Sex-Linked Traits Worksheet

Background Information:

Sex-linked traits are those whose genes are found on the X chromosome but not on the Y chromosome. In humans the X chromosomes are much larger than the Y chromosome and contains thousands of more genes than the Y chromosome. For each of the genes that are exclusively on the X chromosomes, females, who are XX, would obviously have two alleles. Males, who are XY, would have only one allele. Thus females with one recessive allele and one dominant allele, for a gene that is unique to the X chromosome, will always display the dominant phenotype. However, a male with a recessive allele for a gene unique to the X chromosome will always exhibit that recessive trait because there is no other corresponding allele on the Y chromosome.

In humans, each of two different sex-linked genes has a defective recessive allele that causes a disease. The diseases are hemophilia and colorblindness. In hemophilia, the defective allele prevents the synthesis of a factor needed for blood clotting. In colorblindness, the defective allele prevents a person from seeing certain colors.

Use the information below to answer the following questions.

X^H- X chromosome with normal dominant allele (no hemophilia)

X^h - X chromosome with recessive hemophilia allele

Y - Y chromosome (does not contain comparable gene)

X^B - X chromosome with normal dominant allele (not colorblind)

X^b - X chromosome with recessive colorblind 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 (Homozygous) _____

    c. colorblind male _____

    d. normal female carrying the colorblind allele (Heterozygous) _____

    e. colorblind female _____

2. $X^B X^B$ x $X^b Y$

   a. What proportion/percent of the male children are colorblind? _____

   b. What proportion/percent of the female children are colorblind? _____

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

3. $X^B X^b$ x $X^B Y$

   a. What proportion of the male children are colorblind? _____

   b. What proportion of the female children are colorblind? _____

4. What is the probability that a colorblind woman who marries a man with normal vision will have a colorblind child? _____

   _____ X _____

	X^B	Y
X^b		
X^b		

5. A normal-sighted woman (whose father was colorblind) marries a colorblind man. _____ X _____

   a. What is the probability that they will have a **son** who is colorblind? _____

   b. What is the probability that they will have a colorblind **daughter**? _____