

Q1. (June 2018)

8 Which of these is used to **cut DNA molecules** in genetic engineering?

- A Ligase enzymes
- B Plasmids
- C Restriction enzymes
- D Sticky ends

Your answer

[1]

Q2. (June 2018)

10 Why is the process of meiosis important in making gametes?

- A The cells produced are diploid.
- B The cells produced are genetically identical.
- C The cells produced are much smaller in size.
- D The cells produced have half the number of chromosomes.

Your answer

[1]

Q3. (June 2018)

11 What is a genome?

- A A description of the number of chromosomes in an organism.
- B All the proteins that one organism can produce.
- C A store of seeds to preserve genetic variation.
- D The entire genetic material of an organism.

Your answer

[1]

Q4. (June 2018)

- 12** A harmful protein can cause pain in the joints. A new treatment is being developed to stop the protein causing pain.

What effect would this treatment have on the person's phenotype and genotype?

- A** Changes both the phenotype and genotype
- B** Changes the genotype only
- C** Changes the phenotype only
- D** No change to their phenotype or genotype

Your answer

[1]

Q5. (June 2018)

18 Retinitis pigmentosa is a genetic condition that affects the eyes.

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

The condition causes rod cells in the retina to break down.

(a) Explain the meaning of these terms.

Gene

.....

Allele

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

(b) (i) Two people who are heterozygous for retinitis pigmentosa are expecting a baby.

Draw a genetic diagram to calculate the probability that the baby will have the condition.

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

Answer = **[3]**

- (ii) If the baby has retinitis pigmentosa, it will have normal colour vision but will not be able to see well in dim light.

Explain why.

.....

.....

.....

..... [3]

- (c) (i) Explain why stem cells could be used as a treatment for this condition.

.....

.....

..... [2]

- (ii) Why is it an advantage to use stem cells from the patient rather than from another person?

.....

..... [1]

Q6. (June 2018)

- 19 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

- (a) Describe how sex is determined in humans.

You may use a genetic diagram in your answer.

.....

 [2]

- (b) In 2015 there were approximately 698 000 babies born in England and Wales.

Calculate how many of these were male.

Answer = [2]

- (c) There are more females than males living in England and Wales as an average over the whole population.

Suggest **one** reason why there are more females.

.....
 [1]

3 What was Mendel's contribution to modern genetics?

- A** He developed the theory of natural selection.
- B** He discovered that most characteristics are controlled by multiple genes.
- C** He worked out how sex determination occurs in mice.
- D** He found a pattern that shows how characteristics are passed on.

Your answer

[1]

Q8. (June 2019)

13 What is the role of antibiotic resistance markers in producing genetically engineered bacteria?

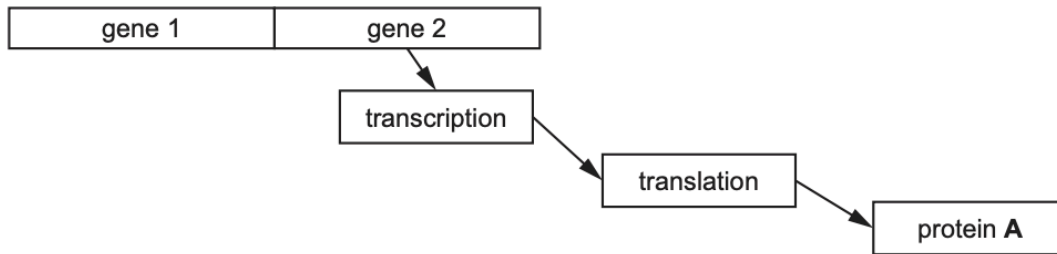
- A** To identify which genes to insert into the bacteria.
- B** To identify which bacteria have taken up the plasmid.
- C** To identify which plasmids contain the genes.
- D** To identify which proteins are produced by the bacteria.

Your answer

[1]

Q9. (June 2019)

- 15 Gene 1 and gene 2 are both needed for the production of protein A.



What is the function of **gene 1** in this process?

- A It codes for the amino acids in protein A.
- B It codes for the mRNA needed to make protein A.
- C It acts as the site for protein synthesis.
- D It controls the expression of **gene 2**.

Your answer

[1]

Q10. (June 2019)

21 Huntington's disease is a genetic condition. It is caused by a **dominant allele**.

(a) Explain what is meant by the term dominant allele.

.....

.....

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

(b)* The symptoms of Huntington's disease usually appear after the age of 40.

There is no cure and people with the disease usually die after 10–15 years.

