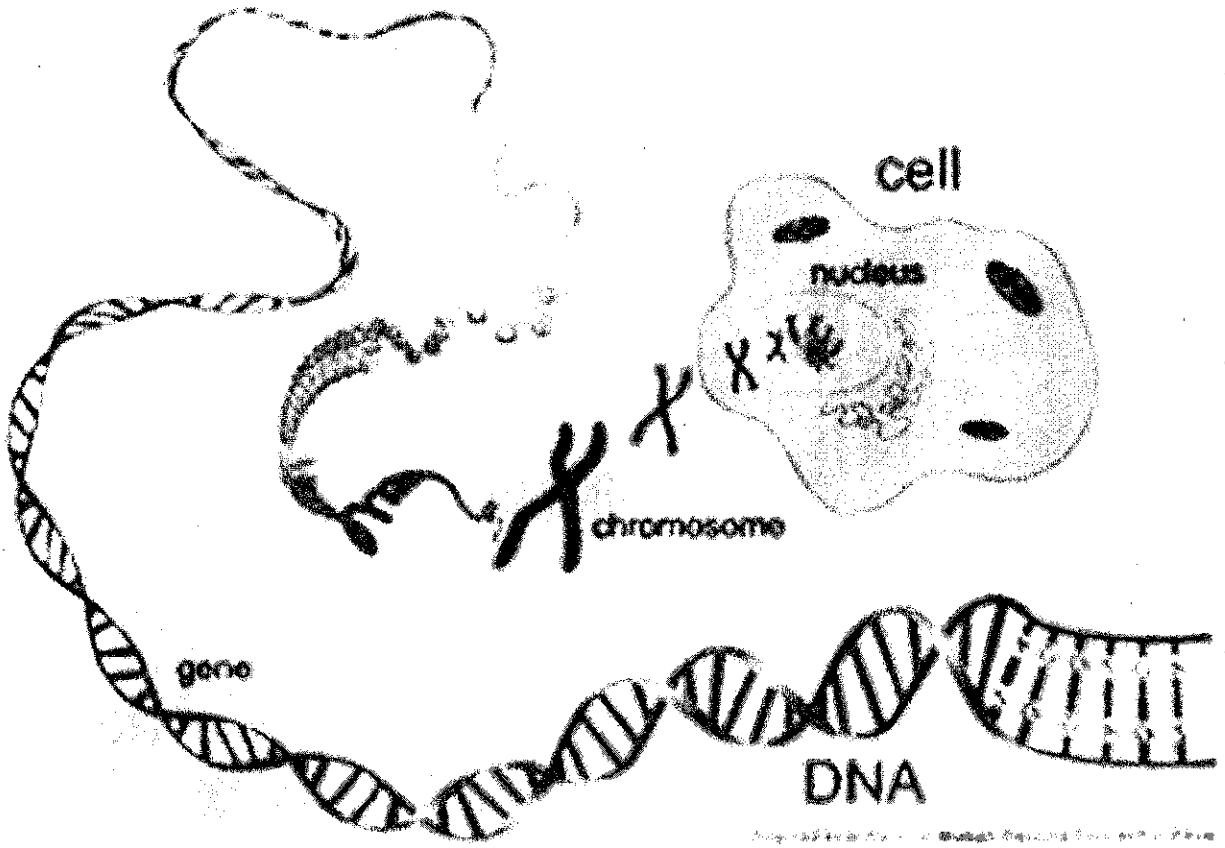
Name:_____

Science teacher: _____ Period:_____



Genetics Workbook

Hopewell Middle School

Mr. Crellin, Mrs. Hinds & Mrs. Rothenhausler

2018-2019

Unit 4: Genetics

TEKS Analysis

TEKS 7.14A- define heredity as the passage of genetic instructions from one generation to the next generation

Demonstrate your understanding of how some likenesses between parents and offspring are passed from generation to the next, such as eye color in humans or shape of leaves in plants. These likenesses are coded in genes. Draw one characteristic trait that is passed on to 3 consecutive generations, color or highlight the trait and label each generation 1-3.

Essential Questions

What are genetic instructions?

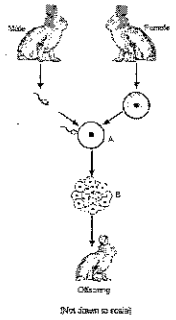
How do you determine which trait is expressed from an organism's genotype?

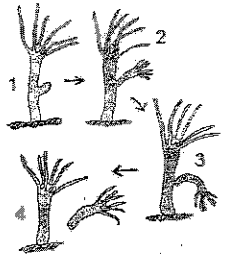
TEKS 7.14B- compare the *results of uniform or diverse offspring* from asexual reproduction or sexual reproduction [supporting standard]

In the table below, give a synonym for each word listed, then recall how many parents are needed for each type of reproduction.

