**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:

- \(X^R X^r\) red female
- \(X^r X^r\) white female
- \(X^R Y\) red male
- \(X^r Y\) 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 \(X^R Y\).

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

- \(X^R X^r\) & \(X^r Y\)

   - 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?

- \(X^R X^r\) & \(X^r Y\)

   - 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. Males will either have the disease or not (but they won’t ever be carriers). Females can be normal, carriers, or have the disease.
$X^H X^H$ = 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.

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

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?

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

$X^H$ \\
$Y$

$X^h$ \\
$Y$

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

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

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?

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

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.

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

What percentage of the kittens will be calico and female? 50%

What color will all the male cats be? Black