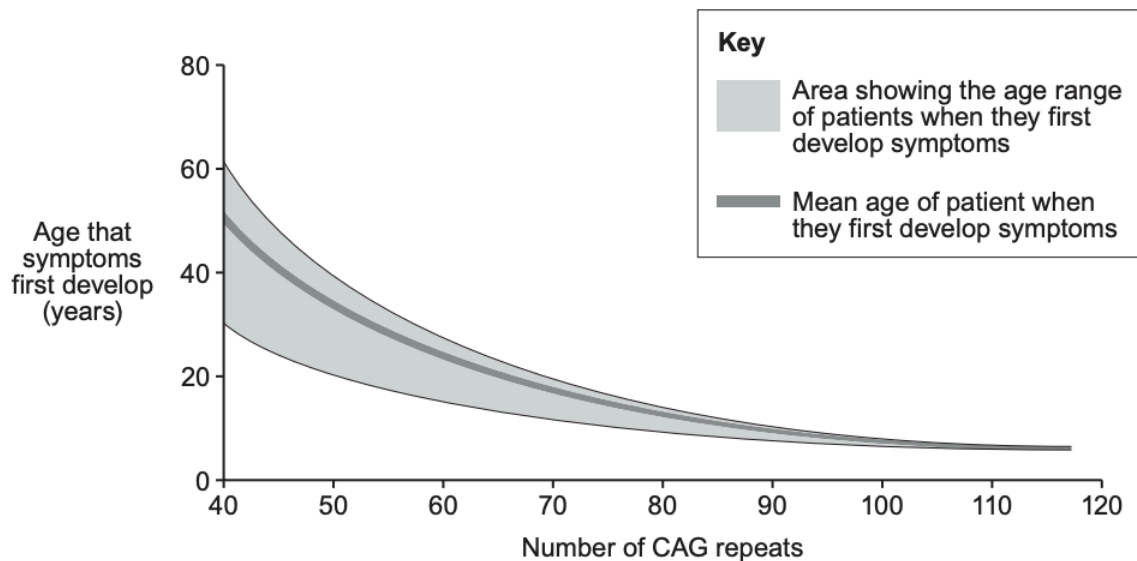
Scientists now know that there are a number of different forms of the allele that causes Huntington's disease. The allele has a sequence of three bases, CAG, that repeats many times. The number of repeats varies between patients.

Patients can be tested to see if they have the allele and how many repeats it has.

Doctors have studied many patients to see:

- The number of CAG repeats a patient has
- The age that the patient starts to show symptoms of the disease.

The results are shown on the graph.



..... [6]

Doctors gave patients an injection of a drug that blocks the action of mRNA that is produced by the Huntington allele.

..... [2]

2 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]

Q12. (June 2022)

14 Genetic engineering involves the use of vectors.

Which is an example of a vector?

- A** A set of unpaired bases on the end of a DNA molecule.
- B** A small ring of DNA present in a bacterium.
- C** An enzyme that joins together two pieces of DNA at specific sites.
- D** An organism that has undergone genetic modification.

Your answer

[1]

Q13. (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.

Explain why most gardeners choose to grow bulbs produced by asexual reproduction rather than seeds.

.....

.....

.....

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

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

Until recently, there were two possible theories that explained the colours of these tulips.

Theory 1 – The stripes are caused by a mutation in the gene that produced the chemical that coloured the flower.

Theory 2 – The stripes are caused by a pathogen that infects the plant and changes the production of the coloured chemical.

Put ticks (✓) or crosses (X) in the table to show whether each theory would produce changes in the phenotype and in the genotype of the tulip plants.

	Theory 1	Theory 2
Changes the phenotype of the tulip plant		
Changes the genotype of the tulip plant		

[2]

- (c) Scientists now know that the colour changes are caused by a virus which infects the tulip tissue.

- The virus is injected into the phloem of the tulip by feeding insects.
- Although the infected bulbs produce attractive flowers, the infected bulbs become weaker every year until they die.

- (i) 2.0×10^9 tulips are grown in the Netherlands every year. This uses 14 200 hectares of land.

1.5% of all the tulips grown are infected.

Calculate how many infected tulips there are in one hectare of land.

Number of infected tulips = [2]

- The text box shows the results of a trial of the machine in a field containing 1000 tulips.

- All 15 infected tulips identified
- 14 not infected tulips identified as infected
- 971 not infected tulips identified as not infected

Use data from the text box in your answer.

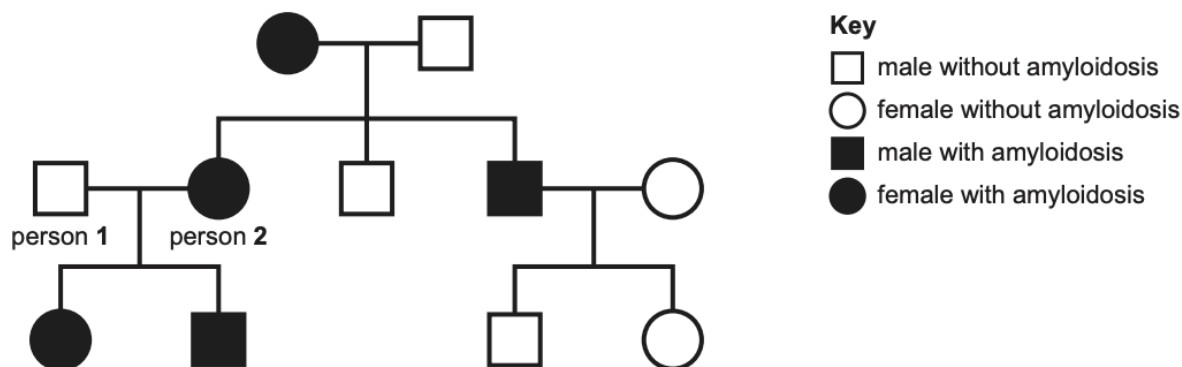
[6]

Q14. (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.

