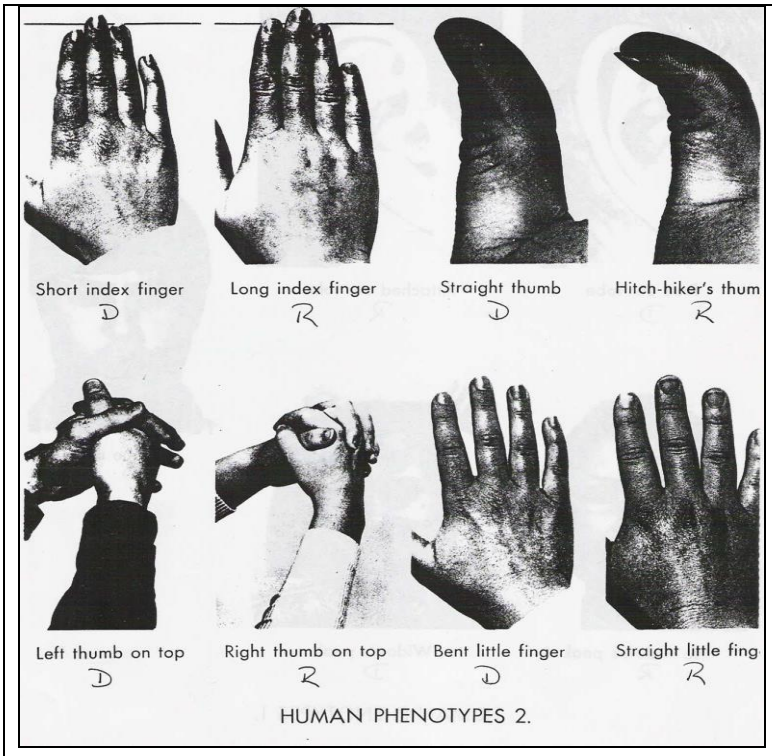
Part 5 Genetics

Name:
Due:

Part 5 Lesson 1 Intro to Genetics and Mendel

Circle what human phenotypes you display?



