**

D Homozygous and **FF**

Your answer ☐ **[1]**

Q11. (June 2019)

Each cell in the eye of a kangaroo has **16** chromosomes.

How many chromosomes are there in one kangaroo **sperm cell**?

A 4

B 8

C 16

D 32

Your answer ☐ **[1]**

Q12. (June 2019)

20 Rats are a major pest in many areas of the world. They can reduce food security and spread diseases.

(a) Warfarin is a chemical that is used as a rat poison. It stops platelets working in the blood.

Describe the function of platelets in the blood.

.....

.....

..... **[2]**

Q13. (June 2019)

(b) Some rats are resistant to warfarin. When fed with large amounts of warfarin the rats do not die.

Scientists found that the resistance is due to the dominant allele **R**.

Two resistant rats (**Rr**) mate.

Complete this genetic diagram to find the ratio of resistant rats to non-resistant rats that would be expected to be produced.

		Rr	
		.....	.....
Rr	R	.....	.....
	r	.....	.....

Ratio = ...

[3]

Q14. (June 2019)

(d) Scientists are now trying to find another poison to use on rats.

They have introduced a chemical called phosphine. This blocks the action of mitochondria in rat cells.

Explain why this might kill rats.

.....

.....

.....

.....

..... **[3]**

Q15. (June 2022)

2 Which of these factors affect the phenotype of an organism?

A Only the environment of the organism.

B Only the organism's genes.

C The organism's genes and its environment.

D The organism's habitat and the habitat of its parents.

Your answer ☐ **[1]**

Q16. (June 2022)

5 Which sperm would fertilise an egg to produce a female baby?

A A sperm with one X chromosome.

B A sperm with one Y chromosome.

C A sperm with two X chromosomes.

D A sperm with X and Y chromosomes.

Your answer ☐ **[1]**

Q17. (June 2022)

15 What is the definition of a genome?

A All the genes present in a community of organisms.

B All the genes present in a gamete.

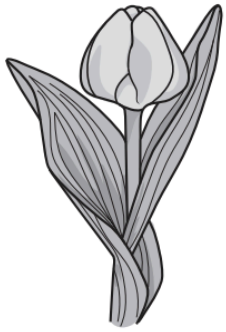
C The entire genetic material of an organism.

D The genes inherited by an offspring from their mother.

Your answer ☐ **[1]**

Q18. (June 2022)

18 The diagram shows a tulip plant. Many gardeners like to grow tulip plants.



(a) Tulips can be grown from seeds produced from sexual reproduction.

They can also be grown from bulbs that are produced by asexual reproduction.

Which statements explain why gardeners usually choose to plant bulbs that were produced asexually?

Tick (✓) **two** boxes.

Bulbs will grow much faster than seeds.	☐
The gardener will know the colour of the flowers from bulbs.	☐
Tulip plants grown from seed will not need to photosynthesise.	☐
Tulips grown from seeds will not require water.	☐
Tulips grown from seeds will all look exactly the same.	☐

[2]

(b) In 1637, tulip growers found that a small number of their tulip plants produced flowers with different coloured stripes.

The growers did not know what was causing the colour changes.

Complete the sentences to show **two** possible explanations for the colour changes.
Use words from the list.

antibody	**gene**	**mutation**
pathogen	**phenotype**	**producer**

The tulips could be diseased because they have been infected by a ..... .

This has altered the production of a chemical that colours the flowers.

Another explanation is that a ..... has occurred in the DNA of the tulip.

This is a change in the ..... that codes for a coloured chemical.

[3]

(c) It was not until 1960 that scientists could show that the tulips were infected with a virus.

Viruses are much smaller than human cells.

Suggest why it took so long to identify the cause of the infection.

.....

..... **[1]**

(d)* This virus is spread by insects that feed on the tulips.

Although infected bulbs produced attractive flowers, growers found that the bulbs became weaker every year until they died.

To stop the spread of the disease, growers can use two approaches:

- Dig up and burn any tulips as soon as they show signs of infection
- Spray their fields with insecticides.