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



(i) Complete the table about the family tree.

The first row has been done for you.

	Number of people in the family
males	6
people who are homozygous recessive for the gene	
people who are homozygous dominant for the gene	

[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			

Probability = [3]

- (b) Allele (**A**) codes for the production of a protein called amyloid. Amyloid can block the blood vessels that leave the pancreas and the thyroid gland, preventing the release of hormones.

Complete the sentences to explain the symptoms that might be shown by person 2 in (a).

Symptoms of person 2 can include:

- Being unable to control blood due to a lack of the hormones and
- Being unable to control rate due to a lack of the hormone

[4]

- (c) One treatment that doctors use for amyloidosis involves:

- Killing all the plasma cells in the body.
- Then giving the patient healthy stem cells.

Explain how this treatment could help people with amyloidosis.

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

- (d) Scientists are now developing a new treatment called gene silencing. They have developed a drug that destroys the mRNA that codes for the amyloid protein.

Explain why this technique is called **gene silencing**.

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

22 Read the text below about two different genetic disorders or syndromes.

Human genes are found on chromosomes in the nuclei of cells.

In body cells, there is the diploid number of chromosomes, and in gametes there is the haploid number.

Sometimes a gamete is formed that has an extra chromosome.

- If this is chromosome number 18, a child with Edward's syndrome can be born.
- If it is chromosome 21, a child that has Down's syndrome can be born.

(a) (i) Explain the difference between haploid and diploid cells.

.....

.....

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

(ii) Explain how meiosis usually makes gametes that will produce children without these genetic disorders.

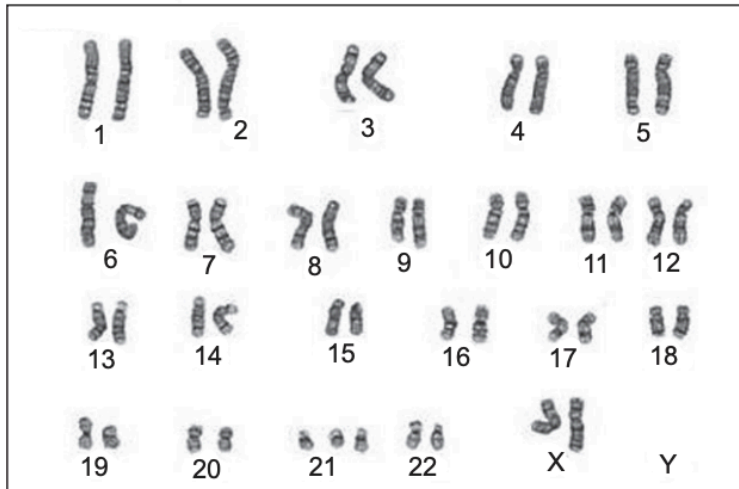
.....

.....

.....

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

(b) The diagram shows the chromosomes found in a cell of a child.

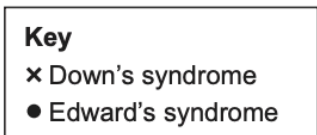
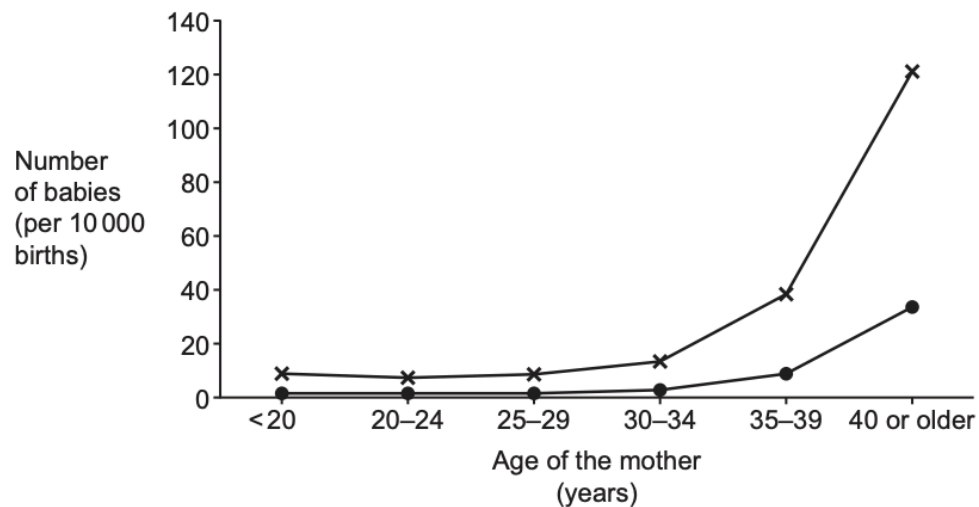


Write down **two** conclusions that can be made about this child from the diagram.

1.....

2..... [2]

(c) The graph shows how the number of babies born with Down's syndrome or Edward's syndrome varies with the age of the mother.



(i) Give **two** conclusions that can be made from this graph.

