Mendelian Genetics Packet

Name:_____Period:_____Date:_____

GENETIC FACTS & FALLACIES PRE-QUIZ

T F 1. Certain acquired characteristics, such as mechanical or mathematical skill, may be inherited.

T F 2. Identical twins are always of the same sex.

T F 3. Fraternal twins are more closely related to each other than to other children in a family.

T F 4. The father determines the sex of a child.

T F 5. Each parent contributes half of a child's genetic makeup.

T F 6. Certain drugs or alcohol can cause birth defects in the fetus.

T F 7. Colorblindness is more common in males than in females.

T F 8. A person may transmit characteristics to offspring, which he, himself does not show.

T F 9. Identical twins are more closely related than fraternal twins.

T F 10. Certain inherited traits may be altered by the stars, moon, or planets early in development.

T F 11. Humans have 23 chromosomes.

T F 12. The tendency to produce twins may run in families.

T F 13. A craving for a food such as strawberries may cause a birthmark on an unborn child.

T F 14. Many of a person's inherited traits are not apparent.

T F 15. The parent with the stronger "will-power" will contribute more to a child's inheritance than the other parent.

T F 16. If a person loses a limb in an accident, it is likely that he or she will have a child with a missing limb.

T F 17. Gregor Mendel was a monk and is known as the "Father of Genetics" based on his experiments with pea plant.

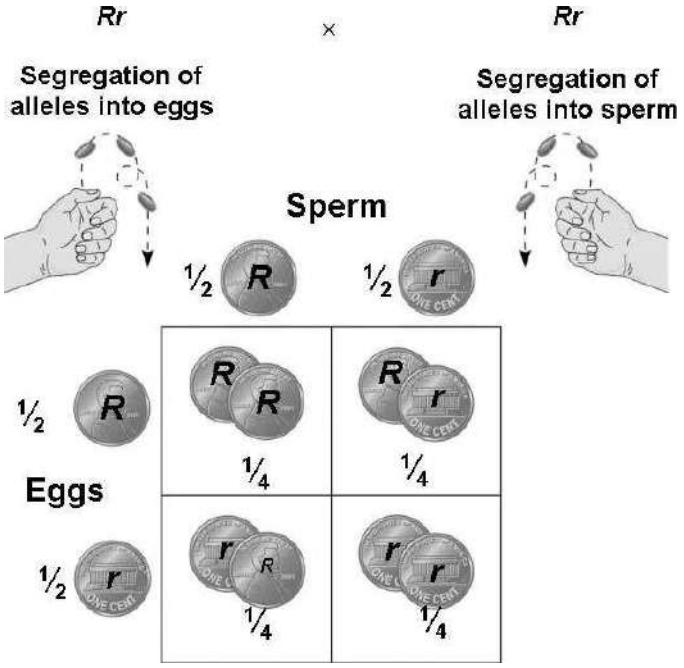
T F 18. Children born to older parents may have a higher change of birth defects than younger parents.

T F 19. The total number of male births exceeds female births each year.

T F 20. If a male "mutt" dog mates with a pedigree (show quality) female dog, all future litters that the female would have (even with other dogs) can have traits from the "mutt" dog.

GENETIC TERMINOLOGY:

- _____= any characteristic that can be passed from parent to offspring
- _____= passing of traits from parent to offspring
- _____= study of heredity
- _____= two forms of a gene (dominant & recessive)
- _____= stronger of two genes expressed in the hybrid; represented by a capital letter (R)
- _____= gene that shows up less often in a cross; represented by a lowercase letter (r)
- _____= gene combination for a trait (ex: RR, Rr, rr)
- _____= the physical feature resulting from a genotype (e.g. tall, short)
- _____= gene combination involving 2 dominant or 2 recessive genes (ex: RR or rr); also called _____
- _____= gene combination of one dominant & one recessive allele (ex: Rr); also called _____
- _____ = cross involving a single trait
- _____= cross involving two traits
- _____= used to solve genetics problems. (based on probability)



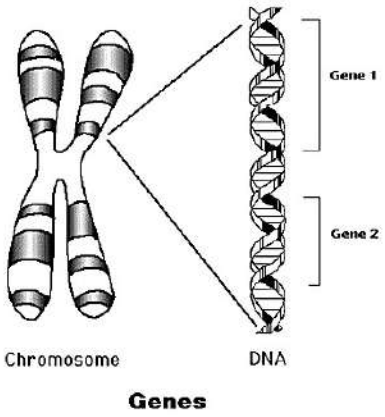
FUNDAMENTALS OF GENETICS

- _____= The passing of traits from _____to_____.
  - Transmitted by means of information stored in molecules of_____.

