

Name: \_\_\_\_\_

## Genetics - X Linked Genes

**\*\*In fruit flies, eye color is a sex linked trait. Red is dominant to white.\*\***

1. What are the sexes and eye colors of flies with the following genotypes?

$X^R X^r$  \_\_\_\_\_  $X^R Y$  \_\_\_\_\_  $X^r X^r$  \_\_\_\_\_

$X^R X^R$  \_\_\_\_\_  $X^r Y$  \_\_\_\_\_

2. What are the genotypes of these flies:

white eyed, male \_\_\_\_\_ red eyed female (heterozygous) \_\_\_\_\_

white eyed, female \_\_\_\_\_ red eyed, male \_\_\_\_\_

3. Show the cross of a white eyed female  $X^r X^r$  with a red-eyed male  $X^R Y$ .

4. Show a cross between a pure red eyed female and a white eyed male.  
What are the genotypes of the parents:

\_\_\_\_\_ and \_\_\_\_\_

How many are:

white eyed, male \_\_\_\_\_

white eyed, female \_\_\_\_\_

red eyed, male \_\_\_\_\_

red eyed, female \_\_\_\_\_

5. Show the cross of a red eyed female (heterozygous) and a red eyed male.

What are the genotypes of the parents?

\_\_\_\_\_ & \_\_\_\_\_

How many are:

white eyed, male \_\_\_\_\_

white eyed, female \_\_\_\_\_

red eyed, male \_\_\_\_\_

red eyed, female \_\_\_\_\_

Math: What if in the above cross, 100 males were produced and 200 females. How many total red-eyed flies would there be? \_\_\_\_\_

Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Blood Type Problems



1. List all the possible genotypes for each of the 4 blood types:

Type O \_\_\_\_\_ Type A \_\_\_\_\_

Type B \_\_\_\_\_ Type AB \_\_\_\_\_

### SHOW WORK!

2. A man with AB blood is married to a woman with AB blood. What blood types will their children be and in what proportion?

3. A man who has type B blood (genotype: BB) is married to a woman with type O blood. What blood type will their children have?

4. A woman with type A blood (genotype: AO) is married to a type B person (genotype: BO). What blood types will their children have?

5. A woman with type A blood is claiming that a man with type AB blood is the father of her child, who is also type AB. Could this man be the father? Show the possible crosses; remember the woman can have AO or AA genotypes.

6. A man with type AB blood is married to a woman with type O blood. They have two natural children, and one adopted child. The children's blood types are: A, B, and O. Which child was adopted?

7. A person with type A blood (unknown genotype) marries a person with type O blood. What blood types are possible among their children. (Show 2 crosses)

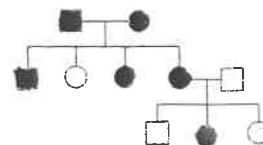
8. A woman is color-blind. a. What are the chances that her sons will be color-blind? b. If she is married to a man with normal vision, what are the chances that her daughters will be color-blind? c. Will be carriers?

Is it possible for a woman who is homozygous dominant for normal color vision and a color-blind man to have a son who is color-blind? Why or why not?

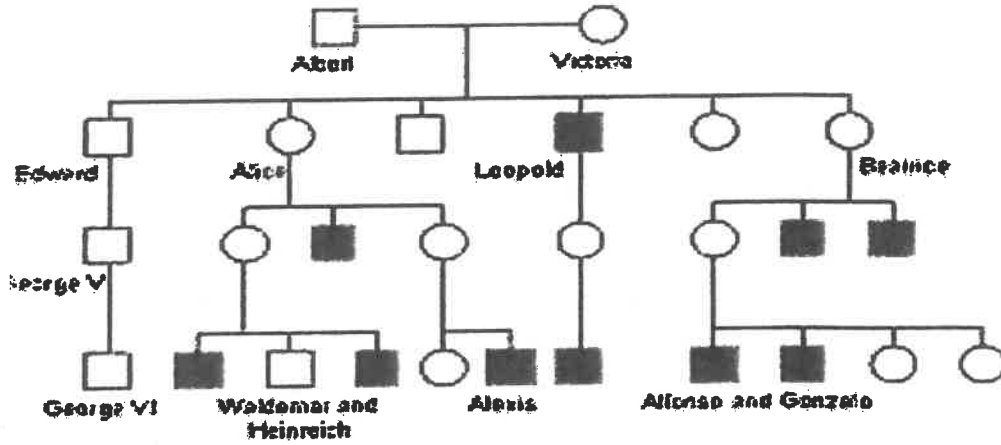
9. Human females are XX and males are XY.  
 a. Does a male inherit the X from his mother or father?  
 b. With respect to X-linked alleles, how many different types of gametes can a male produce?  
 c. If a female is homozygous for an X-linked allele, how many types of gametes can she produce with respect to that allele?  
 d. If a female is heterozygous for an X-linked allele, how many types of gametes might she produce with respect to that allele?

11. Both the mother and father of a male hemophiliac appear normal. From whom did the son inherit the allele for hemophilia? What are the genotypes of the mother, the father, and the son?