Explain how these **two** different methods would control the disease.
Discuss the advantages and disadvantages of each method.

.....

.....

.....

.....

.....

.....

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.....

.....

..... **[6]**

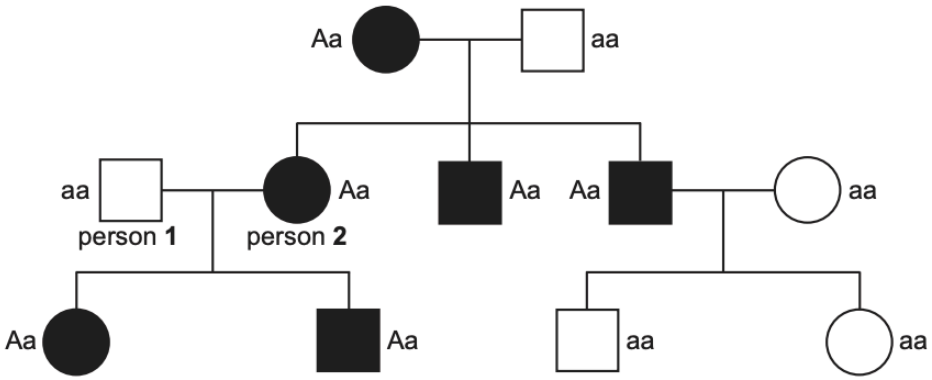
Q19. (June 2022)

19 Amyloidosis is a group of inherited conditions that affect people's health.

The most common type of amyloidosis is caused by a dominant allele (**A**) of a gene.

The allele **A** codes for a harmful protein called amyloid.

(a) The diagram shows the inheritance of the allele in a family.



(i) Complete the table about the family tree.

The first row has been done for you.

	Number in the family
Number of males	**6**
Number of people who are homozygous recessive for the gene	
Number of people who have amyloidosis	

[2]

(ii) Person **1** and person **2** are expecting another baby.

Complete the genetic diagram to find the probability that the baby will have amyloidosis.

		Person **1**	
Person **2**	A		
	a		

Probability = ...

[2]

(b) Amyloid protein is made by blood cells called plasma cells.
Amyloid can stop the pancreas releasing insulin.
It can also prevent sensory neurones from working.

Explain why person **2** starts to develop symptoms of amyloidosis **and** suggest what these symptoms might be.

.....

.....

.....

.....

.....

..... **[3]**

Q20. (June 2023)

3 Using the data in the table, how many people living in the UK have a Y chromosome in their cells?

Number of individuals of each sex in the UK, rounded to 2 significant figures	
males	females
33 000 000	34 000 000

A 33 000 000

B 34 000 000

C 66 000 000

D 67 000 000

Your answer ☐ **[1]**

Q21. (June 2023)

4 A genetic disorder is caused by a dominant allele (D). The recessive allele is (d).

Which row shows all the possible genotypes for heterozygous and homozygous individuals?

	Heterozygous	Homozygous
A	Dd	dd
B	DD or dd	Dd
C	Dd	DD or dd
D	Dd	DD

Your answer ☐ **[1]**

Q22. (June 2023)

5 Which sentence is a correct description of a chromosome?

A A length of protein that contains the genetic material.

B A long molecule of DNA that contains genes.

C A part of a gene that codes for a particular protein.

D A strand of DNA that can leave the nucleus.

Your answer ☐ **[1]**

Q23. (June 2023)

7 There are 28 chromosomes in each elephant sperm cell.

What is the diploid number of chromosomes in elephants?

A 14

B 28

C 56

D 112

Your answer ☐ **[1]**

Q24. (June 2023)

8 Charles Darwin and Gregor Mendel did important work in the development of science.

Which row gives the areas of their work?

	Charles Darwin	Gregor Mendel
A	evolution	medicine
B	medicine	genetics
C	evolution	genetics
D	genetics	evolution

Your answer ☐ **[1]**

Q25. (June 2023)

(c) Sorghum produces a bitter chemical in its seeds.
This makes the seeds less likely to be eaten by birds.