Word	synonym	# of Parents	Sexual or Asexual Reproduction
Uniform			
Diverse			

In the next columns draw a circle around the parent(s) and a box around the offspring. Label the box **"S"** if the offspring was reproduced sexually or **"A"** if reproduced asexually.

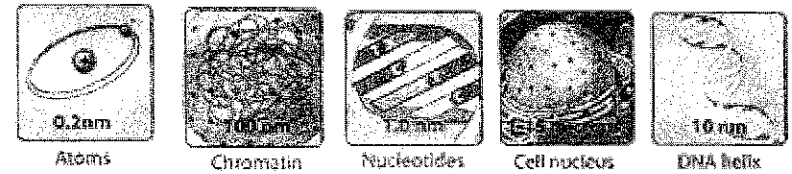




Essential Question

How do the offspring of sexual and asexual reproduction compare genetically to the parent(s)?

TEKS 7.14C- recognize that *inherited traits* of individuals *are governed in the genetic material* found in the genes within chromosomes in the nucleus [supporting standard]



Scale

0.1 nm 1 nm 10 nm 100 nm 1 μm 10 μm 100 μm 1 mm

Using the scale in the previous column to organize the structures by name from smallest to largest, in the column on the right. →

nm- nanometer
μm- micrometer
mm- millimeter

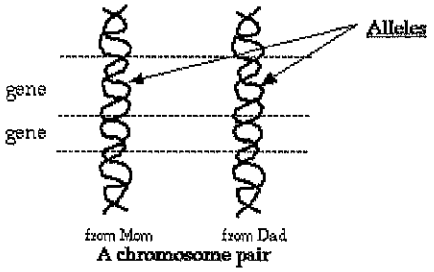
1. _____
2. _____
3. _____
4. _____
5. _____

Essential Question

What controls the inherited traits of individuals?

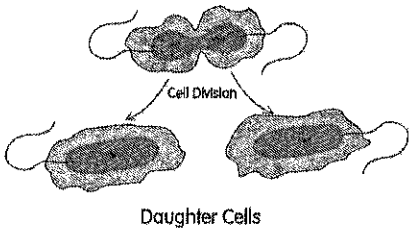
How are Punnett squares used to predict the traits of offspring of monohybrid crosses?

1. **allele:**



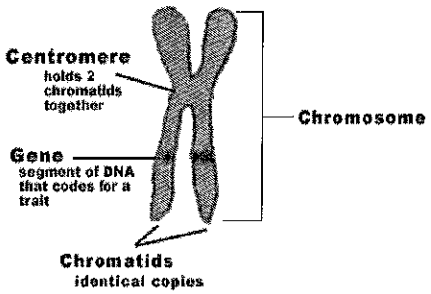
Different forms of a gene

2. **asexual reproduction:**



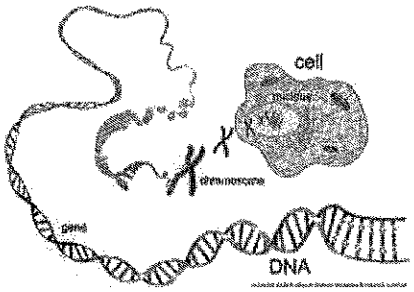
Process by which a single parent reproduces by itself.

3. **chromosome:**



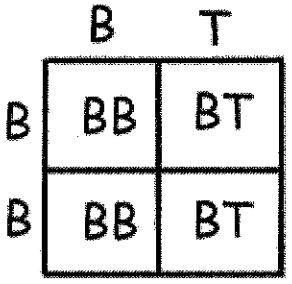
a rod-shaped cellular structure made of condensed chromatin;contains DNA; carries trait information (eyes, hair, etc).

4. **DNA:**



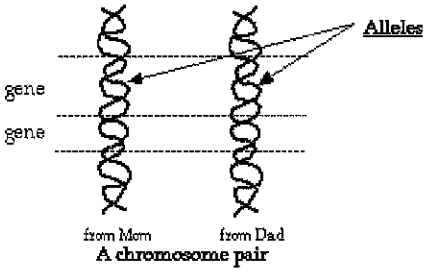
A molecule containing the genetic information that makes up the chromosomes

5. **dominant allele:**



An allele whose trait always shows up in the organism when the allele is present

6. **gene:**

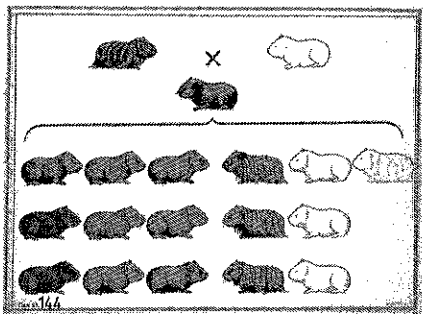


A segment of DNA on a chromosome that codes for a specific trait.

