Fruit Fly Lesson  
Student Learning Assessment (Pre-lesson test)  

Notes: Correct answers are in bold. We recommend shuffling answer choices.

1. A geneticist that bred fruit flies discovered a new trait in her last generation of flies, pink abdomens. She attempted to determine if the inherited trait was sex-linked or autosomal. She crossed a wild type black abdomen female with a mutant type pink abdomen male fly; one hundred percent of the F₁ generation displayed wild type black abdomens. She then crossed a male and female from the F₁ generation. Which of the following results in the F₂ generation would indicate that the gene for abdomen color is most likely sex-linked?  
A. 362 black abdomen males, 351 pink abdomen males, 333 black abdomen females, 298 pink abdomen females  
B. 162 black abdomen males, 143 pink abdomen males, 320 black abdomen females, 0 pink abdomen females  
C. 320 black abdomen males, 0 pink abdomen males, 162 black abdomen females, 143 pink abdomen females  
D. none of the above

2. Females are less likely to express recessive sex-linked mutations than males because ___.  
A. females have two copies of the X chromosome.  
B. female hormones such as estrogen often block expression of mutations on the X.  
C. mutations in males often have more severe effects than mutations in females.  
D. male hormones such as testosterone often cause expression of mutations on the X chromosome.  
E. X chromosomes in females generally have fewer mutations than X chromosomes in males.

3. Color blindness in humans is a recessive sex-linked trait. If a male and female that are not colorblind have a son that is color blind, what combinations of alleles would each parent carry?  
A. X^{B}X^{B} and X^{b}Y  
B. X^{B}X^{b} and X^{B}Y  
C. X^{b}X^{b} and X^{B}Y  
D. X^{b}X^{b} and X^{b}Y  
E. X^{B}X^{b} and X^{B}Y

4. Mendel’s research that led to the “law of segregation” unlocked the secrets of ___.  
A. sex linked inheritance patterns.  
B. inheritance patterns associated with the X-sex chromosome.  
C. inheritance patterns associated with the Y-sex chromosome.  
D. None of the above
5. Which statement is true about X-linked mutations?
A. They are less likely to be expressed by a female than a male, but it is possible for a female to express them.
B. They are never expressed in the phenotype of males.
C. Both sexes express them at equivalent frequencies.
D. X-linked mutations are not expressed in either sex.

6. Morgan’s research on fruit fly eye color employed the scientific method to address ___.
A. sex linked inheritance.
B. the cellular location of a gene.
C. inheritance patterns that are affected by the sex of a fruit fly.
D. all of the above.

7. A geneticist that bred fruit flies discovered a new trait in her last generation of flies, pink abdomens. She attempted to determine if the inherited trait was sex-linked or autosomal. She crossed a wild type black abdomen female with a mutant type pink abdomen male fly; one hundred percent of the F₁ generation displayed wild type black abdomens. She then crossed a male and female from the F₁ generation and recorded the following F₂ data: 133 black abdomen males, 122 pink abdomen males, 261 black abdomen females, 0 pink abdomen females. Which inheritance hypothesis most likely explains the genetics of the trait?
A. sex-linked recessive
B. sex-linked dominant
C. autosomal recessive
D. autosomal dominant

8. A geneticist that bred fruit flies discovered a new trait in her last generation of flies, pink abdomens. She attempted to determine if the inherited trait was sex-linked or autosomal. She crossed a wild type black abdomen female with a mutant type pink abdomen male fly; one hundred percent of the F₁ generation displayed wild type black abdomens. She then crossed a male and female from the F₁ generation and recorded the following F₂ data: 33 black abdomen males, 8 pink abdomen males, 28 black abdomen females, 12 pink abdomen females. Which inheritance hypothesis most likely explains the genetics of the trait?
A. sex-linked recessive
B. sex-linked dominant
C. autosomal recessive
D. autosomal dominant
Fruit Fly Lesson
Student Learning Assessment (Post-lesson test)

1. A geneticist that bred fruit flies discovered a new trait in her last generation of flies, pink abdomens. She attempted to determine if the inherited trait was sex-linked or autosomal. She crossed a wild type black abdomen female with a pink abdomen male fly; one hundred percent of the F1 generation displayed wild type black abdomens. She then crossed a male and female from the F1 generation. Which of the following results in the F2 generation would indicate that the gene for abdomen color is most likely sex-linked?

