

BLOOD GROUPING PROBLEMS

1. If a man with A type blood marries a woman of O type blood and they have five children, all of blood type A:
 - a. What is the most probably genotype of the man?
 - b. What is the genotype of the woman?
 - c. Of the children?

2. A friend of yours has B type blood. He knows his mother has O type blood.
 - a. What is his blood genotype?
 - b. What genotypes of blood might his father have?

With this basic information, find probably solutions to the following genetic problems:

3. What blood types might possibly result in children of a family whose mother has B blood and whose father has AB blood?

4. Suppose a father of blood type A and a mother of type B have a child of type O. What types are possible in their children?

5. Suppose a father of type B and a mother of type O have a child of type O. What are the chances that their next child will be type O? _____ Type B? _____ Type A? _____ Type AB? _____

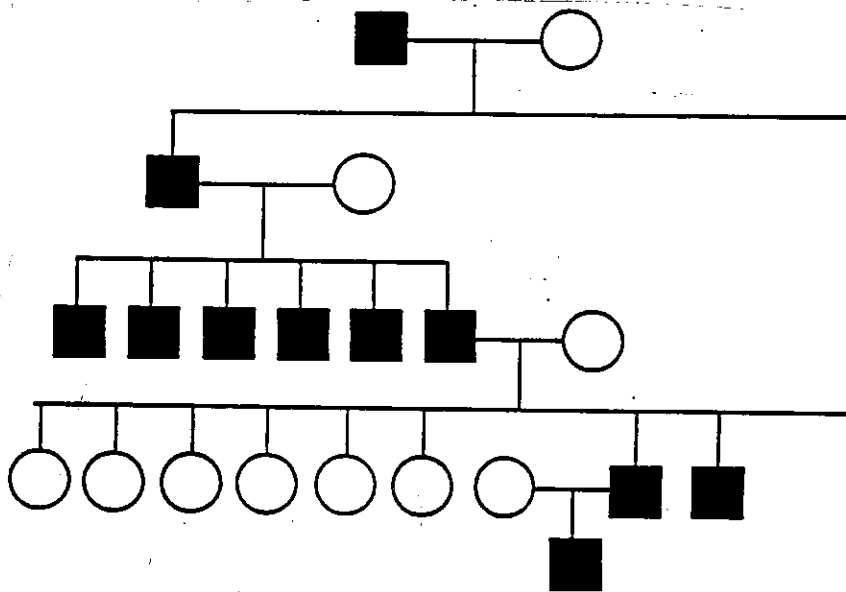
6. Assuming you do not know the blood type of your future husband or wife, but you do know yours, what blood types might you possibly expect your children to have? What blood types can't they possibly have?

7. Two type AB parents took home a newly born type A baby from the hospital and decided it was not their baby because it did not seem to resemble either. They claimed another couple had their baby. The other parents were both type A and took home a type O baby. What is their solution to this problem?
8. You are the judge in a case in which a type O man claimed a \$50,000 inheritance after the death of type A and type AB parents.
- What would be your decision? Explain.
 - What if the man had type B blood? Explain.

Sex Linked Problems

1. If a human male and female produce children, what proportion of their offspring should be males? What proportion should be females? Illustrates using a Punnett square.
2. What conditions are necessary in order for colorblindness to appear in women?
3. In humans, normal vision (X^C) is dominant to colorblindness (X^c) and is sex-linked. A normal-visioned man, whose father was colorblind, marries a colorblind woman. What are the chances that a son will be colorblind. A daughter? Explain.
4. Hemophilia is due to a sex-linked recessive gene (X^h) and the normal condition to the gene (X^H). A hemophiliac man marries a woman who is not. Their first son has hemophilia. What are the chances that their daughter, if they had one, will be hemophilic?
5. The "Porcupine Men" who appeared in England during the 18th and 19th centuries had their whole body, except the palms, soles, and head, covered with cylindrical bristle-like outgrowths nearly an inch long. The condition appeared when the child was seven or eight weeks old. Judging from the accompanying pedigree, what type of inheritance is involved?

NOTE: Circles represent females and squares males. The individuals who are shaded have the trait.



6. In humans, pseudohypertrophic muscular dystrophy is a condition in which the muscles gradually waste away, ending in death in the early teens. In some families it is dependent upon a sex-linked recessive gene. This type occurs only in boys and has never been reported in girls. Why is it not to be expected in girls?

7. Why does the sex-linked gene for pseudohypertrophic muscular dystrophy not become eliminated from the human race since all boys showing the trait die before reaching maturity?

8. In a certain family there are two boys and two girls. One of the boys develops pseudohypertrophic muscular dystrophy, and dies at 14 years of age. The other boy and the two girls grow up and marry. What are the chances of their offspring showing this condition?

9. Ichthyosis hystrix gravior (a greatly thickened horny condition of the skin) is a rare human abnormality, but in the single extensive pedigree which has been studied it occurs only in males. All the sons of each affected father have the condition. Females are not only unaffected, but never transmit the gene for this defect. Can you suggest a possible explanation for this curious and unusual type of inheritance?

In man aniridia (a type of blindness) is due to a dominant gene. Optic atrophy (another type of blindness) is due to a recessive sex-linked gene. A man blind from optic atrophy marries a woman blind from aniridia. Would any of their children be expected to be blind? Which type of blindness would they have?

10. A normal-visioned man marries a normal-visioned woman whose father was color-blind. They have two daughters who grow up and marry. The first daughter has five sons, all normal-visioned. The second daughter has two normal-visioned daughters and a colorblind son. Diagram the family history, including the genotypes of all the individuals mentioned.