- _____= Scientific study of _____

  Based on knowledge that traits are transmitted by_____.
  - Our _____ are made up of our _____, which are pieces of _____ that code for certain_____.
  - Humans have _____ chromosomes in all your somatic (body) cells.

    _____chromosomes from your mom and _____chromosomes from your dad.



Genes

- _____= All the outside forces that act on an organism.

  Affects the development, later life, and the expression of hereditary traits of an organism.

<u>WHAT MAKES YOU WHO YOU ARE TODAY?</u>

- _____--are the two great influences, acting together all through your life.
- Genetic messages determine what organisms _____become.
- The interaction of messages and the environment determines what organisms _____become.
- **Organisms inherit_____, not traits!**
- Traits develop when genetic messages interact with the environment.

- **GREGOR MENDEL** -"_____" – (1865)

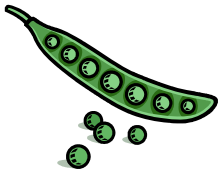
Austrian monk

His research with _____led to the discovery of the basic principles of heredity.

Did a statistical study of traits in garden peas over an eight year period.

Garden peas were a good choice for experimentation because:

1. They can be_____.
2. They display _____in one of two contrasting forms:
   - Height—tall/short
   - Seed color—yellow/green



3. They are normally _____plants and are very easy to cross- pollinate.

Mendel used logical_____ methods and kept careful_____.

He used his math principles of _____to interpret results.

Mendel studied pea traits, each of which had a dominant & a recessive form _____

The _____(shows up most often) gene or allele is represented with a_____, & the _____with a _____of that same letter (ex: B, b).

Mendel's traits included:

a. Seed shape --- Round (R) or Wrinkled (r)
b. Seed Color ---- Yellow (Y) or Green (y)
c. Pod Shape --- Smooth (S) or wrinkled (s)
d. Pod Color --- Green (G) or Yellow (g)
e. Seed Coat Color --- Gray (G) or White (g)
f. Plant Height --- Tall (T) or Short (t)
g. Flower color --- Purple (P) or white (p)

MENDELIAN GENETICS OVERVIEW

Humans each have two sets of_____ chromosomes in their somatic (body) cells and about 30,000 genes.

- The different forms or types of a specific gene are called _____.

  For example, a GENE for eye color might have a blue_____, a brown_____, and a green_____.

- Because our chromosomes are in _____sets, we have two copies of each gene, _____from our _____and _____from our_____.
- If both of our parents gave us the _____of gene – the same allele – then we are:

  _____**or pure** (on both sets of our chromosomes, on both sets of genes; the allele is the_____).

- If one parent gave us one type of gene and the other parent gave us a different type, then we are:

  _____ **or hybrid** – we have two different alleles.

- With MENDELIAN traits (the type of traits that Mendel studied), heterozygotes **DO NOT** have a_____of the two alleles.

  Instead, one type of allele dominates –

  - We show the characteristics of this allele only – it is the _____**trait**.
  - The other version of the trait is still there on half of our chromosomes (so we might still pass it on to our children, depending on meiosis) BUT it **DOES NOT** affect us right now—it is the _____**trait.**

- Whether we are heterozygous, homozygous with the dominant trait, or homozygous with the recessive trait it is called our _____ (**type of genes** that we have).

- Which trait we _____show is our _____(the type of allele that is expressed).

  For example, if the _____of the eye color gene is **brown** and the _____of the eye color gene is **blue**, then the person could have the following possibilities:

1. Two blue alleles, bb (one from_____, one from_____).

Genotype would be _____

Phenotype would be_____

2. Two brown alleles, BB (one from mom, one from dad).

Genotype would be _____ Phenotype would be _____

3. One brown and one blue allele, Bb (one from mom, one from dad). Genotype would be _____

Phenotype would be _____

- When only _____trait is being studied in a genetic cross, it is called a_____.

