

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

## Sex-Linked Traits

Sex-linked traits are genetic characteristics determined by **genes** located on sex chromosomes. Genes are segments of DNA found on **chromosomes** that carry information for **protein** production and that are responsible for the inheritance of specific traits. Genes exist in alternative forms called **alleles**. One allele for a trait is inherited from each parent. Like traits originating from genes on autosomes (non-sex chromosomes), sex-linked traits are passed from parents to offspring through **sexual reproduction**. Sex-linked diseases are passed down through families through one of the X or Y chromosomes. X and Y are sex chromosomes.

**Dominant inheritance** occurs when an abnormal gene from one parent causes disease even though the matching gene from the other parent is normal. The abnormal gene dominates.

**Recessive inheritance** is when both matching genes must be abnormal to cause disease. If only one gene in the pair is abnormal, the disease does not occur, or is mild. Someone who has one abnormal gene (but no symptoms) is called a carrier. A carrier can pass this abnormal gene to his or her children.

The term "**sex-linked**" usually refers to **X-linked** traits.

**Directions:** Answer the questions below about sex linked traits.

1. X-linked (also called sex-linked traits) are inherited on the \_\_\_\_\_ chromosome.
2. Which gender (male or female) is most likely to have X-linked traits? \_\_\_\_\_
3. How many X chromosomes do males have? \_\_\_\_\_
4. How many X chromosomes do females have? \_\_\_\_\_
5. Why does a single X chromosome that carries the allele for red-green colorblindness cause males to be color blind but doesn't cause females to be color blind?
6. What is a "carrier" for an X-linked trait?

### Sex-linked Traits Practice Problems

1. In fruit flies, the gene for white eyes is sex-linked recessive. (R) is red and (r) is white. Cross a white-eyed female with a normal red-eyed male.


- a. What percent of the males will have red eyes? White eyes?
- b. What percent of the females will have red eyes? White eyes?
- c. What **total percent** of the offspring will be white-eyed?

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

d. What **percent** of the offspring will be carriers of the white eye trait?

2. Using the same information as for question #1, cross a heterozygous red-eyed female with a red-eyed male.


a. What are the genotypes of each parent?

b. What **fraction** of the children will have red eyes?

c. What **fraction** of the children will have white eyes?

d. What **fraction** of the female children will carry the white eyed trait?

3. In humans, hemophilia is a sex-linked recessive trait. If a female who is a carrier for hemophilia marries a male with normal blood clotting, answer the following questions.


a. What fraction of the female children will have hemophilia?

b. What fraction of the female children will be carriers?

c. What fraction of the male children will have normal blood clotting?

d. What fraction of the male children will be carriers?

e. What fraction of the male children will have hemophilia?

1. Two normal visioned parents have a color-blind son. Give the genotype of both parents and the son.

2. In cats, the allele (B) produces black color but (b) produces a yellow color. These alleles are incompletely dominant to each other. A heterozygote produces a tortoise shell color. The alleles (B) and (b) are sex-linked as well. Cross a tortoise shell female with a yellow male.

a. What percent of their offspring will be yellow?

b. What percent of their offspring will be black?

c. What percent of their offspring will be tortoise shell?


d. Why is it impossible to have a tortoise shell male offspring?