7. **generation:**

a set organisms produced at a stage in the reproduction of organisms

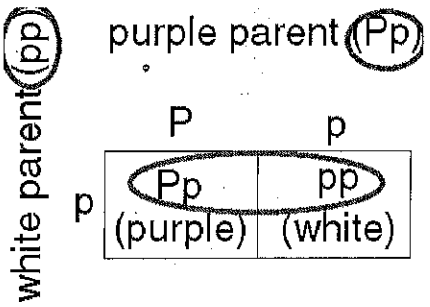
8. **genetics:**



Scientific study of heredity

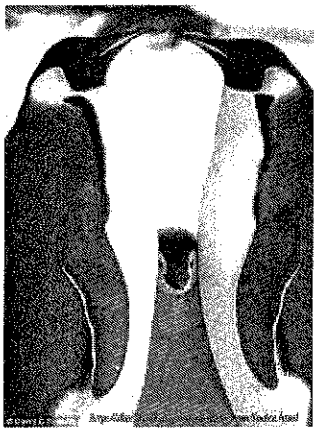
3

9. **genotype:**



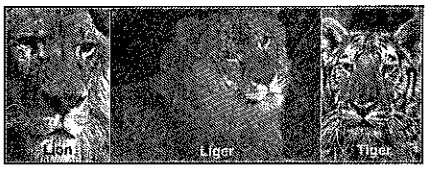
An organism's genetic makeup

10. **heredity:**



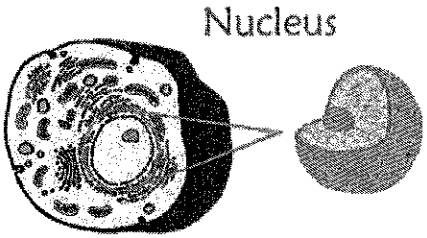
Passing of traits from parents to offspring

11. **hybrid:**



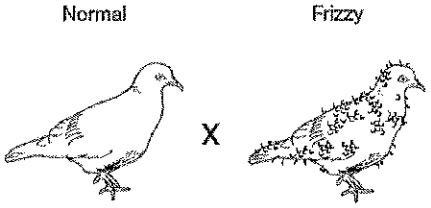
An organism that has two different alleles for a trait

12. **nucleus:**



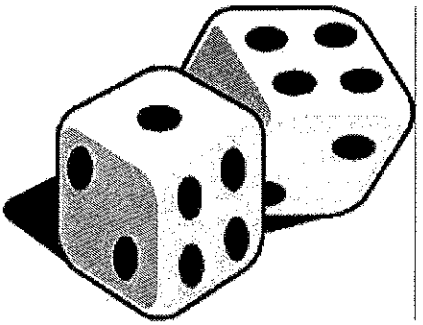
Control center of the cell; contains DNA

13. **phenotype:**



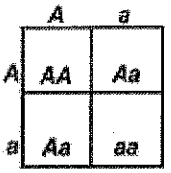
An organism's physical appearance, or visible traits.

14. **probability:**



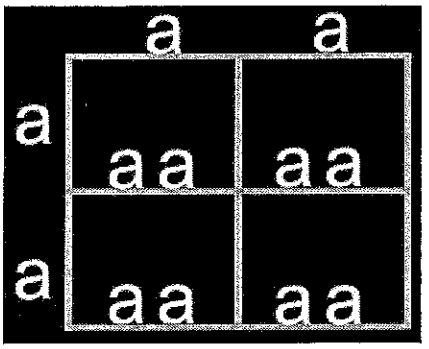
The likelihood that a particular event will occur

15. **Punnett Square:**



A chart that shows all the possible combinations of alleles that can result from a genetic cross

16. **purebred:**

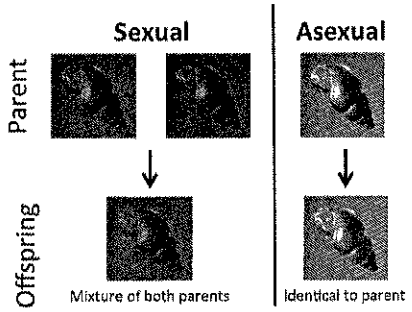


An organism that has identical alleles for a particular trait

17. **recessive allele:**

An allele that is masked when a dominant allele is present

18. **sexual reproduction:**



Process in which genetic material from two parents combines and produces offspring that differ genetically from either parent

19. **trait:**

A characteristic that an organism can pass on to its offspring through its genes.

