AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.6.1.5

# Inherited disorders

## Past-paper questions

| | |
|---|---|
| Tier | **Higher** |
| Question groups | **4** |
| Available paper years | **2020–2024** |

## 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.

### 4.6.1.5 Inherited disorders

**Question 01**

November 2020 | 8464/B/2H | Original Q5

**0 5** This question is about inheritance.

Humans have 23 pairs of chromosomes in each body cell.

One pair of chromosomes determines sex.

**0 5 . 1** Complete **Figure 5**.

**[2 marks]**

**Figure 5**

| | | **Female** | |
|---|---|---|---|
| | | **X** | **X** |
| **Male** | | | |
| | | | |

**0 5 . 2** In some families all children are the same sex.

Give the reason why.

**[1 mark]**

4.6.1.5 Inherited disorders

Question 01 · continued



Cystic fibrosis (CF) is an inherited disorder.

**0 5 . 3** A man and a woman do **not** have CF.

The man and the woman have a child who has CF.

Draw a Punnett square diagram to find the probability that their next child will have CF.

Use the symbols:

**T** = dominant allele

**t** = recessive allele

Draw a ring around the genotype of any children with CF.

**[4 marks]**

Probability = _____

**Question 5 continues on the next page**

4.6.1.5 Inherited disorders

Question 01 · continued



Embryo screening for CF can be done by two methods.

**Method 1**

- The woman becomes pregnant by sexual intercourse.
- After 10 weeks of pregnancy a fine needle is inserted into the uterus.
- A sample of the fluid surrounding the embryo is taken.
- The DNA of the embryo is tested for CF.

The screening is done free by specialist hospitals for couples who are at risk of having a child with CF.

There is a small risk of miscarriage.

**Method 2**

- The couple use In Vitro Fertilisation (IVF) to produce a small number of embryos.
- Each embryo is tested for CF.
- One or two embryos without CF are implanted in the woman's uterus.

In 2017 the success rate for having a baby by IVF for women under 35 years was 30%

IVF is a stressful, invasive procedure.

In most UK areas the free public health service does not provide IVF for all women asking for it.

4.6.1.5 Inherited disorders

Question 01 · continued



**0 5 . 4** Suggest **three** reasons for choosing **Method 1** instead of **Method 2**.

**[3 marks]**

1 _____

_____

2 _____

_____

3 _____

_____

**0 5 . 5** Suggest **one** advantage of **Method 2**.

**[1 mark]**

_____

_____

**11**

4.6.1.5 Inherited disorders

Question 02

November 2021 | 8464/B/2H | Original Q6

**0 6** This question is about genetic disorders.

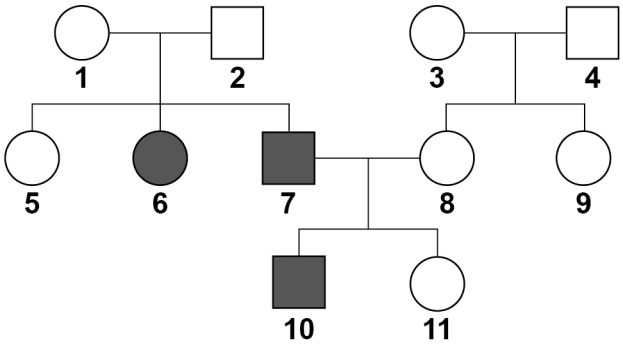
**0 6 . 1** Some people are heterozygous for a genetic disorder.

Define the term 'heterozygous'.

**[1 mark]**

**0 6 . 2** **Figure 6** shows the inheritance of a genetic disorder in a family.

**Figure 6**




**Key**

Female who does **not** have the disorder

Male who does **not** have the disorder

Female who has the disorder

Male who has the disorder

4.6.1.5 Inherited disorders

Question 02 · continued



Person **7** and person **8** plan to have another child.

Determine the probability that the child will be a **male** who has the disorder.

You should:

- draw a Punnett square diagram
- identify the genotype of person **7** and the genotype of person **8**
- identify the phenotype of each offspring genotype
- use the symbols:

  **H** = dominant allele

  **h** = recessive allele

**[6 marks]**

Probability of having a male child with the disorder = _____

**Question 6 continues on the next page**

4.6.1.5 Inherited disorders

Question 02 · continued



**0 6 . 3** Polydactyly is a different inherited disorder.

Two parents do **not** have any alleles for polydactyly in their ordinary body cells.

These parents produced a child with polydactyly.

Explain how polydactyly suddenly occurred in this family.

**[4 marks]**

11

4.6.1.5 Inherited disorders

Question 03

June 2023 | 8464/B/2H | Original Q1

**0 1** Sexual reproduction in humans involves the production of egg cells and sperm cells.

**0 1 . 1** Name the type of cell division that produces egg cells and sperm cells.

**[1 mark]**

**0 1 . 2** Sexual reproduction produces offspring that are genetically different from each other.

Give **two** reasons why sexual reproduction causes variation in the offspring.

**[2 marks]**

1 _____

_____

2 _____

_____

**Question 1 continues on the next page**

4.6.1.5 Inherited disorders

Question 03 · continued



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.