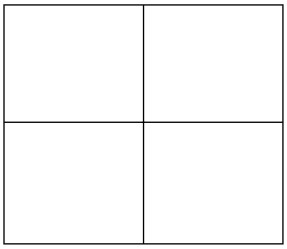
When parent organisms, called the_____, are crossed, the resulting offspring are the first filial, or_____.

When organisms of the F1 generation are crossed, their offspring make up the second filial or,_____.

MENDEL'S EXPERIMENTS:

- Mendel produced pure strains by allowing the plants to self-pollinate for several generations.
- These strains were called the _____generation or P_1 strain.
- Mendel cross-pollinated two strains and tracked each trait through two generations. (ex: TT x tt)
  - _____= plant height
  - _____= T (tall), t (short)

P_1 cross = _____

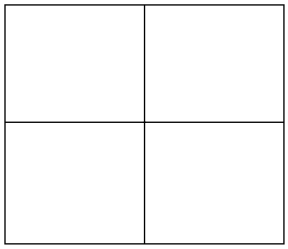


F_1 Genotypic ratio = _____

F_1 Phenotypic ratio = _____

- The offspring of this cross were all _____showing ONLY the _____ & were called the _____generation.
- Mendel then crossed two of his F_1 plants and tracked their traits; known as an _____
  - **Trait** = plant height
  - **Alleles** = T (tall), t (short)

F_1 cross = _____



F_2 Genotypic ratio = _____

F_2 Phenotypic ratio = _____

- When 2 hybrids were crossed, 75% (3/4) of the offspring showed the dominant trait & 25% (1/4) showed the recessive trait
- Two hybrids ALWAYS create _____.
- The offspring of this cross were called the_____.

RESULTS OF MENDEL'S EXPERIMENTS:

- Inheritable _____are responsible for all heritable characteristics.
- _____is based on _____
- _____is based on_____, one from the mother and the other from the father.
- True-breeding individuals are homozygous (both alleles) are the same.
- Formulated 3 laws of heredity in the early 1860's.

MENDEL'S 3 LAWS OF HEREDITY:

1. _____states that when different alleles for a characteristic are inherited (heterozygous), the trait of only one (the dominant one) will be expressed. The recessive trait's phenotype only appears in true-breeding (homozygous) individuals.

Trait: Pod Color	
Genotypes:	**Phenotype:**
GG	**Green Pod** 
Gg	**Green Pod** 
gg	**Yellow Pod** 

2. _____= states that each genetic trait is produced by a pair of alleles which separate (segregate) during reproduction.

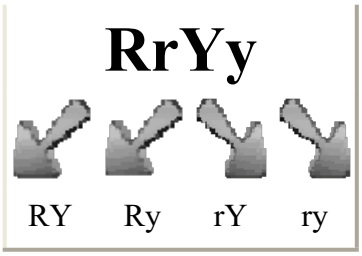
Rr

R r

- Explains the disappearance of a specific trait in the F_1 generation and its reappearance in the F_2 generation.

3. _____= states that each factor (gene) is distributed (assorted) randomly and independently of one another in the formation of _____(egg or sperm).

- Explains that different traits are inherited_____, if on different chromosomes
  - Ex: wrinkled seeds do not have to be yellow. They can be green.
  - Ex: A gamete with RrYy
    - R and r – separate into different gametes
    - Y and y – Separate into different gametes
    - They can then recombine 4 ways to form gametes: **RY Ry rY ry**



