GENETICS: SEX 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:

\[ \begin{align*}
X^R X^r & \quad \text{__________} \quad \text{__________} \quad X^R Y \quad \text{__________} \quad \text{__________} \\
X^R X^R & \quad \text{__________} \quad \text{__________} \quad X^r Y \quad \text{__________} \quad \text{__________}
\end{align*} \]

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:

   \[ \text{__________} \quad \text{__________} \]

   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?

   \[ \text{__________} \quad \text{__________} \]

   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?

\[ \text{__________} \]
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 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? _______