1

.....

2

..... [2]

(ii) In the ovary, meiosis starts before a woman is born and is not completed until just before ovulation.

How does this information explain the trends shown in the graph?

.....

.....

..... [1]

Q16. (June 2023)

4 What is the definition of the **genome**?

A All the alleles that are expressed in the phenotype of an individual.

B All the coding DNA that is present in an individual.

C All the genetic material that is present in an individual.

D All the non-coding DNA that is present in an individual.

Your answer

[1]

Q17. (June 2023)

5 Which sentence describes Gregor Mendel's discovery that helped develop our understanding of genetics?

- A** Characteristics are controlled by DNA found in the nucleus of each cell.
- B** Characteristics are controlled by factors and these factors can be dominant or recessive.
- C** Chromosomes are found in pairs and one from each pair is found in the gamete.
- D** Genes are found on chromosomes and each chromosome is made of DNA.

Your answer

[1]

Q18. (June 2023)

8 Which statement about genes and alleles is correct?

- A** Mutations can produce new genes but not new alleles.
- B** Only genes but not alleles can be dominant or recessive.
- C** The alleles of a gene are always found on the same pair of chromosomes.
- D** There can only be two different alleles of each gene in a population.

Your answer

[1]

Q19. (June 2023)

- 11** In 2022, there were 66 900 000 people living in the UK.

Estimate how many of these people have a Y chromosome in their cells.

Individuals of each sex in the UK (%)	
males	females
49.2	50.8

- A** 32 914 800
B 33 985 200
C 50 442 600
D 66 900 000

Your answer

[1]

Q20. (June 2023)

- 14** Why are antibiotic markers used in the process of genetic engineering?

- A** To act as a vector allowing the DNA into the cell.
B To identify which cells have taken up the genetic material.
C To make the engineered cells resistant to bacterial infections.
D To prevent the spread of antibiotic resistant bacteria.

Your answer

[1]

Q21. (June 2023)

- 15** Human fetuses have a different form of haemoglobin to adults.
When a baby is born, a gene called BCL11A produces a protein that switches off the production of fetal haemoglobin.

Sickle cell disease affects adult haemoglobin but **not** fetal haemoglobin.
Scientists are trying to treat sickle cell disease by targeting the BCL11A gene.

How could this new treatment for sickle cell disease work?

- A** Disabling all the ribosomes in the cells to prevent protein synthesis
- B** Genetically engineering cells by inserting extra copies of the BCL11A gene
- C** Making sure that the translation of the BCL11A gene continues after birth
- D** Preventing the BCL11A gene from being expressed, so that transcription of the fetal haemoglobin gene continues

Your answer

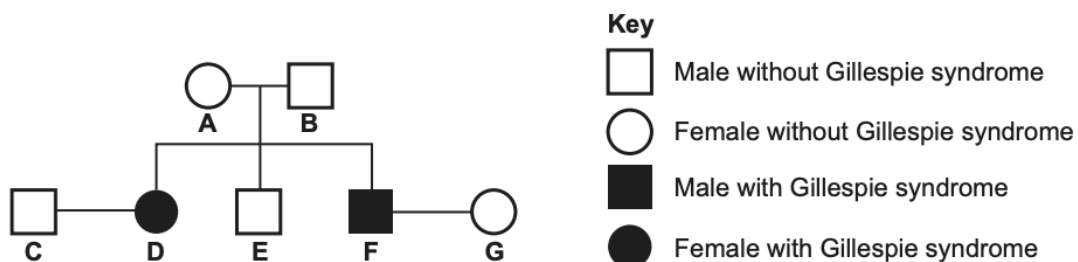
[1]

Q22. (June 2023)

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

Fig. 17.1 shows the inheritance of Gillespie syndrome in a family.

Fig. 17.1



- (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. 17.1.

.....

 [2]

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

Complete Fig. 17.2 to find the probability that it will have Gillespie syndrome.

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

Fig. 17.2

	Person B	
Person A		

Probability = [3]

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

Explain why this is.

.....

.....

.....

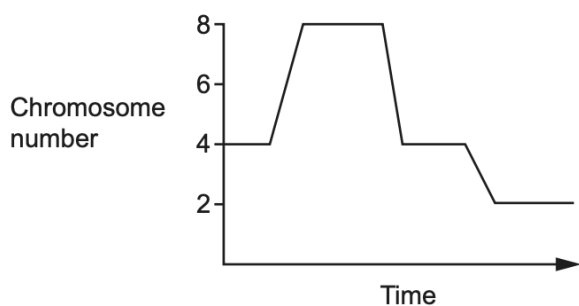
.....

.....

..... [4]

Q23. (June 2024)

- 6 The graph shows the changes in chromosome number in a cell during meiosis.



What is the diploid number of chromosomes for this cell?

- A 2
- B 4
- C 6
- D 8

Your answer

[1]

Q24. (June 2024)

- 7 A gene controlling a characteristic has two possible alleles, **A** and **a**. **A** is the dominant allele.

One person is **Aa** and another person is **AA** for this gene.

Which statement correctly describes both people?