Detached

Attached

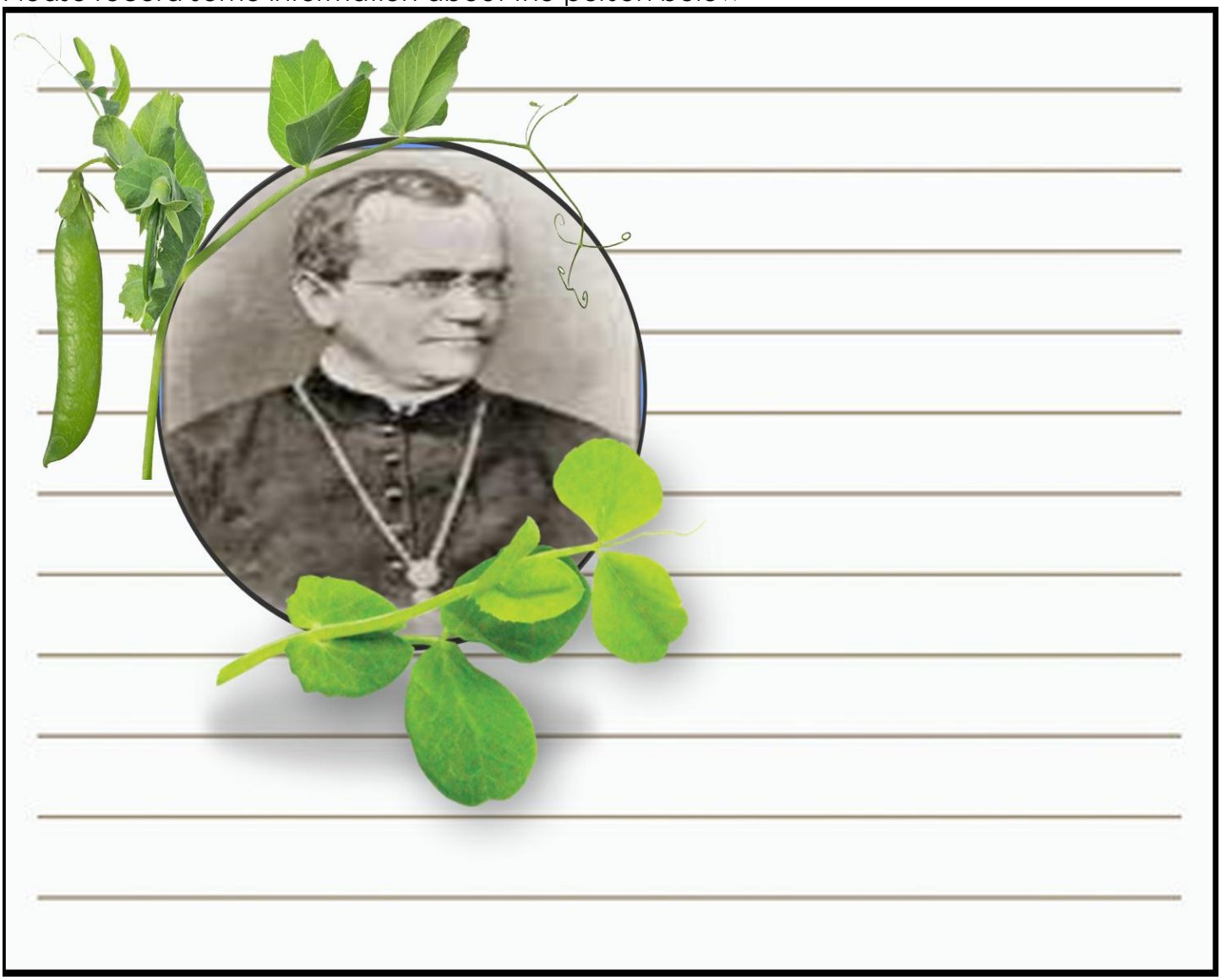
Widows Peak

No Widows Peak

Can you mark your bingo sheet? Any Bingo's? First one to say BINGO may get a prize.

B	I	N	G	O
Dimples	No Freckles	No widows Peak	Alergies	Hitch hikers thumb
No Finger Hair	Cleft chin	Trait in common - Left	No Dimples	Widows Peak
Finger Hair	Curly hair	Free!	Shared trait - Left	I cross my right thumb over my left when I clasp my hands
No Dimples	Second Toe Longest	Not a phenotype but we'll use Can not roll tongue	Right Handed	First Toe Longest
No finger Hair	Straight hairline	I cross my left thumb over my right when I clasp my hands	Detached earlobes	Bent Little Finger

Please record some information about the person below



Gregor M_____: The father of modern genetics. He counted his results and kept "almost too perfect" statistical notes, much like your science journal. The year was 1851, a young priest from Vienna studied mathematics and science at the university. Upon finishing, he went back to priesthood and tended a garden outside of the monastery. He worked with pea plants and became curious as to why some pea plants had different characteristics or _____.

S_____ Breeding: The intentional breeding of organisms with desirable traits in an attempt to produce offspring with similar desirable characteristics or with improved traits.

Descent with Modification: The passing on of traits from parent organisms to their offspring.
Offspring will display small _____.

Darwin found that nature is just like selective breeding but is done automatically.
- The _____ decides who lives and dies.

Part 5 Lesson 2 Alleles, Mendel and More terms

Mendel seemed to notice that pea plants tended to pass traits from parents to offspring, which is called _____.

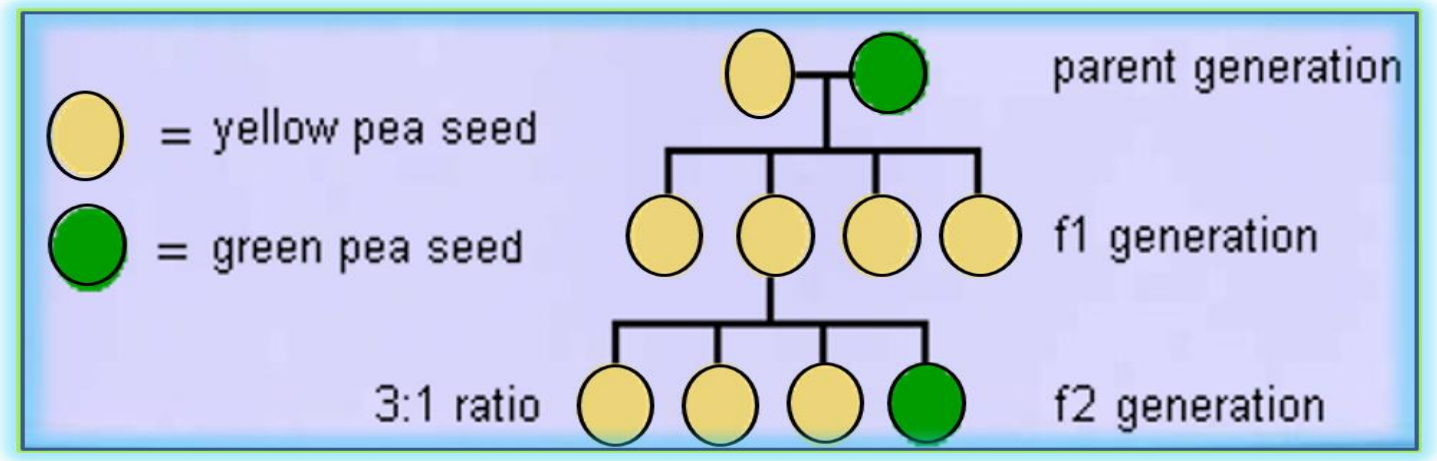
Law of segregation (Heredity), states that allele pairs separate or segregate during gamete formation, and _____ unite at fertilization.

