

Sex-linkage

1. Define a dioecious species.
 - a. Undergoes mitosis
 - b. Has male and female reproductive parts on the same individual
 - c. Reproduces through vegetative reproduction
 - d. Have two types of individuals, each producing a different type of gamete

2. In humans, the heterogametic sex produces gametes with autosomes plus which sex chromosome(s)?
 - a. An *X*
 - b. A *Y*
 - c. An *X* and *Y*
 - d. Either an *X* or *Y*

3. Designate how a *XXXY* Klinefelter man could have been produced.

Mother	Father
a. Nondisjunction of <i>X</i> 's in anaphase II	Normal segregation
b. Nondisjunction of <i>X</i> 's in anaphase I and II	Normal segregation
c. Normal segregation	Nondisjunction of <i>X</i> and <i>Y</i> in anaphase I and II
d. Normal segregation	Nondisjunction of <i>X</i> and <i>Y</i> in anaphase I

4. In what phenotypic sex category would an *XXY AA* *Drosophila* individual belong?
 - a. Male
 - b. Female
 - c. Metafemale
 - d. An intersex

5. What are the effects of the *Y* chromosome in humans?
 - a. Govern fertility
 - b. Determines maleness
 - c. Plays no part in determining sex
 - d. Determines femaleness

6. Rarely a hen's ovary may lose its function and a testis develops instead. The chromosomal make-up does not change. Hens are heterogametic. What sex ratio would you expect among the living progeny of a sex-reversed hen and a normal hen? (Note: In birds *YY* dies)
 - a. All males
 - b. 2/3 males
 - c. 1/2 males
 - d. 1/3 males

7. If a female mammal carries a sex-linked recessive lethal causing abortion, what proportion of its live offspring would be expected to be males?
 - a. 0
 - b. 1/3

- c. 1/2
- d. 2/3
- e. Inadequate information has been provided.

8. Turkeys can be produced parthenogenetically by incubating unfertilized eggs. What would be the sex of the chicks that hatched?
- a. All males
 - b. All females
 - c. Males and females
 - d. 2/3 males and 1/3 females

9. A sex-linked dominant gene, barred (feather pattern) can be used to sex newly hatched chicks. If a barred hen is mated to a nonbarred rooster, what are the phenotypes of the males and female chicks?

Females	Males
a. Barred	Nonbarred
b. Barred	Barred
c. Nonbarred	Nonbarred
d. Nonbarred	Barred

10. Vermilion eye color in *Drosophila* is sex-linked and recessive. What phenotypes would be found in progeny of a cross between a vermilion female and a wild-type male?
- a. Wild type females, wild type males
 - b. Vermilion females, vermilion males
 - c. Wild type females, vermilion males
 - d. Vermilion females, wild type males

11. A normal woman whose father was red-green, color-blind married a man with normal vision. The expected phenotypic ratios of their children are:

Females	Males
a. All normal	1/2 color-blind, 1/2 normal
b. 1/2 color-blind	1/2 color-blind, 1/2 normal
c. All normal	All color-blind
d. All normal	All normal

12. In a certain marriage, one-half of the sons and daughters are hemophilic. Choose the parent's genotypes (*H* is the normal allele, *h* is the hemophilia allele).

Mother	Father
a. <i>hh</i>	<i>h</i>
b. <i>Hh</i>	<i>H</i>
c. <i>hh</i>	<i>H</i>
d. <i>Hh</i>	<i>h</i>

13. In the currant moth, light color is sex-linked and recessive, d , to dark color, D . What are the phenotypes of the parents if a certain cross yields 1/2 dark and 1/2 light colored females and all dark males? Female moths are heterogametic.

Females	Males
a. Dark	Light
b. Dark	Dark
c. Light	Dark
d. Light	Light

14. The gene for ability to taste phenylthiourea (PTU) is autosomal and dominant, T , to nontasting, t . Red-green color-blindness is sex-linked and recessive, c .

A man and his wife both of whom can taste PTU and have normal vision have a child who is color blind and a nontaster. What are their genotypes?

	Wife	Husband
a.	$Tt\ c^+c^+$	$Tt\ c^+Y$
b.	$TT\ c^+c$	$Tt\ c^+Y$
c.	$Tt\ c^+c$	$Tt\ c^+Y$
d.	$Tt\ c^+c$	$TT\ c^+Y$
e.	$Tt\ c^+c$	$Tt\ cY$

15. In man, Huntington Chorea is autosomal dominant and often lethal, H , the individuals usually dying in middle age. Red-green color blindness is recessive and sex-linked. A double heterozygous woman marries a heterozygous Huntington's Chorea color-blind man. What are the expected phenotypic ratios by sex of their children after all deaths caused by Huntington Chorea?

	Daughters	Son
a.	1/2 normal, 1/2 color-blind	1/2 normal, 1/2 color-blind
b.	All normal vision	1/2 normal, 1/2 color-blind
c.	1/2 normal, 1/2 color-blind	All color-blind
d.	3/4 normal, 1/4 color-blind	1/2 normal, 1/2 color-blind

16. How many Barr bodies would be expected in Mammalian cells with a chromosomal constitution of XXXXY?

- 1
- 2
- 3
- 4

17. Assume that 15% of a queen honey bee's eggs are unfertilized and the rest fertilized. What would be the sex ratio of the progeny?

- 100% female
- 85% female
- 50% female

- d. 15% female
- e. All males

18. Hen feather (H) in fowls is dominant to cock-feather (h). Hen feather is expressed in both sexes but cock feather is sex-limited to the male. What ratios of feather pattern would be expected among the offspring of a cock and hen both heterozygous for hen feather?

19. A man, whose father had hair but mother was both bald, has children with a woman with hair whose mother was bald. What are the expected proportions of baldness for both male and female progeny?

	Daughters		Sons	
	Bald	Not bald	Bald	Not bald
a.	1/4	3/4	1	0
b.	1/2	1/2	1	0
c.	1/2	1/2	3/4	1/4
d.	0	1	1/2	1/2
e.	1/4	3/4	3/4	1/4

20. What is the purpose of dosage compensation, as exemplified by the single active X chromosome in mammalian sex cells?

21. In mice, a sex-linked locus influences coat color. There are two alleles, b and B , which produce light and normal color, respectively. Heterozygous females have a blotchy pattern, which is a mixture of light and normal patches of color. Suggest an explanation of these two alleles in heterozygous females.

22. Occasionally a blotchy male mouse is produced which is sterile. Suggest a possible explanation.