

### Monohybrid Inheritance problems

#### Aim

- Know about patterns of monohybrid inheritance.
  - 3.1 Interpret patterns of monohybrid inheritance.
  - 3.2 Predict ratios of offspring characteristics in a monohybrid cross
  - 3.3 Evaluate the risks of inheriting genetic diseases.

#### Questions

**Q1** Some forms of albinism, a genetic disorder, may be due to a single gene mutation. The allele for albinism is recessive to the allele for no albinism. A woman is heterozygous for albinism. Her male partner is homozygous for the 'normal' allele.

- Does the woman suffer from the condition?
- What percentage of their children are likely to be carriers?
- Explain what is meant by the term 'symptomless carrier'.

**Q2** If parents are aware of a genetic disease within the family they may consult a genetic counsellor. If the method of inheritance for the disease is understood, then examination of the genetic family tree, sometimes called a pedigree diagram, will let the counsellor advise on the likelihood of any children inheriting the disease. The family tree in Figure 1 shows the occurrence of sickle cell anaemia within one family.

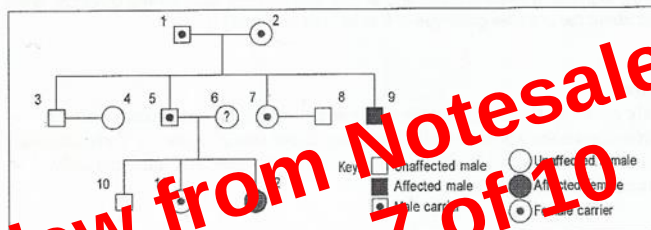


Figure 1: Pedigree diagram showing the occurrence of sickle cell anaemia within one family.

- Look at the family tree in Figure 1 above and using suitable symbols suggest what the genotype of individual 6 might be. Give a reason for your answer.
  - If individuals 7 and 8 have children, state what proportion of their children would be expected to be carriers of the sickle cell anaemia allele.
- Q3** Huntington's disease (HD) causes cells in the brain to degenerate. A person with the disease gradually loses control of his/her physical movements and mental abilities. The HD gene codes for a protein that occurs in the brain. The HD allele produces a non-functioning protein and is dominant to the allele for the functioning protein.
- What is the chance of a mother who is heterozygous for the condition passing it on to a child?
  - A couple who both have the condition would like to have children. Explain what proportion of their children are likely to inherit the disease.