Complete each sentence about how the bitter chemical was first made by sorghum.
Use the words from the list.

gene	**meiosis**	**mutation**	**pathogen**	**sugar**

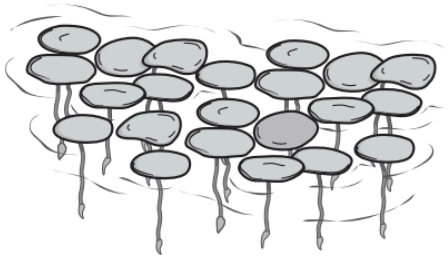
The bitter chemical was first made due to a change in a ..... .

This type of change is called a ..... .

[2]

Q26. (June 2023)

20 Duckweed is a small plant that floats on the surface of ponds.



Each plant has one leaf and it usually reproduces by dividing into two.

Only occasionally does it reproduce sexually by growing flowers.

(a) In the box next to each statement, put **A** if it applies to asexual reproduction or **S** if it applies to sexual reproduction.

It is a quicker process. ☐

It introduces variation into the population. ☐

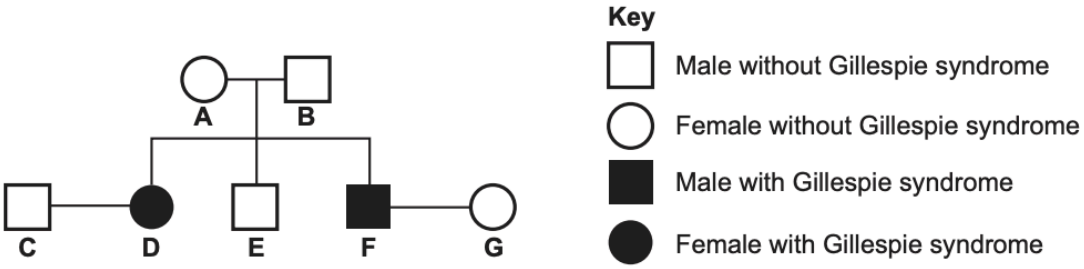
[1]

Q27. (June 2023)

23 Gillespie syndrome is a rare genetic disorder.
People with Gillespie syndrome have eyes with no iris and damage to their cerebellum.

Fig. 23.1 shows the inheritance of Gillespie syndrome in a family.

Fig. 23.1



(a) A doctor makes this statement:
The allele causing Gillespie syndrome in this family is recessive.

Explain why this statement is correct. Use evidence from **Fig. 23.1**.

.....

.....

..... **[2]**

(b) Person **A** and person **B** are expecting another baby.

Complete **Fig. 23.2** to find the probability that it will have Gillespie syndrome.

(Use G for the dominant allele and g for the recessive allele.)

Fig. 23.2

Person **A** \ Person **B**		

Probability = ...
[3]

(c) Person **D** is very sensitive to bright light and has difficulty controlling their balance.

Explain why this is.

.....

.....

.....

.....

.....

..... **[4]**

Q28. (June 2024)

4 Many plants can reproduce either asexually or sexually.

What is a feature of **sexual** reproduction?

A All the offspring are better adapted to the environment.

B More offspring are produced.

C Reproduction is faster.

D The offspring show variation.

Your answer ☐ **[1]**

Q29. (June 2024)

6 Cystic fibrosis is caused by a recessive allele (f).

The diagram shows a genetic cross.

		Parent 1	
		F	f
Parent 2	f	Ff	ff
	f	Ff	ff

Which percentage of the offspring have cystic fibrosis?

A 25%

B 50%

C 75%

D 100%

Your answer ☐ **[1]**

Q30. (June 2024)

10 Which sex chromosomes are found in human egg cells?

A All egg cells have one **X** chromosome.

B All egg cells have one **Y** chromosome.

C All egg cells have two **X** chromosomes.

D Egg cells have either an **X** chromosome or a **Y** chromosome.

