Vocabulary Ch 11

Homozygous

Heterozygous

Phenotype

Genotype

Allele

Chromosome

Gene

DNA

Dominant gene

Recessive gene

Meiosis

Mitosis

Gregor Mendel

Diploid

Haploid

Mutation

gametes

Name _____ Date _____ Class _____

Use after Section 27:3.

TRACING A GENETIC DISORDER IN A FAMILY

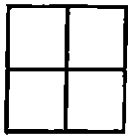
Genetic disorders are conditions that are inherited from parents. Sometimes parents have children who show a genetic disorder trait even though the parents themselves do not show the trait for the disorder. Persons who do not show the disorder trait but are capable of passing it to their children are called carriers. Study the family history below to find out how a child gets a genetic disorder.

Mr. and Mrs. Gearhart have a son, William, who has cystic fibrosis. Cystic fibrosis is a genetic disorder that causes large amounts of mucus to be made in the lungs and near the pancreas. This makes breathing and digestion difficult. Mr. Gearhart told a genetic counselor that he had a cousin who had cystic fibrosis. Mrs. Gearhart cannot remember anyone in her family having this disorder. Persons with cystic fibrosis are known to be pure recessive for the disorder.

Set up a Punnett square to show the gene types for each of William's parents and for William. Use F for the dominant gene and f for the recessive gene. Then, answer the questions.

Mother

Father

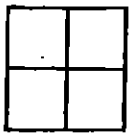


1. What is the gene type for Mr. Gearhart? _____ For Mrs. Gearhart? _____ What is William's gene type? _____.

   Explain your results. _____

2. The Gearhart's doctor told them that they have a chance of having another child with cystic fibrosis. Is this true? Explain. _____

3. Suppose one parent was heterozygous and the other was pure dominant for cystic fibrosis. Make a Punnett square to explain whether they would have children with cystic fibrosis or children who would be carriers of the disorder. Explain your results.



4. Would two persons who are both *FF* for cystic fibrosis ever produce children who have the disorder? _____ Will they produce children who are carriers of the disorder? _____

   Explain. _____

SKILL: MAKE A LINE GRAPH

CHAPTER 27

Name _____ Date _____ Class _____

For more help, refer to the Skill Handbook, pages 715-717. *Use after Section 27:3.*

GENETIC DISORDERS IN NEWBORN BABIES

Genetic disorders can be caused by errors in chromosome number that occur during formation of sex cells. After fertilization, an embryo's body cells might contain more than the normal 46 chromosomes. A chromosome part might be missing, or an extra part might be attached. Down syndrome is a genetic disorder that usually is caused by an extra chromosome. Down syndrome is quite common. In one study of 1000 newborn babies, 53 babies had Down syndrome. Another 32 babies had other chromosome errors. The table below shows mothers with normal babies and with babies having genetic disorders.

Study the table. Then, answer the questions that follow it.

Age of mother (years)	Number of babies with Down syndrome	Number of babies with other chromosome errors	Number of babies without chromosome errors
15–19	1	1	142
20–24	1	1	141
25–29	2	1	140
30–34	3	2	138
35–39	4	3	136
40–44	11	8	123
45 and older	31	16	95
TOTAL	53	32	915

1. In what age group were most of the mothers of the babies with Down syndrome?

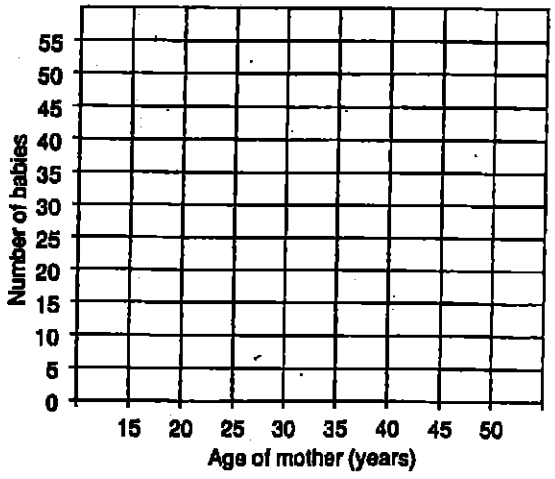
   _____

2. In what age group were most of the mothers of babies with other chromosome disorders?

   _____

3. On the grid, make a line graph to show the number of babies with Down syndrome. Then, use a different color pencil to show the number of babies with other chromosome errors.
4. At what ages are mothers more likely to have babies with chromosome errors?

