

Sex-Linked Traits

Use with textbook page 36.

1. Define
- sex-linked trait*
- .

is a characteristic controlled by genes located on the sex chromosomes

2. Consider the X-linked trait hemophilia. What is the genotype for each of the following individuals?

a) a man with hemophilia $X^h Y$ b) a woman with hemophilia $X^h X^h$ c) a man with normal blood clotting ability $X^H Y$ d) a woman who is a carrier for hemophilia $X^H X^h$ e) a woman with normal blood clotting ability and who is not a carrier
 $X^H X^H$

3. A woman who is a carrier for hemophilia marries a man with normal blood clotting ability. What are the possible genotypes and phenotypes of their children? It may be useful to complete a Punnett square.

- a) Genotypes:

 25% $X^H X^H$ (normal) 25% $X^H X^h$ (carrier) 0% $X^h X^h$ (hemophilia) 25% $X^H Y$ (normal) 25% $X^h Y$ (hemophilia)

	X^H	X^h
X^H	$X^H X^H$	$X^H X^h$
Y	$X^H Y$	$X^h Y$

- b) Phenotypes:

 25% hemophiliac 75% normal blood clotting ability

Name _____

Date _____

X^b - deficiency
 X^B - normal

Evaluating

Topic 1.2

4. Colour vision deficiency is a recessive X-linked trait. A woman who has normal vision and is not a carrier for vision deficiency marries a man who has colour vision deficiency. What is the probability that they will have a child who has colour vision deficiency? It may be useful to complete a Punnett square.

Probability of child with vision deficiency:

0%

woman = $X^B X^B$

man = $X^b Y$

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

5. A woman with normal vision has a father who has colour vision deficiency. She marries a man with normal vision. What is the probability that they will have a child with colour vision deficiency? It may be useful to complete a Punnett square.

Probability of child with vision deficiency:

25%

$X^B X^b$ ←

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

6. Duchenne muscular dystrophy is a recessive X-linked condition. A mother and a father, neither of whom have the condition, have a daughter who is a carrier. It may be useful to complete a Punnett square. → $X^D X^d$

X^D - normal
 X^d - duchenne

- a) What are the genotypes of the parents?

$X^D X^d$: $X^D Y$

- b) What is the probability that their next child will have Duchenne muscular dystrophy?

25% ←

	X^D	X^d
X^D	$X^D X^D$	$X^D X^d$
Y	$X^D Y$	$X^d Y$