Gene Linkage and Sex Linked Traits Worksheet

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

X^RX^r Red-eyed Female X^RY red-eyed male X^rX^r white-eyed female

X^RX^R Red-eyed Female X^rY white-eyed male

2. What are the genotypes of the flies:

white eyed, male X^rY red eyed female (heterozygous) X^RX^r

white eyed, female X^rX^r red eyed, male X^RY

3. Show a cross between a pure red eyed female and a white eyed male.

What are the genotypes of the parents: X^RX^R and X^rY

	X^R	X^R
X^r	X^RX^r	X^RX^r
Y	X^RY	X^RY

How many are:

white eyed, male 0
white eyed, female 0
red eyed, male 2 X^RY
red eyed, female 2 X^RX^r

Genotypic Ratio = 1:1 Phenotypic = 100% Red eyed

5. Show the cross of a red eyed female (heterozygous) and a red eyed male.

What are the genotypes of the parents? X^RX^r & X^RY

	X^R	X^r
X^R	X^RX^R	X^RX^r
Y	X^RY	X^rY

How many are:

white eyed, male 1
white eyed, female 0
red eyed, male 1
red eyed, female 2

4. Show the cross of a white eyed female X^rX^r with a red-eyed male X^RY.

	X^r	X^r
X^R	X^RX^r	X^RX^r
Y	X^rY	X^rY

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

All ♀ red eyed

Sex Linked Traits

Remember that since most sex-linked traits are recessive, the person who shows the trait can have no X's with capital superscript letters.

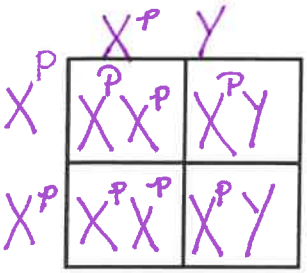
6. Complete the table below.

	X^KX^K	X^kX^k	X^KY	X^KX^k	X^kY
Male or Female?	F	F	M	F	M
Has Trait? (Y or N)	N	Y	N	Y	Y
Carrier? (Y or N)	N	N *	N	Y	N *

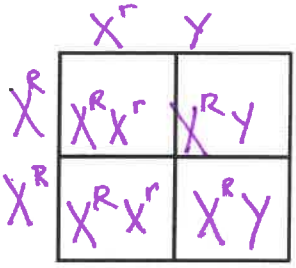
* Individuals are either carriers OR affected. Males can never be carriers. They display the trait!

Before you begin these problems, remember that you set up the problems with the mom and dad sex chromosomes, and then give them the appropriate superscripts, depending on their genotypes.

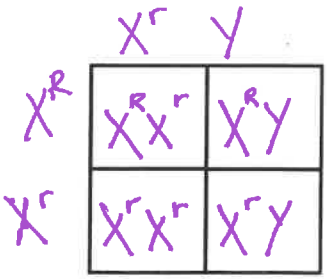
7. In sponges, there exists a sex-linked recessive disorder that causes a sponge to have tiny pores. (X^P=normal pores, X^p=small pores). SpongeBob and his true love SpongeSusie are planning to have a baby sponge. SpongeBob has the disorder and Susie is a carrier.
   a. SpongeBob's genotype: X^pY SpongeSusie's genotype: X^PX^p
   b. What percentage of their son's will have the disorder? 50%
   c. What percentage of their son's will be normal? 50%
   d. What percentage of their daughter's will have the disorder? 50%
   e. What percentage of their daughters will be normal carriers? 50%
   f. What percentage of their daughters will be normal non-carriers? 0%



8. In squid, eye color is a sex-linked trait. Red eyes (R) are dominant over white eyes (r). Squidward (white eyes) has fallen head over heels for a red-eyed beauty, Squidonna. Squidonna also was smitten with Squidward as he was very different from her parents who both had red eyes and she would love to have white eyed children.
   a. Squidward's genotype: X^rY Squidonna's genotype: X^RX^R or X^RX^r *
   b. What percentage of their son's will have white eyes? 0
   c. What percentage of their son's will have red eyes? 100
   d. What percentage of their daughter's will have white eyes? 0
   e. What percentage of their daughters will have red eyes but be carriers for the white eye trait? 100
   f. What percentage of their daughters will be red eyed non-carriers? 0



* Do (b) to (f) for 2nd square as well



b) 50%
c) 50%
d) 50%
e) 50%
f) 0

* 2 possible genotypes so show both possibilities AND answer b → f for both squares