Your answer ☐ **[1]**

Q31. (June 2024)

12 Mendel discovered some of the principles of genetics.

He crossed tall pea plants with short pea plants.

All the offspring were **tall**.

How did Mendel explain this result?

A Offspring are always taller than the parent plant.

B Several genes control the height of the pea plants.

C The height of the pea plants is a mixture of tall and short.

D The instructions for short pea plants are recessive so do not show.

Your answer ☐ **[1]**

Q32. (June 2024)

15 Which process can make new alleles?

A Evolution

B Mutation

C Selective breeding

D Specialisation

Your answer ☐ **[1]**

Q33. (June 2024)

(ii) The fungus reproduces using spores.

Which type of reproduction uses meiosis to make spores?

..... **[1]**

Q34. (June 2024)

19 Spinal muscular atrophy (SMA) is a genetic disease.

(a) 700 000 babies are born each year in the UK.

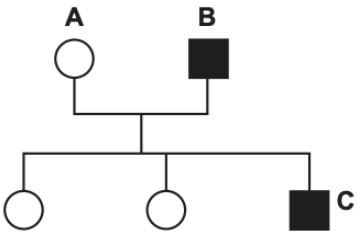
35 of these babies are born with SMA.

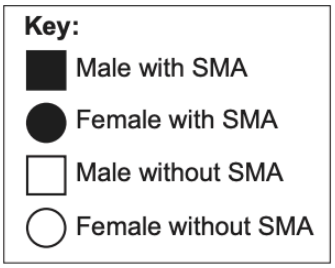
Calculate the percentage of babies that have SMA.

Percentage of babies with SMA = ... % **[2]**

(b) The diagram shows a family tree which contains some people with SMA.

SMA is caused by a recessive allele.





(i) Use the key to give the phenotype of person **A**.

..... **[1]**

(ii) Which term describes the genotype of person **B**?

Tick (✓) **one** box.

Heterozygous ☐

Homozygous dominant ☐

Homozygous recessive ☐

[1]

(iii) People that have SMA cannot produce a protein that is needed for their motor neurones to function.

Explain why person **C** has difficulty moving their legs.

.....

.....

.....

..... **[3]**

(c) Researchers have developed a treatment for SMA.

This involves using a virus to insert a replacement gene into the nucleus of motor neurone cells.

(i) Why is the gene inserted into the **nucleus** of the motor neurone?

..... **[1]**

(ii) Researchers tested this treatment on animals first.

Suggest **one** reason why they did this.

.....

..... **[1]**

Q35. (June 2025)

5 Who developed a theory about how characteristics are inherited in pea plants?

A Darwin

B Darwin and Wallace

C Mendel

D Mendel and Wallace

Your answer ☐ **[1]**

Q36. (June 2025)

8 A horse has 64 chromosomes in a muscle cell.

How many chromosomes are in a horse **sperm cell**?

A 16

B 32

C 64

D 128

Your answer ☐ **[1]**

Q37. (June 2025)

10 Which description is **correct** for human egg cells?

A They contain an X and a Y chromosome.

B They contain one X chromosome.

C They contain one Y chromosome.

D They contain two X chromosomes.

Your answer ☐ **[1]**

Q38. (June 2025)

11 Greenfly are small insects that can reproduce sexually or asexually.

A population of greenfly live in a constant environment and are well adapted.

Which statement explains why these greenflies will reproduce **asexually**?

A Many offspring can be produced quickly to take advantage of a plentiful food supply.

B The offspring have variation, so can adapt to any changing conditions.

C There are a lot of greenflies around, so it is easy to find a mate.

D When offspring are produced asexually, the offspring cannot reproduce.

Your answer ☐ **[1]**

Q39. (June 2025)

13 Cystic fibrosis is a genetic disorder. It is caused by a recessive allele **f**.

A female who has the genotype **Ff** is expecting a baby.
The father has the genotype **FF**.

What is the probability that the baby will have cystic fibrosis?