   _____



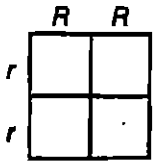
STUDY GUIDE

Name _____ Date _____ Class _____

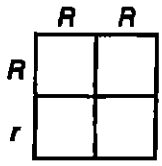
EXPECTED AND OBSERVED RESULTS

In Section 26:2 of your textbook, read about the work done by Gregor Mendel in genetics.

10. Mendel made the following crosses with pea plants. Complete the Punnett squares and answer the questions about each cross.



1



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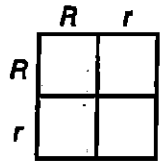
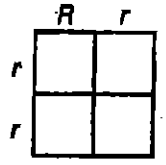


3



4

a. He crossed a red flowered *R* plant with a white flowered *r* plant. His results were 126 red flowered plants and 122 white flowered plants. Which of the Punnett squares above best shows the parents and offspring that could give these results? _____

b. He crossed a red flowered plant with a white flowered plant. His results were 307 red flowered plants and 0 white flowered plants. Which of the Punnett squares above best shows the parents and offspring that could give these results? _____

c. He crossed a red flowered plant with a red flowered plant. His results were 306 red flowered plants and 110 white flowered plants. Which of the Punnett squares above best shows the parents and offspring that could give these results? _____

d. He crossed a red flowered plant with a red flowered plant. His results were 300 red flowered plants and 0 white flowered plants. Which of the Punnett squares above best shows the parents and offspring that could give these results? _____

Name _____ Date _____ Class _____

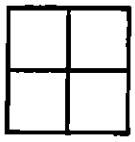
Use with Section 26:2.

USING THE PUNNETT SQUARE TO SOLVE PROBLEMS

Use the Punnett squares provided to find the expected offspring from each of the matings (genetic crosses). In using the Punnett square, show the genes in the sex cells of each parent. Also show the genes that are possible in the offspring and what their traits will be.

1. Garden pea plants can be either tall or short. Tall plants have at least one dominant gene present, ***T***, while short plants are always pure recessive, ***tt***. Show the results of the following crosses in the Punnett squares provided.

(a) $Tt \times tt$

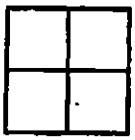


Offspring will be:

Genes: _____

Traits: _____

(b) $Tt \times Tt$

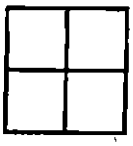


Offspring will be:

Genes: _____

Traits: _____

(c) $TT \times tt$



Offspring will be:

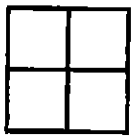
Genes: _____

Traits: _____

2. Below is a table showing the traits of cucumber plants that were pollinated and the traits of the cucumbers produced. Use the information on the table to fill in the Punnett squares below. Use ***G*** for the dominant trait, green, and ***g*** for the recessive trait, striped.

Traits of cucumbers crossed	Traits of cucumbers produced
(a) green × striped	all green
(b) striped × striped	all striped
(c) green × green	some green; some striped

(a) green × striped

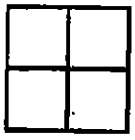


Offspring will be:

Genes: _____

Traits: _____

(b) striped × striped

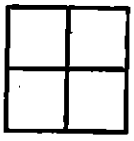


Offspring will be:

Genes: _____

Traits: _____

(c) green × green



Offspring will be:

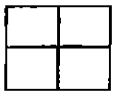
Genes: _____

Traits: _____

_____

Name:_____ Per: _____
Genetics

1. Cross a pure recessive white rabbit with a heterozygous black rabbit. Black fur (B) is dominant to white fur (b)



	Number	Genes
a)White offspring	_____	_____
b) Black offspring	_____	_____
c) heterozygous offspring	_____	_____
d) pure offspring	_____	_____

2. A black rabbit and a white rabbit mate several times. All of their offspring are black. What must the genotype of the black rabbit be? _____ What is the genotype of the white rabbit? _____ What genotype(s) are all of the offspring? _____

3. Cross two heterozygous black dogs. B=black b=brown

	%	Genes	Phenotype
a) black offspring	_____	_____	
b) brown offspring	_____	_____	
c) heterozygous	_____	_____	_____
d) pure dominant	_____	_____	_____

4. Kim's Mom and Dad are tall. Kim says she must have inherited a recessive gene from each parent. If she did, what is Kim's genotype if T=tall, t=short. Genotype =_____ What is her phenotype? _____

5. Explain what a farmer must do to find out if his red tomato plants are pure dominant (RR) or heterozygous (Rr)?

STUDY GUIDE

Name _____ Date _____ Class _____

VOCABULARY

Review the new words used in Chapter 26 of your textbook. Then, answer these questions.