- A gene can exist in _____ than one form.
- Organisms inherit _____ alleles for each trait.
- When gametes are produced (by meiosis), allele pairs _____ leaving each cell with a _____ allele for each trait.

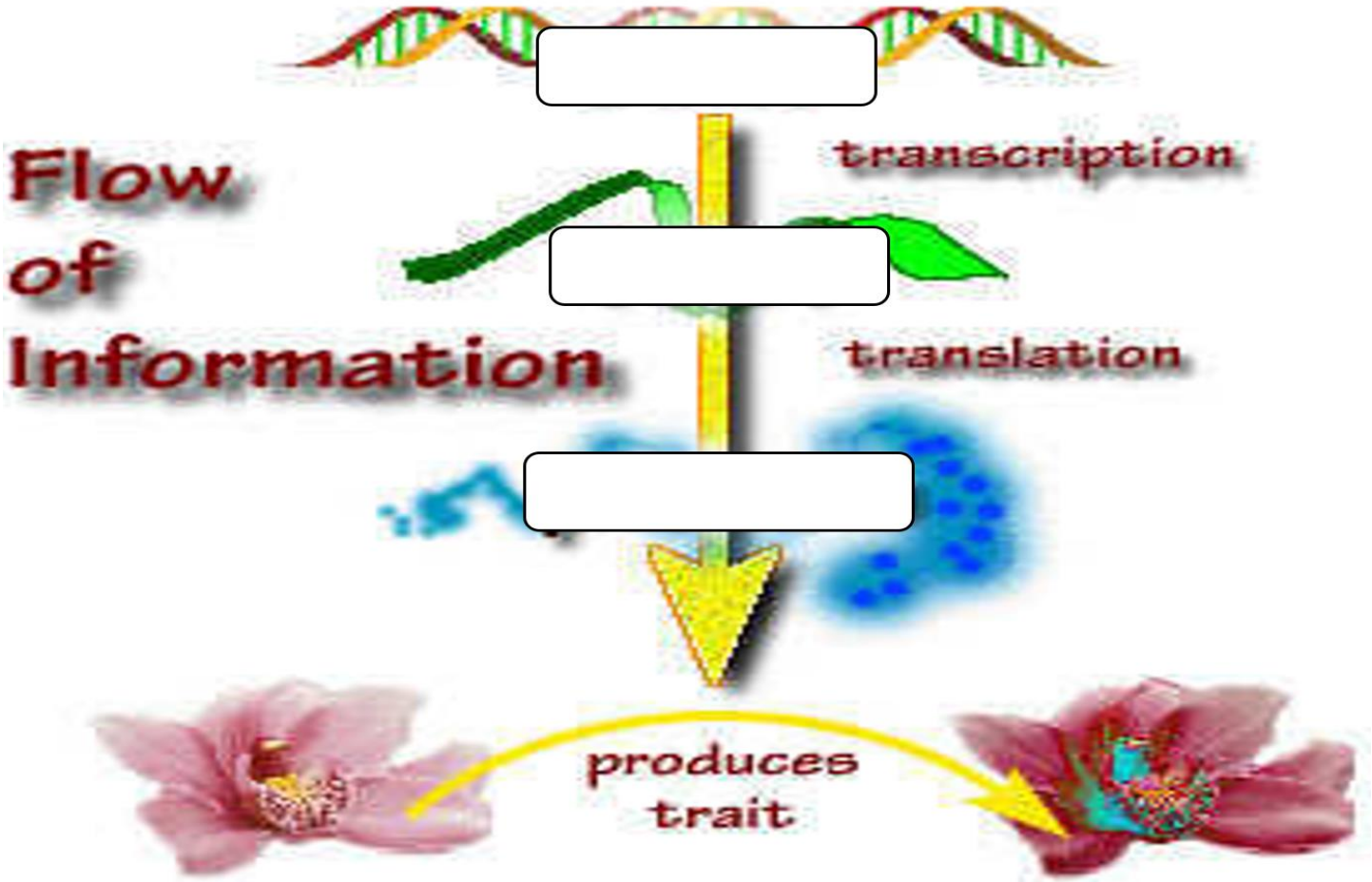
Mendel started doing experiments with _____plants, or plants that always produce offspring with the _____ trait as the parent. For example, short pea plants always produce short offspring. Mendel then decided to cross short pea plants with tall pea plants.

What do you think Mendel got when he bred tall and short? A.) Medium sized plants. B.) Half tall, and half short. C.) All Short D.) All Tall E.) They won't germinate	What do you think Mendel got when he bred all of those tall offspring? A.) Medium sized plants. B.) Most tall and some short. C.) All Short D.) All Tall E.) They won't germinate.