**0 1 . 3** A person with the genotype **DD** is homozygous.

What word describes the genotype **Dd**?

**[1 mark]**

_____

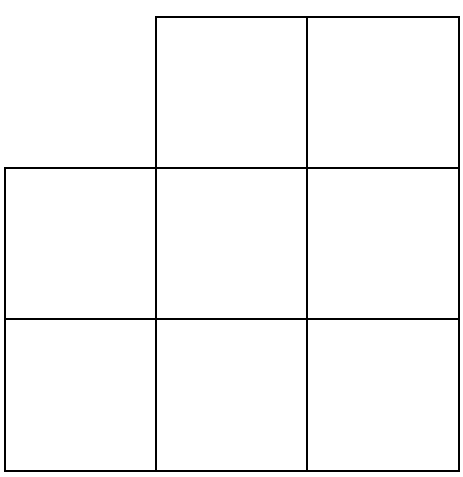
**0 1 . 4** A person with the genotype **Dd** and a person with the genotype **dd** plan to have a child.

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 = _____

4.6.1.5 Inherited disorders

Question 03 · continued



**0 1 . 5** Embryos can be screened for the alleles that cause inherited disorders.

Give **two** advantages of embryo screening.

**[2 marks]**

1 _____

_____

2 _____

_____

11

**Turn over for the next question**

4.6.1.5 Inherited disorders

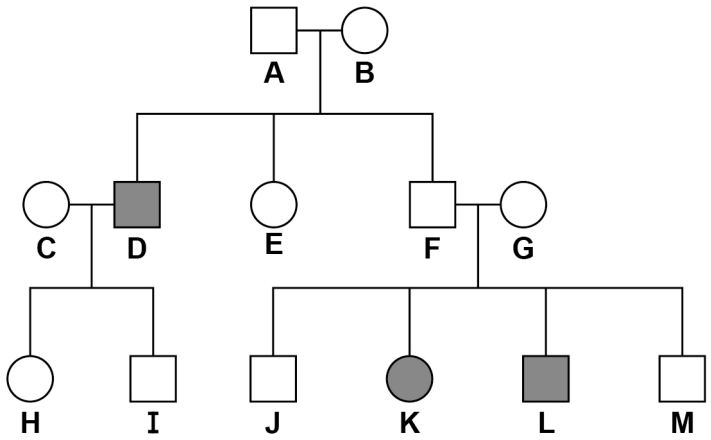
Question 04



**0 3** AKU is a genetic disorder.

**Figure 3** shows the inheritance of AKU in one family.

**Figure 3**




**Key**

- Male who has AKU
- Female who has AKU
- Male who does **not** have AKU
- Female who does **not** have AKU

**0 3 . 1** Describe how **Figure 3** shows that the allele for AKU is recessive.

**[1 mark]**

**0 3 . 2** Which person is **definitely** heterozygous for AKU?

**[1 mark]**

Tick (✓) **one** box.

C ☐ D ☐ E ☐ G ☐

4.6.1.5 Inherited disorders



**0 3 . 3** A female who has AKU and a male who is heterozygous for AKU plan to have a child.

Determine the probability that the child will have AKU.

You should:

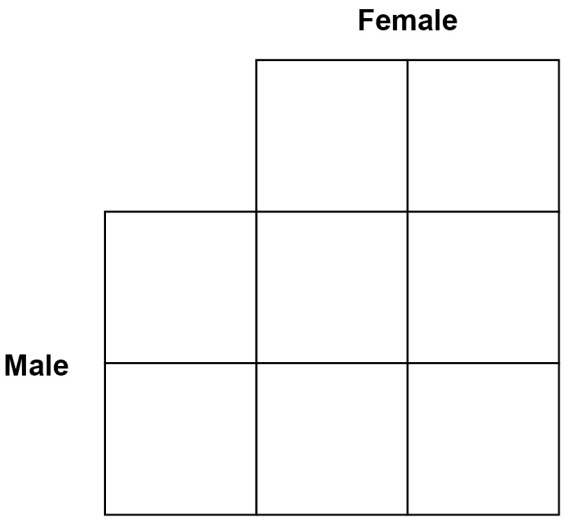
- complete **Figure 4**
- identify the phenotype of each offspring genotype
- use the symbols:

  **A** = dominant allele

  **a** = recessive allele.

**[5 marks]**

**Figure 4**




Probability that the child will have AKU = _____

**Question 3 continues on the next page**

4.6.1.5 Inherited disorders

Question 04 · continued



**0 3 . 4** A mutation is a change in a gene.

People who have AKU have a mutation that causes the production of a non-functioning enzyme.

Enzymes are proteins.

Suggest how a mutation can result in the production of a non-functioning enzyme.

**[2 marks]**

**0 3 . 5** Some people have In Vitro Fertilisation (IVF) treatment to increase the chance of becoming pregnant.

Describe how the process of IVF can result in pregnancy.

**[4 marks]**

4.6.1.5 Inherited disorders

Question 04 · continued



**0 3 . 6** Embryos can be screened to detect inherited disorders.

Give **two** arguments **against** embryo screening.

Do **not** refer to religion in your answer.

**[2 marks]**

1 _____

_____

2 _____

_____

15

**Turn over for the next question**