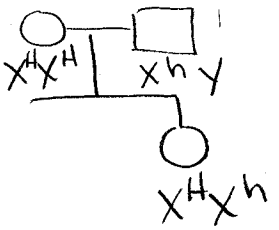
Inheritance Problems – Sex Linked

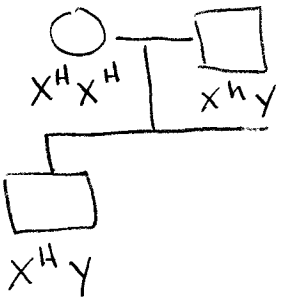
Name: ANSWER KEY

1. Hemophilia is a sex linked trait where X^H expresses normal blood clotting and is dominant to the hemophilia allele X^h.
   a. Give the genotypes of 1) a woman with normal clotting whose father had hemophilia and 2) a normal man whose father had hemophlia. Provide a family pedigree to support your answer.

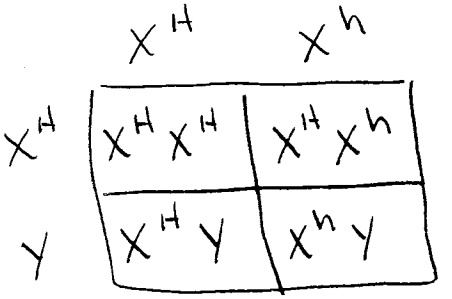
1)



2)



   b. What is the probability that a mating between these two individuals will produce a child, regardless of gender, that has hemophilia?



$\frac{1}{4}$ or 25%

   c. If this couple has a daughter, what is the probability that the daughter will be a carrier of the hemophilia trait? Of having hemophilia?

$\frac{1}{2}$ or 50%

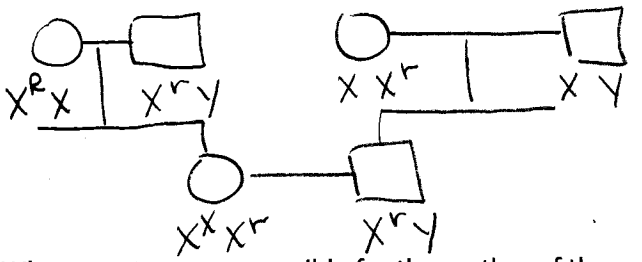
0%

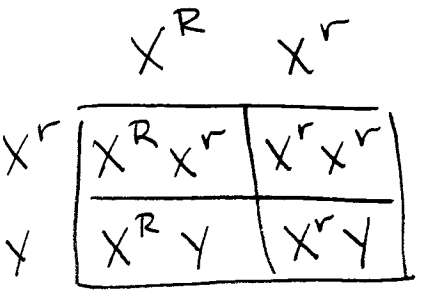
   d. If this couple has a son, what is the probability he will have hemophilia?

$\frac{1}{2}$ or 50%

2. A sex linked recessive allele *r* produces red-green colorblindness in humans. A **normal woman** whose father was colorblind marries a colorblind man.

a. Draw a pedigree using the information provided above.





b. What genotypes are possible for the mother of the colorblind man?

X^RX^r or X^rX^r

c. What are the chances that the first born child from this marriage will be a colorblind boy?

$\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$ or 25%

d. Of the girls produced by these parents, what proportion can be expected to be colorblind?

$\frac{1}{2}$ or 50%

e. Of all the children of these parents, what proportions can be expected to have normal color vision?

$\frac{1}{2}$ or 50%

3. Duchenne-type muscular dystrophy is an inherited disease of muscle due to a mutant form of the protein, dystrophin. The pattern of inheritance has these characteristics:
   a. Affected males have unaffected children
   b. The unaffected sisters of affected males often have affected sons
   c. The unaffected brothers of affected males have unaffected children

   What type of inheritance do these findings suggest? Explain your reasoning.

a) X-linked recessive
Fact a supports this.

b) If heterozygous carriers
are the sisters
Trait is recessive, sisters are
unaffected.

c) Inherited normal allele on X from
mom. But affected males received
mutant allele on X from mom who
is a carrier.