Please write about Gregor Mendel and his research with pea plants and early genetics using this diagram. What is so significant when comparing the f_1 and f_2 generation?

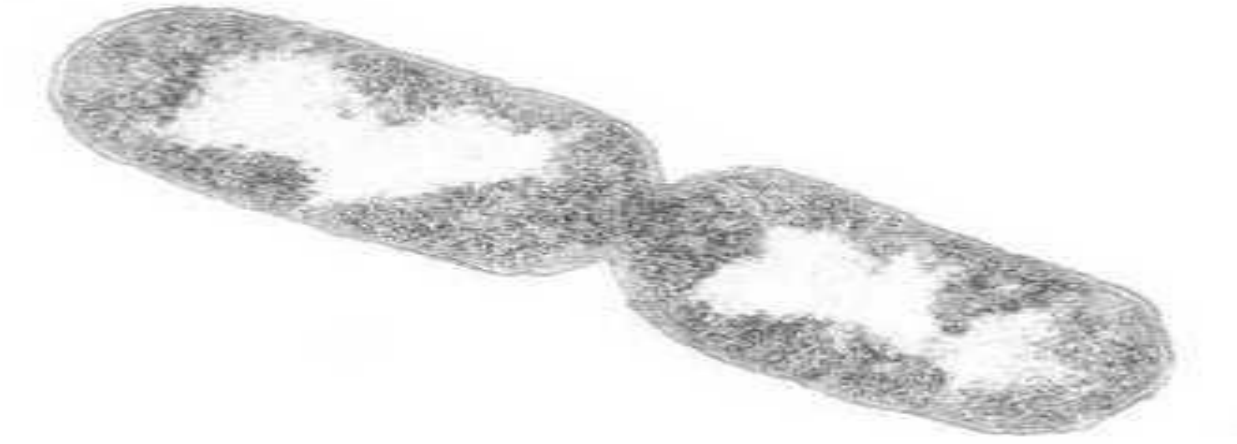


An organism's _____ is its physical appearance or its visible traits. An organism's _____ is its genetic makeup, or allele combinations.



From all of Mendel's' results, he reasoned that individual factors must control the inheritance of traits in peas. Mendel knew that the female contributes one factor, while the male contributes the other factor in _____ _____.

What type of reproduction are these bacteria doing?



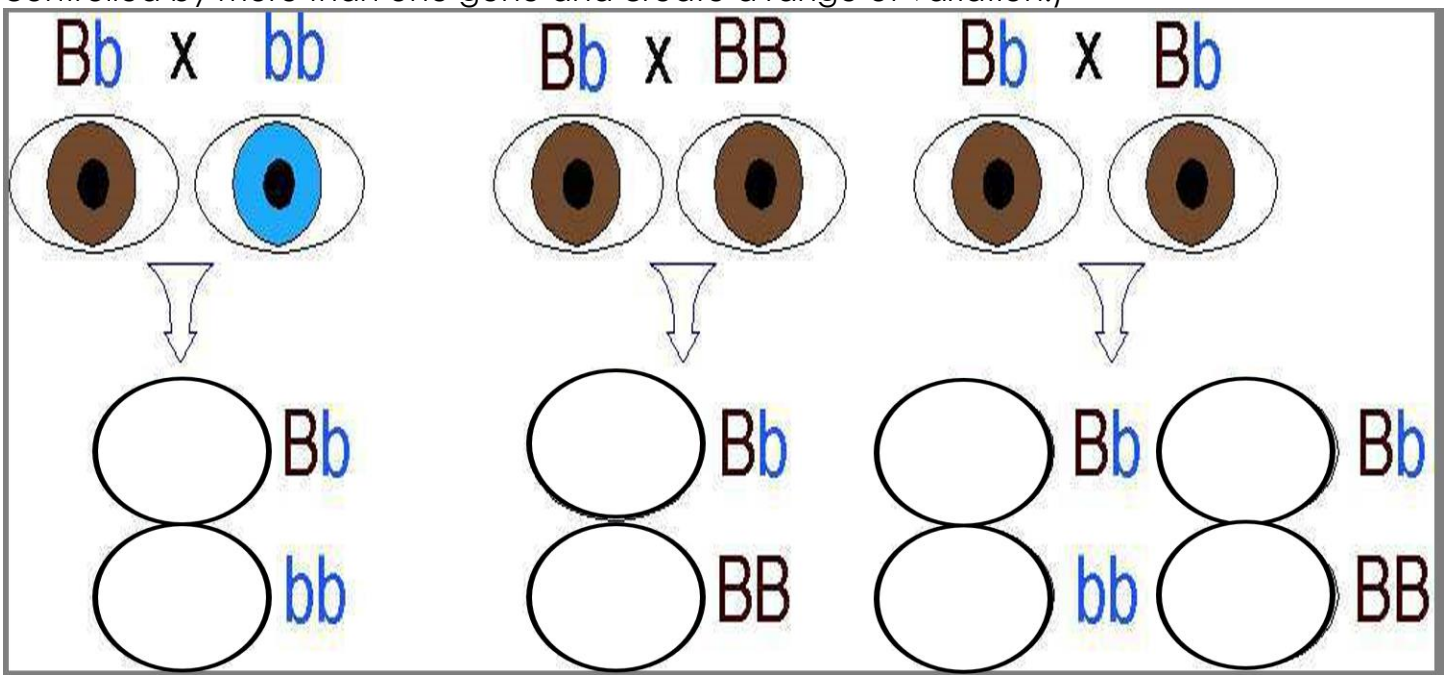
Today's scientists call the factors that control traits _____. Scientists call the different forms of gene _____.

