

45B

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:

$X^R X^r$ _____
 $X^R X^R$ _____

$X^R Y$ _____
 $X^r Y$ _____

2. What are the genotypes of these flies:

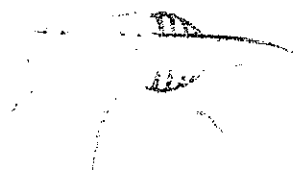
white eyed, male _____

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:

_____ & _____

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

$X^H Y$ = male, normal

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

$X^h Y$ = male, hemophiliac

$X^h X^h$ = female, 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 cats, the gene for calico (multicolored) cats 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 never calico.

Here's what a calico female's genotype would look like. $X^B X^R$

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

What percentage of the kittens will be black and male? _____
 What percentage of the kittens will be calico and male? _____
 What percentage of the kittens will be calico and female? _____

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

What percentage of the kittens will be calico + female _____
 What color will all the males be? _____

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:

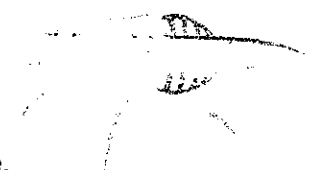
$X^R X^r$ hetero (carrier) red female $X^R Y$ homo red male
 $X^R X^R$ homo red female $X^r Y$ homo white male

2. What are the genotypes of these flies:

white eyed, male $X^r Y$ red eyed female (heterozygous) $X^R X^r$
 white eyed, female $X^r X^r$ 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	$X^R X^r$	$X^r Y$	carrier red female white male
X^r	$X^R X^r$	$X^r Y$	



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

$X^R X^R$ & $X^r Y$

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

How many are:
 white eyed, male 0
 white eyed, female 0
 red eyed, male 2
 red eyed, female 2

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

$X^R X^r$ & $X^R Y$

	X^R	Y	
X^R	$X^R X^R$	$X^R Y$	50 red
X^r	$X^R X^r$	$X^r Y$	50 white

How many are:
 white eyed, male 1
 white eyed, female 0
 red eyed, male 1
 red eyed, female 2

Math: What if in the above cross, 100 males were produced and 200 females. How many total red-eyed flies would there be?
250

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

$X^H Y$ = male, normal

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

$X^h Y$ = male, hemophiliac

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

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

$X^H X^h \times X^h Y$

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

What is the probability that their children will have the disease? 50%

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?

$X^H X^h \times X^H Y$

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

25%

male

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

$X^h X^h \times X^H Y$

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

50%

male

9. In cats, the gene for calico (multicolored) cats 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 never calico.

Here's what a calico female's genotype would look like. $X^B X^R$

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

$X^B X^R \times X^B Y$

$X^B X^R$ - black/orange

$X^B Y$ - black

$X^R Y$ - orange

What percentage of the kittens will be black and male? 25%
 What percentage of the kittens will be calico and male? 0
 What percentage of the kittens will be calico and female? 25%

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

$X^B X^B \times X^R Y$

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

calico = black
 ♀
 0 →

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