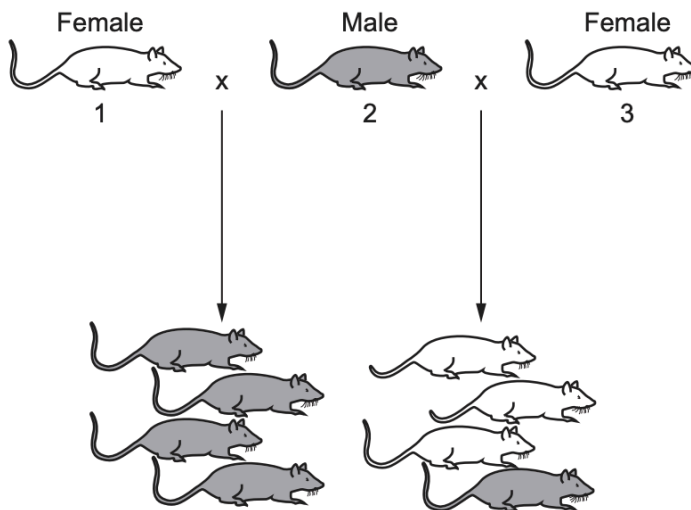
- A** They have different genomes but the same genotype.
- B** They have different phenotypes but the same genotype for this characteristic.
- C** They have the same genome but different genotypes.
- D** They have the same phenotype but different genotypes for this characteristic.

Your answer ☐

[1]

Q25. (June 2024)

- 9 The diagram shows the results of two different crosses of rats.



Which is a possible explanation of the results of these crosses?

- A** Grey is dominant. Rat 2 is heterozygous.
- B** Grey is dominant. Rat 2 is homozygous dominant.
- C** White is dominant. Rat 1 is homozygous dominant.
- D** White is dominant. Rat 2 is heterozygous.

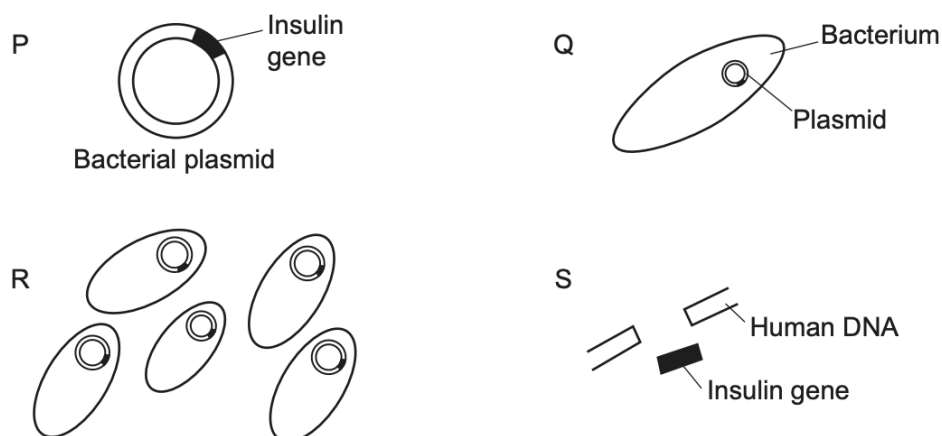
Your answer ☐

[1]

Q26. (June 2024)

12 Bacteria can be genetically engineered to make human insulin.

The diagrams show four stages in this process.



What is the order of these processes in insulin production?

- A** P, S, Q, R
- B** R, Q, P, S
- C** R, Q, S, P
- D** S, P, Q, R

Your answer

[1]

22 The table shows some details of three genetic diseases that can affect humans.

Disease	Cause	Number of UK cases	Effect
Huntington's	a dominant allele	12 in 100 000 people	The mutation produces a protein that stops the cerebrum communicating with the spinal cord.
Muscular dystrophy (MD)	a recessive allele	1 in 4 000 males	The mutation prevents a muscle protein being made.
Spinal muscular atrophy (SMA)	a recessive allele	1 in 10 000 people	The mutation prevents a protein being made that is needed for motor neurones to work.

(a) There are 66 million people in the UK.

Calculate the number of cases of Huntington's disease in the UK.

Number of cases = [2]

(b) All three diseases affect proteins in different parts of the body.

Explain why each of these diseases cause difficulty in moving the legs.

Huntington's

.....

MD

.....

SMA

.....

[3]

- (c) Suggest why the mutation that causes Huntington's is dominant but the mutation that causes MD and SMA is recessive.

Use the information in the **effect** column of the table.

.....

.....

.....

..... [2]

- (d) Scientists are trying to develop treatments for Huntington's using stem cells to replace cells damaged by the protein.

Describe **two** risks of using stem cells to treat patients.

1

.....

2

..... [2]

Q28. (June 2025)

- 5 An organism has the alleles Aa for a gene.

What do the Aa alleles represent?