Part 5 Lesson 3 Alleles

A dominant allele is one whose trait always shows up in the organism when the allele is present. A _____ _____ is covered up when the dominant allele is with it. A _____ has two different alleles.

T = Dominant
t = Recessive
TT = Two dominant
tt = Two recessive
T*t* = One dominant, one recessive

Please sketch in the correct eye Color if Brown color (B) is dominant and (b) blue color is recessive. (Note-It's more complicated than below as human eye color is polygenic, controlled by more than one gene and create a range of variation.)



Which letter below best describes heredity? A.) When the female contributes one factor, while the male contributes the other. B.) An organism's physical appearance or visible traits. C.) When traits are passed from parents to offspring. D.) Factors that control traits. E.) Allele that is covered up when the dominant allele is with it.	Which letter below best describes a gene? A.) Allele that is covered up when the dominant allele is with it. B.) An organism's physical appearance or visible traits. C.) Factors that control traits. D.) When the female contributes one factor, while the male contributes the other.
Which letter below best describes Mendel's Law of Segregation? A.) An organism's physical appearance or visible traits. B.) When allele pairs separate during gamete formation, and randomly unite at fertilization. C.) When traits are passed from parents to offspring. D.) An organism's genetic makeup, or allele combinations. E.) Allele that is covered up when the dominant allele is with it.	Which letter below best describes an allele? A.) An organism's genetic make-up. B.) An organism's physical appearance or visible traits. C.) When traits are passed from parents to offspring. D.) The different forms of a gene. E.) Alleles do not exist in nature.

Mendel's Laws of Heredity:

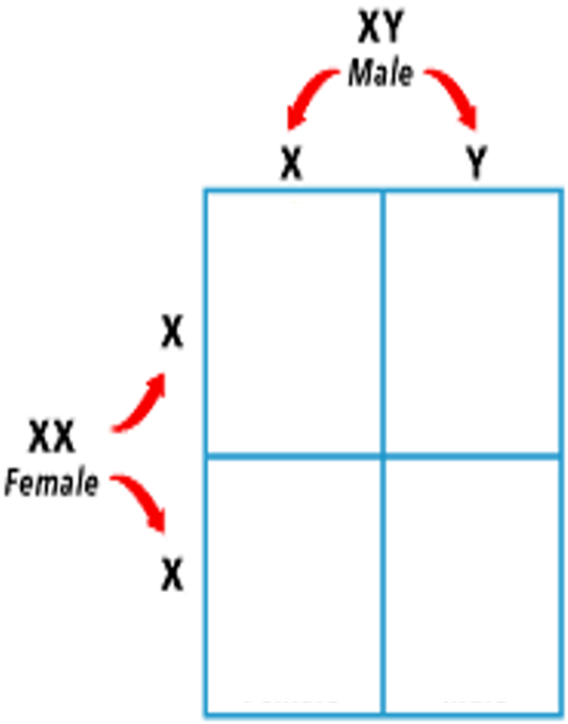
- 1) The Law of Segregation: Each inherited _____is defined by a _____pair. Parental genes are randomly separated to the sex cells so that sex cells contain only _____gene of the pair. Offspring therefore inherit one genetic _____from each parent when sex cells unite in f_____.
- 2) The Law of Independent Assortment: _____ for different traits are sorted _____from one another so that the inheritance of one trait is not _____ on the inheritance of another.
- 3) The Law of Dominance: An organism with alternate forms of a gene will express the form that is _____.

Most traits are _____genic, controlled by _____ or _____ genes with six alleles.

- Height, eye color, skin color, are all controlled by multiple alleles.

Punnett Square: A diagram that is used to _____ the outcome of a particular cross.

- (_____ / likelihood that that an event / cross will occur)

Please use complete the Punnett square and then describe which gender controls the sex of the child in humans? Please respond on the lines below.	