1. Below each of the following words are choices. Circle the choices that are examples of each of those words.

   a. Dominant gene

   D e k L N o R S

   b. Recessive gene

   M n d F G i k P

   c. Pure dominant

   AA Gg KK ll pp Rr TT

   d. Pure recessive

   ee Ff HH Oo qq Uu ww

   e. Offspring combinations in which dominant gene *must* show

   AA Dd EE ff Jj RR Ss

   f. Offspring combinations in which recessive gene *must* show

   aa Gg Ff KK Oo PP ss tt

2. Fill in the blanks below using these choices: dominant, genes, genetics, heterozygous, pure, recessive, chromosomes, Punnett square.

   a. Chromosomes have parts that determine traits. These parts are _____.

   b. A person having two genes that are alike is said to be _____.

   c. A gene that prevents others from showing is said to be _____.

   d. A gene that may not show up even though it is there is said to be _____.

   e. Long rod-shaped bodies inside a cell's nucleus are called _____.

   f. One who studies how traits are passed on is studying _____.

   g. A person with one dominant and one recessive gene for a trait is _____.

   h. A way to show which genes can combine when an egg and sperm join is a _____.

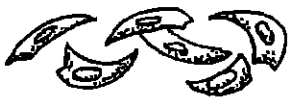
Name _____ Date _____ Class _____

HUMAN TRAITS

In your textbook, read about incomplete dominance in Section 27:2.

1. Red blood cell shape shows incomplete dominance in humans. R is the gene for round cell shape and R' is the gene for sickle cell shape.

   a. Put checkmarks in the following table to show the shape of cells for persons with the genes listed.

			
$R'R'$			
RR'			
RR			

   b. Which gene, R or R', is dominant? _____ Which is recessive? _____

2. a. Describe the condition that a person with $R'R'$ genes has. _____

   _____

   _____

   _____

   b. What is the name of this disease? _____

3. Human blood types show incomplete dominance as well as dominance. Fill in the table at the right showing possible genes a person with each blood type might have.

Blood type	Possible genes
A	or
B	or
O	
AB	

4. Which blood type genes are dominant to other blood type genes? _____

   _____

5. Which blood type genes show incomplete dominance to each other? _____

Name _____ Date _____ Class _____

Use after Section 27:2.

KNOWING YOUR BLOOD TYPE

If you ever have surgery and need blood, your doctor will need to know your blood type. The only type of blood you can receive is blood that will not clot with your blood.

Use the information on blood types in Chapter 12 and in Section 27:2 to complete the tables.

1. *Fill in the blanks in the table.*

If you have blood type	your genes are	so you received this gene from one parent	and this gene from the other parent
A	_____ or _____		
B	_____ or _____		
AB	_____		
O	_____		

2. *Use the information below to fill in the table.*
   Type A has plasma proteins that clot with red cell proteins from donor type B.
   Type B has plasma proteins that clot with red cell proteins from donor type A.
   Type AB has no plasma proteins that will clot with red cell proteins from any donor types.
   Type O has plasma proteins that clot with red cell proteins from donor types A, B, or AB.

Blood type	Can receive blood type(s)
A	
B	
AB	
O	

Simple Genetics Practice Problems

1. For each genotype, indicate whether it is heterozygous (HE) or homozygous (HO)

AA ____	Ee ____	Ii ____	Mm ____
Bb ____	ff ____	Jj ____	nn ____
Cc ____	GG ____	kk ____	OO ____
Dd ____	HH ____	Ll ____	Pp