INHERITANCE OF HUMAN TRAITS: **DOMINANT/ RECESSIVE**

No cleft in chin / Cleft in chin recessive

Straight thumb / Hitch-hiker's thumb

Hair on back of hand / no hair on back of hand

Inability to fold tongue/ ability to fold tongue

Tongue roller/ Non-roller

Dark hair/ Light hair

Hitch-hiker's thumb

Non-red hair/ Red hair

Widows peak/ Straight or curved hairline

White forelock/ Normal hair

Freckles/ Normal

Dimples/ No dimples

Brown eyes/ Blue eyes

Normal eyesight/ Nearsighted

Almond shaped eyes/ Round eyes

Long eyelashes/ Short eyelashes

Broad nostrils/ Narrow nostrils

Roman nose/ Straight nose

Free ear lobe/ Attached ear lobe

Bent little fingers/ Parallel little fingers

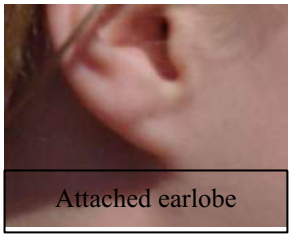
Left over right thumb/ Right over left thumb

A or B blood/ O blood

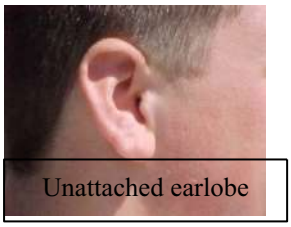
RH+ blood/ RH- blood

Normal clotting/ Hemophilia

Normal / Allergy



Attached earlobe



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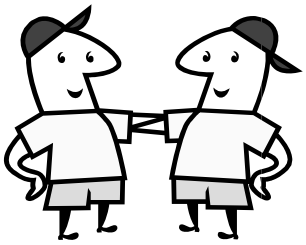
HUMAN GENETICS



Fraternal vs. Identical Twins:

- _____develop from a_____fertilized egg that splits shortly after fertilization
  - Since they developed from the _____egg they have exactly the same _____
- _____develop from_____eggs that are fertilized by _____sperms
  - They are _____different people

By studying identical twins, geneticists have learned that _____seem to have a _____influence than the _____on such traits as height, weight, blood pressure, speech patterns, and gestures.

- They have also discovered that _____play a role in some _____problems once thought to be caused only by environmental factors.
    - For instance, genes can cause a susceptibility to _____ such as diabetes and certain types of cancer.

Inherited Diseases:

- _____and _____ MAY be _____ ○ Ex: Aids (HIV) can be passed onto offspring
    - Ex: Common cold (rhino virus) can't be passed onto the offspring
- Disorders resulting from abnormal structure or function of body organs are _____ likely to be based on genes
- Some disorders that are associated with genes are:

    -diabetes – respiratory allergies – colorblindness– down syndrome – farsightedness - sickle cell anemia- etc..

- - We will learn more about genetic disorders in a couple of units

Sex Determination:  OR  ?

- _____= determine the sex of an individual The X chromosomes (**XX**) produce a_____

    An X chromosome paired with a Y chromosome (**XY**) produces a _____

    Since only a male can produce a gamete bearing a Y chromosome, the _____determines the_____of the child

    Note: the X chromosome contains additional genetic information that the Y chromosome does not have, therefore a male child actually inherits **more** genetic information from his_____than his father (a very tiny amount)

Sex-Linked Traits:

- Traits that occur _____frequently in one sex than another (usually males)
    - Males -color blindness and hemophilia

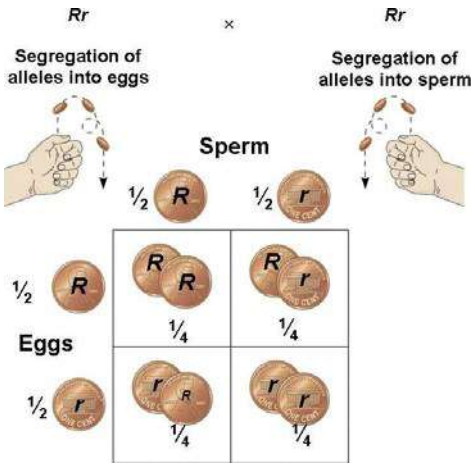
- Occurs because other genes besides the alleles for sex are also located on the sex chromosomes

  They are _____to the normal condition and the Y chromosomes appear to lack genes for these traits

  These traits generally do not show up in _____

Punnett Squares:

- **Punnett Square** = used to solve genetics problems. (based on probability)
- Ex: Crossing two heterozygous genotypes (**Rr** x **Rr**)



- Remember the letters of a genotype (R, r's) represent possible _____ (egg/sperm) combinations.

