

Sex-Linked Traits Worksheet Answers

Hemophilia Sex Linkage Phenotypes and Genotypes		
Normal Female	$X^H X^H$	blood clots normally
Carrier Female	$X^H X^h$	blood clots normally
Hemophilic Female	$X^h X^h$	blood does not clot normally
Normal Male	$X^H Y$	blood clots normally
Hemophilic Male	$X^h Y$	blood does not clot normally

Use the information above to answer the following questions.

1. **Write the genotypes for the following phenotypes of hemophilia:**
 - i. normal male _____
 - ii. normal female carrying no hemophilia alleles (Homozygous) _____
 - iii. hemophiliac male _____
 - iv. normal female carrying the hemophilia allele (Heterozygous) _____
 - v. hemophilic female _____

2. **A homozygous normal female ($X^H X^H$) has children with a hemophiliac male ($X^h Y$)**
- Complete the Punnett Square to predict the possible genotypes and phenotypes of their children.**

	X^H	X^H
X^h		
Y		

- What proportion/percent of the male children may have hemophilia?

- What proportion/percent of the female children may have hemophilia?

3. **A female who is a carrier for hemophilia ($X^H X^h$) has children with a normal male ($X^H Y$)**

- Complete the Punnett Square to predict the possible genotypes and phenotypes of their children.

	X^H	X^h
X^H		
Y		

- What proportion/percent of the male children may have hemophilia?

- What proportion/percent of the female children may have hemophilia?

4. **What is the probability that a woman with hemophilia who has a child with a normal male will have a child with hemophilia?**

- Write the genotypes for the male and female parents

_____ X _____

- Complete the Punnett Square
- What is the probability of the child having hemophilia?

		X
Y		

5. A woman who is a carrier for hemophilia marries a hemophiliac man

i. What are the genotypes of the parents?

_____ X _____

ii. Complete the Punnet Square

iii. What is the probability their son will have hemophilia? _____

iv. What is the probability their daughter will have hemophilia? _____

Colorblindness Sex Linkage Phenotypes and Genotypes		
Normal Female	$X^B X^B$	normal vision
Carrier Female	$X^B X^b$	normal vision
Color blind Female	$X^b X^b$	colorblind for red and green
Normal Male	$X^B Y$	blood clots normally
Color blind Male	$X^b Y$	colorblind for red and green

6. A woman who is a carrier for colorblindness marries a color blind man.

i. What are the genotypes of the parents?

_____ X _____

ii. Complete the Punnet Square

iii. What proportion of their male children will be colorblind? _____

iv. What proportion of their female children will be colorblind? _____

7. A normal-sighted woman (whose father was colorblind) has children with a colorblind man.
- i. What are the genotypes of the parents?
_____ X _____
 - ii. What is the probability their son will be colorblind?
 - iii. What is the probability their daughter will be colorblind?

Check your understanding of sex linkage and inheritance by answering the following questions.

8. What is a sex-linked trait?
9. Why must males inherit colorblindness or hemophilia from their mothers?
10. Why is colorblindness or hemophilia more common in males than in females?