Sex Chromosome: A _____involved with determining the sex of an organism, typically one of two kinds. (___,____)

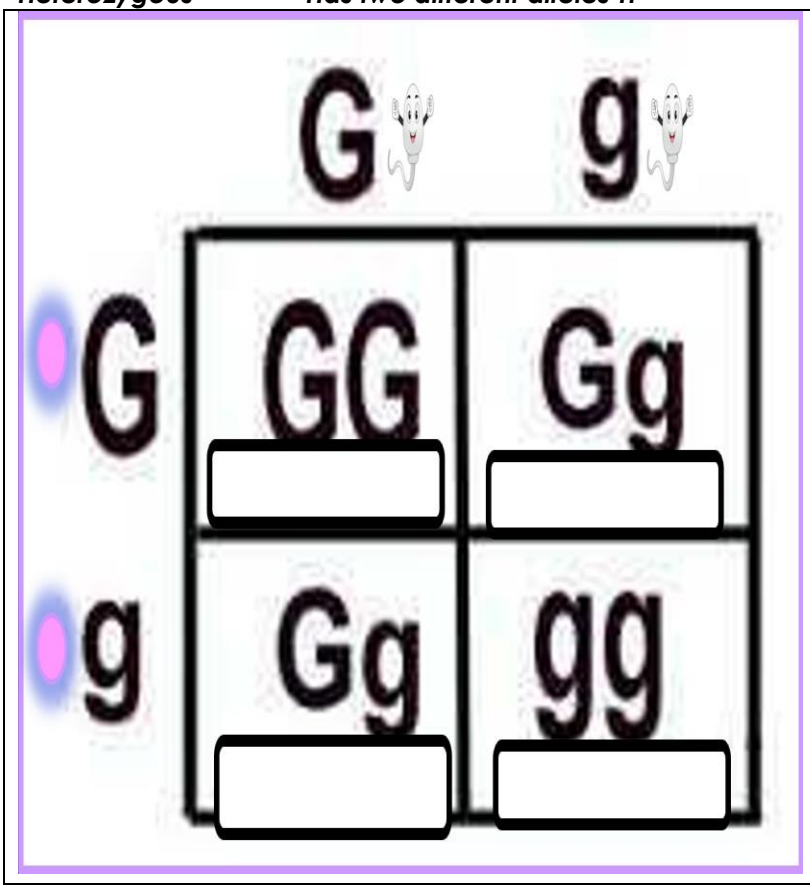
Biologist _____ _____in 1905 Discovered the X and Y chromosome and answered the thousand year old question of why boys become boys and girls become girls.

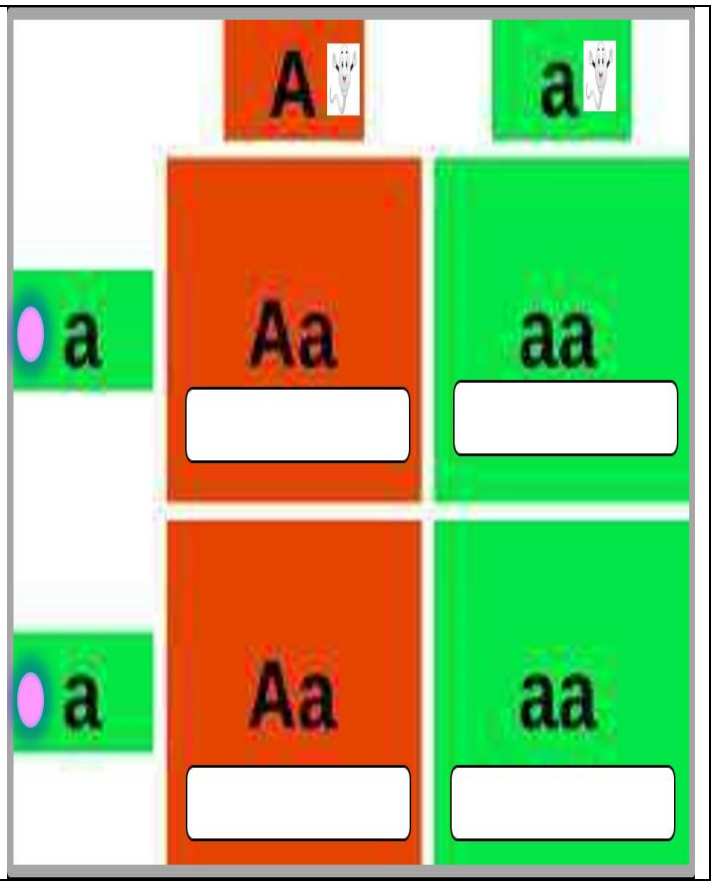
Part 5 Lesson 4 Probability and Punnett Squares

Genetics deals heavily with probability, or the _____ that a particular event will occur.

Please record which boxes in the Punnett Square are….

