

3.4 Inheritance

Mendelian Genetics

Describe the methodology and conclusions drawn from Mendel's pea plant experiment

Method:

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Conclusions:

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Explain how sexual reproduction results in diploid zygotes with two alleles for each characteristic

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Differentiate between homozygous, heterozygous and hemizygous

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Modes of Inheritance

Distinguish between complete dominance and co-dominance

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Solve the following questions (HINT: use Punnett squares)

1. Albinism is a recessive trait. An albino man marries a normal woman who had an albino parent. How likely is it that their first child will be albino?

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2. In guinea pigs, curly hair (H) is dominant over straight hair (h). Work out F₁ and F₂ generations of a cross between a homozygous curly hair guinea pig and a homozygous straight hair guinea pig.

F₁:

F₂:

3. Red coat colour (R) is dominant to silver-grey coat (r). Work out genotypes and phenotypes for:

a) *Homozygous red* × *silver grey*:

b) *Heterozygous red* × *silver grey*:

c) *Homozygous red* × *heterozygous red*:

4. In hamsters, black hair is dominant over white hair and curly hair is dominant over straight hair. How would you tell if a black and curly hamster was homozygous or heterozygous for each trait?

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5. In humans, widow's peak (W) is dominant over a continuous hairline (w), and short fingers (F) are dominant over long fingers (f). Two individuals with widow's peak and short fingers have a child with continuous hairline and long fingers. Determine the genotype of the parents.

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6. Achondroplasia (dwarfism) is caused by a dominant allele that is embryonically lethal when in a homozygous state. Calculate the likelihood of two dwarf parents having a normal sized offspring.

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List the possible genotypes for the following blood groups

Phenotype	Type A	Type B	Type AB	Type O
Genotype				

Identify which blood group is the universal donor and which is the universal acceptor

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Define sex linkage and identify two examples of sex-linked conditions

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Outline why X-linked recessive disorders are more common in males

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Describe the inheritance and cause of the following genetic diseases

Cystic Fibrosis:

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Huntington's Disease:

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Compare the health consequences associated with the Hiroshima bombing and Chernobyl meltdown

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Solve the following questions (HINT: use Punnett squares)

1. A young man has type AB blood and his sister has type O blood. What are the genotypes and phenotypes of the parents?

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2. A woman with blood type A marries a man with type O. They have six children, all with type A blood. What are the probable parental genotypes of the parents and could they possibly have a child with type O blood?

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3. A young woman sues a man for parental support for her illegitimate child. The man's blood type is B, while the mother and child are both blood type O. Based on this information, the judge rules in the man's favour. Was this wise?

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4. A woman with haemophilia marries a normal man. What are the probabilities of them having children with haemophilia (include genders)?

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5. Can a colour-blind woman have a son with normal vision? Explain

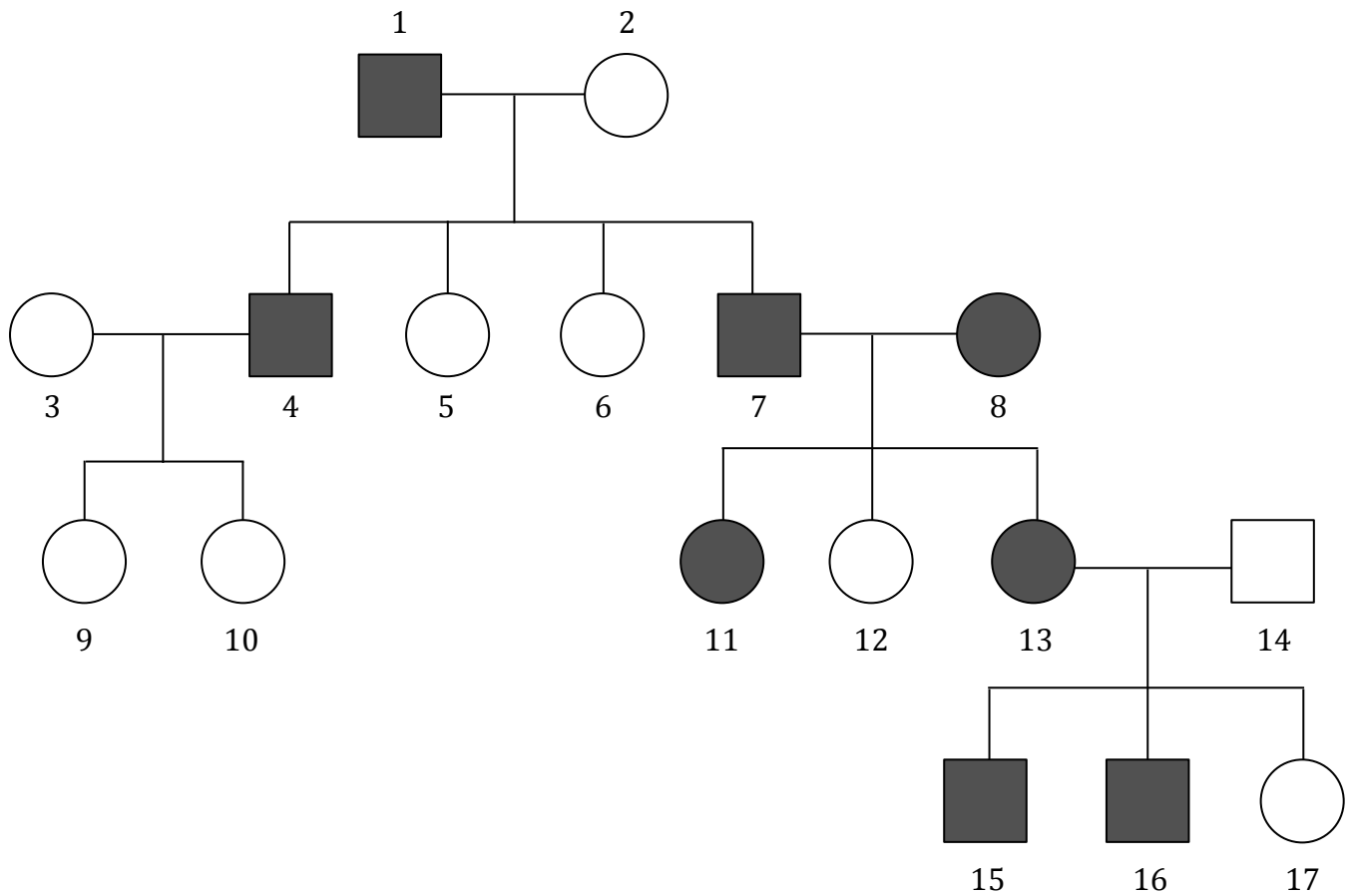
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6. Baldness is X-linked recessive. Identify parental genotypes that could produce bald daughters

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Analyse the data in the following pedigree chart to draw appropriate conclusions

Fatal familial insomnia is a rare autosomal condition characterised by a progressive inability to sleep (insomnia), eventually leading to death



Is the condition caused by a dominant or recessive allele? Explain

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Work out (where possible) the genotypes of each of the individuals

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| 1. | 6. | 11. | 16. |
| 2. | 7. | 12. | 17. |
| 3. | 8. | 13. | |
| 4. | 9. | 14. | |
| 5. | 10. | 15. | |

What is the probability that individual 11 is homozygous?

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