A 0%

B 25%

C 75%

D 100%

Your answer ☐ **[1]**

Q40. (June 2025)

14 A student is investigating variation by collecting data on shoe sizes.
These are the shoe sizes of six members of their family.

10	5	6	7	8	6

Which of these statements about the data is **correct**?

A The mean shoe size and the modal shoe size are the same.

B The mean shoe size is 6.

C The mean shoe size is larger than the modal shoe size.

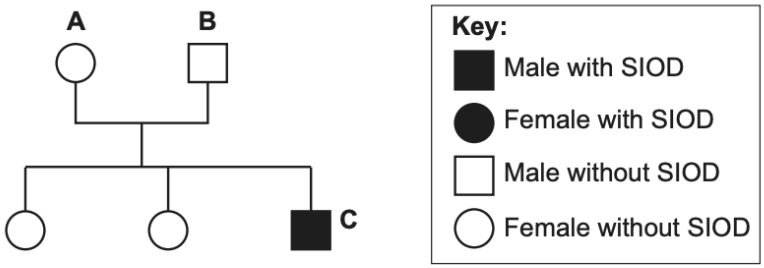
D The modal shoe size is 7.

Your answer ☐ **[1]**

Q41. (June 2025)

17 SIOD is an inherited genetic disorder.

The diagram shows a family tree with a person who has SIOD.



(a) Complete the sentences about the family tree.

Use words from the list.

dominant	**female with SIOD**	**heterozygous**
homozygous	**male with SIOD**	**recessive**

The phenotype of person **C** is ..... .

Persons **A** and **B** are ..... for the SIOD gene.

The allele for SIOD must be ..... because neither person **A** nor person **B** have the disorder.

[3]

Q42. (Nov 2020)

3 The table shows features of **meiosis**.

	Type of cells made	Genetic variation introduced
A	body cells	✓
B	body cells	✗
C	gametes	✓
D	gametes	✗

Which row in the table is correct?

Your answer ☐ **[1]**

Q43. (Nov 2020)

9 Scientists found DNA from a Stone Age woman trapped in gum from a tree. The woman had chewed the tree gum. Using this DNA scientists were able to predict some of her features.

Which feature would scientists have been able to predict from her DNA alone?

A Body weight

B Diet

C Eye colour

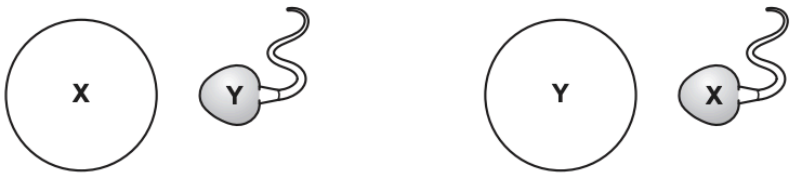
D Height

Your answer ☐ **[1]**

Q44. (Nov 2020)

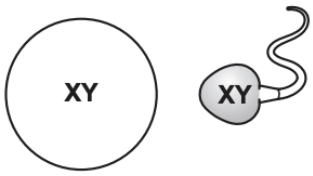
10 The diagrams show gametes and sex chromosomes.

Which diagram shows the correct combination of sperm and egg to produce a **male** baby?

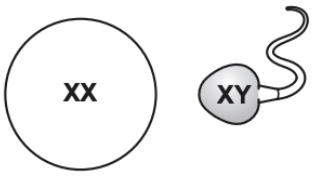


A

B



C



D

Your answer ☐ **[1]**

Q45. (Nov 2020)

11 Gregor Mendel studied the inheritance of characteristics in pea plants.

Which of these is a possible reason why he chose pea plants for his experiments?

A Pea plants can produce many offspring, quite quickly.

B Pea plants can reproduce asexually.

C Pea plants do not develop mutations.

D Pea plants do not produce gametes.

Your answer ☐ **[1]**

Q46. (Nov 2020)

12 Tigers have a diploid number of 38 chromosomes.

How many chromosomes are present in a tiger sperm cell?