5

Name _____ Date _____

Class period_____

Word Match Activity

Match the following genetic terms to their corresponding parts of the illustration: **base pair, cell, chromosome, DNA (Deoxyribonucleic Acid), double helix*, genes, nucleus**

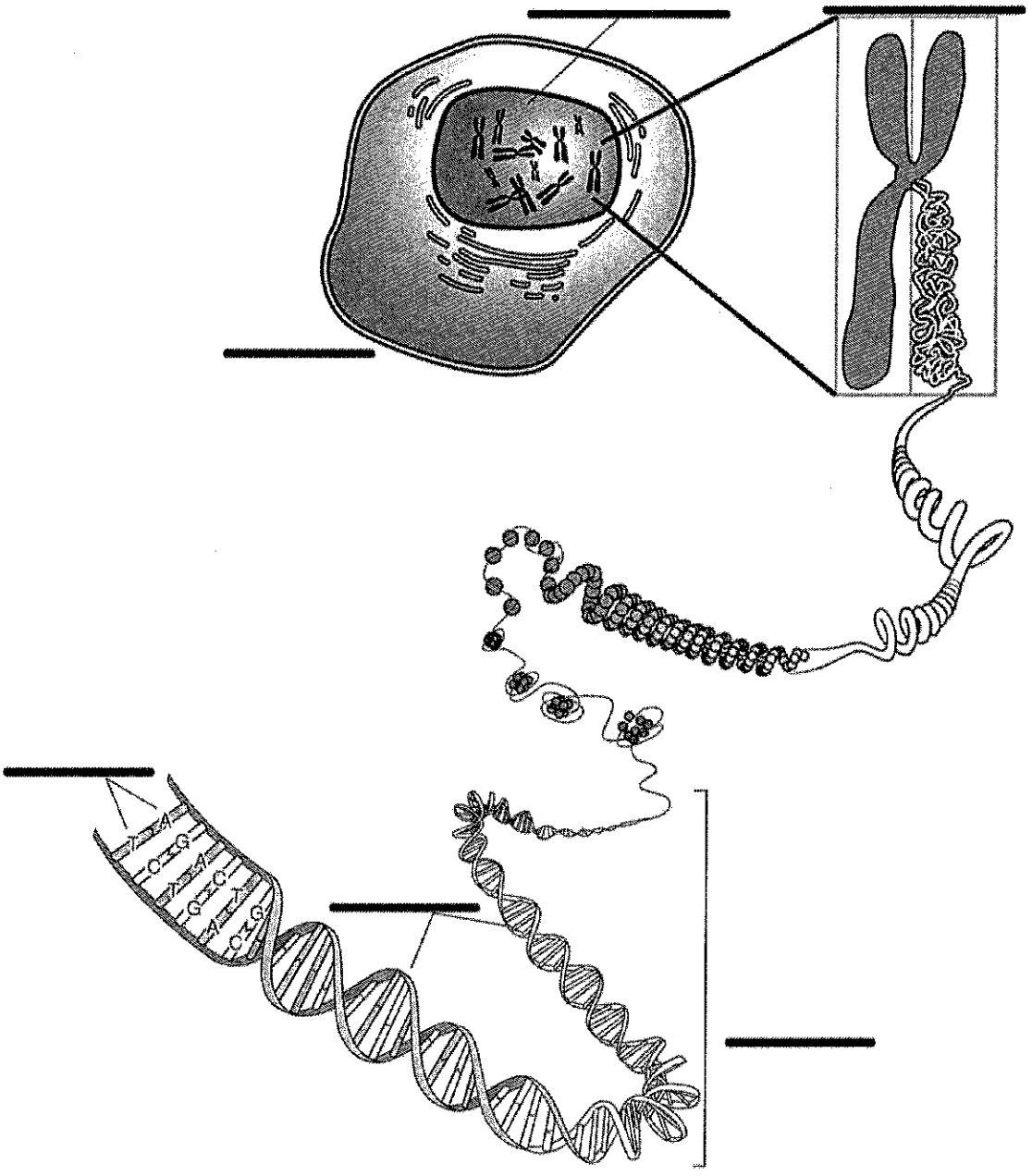


Illustration Source: Talking Glossary of Genetic Terms http://www.genome.gov/glossary.cfm?key=chromosome

Name _____ Date _____ 6

Class period_____

Potters' Hair Colors

Solve the two questions below and use Punnett Square to demonstrate how you arrived at your answers.

Question 1: Harry has dark hair like his father, but his mom had red hair. Using the genotypes of **rr** (red hair), **Rr** (dark/brown hair), **RR** (dark/brown hair), what possible genotypes does each of the Potters have?

Question 2: Harry marries Ginny who has red hair. What are possible genotypes of their children's hair colors?

Name: _____ Date _____

Class period: _____

Human Mendelian Traits

Mendelian Traits are those traits which follow Mendel's rules of only 2 possible versions of a gene (1 dominant, 1 recessive). There are only a few examples of this in humans.

1. Use the chart below to determine your phenotype (observable characteristic) and possible genotype(s) (a pair or pairs of alleles). Since you cannot do a genetic test right now, if you have the dominant phenotype, you should include both the homozygous and heterozygous genotypes—see the example for Advanced Sleep Phase Syndrome in the first row.

