

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:

- a.  $X^R X^r$  ♀ red  
 b.  $X^R X^R$  ♀ red  
 c.  $X^R Y$  ♂ red

- d.  $X^r Y$  ♂ white  
 e.  $X^r X^r$  ♀ white

2. What are the genotypes of these flies:

- a. White-eyed, male:  $x^r y$   
 b. White-eyed, female:  $x^r x^r$   
 c. Red-eyed, heterozygous female:  $X^R x^r$   
 d. Red-eyed, male:  $X^R Y$

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

	$x^R$	$Y$
$x^r$	$x^R x^r$	$x^r Y$
$x^r$	$x^R x^r$	$x^r Y$

2 female carriers  $x^R x^r$  (red eyes)  
 2 males (white eyes)

4. Show a cross between a pure (homozygous) red-eyed female and a white-eyed male. What are the genotypes of the parents?

	$x^R$	$Y$
$x^R$	$x^R x^R$	$x^R Y$
$x^R$	$x^R x^R$	$x^R Y$

$X^R X^R$  x  $x^r Y$

How many offspring are

white-eyed, male: 0

white-eyed, female: 0

red-eyed, male:  $\frac{2}{4}$  ( $\frac{1}{2}$ )

red-eyed, female:  $\frac{2}{4}$  ( $\frac{1}{2}$ )

5. Show the cross of a red-eyed female (heterozygous) and a red-eyed male. What are the genotypes of the parents?

	$x^R$	$Y$
$x^R$	$x^R x^R$	$x^R Y$
$x^r$	$x^R x^r$	$x^r Y$

$X^R X^r$  x  $x^R Y$

How many offspring are

white-eyed, male:  $\frac{1}{4}$

white-eyed, female: 0

red-eyed, male:  $\frac{1}{4}$

red-eyed, female:  $\frac{2}{4}$  ( $\frac{1}{2}$ )

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

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

**Genetics Practice 5: Sex-Linked Traits**

If, from the previous cross, 100 males and 200 females were produced, how many total red-eyed flies would there be?

$50 \text{ males} + 200 \text{ females} = \boxed{250 \text{ red-eyed flies}}$

6. In humans, hemophilia is an X-linked recessive blood disorder. 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?

$X^h Y$  50% likely

$X^H$	$X^H Y^h$	$X^H Y$
$X^h$	$X^h Y^h$	$X^h Y$

7. A woman who is a carrier reproduces with a normal man. Show the cross. What is the probability that their children will have hemophilia? What will be the sex of a child in the family with hemophilia?

$X^H Y$  25% likely - male

$X^H$	$X^H Y$	$X^H Y$
$X^h$	$X^h Y^h$	$X^h Y$

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

$X^h Y$  50% likely - male

$X^H$	$X^H Y^h$	$X^H Y$
$X^h$	$X^h Y^h$	$X^h Y$

9. In cats, the gene for calico cats (orange, black, and white) is codominant. Females that receive a B and an R gene have black and orange splotches on white coats. Males can only be black or orange, but not calico. A calico female's genotype would be  $X^B X^R$ .

Show the cross of a female calico cat with a black male.

	$X^B$	$Y$
$X^B$	$X^B X^B$	$X^B Y$
$X^R$	$X^B X^R$	$X^R Y$

What % of kittens are black/male? 25%

What % of kittens are calico/male? 0%

What % of kittens are calico/female? 25%

10. Show the cross of a female black cat with a male orange cat.

	$X^R$	$Y$
$X^B$	$X^B X^R$	$X^B Y$
$X^O$	$X^O X^R$	$X^O Y$

What % of kittens are calico/female? 50%

All males will be what color? Black