

**Sex-linked Traits Practice Problems**

1. In fruit flies, the gene for white eyes is sex-linked recessive. (R) is red and (r) is white. Cross a white-eyed female with a normal red-eyed male.

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

- What percent of the males will have red eyes? White eyes?  
0% red 100% white
- What percent of the females will have red eyes? White eyes?  
100% red 0% white
- What **total percent** of the offspring will be white-eyed?  
50%
- What **percent** of the offspring will be carriers of the white eye trait? 50% carriers

2. Using the same information as for question #1, cross a heterozygous red-eyed female with a red-eyed male.

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

- What are the genotypes of each parent?  $X^R X^r$  &  $X^R Y$
- What **fraction** of the children will have red eyes? ~~75%~~ 75%
- What **fraction** of the children will have white eyes? 25%
- What **fraction** of the female children will carry the white eyed trait?  
50%

3. In humans, hemophilia is a sex-linked recessive trait. If a female who is a carrier for hemophilia marries a male with normal blood clotting, answer the following questions.

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

- What fraction of the female children will have hemophilia?  
0%
- What fraction of the female children will be carriers?  
50%
- What fraction of the male children will have normal blood clotting?  
50%
- What fraction of the male children will be carriers? 0%
- What fraction of the male children will have hemophilia? 50%

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Period: \_\_\_\_\_

1. Two normal visioned parents have a color-blind son. Give the genotype of both parents and the son.

mom -  $X^C X^c$     dad -  $X^C Y$     son -  $X^c Y$

2. In cats, the allele (B) produces black color but (b) produces a yellow color. These alleles are incompletely dominant to each other. A heterozygote produces a tortoise shell color. The alleles (B) and (b) are sex-linked as well. Cross a tortoise shell female with a yellow male.

	$X^B$	$X^b$
$X^b$	$X^B X^b$	$X^b X^b$
$Y$	$X^B Y$	$X^b Y$

a. What percent of their offspring will be yellow?

50%

b. What percent of their offspring will be black?

25%

c. What percent of their offspring will be tortoise shell?

25%

d. Why is it impossible to have a tortoise shell male offspring?

Because you need both the B & b allele to be tortoise shell. Since the gene is on the X chromosome, a male can only have one copy of the allele - either B or b, not both!