Name _____

GENETICS: X LINKED GENES

****In fruit flies, eye color is a sex linked trait. Red is dominant to white ****

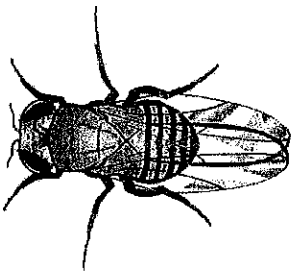
1. What are the sexes and eye colors of flies with the following genotypes:

X^RX^r _____ X^RY _____ X^rX^r _____
X^RX^R _____ X^rY _____

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^rX^r with a red-eyed male X^RY .



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 c e.
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 hemophillia, 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 and female? _____
What color will all the male cats be? _____

Name_____

X Linked Genetics in the Calico Cat

Calico is a coat color found in cats, which is caused by a SEX-LINKED, CODOMINANT allele.

B = Black
R = oRange
BR = calico

The following genotypes are possible;

Female cats can be black X^BX^B, orange X^RX^R, or calico X^BX^R
Male cats can be black X^BY or orange X^RY

Show each of the crosses below and include the phenotypic ratios of the offspring.

1. A black male crossed with an orange female

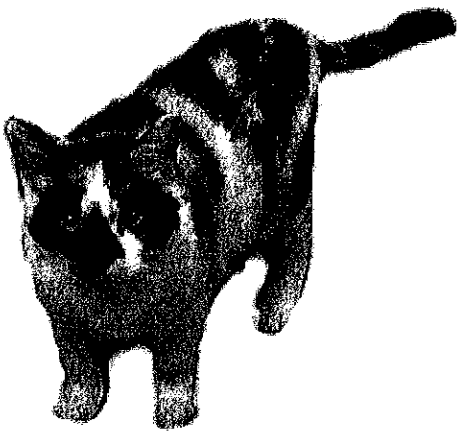
2. An orange male crossed with a calico female

3. A black male crossed with a black female

4. An orange male crossed with an orange female

5. A black male crossed with a calico female

**If you are a cat breeder, what type of parents should you choose to have the MOST number of calico kittens?



The coloration of calico cats is also the result of the inactivation of one of a female cat's sex chromosomes. In females, two X chromosomes are present in all cells but only one is active, the inactive one is called a BARR BODY. This is why the coat color is random, even among cloned calico cats that have identical genomes.

Read about Rainbow and CC to learn more about cloning calico cats.