2. For each of the genotypes below, determine the phenotype.

Purple flowers are dominant to white flowers
PP _____
Pp _____
pp _____

Brown eyes are dominant to blue eyes
BB _____
Bb _____
bb _____

Round seeds are dominant to wrinkled
RR _____
Rr _____
rr _____

Bobtails are recessive (long tails dominant)
TT _____
Tt _____
tt _____

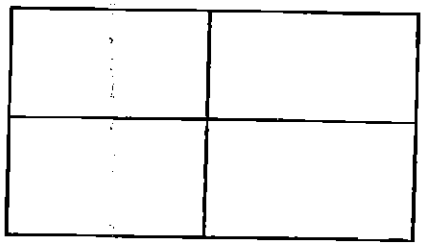
3. For each phenotype, list the genotypes. (Remember to use the letter of the dominant trait)

Straight hair is dominant to curly.
_____ straight
_____ straight
_____ curly

Pointed heads are dominant to round heads.
_____ pointed
_____ pointed
_____ round

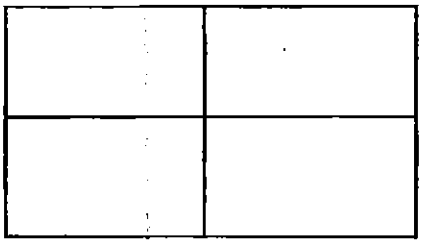
4. Set up the square for each of the crosses listed below. The trait being studied is round seeds (dominant) and wrinkled seeds (recessive)

Rr x rr



What percentage of the offspring will be round?
_____

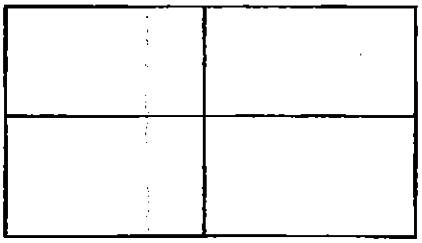
Rr x rr



What percentage of the offspring will be round?

_____

RR x Rr



What percentage of the offspring will be round?

_____

Practice with Crosses. Show all work!

5. A TT (tall) plant is crossed with a tt (short plant).
What percentage of the offspring will be tall? _____

6. A Tt plant is crossed with a Tt plant. What percentage of the offspring will be short? _____

7. A heterozygous round seeded plant (Rr) is crossed with a homozygous round seeded plant (RR). What percentage of the offspring will be homozygous (RR)? _____

8. A homozygous round seeded plant is crossed with a homozygous wrinkled seeded plant. What are the genotypes of the parents?
_____ x _____

What percentage of the offspring will also be homozygous? _____

9. In pea plants purple flowers are dominant to white flowers.
If two white flowered plants are cross, what percentage of their offspring will be white flowered? _____

10. A white flowered plant is crossed with a plant that is heterozygous for the trait. What percentage of the offspring will have purple flowers? _____

11. Two plants, both heterozygous for the gene that controls flower color are crossed. What percentage of their offspring will have purple flowers? _____
What percentage will have white flowers? _____

Genetics with a Smile

Name _____

Part A: Smiley Face Traits

(1) Obtain two coins from your teacher. Mark one coin with a "F" and the other with a "M" to represent each of the parents. The parents are heterozygous for all the Smiley Face traits.

(2) Flip the coins for parent for each trait. If the coin lands with heads up, it represents a dominant allele. A coin that lands tails up indicates a recessive allele. Record the result for each person by circling the correct letter. Use the results and the Smiley Face Traits page to determine the genotype and phenotype for each trait.

Trait	Female		Male		Genotype	Phenotype
Face Shape	C	c	C	c		
Eye Shape	E	e	E	e		
Hair Style	S	s	S	s		
Smile	T	t	T	t		
Ear Style	V	v	V	v		
Nose Style	D	d	D	d		
Face Color	Y	y	Y	y		
Eye Color	B	b	B	b		
Hair Length	L	l	L	l		
Freckles	F	f	F	f		
Nose Color	R	Y	R	Y		
Ear Color	P	T	P	T		

Part B: Is it a boy or girl?

To determine the sex of your smiley face, flip the coin for the male parent. Heads would represent X, while tails would be Y.

	Female	Male		Genotype	Phenotype
Sex	X	X	Y		

Part C: Create Your Smiley Face!

Use the Smiley Face Traits chart and your results from Part A to create a sketch of your smiley face in the box. Once you have completed the sketch, use the drawing tools in Microsoft Word to create your smiley face!

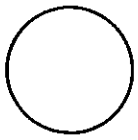
Two things to remember ...

√ Do not add color on the computer! Print a black and white copy and then use crayons or colored pencils to finish it.