- A** A heterozygous genotype
- B** A heterozygous phenotype
- C** A homozygous genotype
- D** A homozygous phenotype

Your answer

[1]

Q29. (June 2025)

6 Which of these units of genetic material is **largest**?

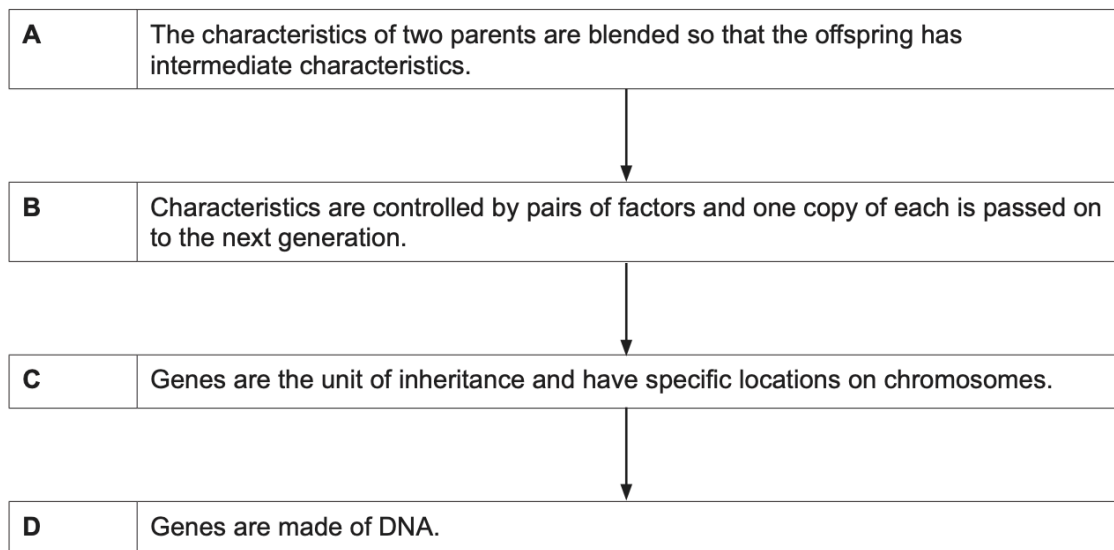
- A Base
- B Chromosome
- C Gene
- D Genome

Your answer

[1]

Q30. (June 2025)

7 The flow chart shows some developments in our understanding of genetics.



Which stage on the flow chart represents the ideas of Mendel?

Your answer

[1]

Q31. (June 2025)

- 9 A muscle cell in a horse has 64 chromosomes.

Which of these statements is **correct**?

- A A horse egg cell has 64 chromosomes and is haploid.
- B A horse liver cell has 32 chromosomes and is haploid.
- C A horse neurone has 64 chromosomes and is diploid.
- D A horse sperm cell has 32 chromosomes and is diploid.

Your answer

[1]

Q32. (June 2025)

- 11 Which description is **correct** for human sperm cells?

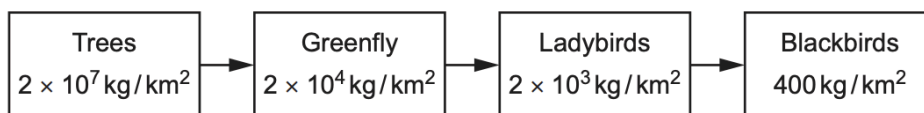
- A They always contain an X chromosome.
- B They always contain a Y chromosome.
- C They contain an X and a Y chromosome.
- D They contain either an X or a Y chromosome.

Your answer

[1]

Q33. (June 2025)

- 12 The diagram shows the flow of biomass through a food chain.



What is the combined biomass of all the predators in this food chain?

- A 400 kg/km²
- B 2400 kg/km²
- C 22400 kg/km²
- D 20022400 kg/km²

Your answer

[1]

Q34. (June 2025)

15 How may a mutation in non-coding DNA result in a change in phenotype?

- A** It changes the amino acid sequence of a protein.
- B** It changes the shape of the active site of a protein.
- C** It prevents mRNA binding with ribosomes.
- D** It prevents transcription occurring.

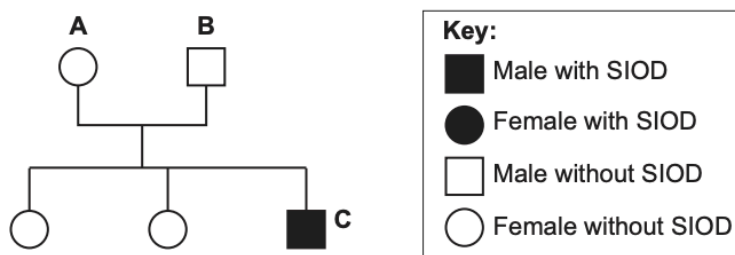
Your answer

[1]

Q35. (June 2025)

- 19 SIOD is an inherited genetic disorder.

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



- (a) SIOD is caused by a recessive allele.

Explain how you can tell from the family tree that the allele for SIOD is recessive.

.....

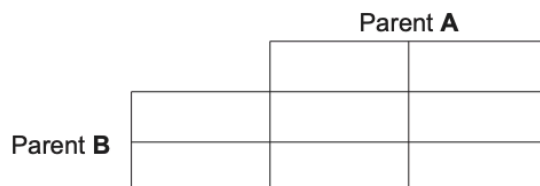
.....

..... [2]

- (b) The parents **A** and **B** are expecting another child.

