# Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Block \_\_\_\_\_\_ #\_\_\_\_\_\_\_\_

**Sex-Linked Traits Worksheet**

**Use the information below to answer the following questions.**

XB - X chromosome w/ normal dominant allele (not colorblind)

Xb - X chromosome w/ recessive colorblind allele

Y -Y chromosome (does not contain comparable gene)

XH- X chromosome with normal dominant allele (no hemophilia)

Xh - X chromosome with recessive hemophilia allele

Y - Y chromosome (does not contain comparable gene)

**1.** Write the genotypes for the following phenotypes of red-green color blindness.  
 a. normal male \_\_\_\_\_\_\_\_\_\_\_\_\_  
 b. normal female carrying no colorblind alleles \_\_\_\_\_\_\_\_\_\_\_\_\_

c. colorblind male \_\_\_\_\_\_\_\_\_\_\_\_\_

d. carrier female \_\_\_\_\_\_\_\_\_\_\_\_\_

e. colorblind female \_\_\_\_\_\_\_\_\_\_\_\_\_

**2. XBXB  x XbY**

|  |  |
| --- | --- |
|  |  |
|  |  |

a. What proportion/percent of the male children

are colorblind? \_\_\_\_\_\_\_\_\_\_\_\_\_

b. What proportion/percent of the female children

are colorblind? \_\_\_\_\_\_\_\_\_\_\_\_\_

**3. XBXb  x XBY**

|  |  |
| --- | --- |
|  |  |
|  |  |

a. What proportion of the male children are

colorblind? \_\_\_\_\_\_\_\_\_\_\_\_\_

b. What proportion of the female children are

colorblind? \_\_\_\_\_\_\_\_\_\_\_\_\_

**4.** Identify the genotype cross of a colorblind woman who mates with a man who has normal vision.

\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
|  |  |
|  |  |

What is the probability that this woman (colorblind) and

this man (normal) have a colorblind child??

\_\_\_\_\_\_\_\_\_\_ %

For the following Sex-Linked Punnett Squares:

|  |  |
| --- | --- |
|  |  |
|  |  |

H= normal blood clotting

h=hemophilia

**5. XHXh  x XHY**

a. What is the probability that any of their offspring

will have hemophilia? \_\_\_\_\_\_\_\_\_\_\_\_\_

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

|  |  |
| --- | --- |
|  |  |
|  |  |

a. What proportion of the male children are

hemophiliacs? \_\_\_\_\_\_\_\_\_\_\_\_\_

b. What proportion of the female children are

hemophiliacs? \_\_\_\_\_\_\_\_\_\_\_\_\_

**7**. A phenotypically normal man marries a homozygous normal woman.

|  |  |
| --- | --- |
|  |  |
|  |  |

\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_

a. What is the probability that any of their children will be

hemophiliacs? \_\_\_\_\_\_\_\_\_\_\_\_\_

**8**. A phenotypically normal woman has phenotypically normal parents. However, she has a hemophiliac brother.

(Mom is carrier) (Dad) Brother

\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
|  |  |
|  |  |

a. What are her chances of being a carrier for hemophilia? \_\_\_\_\_\_\_\_\_\_\_\_\_

ANSWER THE FOLLOWING QUESTIONS USING YOUR KNOWLEDGE OF SEX-LINKED TRAITS, THE BACKGROUND INFORMATION AND YOUR NOTES.

9. What is a sex-linked trait?

10. Why must males inherit colorblindness or hemophilia from their mothers?

11. Why is colorblindness or hemophilia more common in males than in

females?

**Complete the Pedigree to answer the following problems.**

1. Colorblindness is a sex-linked trait. Colorblindness is caused by a recessive allele found on the X chromosome. Use the letter “B” to represent normal vision and “b” for colorblindness. Look at the pedigree below and answer the questions that follow.



**1 2**



**6 7**

**4 5**

**3**



**9 10**

**11**

**8**

* 1. What are the genotypes for each individual?
  2. Individual 2, 6 and 9 are half shaded in. What does that represent?
  3. Is it possible for individual 4 and individual 5 have a child who is colorblind? Show your work!
  4. Individual 6 and 7 had a child. What is the percent chance they have a child who is colorblind? Show your work!
  5. If individual 11 married a woman who is XBXb, would it be possible to have a daughter who is colorblind? Show your work!

1. Hemophilia is a sex-linked trait. Hemophilia is caused by a recessive allele so use “N” for normal and “n” for hemophilia. A woman who is heterozygous (a carrier) for hemophilia marries a normal man:
   1. What are the genotypes for the parents?
   2. Make a Punnett square for the cross between these parents.
   3. What is the percent chance that they will have a son who has hemophilia?
   4. What is the percent chance that they will have a daughter who has hemophilia?
2. Can a colorblind female have a son that has normal vision? Use “B” for normal vision and “b” for colorblindness. Show your work!