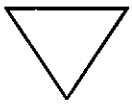
√ Don't forget to give your smiley face a name! You will also need to include your name as parent and your class hour.

Smiley Face Traits

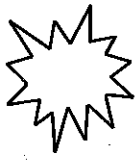
Face Shape
Circle (C) Oval (c)




Nose Style
Down (D) Up (d)




Eye Shape
Star (E) Blast (e)

Face Color
Yellow (Y)
Green (y)

Eye Color
Blue (B)
Red (b)

Hair Style
Straight (S) Curly (s)


Hair Length
Long (L)
Short (l)

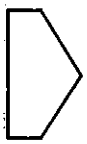
Freckles
Present (F)
Absent (f)

Smile
Thick (T) Thin (t)


Nose Color
Red (RR)
Orange (RY)
Yellow (YY)

Ear Color
Hot Pink (PP)
Purple (PT)
Teal (TT)

Ear Style
Curved (V) Pointed (v)

Sex
To determine the sex, the flip the coin for the male parent. Heads equals X and tails equals Y.

XX - Female - Add pink bow in hair
XY - Male - Add blue bow in hair

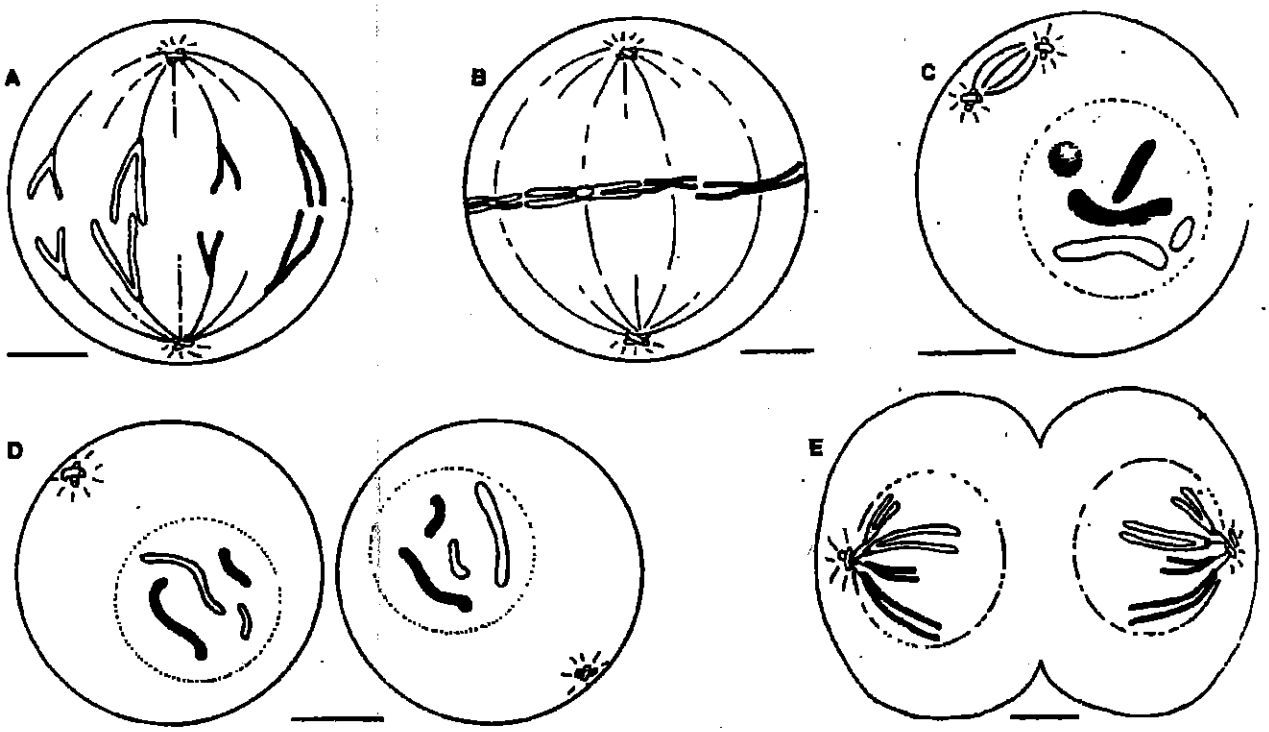
STUDY GUIDE

Name _____ Date _____ Class _____

MITOSIS

In your textbook, read about the steps of mitosis in Section 22:1.