A. 730 black abdomen males, 225 pink abdomen males, 814 black abdomen females, 180 pink abdomen females
B. 253 black abdomen males, 212 pink abdomen males, 498 black abdomen females, 0 pink abdomen females
C. 112 black abdomen males, 153 pink abdomen males, 161 black abdomen females, 98 pink abdomen females
D. 498 black abdomen males, 0 pink abdomen males, 212 black abdomen females, 253 pink abdomen females

2. Males are more likely to express recessive sex-linked mutations than females because

A. males are hemizygous (only have one) for the X chromosome.
B. female hormones such as estrogen often compensate for the effects of mutations on the X.
C. mutations on the Y chromosome often worsen the effects of X-linked mutations.
D. male hormones such as testosterone often alter the effects of mutations on the X chromosome.
E. X chromosomes in males generally have more mutations than X chromosomes in females.

3. Color blindness in humans is a recessive sex-linked trait. If a male and female that are colorblind have a son that is color blind, what combinations of alleles could each parent carry?

A. X^B_X^b and X^b_Y       B. X^b_X^b and X^B_Y       C. X^B_X^b and X^B_Y       D. X^B_X^b and X^B_Y       E. X^b_X^b and X^b_Y

4. Morgan studied the fruit fly eye color gene which revealed ____.
A. Autosomal inheritance patterns.
B. inheritance patterns associated with the X-sex chromosome.
C. inheritance patterns associated with the Y-sex chromosome.
D. All of the above
5. Which statement is true about mutations that show X-linked inheritance?
A. They are more likely to be expressed by a male but may be expressed by females at a lower probability.
B. Females never express them.
C. They are equally likely to be expressed in both sexes.
D. They are located on autosomes.

6. Morgan’s research on fruit fly eye color employed the scientific method to address ____.
A. autosomal inheritance.
B. inheritance of genes located on sex chromosomes.
C. the law of independent assortment.
D. the law of segregation.

7. A geneticist that bred fruit flies discovered a new trait in her last generation of flies, pink abdomens. She crossed a wild type black abdomen female with a pink abdomen male fly; one hundred percent of the F₁ generation displayed wild type black abdomens. She then crossed a male and female from the F₁ generation and recorded the following F₂ data: 58 black abdomen males, 49 pink abdomen males, 115 black abdomen females, 0 pink abdomen females. Which inheritance hypothesis most likely explains the genetics of the trait?
A. sex-linked recessive
B. sex-linked dominant
C. autosomal recessive
D. autosomal dominant

8. A geneticist that bred fruit flies discovered a new trait in her last generation of flies, pink abdomens. She crossed a wild type black abdomen female with a pink abdomen male fly; one hundred percent of the F₁ generation displayed wild type black abdomens. She then crossed a male and female from the F₁ generation and recorded the following F₂ data: 309 black abdomen males, 97 pink abdomen males, 323 black abdomen females, 111 pink abdomen females. Which inheritance hypothesis most likely explains the genetics of the trait?
A. sex-linked recessive
B. sex-linked dominant
C. autosomal recessive
D. autosomal dominant
9. Did this activity stimulate your interest on the topic of sex linked inheritance?
   A. Very much so
   B. Yes
   C. Average, no more than any other activity on other topics
   D. Not really
   E. Not at all

10. Do you feel that this activity helped you to understand the information?
   A. Very much so
   B. Yes
   C. Average, no more than any other activity on other topics
   D. Not really
   E. Not at all

11. Overall in terms of engagement, comprehension, and support of the learning objectives of this chapter, how would you rate this activity, 5 being the best possible, 1 being not helpful?
   A. 5
   B. 4
   C. 3
   D. 2
   E. 1

12. In hindsight, having had the experience of participating in this activity, I recommend that the instructor
   A. administer this activity to future classes.
   B. continue to teach the course without this activity.

13. Do you think that you will perform better on the exam because you participated in the activity?
   A. Yes
   B. No