Homozygous- **Has two identical** **alleles TT or *tt***
Homozygous Dominant: All dominant (TT)
Homozygous Recessive: All recessive (tt)
Heterozygous- ***Has two different alleles Tt***





Built-In Quiz: Word Bank=Homozygous recessive, homozygous dominant, heterozygous

1)	2)	3)	4)
5)	6)	7)	8)
9)	10)	*11)	

Designing your Child Part 5 Lesson 4 Project

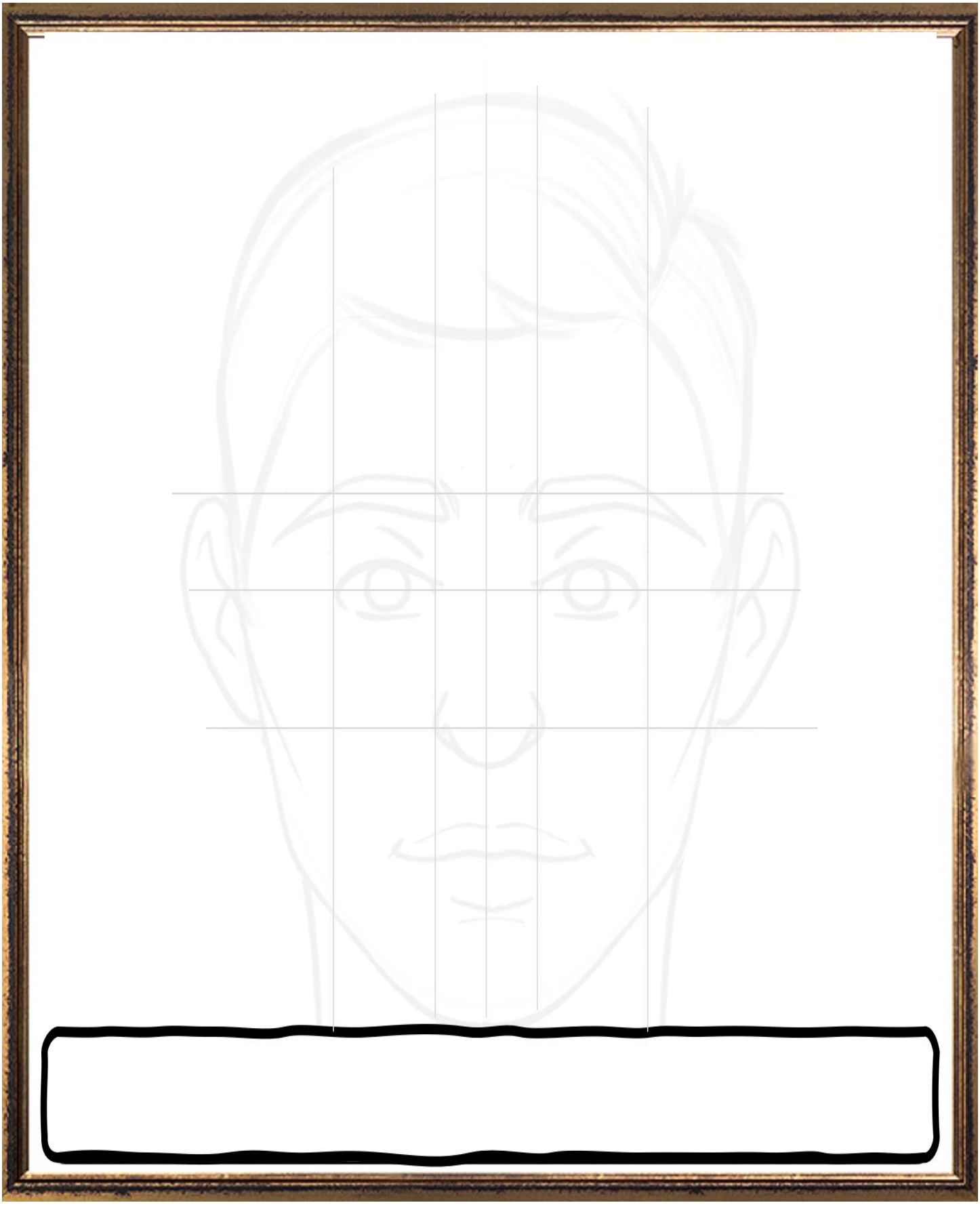
Please partner up with a member of the opposite sex. If numbers don't work than the remaining students can work solo. Determine the genotype by flipping a coin and looking at the letters on the left (Ex. H or h). Male flips coin and female flips coin. Record a capital letter if you flip a heads, or lower case letter if you flip a tails. Genotype will determine the phenotype.