Trait	Possible alleles	Your Phenotype	Your Genotype(s)
Advanced Sleep Phase Syndrome	Wakes up very early (E) Wakes up at normal time (e)	Ex., wakes up very early	EE (homozygous) or Ee (heterozygous)
Achoo Syndrome	Sneezes in the sun (A) Doesn't sneeze in the sun (a)		
Ear wax (wet/dry)	Wet (W) Dry (w)		

2. Did you have mostly dominant or recessive traits? _____

3. Compare your findings with other students.

    a. For which trait were most students dominant?

    b. For which trait were most students recessive?

Name: _____ Date _____

Class period: _____

4. First complete the Punnett Squares below using your own genotype for each trait. If you have a dominant trait, choose to use either the heterozygous or homozygous genotype. The other person's genotype is provided. After completing the Punnett Square, identify possible phenotypes of offspring and the probability of each phenotype in percentage.

a) Achoo Syndrome genotypes: Yours ____ & the other person's Aa

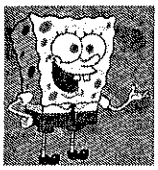
List possible Phenotypes % (Probability of inheritance)

b) Ear wax genotypes: Yours ____ & the other person's ww

List possible Phenotypes % (Probability of inheritance)

9

Bikini Bottom Genetics **Name** _____ **Per:**____



Scientists at Bikini Bottom have been investigating the genetic makeup of the organisms in the community. Use the information provided and your knowledge of genetics to answer each question.

1. For each genotype below, indicate whether it is **purebred (homozygous) dominant (PD), purebred (homozygous) recessive (PR),** or **hybrid (heterozygous) (Hy).**

TT	_____	Bb	_____	DD	_____	Ff	_____
tt	_____	dd	_____	Dd	_____	ff	_____
Tt	_____	bb	_____	BB	_____	FF	_____

Which genotypes would be considered purebred? _____

Which genotypes would be considered hybrid? _____

2. Determine the **phenotype** for each genotype using the information provided about SpongeBob.

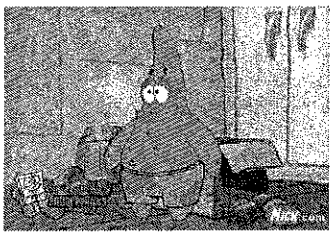
Yellow body color is dominant to blue.

YY _____ Yy _____ yy _____

Square shape is dominant to round.

SS _____ Ss _____ ss _____

3. For each phenotype, give **ALL possible genotype(s)** for Patrick.



A tall head (T) is dominant to short (t).

Tall = _____

Short = _____

Pink body color (P) is dominant to yellow (p).

Pink body = _____

Yellow body = _____

Use the data table for SpongeBob's traits to complete #4-6.

Trait	Dominant Gene	Recessive Gene
Body Shape	Squarepants (S)	Roundpants (s)
Body Color	Yellow (Y)	Blue (y)
Eye Shape	Round (R)	Oval (r)
Nose Style	Long (L)	Stubby (l)

4. Determine the **phenotype** for each genotype below.

LL _____ yy _____

Ss _____ RR _____

Rr _____ ll _____

ss _____ Yy _____

5. Determine the **specific genotype** for each phenotype below.

Hybrid round eyes _____

Purebred long nose _____

Purebred squarepants _____

Hybrid yellow body _____

6. Determine **ALL possible genotype(s)** for each phenotype below.

Yellow body _____ Stubby nose _____

Roundpants _____ Round eyes _____

Oval eyes _____ Squarepants _____

Long nose _____ Blue body _____

Bikini Bottom Genetics Name _____

Scientists at Bikini Bottoms have been investigating the genetic makeup of the organisms in this community. Use the information provided and your knowledge of genetics to answer each question.

1. For each genotype below, indicate whether it is a heterozygous (He) OR homozygous (Ho).

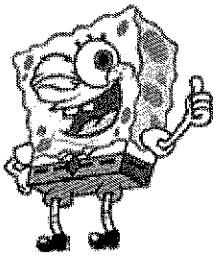
TT _____ Bb _____ DD _____ Ff _____ tt _____ dd _____

Dd _____ ff _____ Tt _____ bb _____ BB _____ FF _____

Which of the genotypes in #1 would be considered purebred? _____

Which of the genotypes in #1 would be hybrids? _____

2. Determine the phenotype for each genotype using the information provided about SpongeBob.



Yellow body color is dominant to blue.

YY _____ Yy _____ yy _____

Square shape is dominant to round.

SS _____ Ss _____ ss _____

3. For each phenotype, give the genotypes that are possible for Patrick.

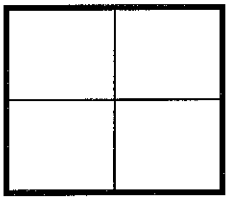
A tall head (T) is dominant to short (t).