Test Cross Punnett Square:

- You cannot tell by looking at an organism that shows the _____trait whether it is heterozygous (Rr) or homozygous(RR) for that trait
- To determine the genotype of an organism showing the dominant trait a _____ would be done.
- _____= the organism of unknown dominant genotype is crossed with a _____(rr) organism.

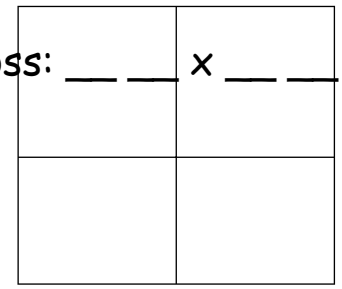
IN CLASS PRACTICE PROBLEMS – MONOHYBRIDS (one trait)

Black coat color in guinea pigs is dominant over white coat color. Look at the "Example 1" cross below. This cross shows a hybrid black guinea pig with pure white guinea pig.

P_1 cross: _____ X _____

F_1 genotypes:

P_1 cross: __ __ x __ __



F_1 phenotypes:

Then try solving "Example 2".

EXAMPLE 2:

Cross a hybrid black and a hybrid black guinea pig.

Black Trait – _____

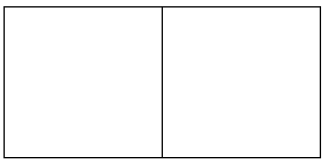
White Trait - _____

F_1 genotypes:

Hybrid black - _____

Hybrid black -_____

F_1 phenotypes:



NOW YOU TRY SOME:

1.) In pigs, the white color (**W**) is **dominant**; the black color (**w**) is **recessive**. Using Punnett squares, show the expected results of the following crosses.

a) A pure (homozygous) white pig is mated with a black pig.

P_1 cross: __ __ **x** __ __

F_1 **G=** _____

F_1 **P=** _____

b) Show a cross between two of the F_1 offspring from number 1a. Determine the genotypes and phenotypes of the offspring in the F_2 generations.

F_1 cross: __ __ **x** __ __

F_2 **G=** _____

F_2 **P=** _____

MONOHYBRID PRACTICE

1. Crossing Guinea Pigs. In Guinea pigs black hair dominates over white. Thus a pure black is represented by BB, a hybrid by Bb, and a white by bb. It should be noted that whenever the recessive trait appears it must be pure. Try working out the following crosses in guinea pigs using the Punnett square method. Determine the genotypes and phenotypes in each cross.

A. homozygous black x homozygous black **P cross: __ __ x __ __**

B. pure white x pure white **P cross: __ __ x __ __**

C. pure black x pure white **P cross: __ __ x __ __**

D. hybrid black x homozygous black **P cross: __ __ x __ __**

E. heterozygous black x heterozygous black **P cross: __ __ x __ __**

Bikini Bottom Genetics

Name _____ Period: _____ Date: _____

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 _____

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

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

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

a) *Yellow body color is dominant to blue*.

YY _____ Yy _____ yy _____

b) *Square shape is dominant to round.*

SS _____ Ss _____ ss _____

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

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

Tall = _____ Short = _____

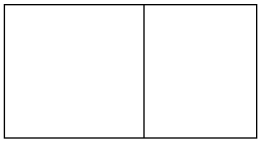
b) *Pink body color (P) is dominant to yellow (p).*

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!

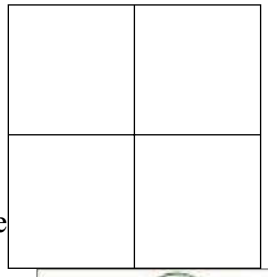
a) List the genotypes for SpongeBob and SpongeSusie._____

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 _____%

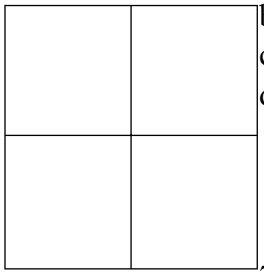
5. Patrick met Patti at the dance. Both of them are heterozygous for their pink body color, which is dominant over a yellow body color. Create a Punnett square to show the possibilities that would result if Patrick and Patti had children. HINT: Read question #3!