1. The following steps of mitosis are out of order. Place the numbers *1-5* in the blanks to show the correct order.



2. In the blanks below, write the letter of the diagram above that is being described.

   a. Two new identical cells are formed. _____

   b. Cytoplasm begins to separate. _____

   c. Sister chromatids are first pulled apart. _____

   d. Chromosomes are completely separated and at opposite ends of the cell. _____

   e. Sister chromatids can be seen for the first time. _____

   f. This is what cells look like before going through mitosis. _____

   g. Nuclear membrane begins to break down. _____

   h. Sister chromatids move to the cell's center and line up on fibers. _____

   i. A nuclear membrane begins to form around chromosomes. _____

APPLICATION: HEALTH

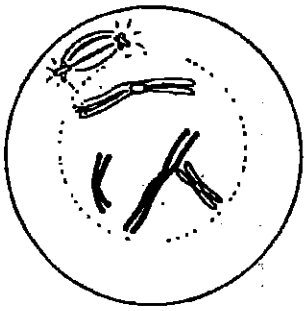
Name _____ Date _____ Class _____

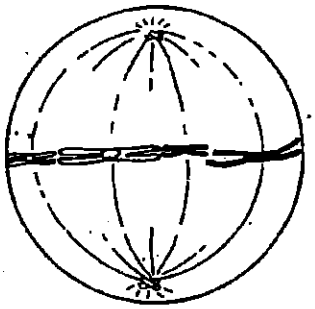
Use after Section 22:1.

THE STEPS OF MITOSIS

To stay healthy, your body cells must undergo mitosis regularly. Dead or damaged cells are replaced with new cells.

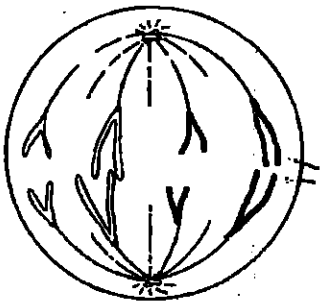
Label the diagrams below to show the stages in the four steps of mitosis.

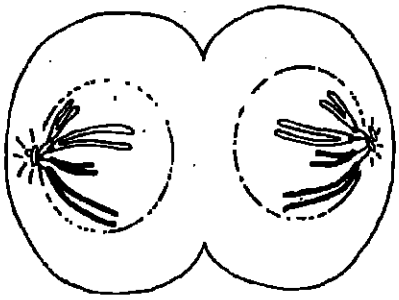




1. _____

2. _____





3. _____

4. _____

Mendel's Experiments

http://www2.edc.org/weblabs/Mendel/mendel.html

1. Explain why Gregor Mendel was so important? _____
   _____
   _____

2. What plants did Mendel study? _____

3. **List** and **describe** the seven different traits that Mendel examined.
   a. _____
   b. _____
   c. _____
   d. _____
   e. _____
   f. _____
   g. _____

4. Perform five crosses and observe the traits in the offspring. (Hints-to find out the shape of the seed (peas) and the pod, roll your cursor over the plant)

5. Answer the following question from the screen: When I cross the two plants below, the seeds (peas) will be _____.

6. Define the following:
   a. Dominant trait- _____
   b. Recessive trait-_____
   c. Pedigree-_____

7. Complete the following chart for pea traits.

Pea Trait	Dominant	Recessive
Pea Shape		
Pea Color		
Pod Shape		
Pod Color		
Flower Color		
Plant Size		
Position of Flower		

Sex Determination and Linkage
http://www2.edc.org/weblabs/SexDetermination/sexdetermination.html

1. What are the sex chromosomes of a male? _____ What sex chromosomes can be present in his sperm? _____

2. What are the sex chromosomes of a female? _____ What sex chromosomes can be present in her eggs? _____

3. Explain why very little genetic information is carried on the X chromosome. _____
_____
_____
_____

4. List the possible gene combinations for a colorblind female.
_____

5. List the possible gene combinations for a colorblind male.
_____

6. Why is there a difference between the gene combinations for colorblind males and females? _____
_____
_____
_____

7. Why are there more colorblind males than females?_____
_____
_____
_____
_____

8. Why do you think that colorblindness is called a sex-linked trait? _____
_____
_____
_____
_____

9. What other sex-linked trait is mentioned in this web lab?
_____