

Name: Answer Key

Period #: _____ Date: _____

Pod Name: _____

No Excuses

Sex-Linked Traits

1. What makes something sex-linked trait instead of just a regular trait.

The gene is located on the sex chromosome (X or Y).

2. Are males or females be more susceptible (likely to be affected) to sex-linked diseases? Explain.

Males (if it is an X-linked disease) because they only have 1 X and females have 2 X's.

3. Hemophilia is a sex-linked trait found on the X chromosome. To get this disease, a person must have a recessive copy of the gene (h) on every X chromosome. Predict the genotypic and phenotypic probabilities of the offspring if a woman who was a carrier for the disease had a baby with a man who had the disease.

Genotype of one parent: $X^H X^h$

Genotype of other parent: $X^h Y$

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

GENOTYPE: 1:1:1:1

PHENOTYPE: 1:1 (have hemophilia : don't have it)
(you could separate out male + female + would get a dif result)

4. Color Blindness is also a sex-linked trait found on the X chromosome. To become color blind, a person must have a recessive copy of the gene (b) on every X chromosome. Predict the genotypic and phenotypic probabilities of the offspring if a woman who has no history of color blindness in her family (B) had a baby with a man who was color-blind.

Genotype of one parent: $X^B X^B$

Genotype of other parent: $X^b Y$

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

GENOTYPE: 1:1

PHENOTYPE: 0:4 (have CB : don't have it)

Sex-linked Traits Worksheet

1. Which sex is more likely have a recessive, sex-linked trait? Male Female
2. Which parent do sons inherit recessive, sex-linked traits from? Mother Father
3. Which type of sex chromosome do you find most sex-linked traits on? X Y
4. Colorblindness is a recessive, sex-linked disorder in humans. A colorblind man has a child with a woman who is a carrier of the disorder.

KEY: X^N = normal vision X^n = colorblindness

- a. What is the genotype of the man? $X^n Y$
- b. What is the genotype of the woman? $X^N X^n$
- c. Fill in the Punnett Square to the right.

	X^n	Y
X^N	$X^N X^n$	$X^N Y$
X^n	$X^n X^n$	$X^n Y$

- d. What is the chance that the *child* will be colorblind? 50%
 - e. What is the chance that a *daughter* will be colorblind? 50%
 - f. What is the chance that a *son* will be colorblind? 50%
- (Same, chance you have a colorblind son is 25%)
- However, the chance that you have a colorblind daughter is only 25%.
5. In fruit flies, red eyes are dominant over white eyes. Eye color is a sex-linked trait. A red-eyed male mates with a white-eyed female.

- a. Make a key with eye color in fruit flies.

X^R = Red eyes X^r = white eyes

- b. What is the genotype of the male? $X^R Y$
- c. What is the genotype of the female? $X^r X^r$
- d. Fill in the Punnett Square to the right.

	X^R	Y
X^r	$X^R X^r$	$X^r Y$
X^r	$X^R X^r$	$X^r Y$

- e. What is the chance that there will be an *offspring* with white eyes? 50%

6. Hemophilia is a disease caused by a gene found on the X chromosome. Therefore, it is referred to as a sex-linked disease. The recessive allele causes the disease. A man with hemophilia marries a woman that is homozygous dominant for the trait.

a. Make a key for the trait.

X^N = Normal x^n = hemophilia

b. What is the genotype of the male? X^nY

c. What is the genotype of the female? X^NX^N

d. Fill in the Punnett Square to the right.

	X^N	X^N
X^N	X^NX^N	X^NX^N
Y	X^NY	X^NY

e. Will any of their offspring have the disease?

no

Important Background Information for Question #7: (This is a challenge!)

In fruit flies, humans and other mammals, sex is determined by an X-Y system. However, many organisms do not have the X-Y system of sex determination. For example, birds have a Z-W system. Male birds are ZZ, where as females are ZW.

7. In chickens, barred feathers (Z^B) are dominant over nonbarred feathers (Z^b).

a. Draw a Punnett square that shows the results of a cross between a barred female and a nonbarred male.

	Z^B	Z^b
Z^B	Z^BZ^B	Z^BZ^b
Z^b	Z^bZ^B	Z^bZ^b
W	Z^BW	Z^bW



b. What is the probability that the offspring will be:

i. Barred females? 0%

ii. Nonbarred females? 50%

iii. Barred males? 50%

iv. Nonbarred males? 0%