a) List the genotypes of Patrick and Patti _____.
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 _____%

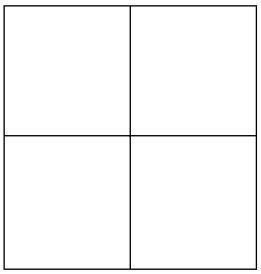
6. Everyone in Squidward's family has light blue skin, which is the dominant trait for body color in his hometown of Squid Valley. His family brags that they are a "purebred" line. He recently married a nice girl who has light green skin, which is a recessive trait.
Create a Punnett square to show the 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 genotypes of Squidward and Squidward's new wife. _____.



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 genotypes of Squidward's son and his wife. _____

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. Krabs and his wife recently had a Lil' Krabby, but it has not been a happy occasion for them. Mrs. Krabs 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. Krabs 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 genotypes of Mr. and Mrs. Krabs. _____

b) Did the hospital make a mistake? Explain your answer

c)

Bikini Bottom Genetics Worksheet #2

Name _____ Period: _____

Date: _____

Directions: *Use your knowledge of genetics to complete this worksheet.*

1. Use the information for SpongeBob's traits to write the **phenotype** (physical appearance) for each item.

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)

a) LL-_____ e) Rr-_____

b) yy-_____ f) ll- _____

c) Ss-_____ g) ss- _____

d) RR - _____ h) Yy -_____

2. Use the information in the chart above to write the **genotype or genotypes** for each trait below.

a) Yellow body - _____ e) Stubby nose - _____

b) Roundpants - _____ f) Round eyes - _____

c) Oval eyes - _____ g) Squarepants - _____

d) Long nose - _____ h) Blue body - _____

3. Using the information in the chart above, determine the **genotypes** for each of the following:

a) Heterozygous round eyes -_____ c) Homozygous long nose - _____

b) Purebred squarepants - _____ d) Hybrid yellow body - _____

4. One of SpongeBob's cousins, SpongeBillyBob, recently met a cute squarepants gal, SpongeGerdy, at a local dance and fell in love. Use your knowledge of genetics to answer the questions below.

a) If SpongeGerdy's father is a *heterozygous squarepants* and her mother is a *roundpants*, what is her genotype? Complete the punnett square to show the possible genotypes that would determine Gerdy's result to help you genotype.

b) List the genotypes for SpongeGerdy's father and SpongeGerdy's mother. _____

c) What is Gerdy's genotype? _____

d) SpongeBillyBob is heterozygous for his squarepants shape. What is his genotype? _____

5. Complete the punnett square to show the possibilities that would result if SpongeBillyBob & SpongeGerdy had children.
   a) List the genotypes for SpongeBillyBob and SpongeGerdy._____
   b) List the possible genotypes and phenotypes for the kids.

   G:_____

   P: _____

   c) What is the probability of kids with squarepants? _____ %
   d) What is the probability of kids with roundpants? _____ %

DIHYBRIDS (two traits)

Because each parent and offspring are using _____traits, each one should have **4** alleles, _____ for each_____.

Each gamete produced by the P_1 generations will contain 2 alleles, one for each trait.

Example: A plant that is heterozygous for being tall and having green seeds is crossed with a homozygous yellow and short

- Traits = seed color and plant height
  - Alleles **G** =green **T** = tall
    g = yellow **t** = short

Cross: _____

Determine the gametes produced by each parent by using the FOIL method.

-TtGg produces 4 different gametes:_____, _____, _____, _____

-ttgg produces only 1 gamete: _____

Phenotypes:

Genotypes:

MENDELIAN GENETICS REVIEW QUESTIONS

Lesson 1 Questions: Introduction to Genetics

1) What are two factors that affect who you are?
   a) _____
   b) _____

2) _____ is the passing of traits from parent to offspring.

3) _____ is the "Father of Genetics".

4) What organism did Mendel use to conduct his research? _____ 5)

   _____ are two forms of a gene (dominant & recessive)

6) What is the difference between a phenotype and a genotype?