Tall = _____ Short = _____

Pink body color (P) is dominant to yellow (p).

Pink body = _____ Yellow body = _____

4. SpongeBob SquarePants recently met SpongeSusie Roundpants at a dance. SpongeBob is heterozygous for his square shape, but SpongeSusie is round. Create a Punnett square to show the possibilities that would result if SpongeBob and SpongeSusie had children. HINT: Read question #2!

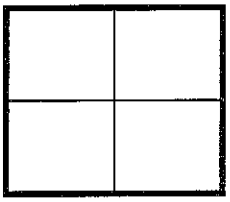


A. List the possible genotypes and phenotypes for their children.

B. What are the chances of a child with a square shape? ____ out of ____ or ____%

C. What are the chances of a child with a round shape? ____ out of ____ or ____%

5. Patrick met Patti at the dance. Both of them are heterozygous for their pink body color, which is dominant over a yellow body color. Create a Punnett square to show the possibilities that would result if Patrick and Patti had children. HINT: Read question #3!

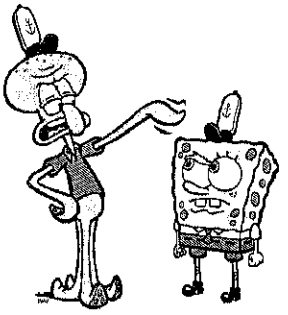


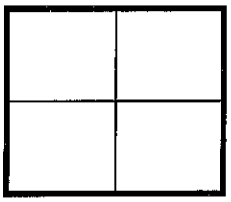
A. List the possible genotypes and phenotypes for their children.

B. What are the chances of a child with a pink body? ____ out of ____ or ____%

C. What are the chances of a child with a yellow body? ____ out of ____ or ____%

6. Everyone in Squidward's family has light blue skin, which is the dominant trait for body color in his hometown of Squid Valley. His family brags that they are a "purebred" line. He recently married a nice girl who has light green skin, which is a recessive trait. Create a Punnett square to show the possibilities that would result if Squidward and his new bride had children. Use B to represent the dominant gene and b to represent the recessive gene.





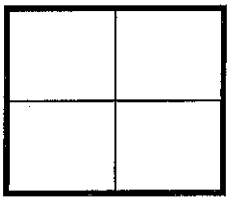
A. List the possible genotypes and phenotypes for their children.

B. What are the chances of a child with light blue skin? ____%

C. What are the chances of a child with light green skin? ____%

D. Would Squidward's children still be considered purebreds? Explain!

7. Assume that one of Squidward's sons, who is heterozygous for the light blue body color, married a girl that was also heterozygous. Create a Punnett square to show the possibilities that would result if they had children.

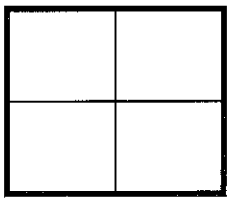


A. List the possible genotypes and phenotypes for their children.

B. What are the chances of a child with light blue skin? ____%

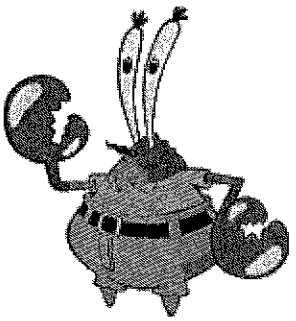
C. What are the chances of a child with light green skin? ____%

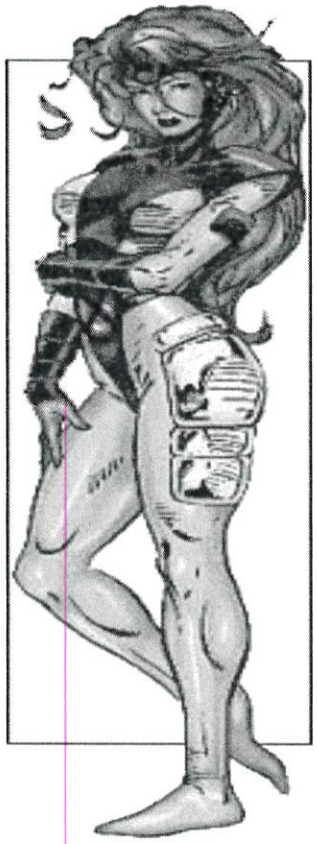
8. Mr. Krabbs and his wife recently had a Lil' Krabby, but it has not been a happy occasion for them. Mrs. Krabbs has been upset since she first saw her new baby who had short eyeballs. She claims that the hospital goofed and mixed up her baby with someone else's baby. Mr. Krabbs is homozygous for his tall eyeballs, while his wife is heterozygous for her tall eyeballs. Some members of her family have short eyes, which is the recessive trait. Create a Punnett square using T for the dominant gene and t for the recessive one.