Predict the probability that this child will have SIOD.

Complete the genetic diagram to explain your answer using **D** for the dominant allele and **d** for the allele for SIOD.



Probability = [3]

- (c) One of the symptoms of SIOD is kidney failure.

People with the disorder often need a kidney transplant.

- (i) After receiving a kidney transplant from a donor, a person needs to take drugs to reduce the activity of their immune system.

Explain why it is necessary to reduce the activity of their immune system after a transplant.

.....

.....

.....

..... [2]

- (ii) Give a possible disadvantage of having to take drugs to reduce the activity of the immune system.

.....

..... [1]

- (iii) The first person to receive stem cell treatment for SIOD was in 2023.

This person received stem cells from a donor.

These stem cells reached the bone marrow and produced large numbers of white blood cells.

Explain why stem cells can produce large numbers of white blood cells.

.....

.....

.....

..... [2]

- (iv) Six months later, the person received a kidney transplant from the same donor.

Why would this person **not** need to take drugs to reduce the activity of their immune system?

.....

..... [1]

[6]

5 Why are the effects of most mutations **not** observed?

- A Most mutations do not affect the genotype or phenotype.
- B Most mutations do not affect the phenotype.
- C Mutations mainly affect internal body processes.
- D Mutations often kill the organism.

Your answer

[1]

Q38. (Nov 2020)

7 The table describes meiosis.

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

Which row in the table is correct?

Your answer

[1]

Q39. (Nov 2020)

12 How can a mutation in non-coding DNA change the activity of a cell?

- A It can change the amino acid sequence in a protein.
- B The base sequence of mRNA may be altered.
- C The shape of a protein may be changed.
- D Transcription of mRNA may be stopped.

Your answer

[1]

Q40. (Nov 2020)

- 19** Fanconi anaemia is a genetic disorder. It results in the bone marrow being destroyed. This causes a decrease in the numbers of red blood cells, white blood cells and platelets.

(a) Explain **two** possible symptoms of Fanconi anaemia.

- 1
-
- 2
-

[2]

(b) **Table 19.1** shows normal ranges for blood components in people **without** Fanconi anaemia.

Blood component	Number per mm ³
red blood cell	$4.5-6.5 \times 10^6$
white blood cell	$6.0-16.0 \times 10^3$
platelet	$1.5-4.0 \times 10^5$

Table 19.1

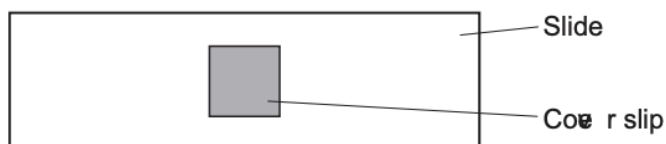
(i) Suggest why there is such a wide range of white blood cell numbers.

.....

.....

..... [2]

(ii) The diagram shows a microscope slide containing blood from a patient.



The square cover slip is 10mm wide and the thickness of the blood underneath is 0.001 mm.

Calculate the volume of blood under the cover slip.

Volume of blood = mm³ [1]

(iii) Under the cover slip are 1000 white blood cells.

Does the blood sample provide evidence that the patient has Fanconi anaemia?

Use **Table 19.1** and your answer to part (b)(ii) to justify your answer.

.....

.....

.....

..... [3]

(c) There are many different genetic disorders that can affect blood cells. Details of three of these are found in **Table 19.2**.

Name of disorder	Cause of disorder	Symptom
D-B anaemia	dominant allele	low red blood cell numbers
S-D syndrome	recessive allele	low white blood cell numbers
Fanconi anaemia	recessive allele	small numbers of all blood cells

Table 19.2

A blood smear from another patient shows that he has 3×10^6 red blood cells per mm^3 of blood. Neither of his parents have a blood disorder.

Use **Table 19.1** and **Table 19.2** to explain which blood disorder the patient could have.

Name of disorder

Explanation

.....

.....

..... [3]

- 21** Hypercholesterolemia (HC) is the result of a mutation in the genome. It is caused by a dominant allele on chromosome 19. The mutation involved causes a change in the DNA nucleotides.

(a) Write the words **allele**, **chromosome**, **genome** 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.

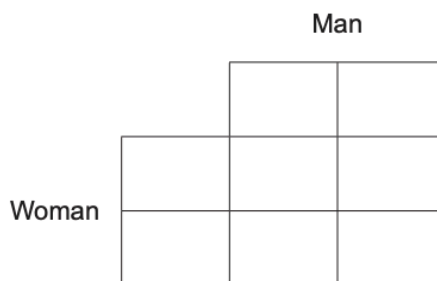
Number of people = [1]

(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.

Use **D** for the dominant HC allele and **d** for the recessive allele.



Probability = [2]

- (d) The allele that is affected by HC codes for a protein called LDL receptor protein. The faulty allele often has four extra nucleotides, making a total of 2521 nucleotides.

Calculate the number of **amino acids** found in the healthy, **unaffected** protein.

Number of amino acids = [2]

(e)* People with HC are more likely to develop heart disease. **Fig. 21.1** shows the heart of a person who has heart disease.