A 2

B 19

C 38

D 72

Your answer ☐ **[1]**

Q47. (Nov 2020)

21 Hypercholesterolemia (HC) is caused by a dominant allele on chromosome 19. This allele has mutations which cause a change in the order of DNA nucleotides.

(a) Write the words **allele**, **chromosome** and **nucleotide** in the boxes to show their size from smallest feature to largest feature.

Smallest feature	
Largest feature	

[1]

(b) One in 500 people are heterozygous for HC.

There are 66 000 000 people in the UK.

Calculate how many people in the UK are heterozygous for HC.

Number of people = ... **[1]**

(c) A woman who does **not** have HC and a man who is heterozygous are expecting a baby.

What is the probability of the baby having HC?

Complete the genetic diagram to explain your answer.

D is the dominant HC allele and **d** is the recessive allele.

		Man	
		D	**d**
Woman	**d**		
	d		

Probability = ... **[2]**

Q48. (Nov 2021)

5 Which process can result in a new allele being formed?

A Asexual reproduction

B Fertilisation

C Mutation

D Natural selection

Your answer ☐ **[1]**

Q49. (Nov 2021)

9 A genetic condition is controlled by a dominant allele **P**.

How is the genotype **Pp** described?

A Haploid

B Heterozygous

C Homozygous dominant

D Homozygous recessive

Your answer ☐ **[1]**

Q50. (Nov 2021)

11 The diploid number of chromosomes in sheep is 54.

How many chromosomes would be found in a sperm cell from a sheep?

A 23

B 27

C 54

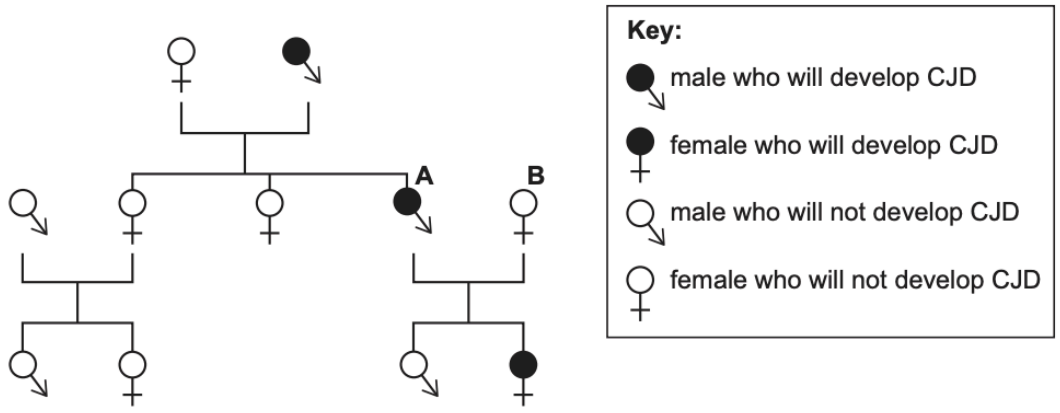
D 108

Your answer ☐ **[1]**

Q51. (Nov 2021)

19 CJD is a group of diseases that occur in the brain. One type of CJD is caused by a **dominant allele**.

(a) The family tree shows the occurrence of this type of CJD in a family.



(i) **D** represents the dominant allele and **d** the recessive allele.

Person **A** in the family tree must have the genotype **Dd**.

Explain how you can tell this from the family tree.

.....

.....

.....

..... **[2]**

(ii) Person **A** and person **B** are expecting another child.

Complete the genetic diagram to calculate the probability that the child will develop CJD.

Person **B**

Person **A**	**d**	**d**
D	.....	.....
d	.....	.....

Probability = ... **[2]**

Q52. (Nov 2021)

(d) The scientists also observed that the factors that determine sex in skinks are different than in humans.

Which factor determines sex in humans?

Tick (✓) **one** box.

- How many genes a person has ☐
- The environment ☐
- The number of chromosomes a person has ☐
- Whether a person has a Y chromosome or not ☐

[1]