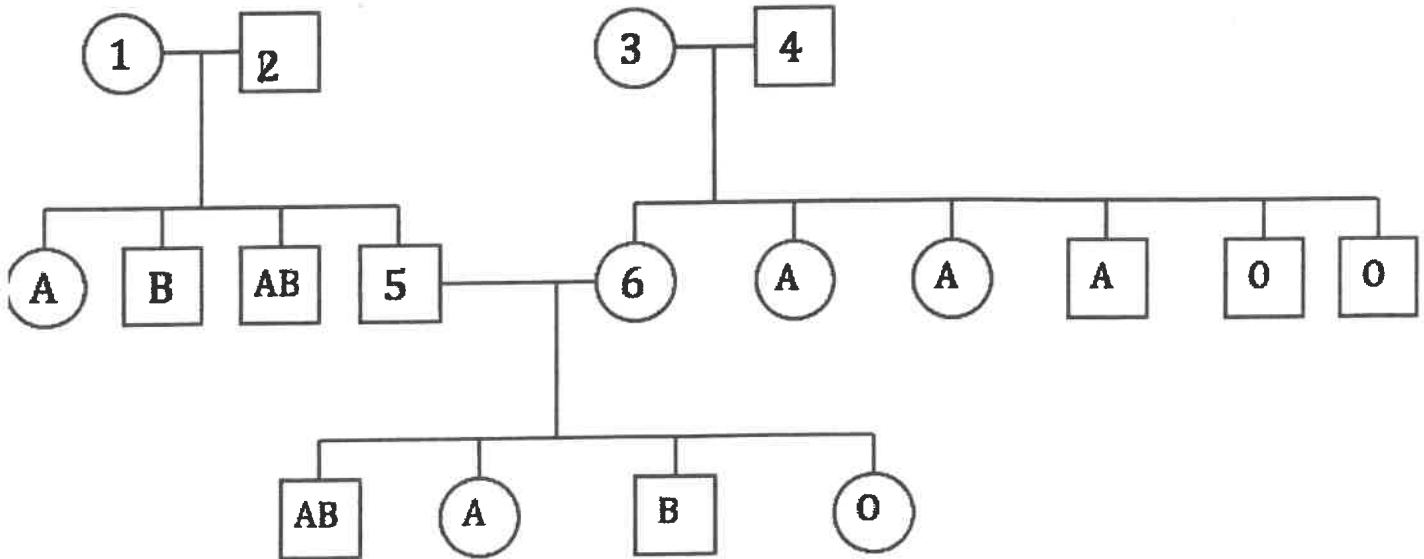
12. Does the phenotype indicated by red circles and squares in this pedigree show a Mendelian inheritance pattern that is autosomal dominant, autosomal recessive, or X-linked?



Queen Victoria was the world's most famous carrier of hemophilia. Her son, Leopold, and two carrier daughters, Alice and Beatrice, spread the gene fairly widely through the royal families of Europe, Prussia and Russia. Fortunately, no modern monarchs have inherited the allele. Indicate the probably genotype of each of the people below. Remember, hemophilia is a sex-linked trait and shaded individuals have the disease.



The pedigree table below shows the blood types of three generations of family members. Notice that some of the blood type phenotypes have been given to you. What is the genotype of the individuals 1 - 6? Give the probable genotype of all other family members.

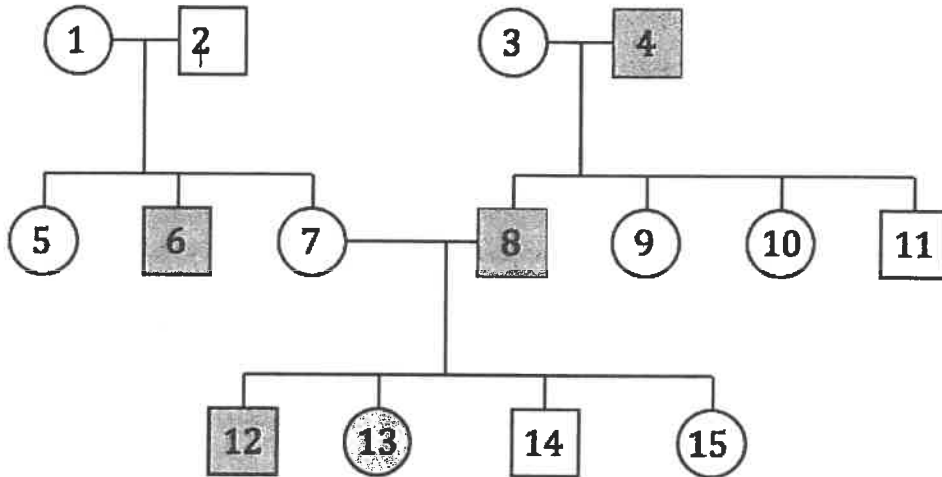


## Genetics Practice Problems: Pedigree Tables

Remember the following when working pedigree tables:

- 1) Circles are females and squares are males.
- 2) A shaded circle or square indicates that a person has the trait.

The pedigree seen below is for colorblindness. Shaded individuals are colorblind. First, determine the probable genotype of persons 1 – 15; then, answer the questions below the table.



How did you determine the genotype of the mother at 3?

Number 8 was colorblind just like his father. Where did the son at 8 get his allele for colorblindness?

Neither numbers 1 nor 2 were colorblind. How did they have a colorblind son (6)?

What must be the genotypes of the parents of a colorblind daughter? Explain.

If number 13 marries a normal man, what is the probability that their sons will be colorblind?