

Name: _____

Period: _____

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? _____

6. In humans, hemophilia is a sex linked trait. Females can be normal, carriers, or have the disease. Males will either have the disease or not (but they won't ever be carriers)

$X^H X^H$ = female, normal

$X^H X^h$ = female, carrier

$X^h X^h$ = female, hemophiliac

$X^H Y$ = male, normal

$X^h Y$ = male, hemophiliac

Show the cross of a man who has hemophilia with a woman who is a carrier.

What is the probability that their children will have the disease? _____

7. A woman who is a carrier marries a normal man. Show the cross.

What is the probability that their children will have hemophilia?

What sex will a child in the family with hemophilia be?

8. A woman who has hemophilia marries a normal man. How many of their children will have hemophilia, and what is their sex?

9. 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?

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

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

- e. What are the genotypes of each parent?
- f. What **fraction** of the children will have red eyes?
- g. What **fraction** of the children will have white eyes?

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

11. 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?

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

13. 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.

- i. What percent of their offspring will be yellow?
- j. What percent of their offspring will be black?
- k. What percent of their offspring will be tortoise shell?

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