7) How would you write a homozygous dominant genotype (use the first letter of the alphabet) _____

8) How would you write a homozygous recessive genotype (use the first letter of the alphabet) _____

9) How would you write a heterozygous genotype (use the first letter of the alphabet) _____

10) A homozygous genotype can also be called _____

11) A heterozygous genotype can also be called a _____

12) What is the difference between the P generation and the F_1 generation?

13) _____ is the study of heredity

14) How many chromosomes would a human have in their skin cells? _____

15) How many chromosomes did you inherit from your mom?_____ from your dad? _____

Lesson 2 Questions: Mendel's Law's

1) A cross between two hybrids will ALWAYS create what phenotypic ratio?

2) The _____ is based on the genotype.

3) What are Mendel's three laws?

   a. _____

   b. _____

   c. _____

4) _____ law states that each factor (gene) is distributed (assorted) randomly and independently of one another in the formation of gametes (egg or sperm).

5) _____ law states that when different alleles for a characteristic are inherited (heterozygous), the trait of only one (the dominant one) will be expressed.

6) _____ law states that each genetic trait is produced by a pair of alleles which separate during reproduction.

Lesson 3 Questions: Human Genetics & Punnett Squares

1) Are fraternal twins or identical twins more closely related? _____ a. How do you know?

2) What sex chromosomes are present for a male? _____ a female?_____

3) Which parent determines the sex of the child? _____
   a. Why?

4) In guinea pigs black (B) hair dominates over white. Cross a homozygous black guinea pig with a white guinea pig. What are the genotypic and phenotypic ratios for the F_1 generation and the F_2 generation?

F_1 genotypic ratio:_____

F_1 phenotypic ratio:_____

F_2 genotypic ratio:_____

F_2 phenotypic ratio:_____

5) How could a guinea pig breeder determine if a black guinea pig is homozygous dominant or heterozygous?

6) Suppose that black hair (B) is dominant over blonde hair (b) and brown eyes (E) are dominant over blue (e). What percent of offspring could be expected to have *black hair and blue eyes* if the father has black hair (homozygous) and brown eyes (heterozygous) and the mother has blonde hair and blue eyes.

   a. Father's genotype = _____

   b. Mom's genotype = _____

_____**% black hair & blue eyes**

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DIHYBRID (2 traits) HOMEWORK SET

In a dihybrid cross, when two traits are considered, the number of possible combinations of the offspring increases. Suppose that black hair (B) is dominant over blonde hair (b) and brown eyes (E) are dominant over blue (e).
What percent of offspring could be expected to have blonde hair and blue eyes if:

2. The father has black hair (heterozygous) and brown eyes (heterozygous) and the mother has blonde hair and blue eyes.

   Genotype of father = <u>BbEe</u>

   Genotype of mother = <u>bbee</u>

   Complete the cross using the Punnett square. Determine what percent of offspring will have blonde hair and blue eyes.

_____% blonde hair & blue eyes

3. Both parents have black hair (heterozygous) and brown eyes (heterozygous).

Genotype of father = _____

Genotype of mother = _____

Complete the Punnett square below. Determine what percent of offspring will have blonde hair and blue eyes.

_____% blonde hair & blue eyes

DIHYBRID (2 traits) HOMEWORK SET

1. Mendel found **yellow seed color was dominant (Y) trait over green (y)** in garden peas. He found **white seed coat was the recessive (w) trait and black was the dominant (W) trait**. What would the F_1 genotype and phenotype be from crossing parents that were pure yellow seed color and black seed coat with pure green seed color and white seed coat?

P cross = _____ X _____

F_1 Genotype:

F_1 Phenotype:

2. In guinea pigs **rough coated (R) is dominant over smooth coated (r) and black color (B) is dominant over white color (b)**. A rough coated and black guinea pig, whose mother was smooth and white is mated with a smooth, white animal. What are the genotypes and phenotypes of the offspring?

P cross = _____ X _____

F_1 Genotype:

Phenotype: F1

3. In squash the **color white (W) is dominant over yellow and disk shape (D) is dominant over sphere shape.** a) When crossing two homozygous squashes, one white, sphere and the other yellow, disk. Determine the genotypes and phenotypes of the F_1 generation. b) Then determine the phenotypic ratio of the F_2 generation (obtained by crossing the F_1 plants).