A. List the possible genotypes and phenotypes for their children.

B. Did the hospital make a mistake? Explain your answer.



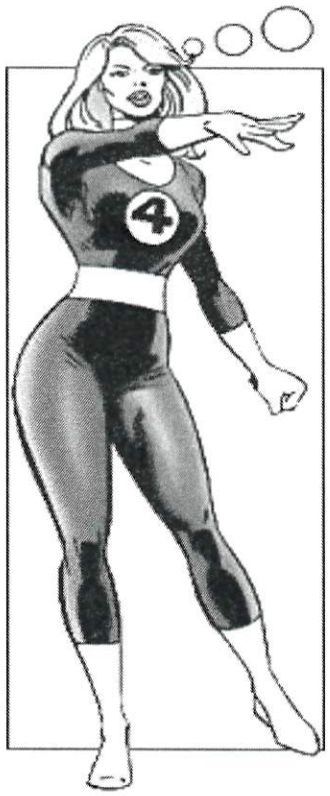


Jean Grey

Trait	Pheno	Geno
Height	Short	hh
Eye Color	Brown	Bb
Hair Color	Red	rr
Strength	Human	gg
Hand Use	Right	Dd

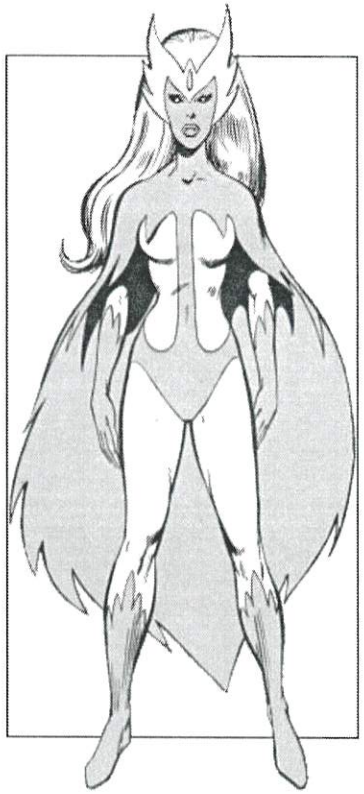
Rogue

Trait	Pheno	Geno
Height	Tall	HH
Eye Color	Green	bb
Hair Color	Brown	RR
Strength	Super Human	Gg
Hand Use	Left	dd



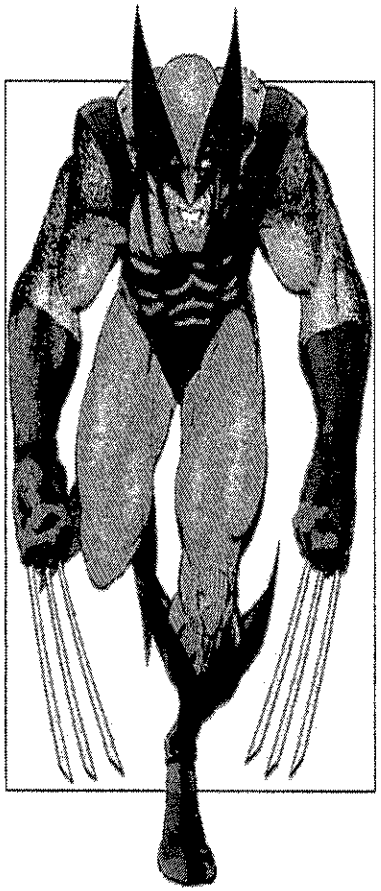
Invisible Woman

Trait	Pheno	Geno
Height	Short	hh
Eye Color	Blue	bb
Hair Color	Blonde	rr
Strength	Human	gg
Hand Use	Right	DD



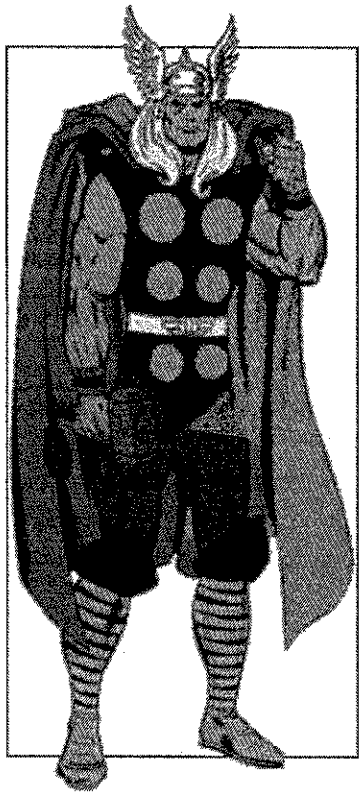
Snowbird

Trait	Pheno	Geno
Height	Tall	Bh
Eye Color	Blue	bb
Hair Color	Blonde	rr
Strength	Human	gg
Hand Use	Right	Dd