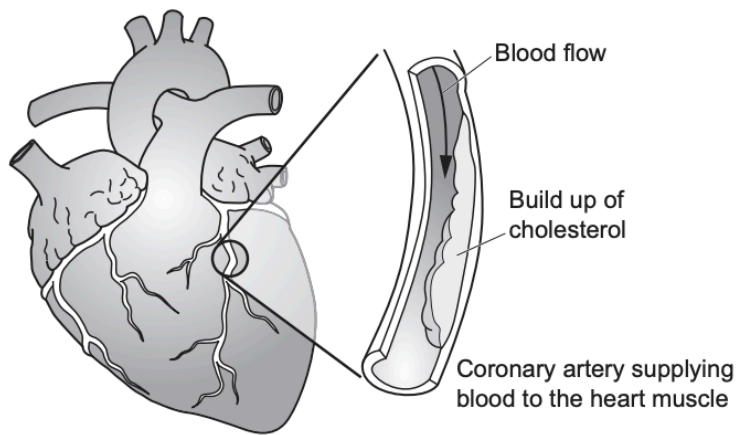


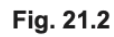
Fig. 21.1

The LDL receptor protein is found on the cell membrane of liver cells. The receptor picks up cholesterol from the blood and transports it into the liver cell. Inside the liver cell the cholesterol is broken down or used.

Explain why people who have the mutation in the allele for the LDL receptor are much more likely to develop heart disease.

..... [6]

- The results are shown in **Fig. 21.2**.



..... [3]

5 Which pair of genetic terms have the same meaning?

- A Base and nucleotide
- B Gene and allele
- C Gene and genome
- D Variant and allele

Your answer

[1]

Q43. (Nov 2021)

10 Genetic engineering involves the use of sticky ends to form plasmids.

What is a sticky end?

- A A length of DNA which is single stranded.
- B A length of DNA which is double stranded.
- C A length of mRNA which is single stranded.
- D A length of mRNA which is double stranded.

Your answer

[1]

Q44. (Nov 2021)

11 The diploid number of chromosomes in sheep is 54. Sex in sheep is determined in the same way as in humans.

Which is a possible chromosome combination in a **sperm cell** of a male sheep?

- A 22 chromosomes + Y
- B 26 chromosomes + X
- C 52 chromosomes + XY
- D 54 chromosomes + XY

Your answer

[1]

Q45. (Nov 2021)

13 The pea plants studied by Mendel were either tall or dwarf.

Scientists think that he was lucky to have chosen this characteristic because many other characteristics produce a range of different phenotypes.

Which statement about the types of inheritance discussed by the scientists is correct?

- A** Height in pea plants is controlled by a single allele.
- B** Height in pea plants is controlled by two different genes.
- C** Many characteristics are controlled by multiple genes working together.
- D** Many characteristics are completely controlled by the environment.

Your answer

[1]

Q46. (Nov 2021)

15 Scientists have found that only about 1% of our DNA codes for proteins.

The other 99% of DNA used to be called 'junk' DNA.

Why is the term 'junk' DNA **not** used anymore?

- A** Enzymes may be present in the 'junk' DNA.
- B** The 'junk' DNA can code for the production of carbohydrates.
- C** The 'junk' DNA is non-coding DNA that can control transcription.
- D** Translation can occur on the 'junk' DNA.

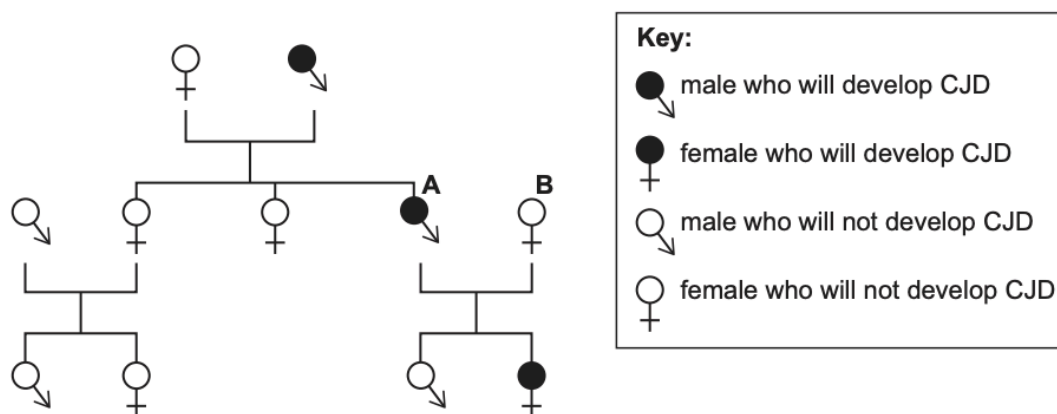
Your answer

[1]

Q47. (Nov 2021)

- 21** CJD is a group of diseases that occurs 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) Complete this table about the family tree.

Number of people who will develop CJD	3
Number of people that are homozygous recessive for this gene	
Number of people who are heterozygous for this gene	

[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.
(Use **D** to represent the dominant allele and **d** for the recessive allele.)

	Person B	
Person A		

Probability = [2]