

Name \_\_\_\_\_

Date \_\_\_\_\_

### Biology Homework: Sex-Linked Inheritance Practice Problems

A female has the chromosomes **XX**, while a male has the chromosomes **XY**. In sex-linked inheritance the genes are carried on the X chromosome as a rule and are usually recessive. For example: A woman with a normal gene on one X chromosome will not be colorblind, but is called a carrier for color-blindness. In order to be colorblind, a woman must carry the recessive allele for colorblindness on each of her X chromosomes. A male is either normal or has colorblindness. He cannot be a carrier.

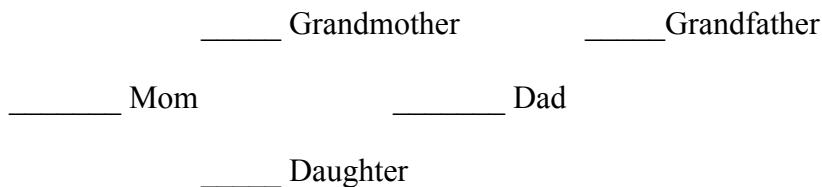
**1. The gene for colorblindness is carried on the X chromosome and is recessive. A man, whose father was colorblind, has a colorblind daughter.**

a) Is this man colorblind? How do you know? \_\_\_\_\_

b) Where did he get his gene for colorblindness? \_\_\_\_\_

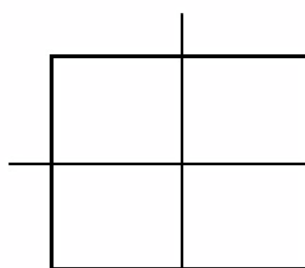
c) Must the fathers of all colorblind girls be colorblind? Why? \_\_\_\_\_

**2. A man whose parents were normal with respect for color vision marries a woman of normal vision and similar pedigree. One of their daughters is colorblind. Write the genotypes of this daughter, her parents, and paternal grandparents.**



Does the father of the colorblind daughter have to be colorblind? \_\_\_\_\_

**3. Cross a woman carrier for hemophilia to a hemophiliac man.**



Genotypes	Phenotypes

\_\_\_\_\_ (a) What fraction of the offspring will be carrier females?

\_\_\_\_\_ (b) What fraction will be normal males?

\_\_\_\_\_ (c) What fraction will be normal females--those who do not have the disease?

\_\_\_\_\_ (d) What fraction will be hemophiliac females?

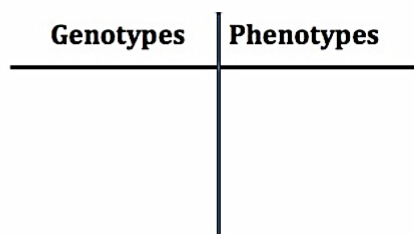
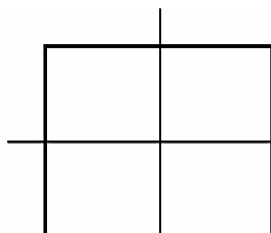
\_\_\_\_\_ (e) What is the genotype of the carrier female?

\_\_\_\_\_ (f) How many different genotypes are possible among the offspring?

4. A normal woman who is a carrier for colorblindness marries a normal man.  
What types of offspring would you expect?

\_\_\_\_\_ Genotype of woman

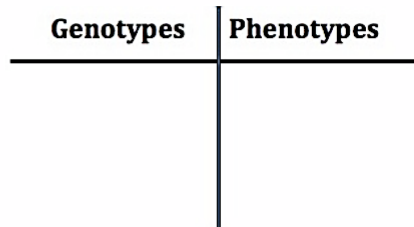
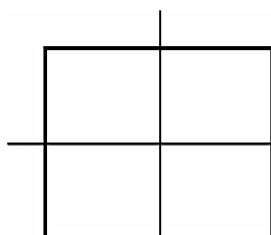
\_\_\_\_\_ Genotype of man



5. In fruit flies, eye color is carried on the X chromosome. The allele for red eyes is dominant over its recessive allele, white eyes. Cross a homozygous red-eyed female to white-eyed male.

\_\_\_\_\_ What is the genotype of the male?

\_\_\_\_\_ What is the genotype of the female?



- \_\_\_\_\_ a) How many genotypes are possible among the offspring?
- \_\_\_\_\_ b) How many phenotypes are possible among the offspring?
- \_\_\_\_\_ c) What is the probability of getting offspring that are red-eyed males?
- \_\_\_\_\_ d) What is the probability of getting offspring that are white-eyed males?
- \_\_\_\_\_ e) What is the probability of getting offspring that are red-eyed females?
- \_\_\_\_\_ f) What is the probability of getting offspring that are white-eyed females?

6. In fruit flies, eye color is carried on the X chromosome. The allele for red eyes is dominant over its recessive allele, white eyes. Two fruit flies are mated; both have red eyes. The female offspring are all red-eyed, but some of the male offspring are white-eyed and some are red-eyed.

- \_\_\_\_\_ What is the genotype of the male parent?
- \_\_\_\_\_ What is the genotype of the female parent?
- \_\_\_\_\_ What is the genotype of the red-eyed female offspring?
- \_\_\_\_\_ What is the genotype of the red-eyed male offspring?
- \_\_\_\_\_ What is the genotype of the white-eyed male offspring?

7. A man whose father was a hemophiliac, but whose own blood clotting time is normal, marries a normal woman with no record of hemophilia in her ancestry. What is the chance of hemophilia in their children? [Show your solution.]

8. If a husband and wife have a heterozygous girl for colorblindness, a normal boy, a colorblind girl, and a colorblind boy, what would be the genotypes of the parents? [Show your solution.]