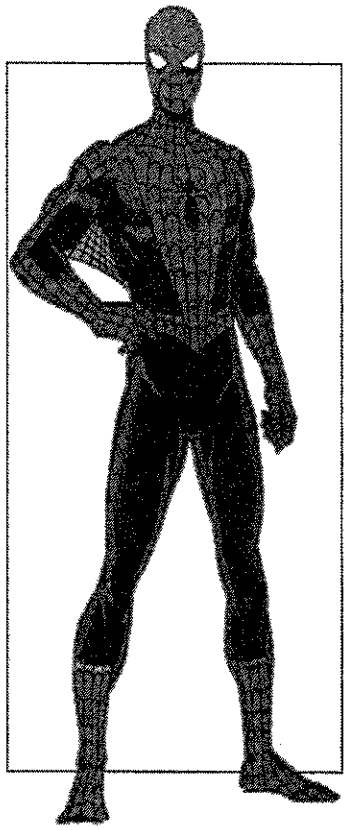
Wolverine

Trait	Pheno	Geno
Height	Short	hh
Eye Color	Blue	bb
Hair Color	Black	RR
Strength	Super Human	Gg
Hand Use	Left	dd



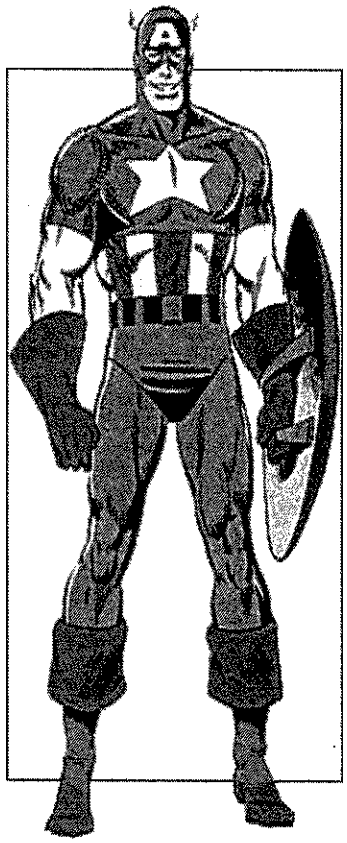
Thor

Trait	Pheno	Geno
Height	Tall	Hh
Eye Color	Hazel	Bb
Hair Color	Brown	Rr
Strength	Human	gg
Hand Use	Right	Dd



Spiderman

Trait	Pheno	Geno
Height	Tall	Hh
Eye Color	Blue	bb
Hair Color	Blonde	rr
Strength	Super Human	GG
Hand Use	Right	DD



Captain America

Trait	Pheno	Geno
Height	Tall	Hh
Eye Color	Blue	bb
Hair Color	Blonde	rr
Strength	Human	gg
Hand Use	Right	Dd

TEKS	Unit 4: Genetics	Test Question (Shade # if correct)				My %	Class Mastery %	Campus Mastery %	My Unit Mastery Overall
7.14A	I can **define** *heredity* as the passage of genetic instructions from one generation to the next generation	1	2						
7.14B	I can **compare** the *results of uniform or diverse offspring* from asexual reproduction or sexual reproduction [supporting standard]	4	5	7	9				
7.14C	I can **recognize** that *inherited traits* of individuals *are governed in the genetic material* found in the genes within chromosomes in the nucleus [supporting standard]	3	6	8	10				% Y / N

Assigned: ☐ Enrichment ☐ Intervention

Date _____ Report to _____

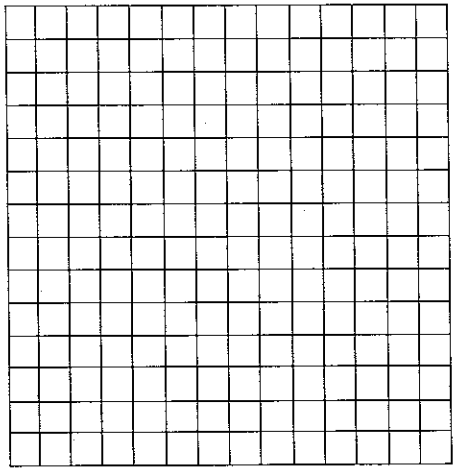
Answer the following Questions

1. Rate your confidence level on content knowledge: 10- High to 0- Low

   Before Test _____ After Test_____
2. After analyzing your test data, what concept(s) did you identify as challenging?

3. What resource or activity would or did assist you in understanding the concept(s) that challenged you?

Create a data table and graph using results from the Unit Test Analysis above. The data can be demonstrated in various ways. Select data you want emphasized. (Remember: TAILS and DRY MIX)



Corrections completed	Dates Attended Tutoring			Re-test Score	Enrichment Credit	Science Grade __/__	__/__
Yes No				%		%	%