P cross = _____ X _____

F_1 Genotype:

F_1 Phenotype:

P cross = _____ X _____

F_2 Phenotype:____

4. Determine the genotype and phenotypes of the offspring, if one of the F_1 plants in #3 is crossed with a yellow, homozygous disk plant.

P cross = _____ X _____

Genotype:

Phenotype:

5. In garden peas, **a yellow (Y) seed with smooth (S) coat dominates green(y) and wrinkled (s) seeds.** Determine the genotypes and phenotypes of the offspring in the following crosses:

a. A plant that is heterozygous for yellow seed color and homozygous for a wrinkled coat is crossed with a plant that is green and homozygous for a smooth coat.

P cross = _____ X _____

Genotype:

Phenotype:

b. A plant that is heterozygous for yellow seed color and heterozygous for a smooth coat is crossed with a plant that is green and homozygous for a smooth coat.

P cross = _____ X _____

Genotype:

Phenotype:

c. **A plant that is heterozygous for yellow seed color and has a wrinkled coat is crossed with a plant that is green and has a wrinkled coat.**

P cross = _____ X _____

Genotype:

Phenotype:

MORE GENETICS REVIEW QUESTIONS:

1. Any characteristic that can be passed from parent to offspring:_____
2. The study of heredity:_____
3. The physical feature resulting from a genotype:_____
4. A cross that only involves a single trait:_____
5. A tool used to solve genetic problems based on probability:_____
6. The passing of traits from parent to offspring: _____
7. A gene combination for a trait:_____
8. States that each factor (gene) is distributed (assorted) randomly and independently of one another in the formation of gametes (egg or sperm):
   _____
9. The father of modern genetics:_____

10. A cross involving two traits:_____

11. Two forms of a gene (dominant & recessive): _____

12. A combination of genes with one dominant & one recessive allele:
    _____

13. The resulting offspring of the parent organisms or P_1: _____

14. When different alleles are inherited(hybrid), only the dominant one will be
    expressed:_____

15. Gene that shows up less often in a cross; represented by a lowercase letter:_____

16. A factor that can affect how genes are expressed:
    _____

17. Parent organisms are referred to as the:_____

18. Determines the sex of the child: _____

19. Each genetic trait is produced by a pair of alleles which separate during reproduction:
    _____

Mendelian Genetics Vocabulary:

1) **Trait** = any characteristic that can be passed from parent to offspring
2) **Heredity** = passing of traits from parent to offspring
3) **Genetics** = study of heredity
4) **Gregor Mendel** = Father of Genetics; experimented using pea plants
5) **Alleles** = two forms of a gene (dominant & recessive)
6) **Dominant** = stronger of two genes expressed in the hybrid; represented by a capital letter (R)
7) **Recessive** = gene that shows up less often in a cross; represented by a lowercase letter (r)
8) **Genotype** = gene combination for a trait (ex: RR, Rr, rr)

9) **Phenotype** = the physical feature resulting from a genotype (e.g. tall, short)

10) **Homozygous genotype** = gene combination involving 2 dominant or 2 recessive genes (ex: RR or rr); also called pure

11) **Heterozygous genotype** = gene combination of one dominant & one recessive allele (ex: Rr); also called hybrid

12) **Law of Dominance** = states that when different alleles for a characteristic are inherited (heterozygous), the trait of only one (the dominant one) will be expressed. The recessive trait's phenotype only appears in true-breeding (homozygous) individuals

13) **Law of Segregation** = states that each genetic trait is produced by a pair of alleles which separate (segregate) during reproduction

14) **Law of Independent Assortment** = states that each factor (gene) is distributed (assorted) randomly and independently of one another in the formation of gametes (egg or sperm)

15) **Sex-linked traits** = traits that occur more frequently in one sex than the other because the genes are on the sex chromosomes

16) **Monohybrid cross** = cross involving a single trait

17) **Dihybrid cross** = cross involving two traits

18) **Punnett Square** = tool used to solve genetics problems; based on probability