Heads =Dominant (Capital Letter)
Tails = Recessive (Lower Case Letter)

Trait	Male	Fem	Genotype	Phenotype	Phenotype	Phenotype
Hair (H or h)				HH – Lots of Hair	Hh- Average Hair	hh – Bald
Widows Peak				WW-Widows Peak	Ww-Widows Peak	ww- No Widows Preak
Ears (E or e)				EE – Big Ears	Ee – Average Ears	ee – Small ears
Earlobes				EE- Unattached	Ee- Unattached	ee-attached
Hairy Ears (J or j)				JJ – No hair on ears	Jj – No hair on ears	jj- hairy ears
Head (U or u)				UU – Wide head	Uu – Average head	uu – Small head
Nose (N or n)				NN – Large Nose	Nn – Average Nose	nn – Small nose
Eyes (E or e)				EE – Large eyes	Ee–Average eyes	ee – squinty eyes
Eye Color (B or b)				BB – Brown Eyes - If either parent has brown eyes	Bb - Brown Eyes - If either parent has brown eyes	bb – Blue eyes Only if both parents have blue eyes.
Eye Brows (B or b)				BB – Large bushy eyebrows	Bb – Average eyebrows	bb – Unibrow
Eye Brow Color				BB – Darker than hair	Bb – Same as hair	bb – lighter than hair
Eye Shape (E or e)				EE- Rounded Eyes	Ee-Rounded Eyes	ee- Almond shaped
Eye Distance (D or d)				DD- Close together	Dd – Average	dd – far apart
Eye Lashes (L or l)				LL – Long eyelashes	Ll -Average	ll – Short and stubby
Facial Hair (F or f)				FF – Lots of facial hair	Ff – No facial hair	ff – No facial hair
Lips (L or l)				LL – Huge lips	Ll – Average lips	ll – Small thin lips
Chin (C or c)				CC – Large square chin	Cc – Rounded chin	cc – Chubby chin
Dimples (D or d)				DD – Dimples	Dd – Dimples	dd – No dimples
Cleft Chin				CC-Cleft	Cc-Cleft	cc – No cleft
Eyesight (E or e)				EE – No glasses needed	Ee – No glasses needed	ee – Eyeglasses are needed.
Freckles (F or f)				FF – Lots of freckles	Ff – Lots of Freckles	ff – No freckles
Hair Color (H or h)				HH – Dark hair	Hh – Dark hair	hh – Light hair
Hitch hikers Thumb				TT-Hitch Hikers Thumb	Tt-Hitch Hikers Thumb	tt- No Hitch Hikers Thumb
Ear Wax (E or e)				EE- Wet ear wax	Ee-Wet ear wax	ee-Dry ear wax
Taste PTC Paper (P or p)				PP-Can taste PTC	Pp-Can taste PTC	pp-Cannot Taste PTC
Teeth (T or t)				TT- No gap in teeth	Tt – No Gap in teeth	tt- gap in front teeth
Color Blindness (C or c)				CC-No color blindness	Cc – No color blindness	cc – Mild color blindness (green / blue)

To determine gender – Male roles a coin as only the male can determine the sex of the child. If the male roles a heads than the offspring is a boy as heads will represent the Y chromosome.

The Gender is _____ The Name is _____ _____ _____



Please complete the Punnett Squares below. Part 5 Lesson 4 Punnett Squares

- Phenotypic ratio

_____:_____

Genotypic ratio

___:___:___

	B	b
B		
b		

- Punnett Square "Twilight"
  - What would the offspring of Jacob and Renesmee be...?
  - W = Werewolf
  - V = Vampire
  - h = Human

	V	h
W		
h		

The F1 Generation (Two black gerbils)
One homozygous dominant (black)
One heterozygous (black)

	B	b
B		
B		

Outcome=

The F2 Generation (Both black gerbils heterozygous)

	B	b
B		
b		

Outcome=

The F3 Generation (One heterozygous black gerbil and one homozygous recessive white gerbil)

	b	b
B		
b		

Outcome

The F4 Generation (Two homozygous recessive white gerbils)

	b	b
b		
b		

Outcome=

What would happen if we went back to the pet store and got two homozygous dominant black gerbils over four generations? What would the color be? Explain.

Part 5 Lesson 6 and 7 Dihybrid Crosses

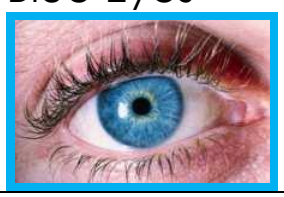
Dihybrid Cross: A cross that involves _____ sets of characteristics.

Please complete the dihybrid cross below and record the probability of the outcomes at the bottom. The husband is BGbg and the wife is the same BGbg. (BGbg x BGbg). Use a brown, green, and blue crayon to assist you.

B=Brown Eyes (Dominant) G=Green Eyes b= Blue Eyes

Gametes Female → Male↓	BG	Bg	bG	bg
BG				
Bg				
bG				
bg				

What's the probability that the offspring will have…

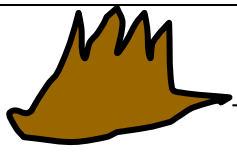
Brown Eyes	Green Eyes	Blue Eyes
		

Please complete the dihybrid cross below and record the probability of the outcomes at the bottom. The Male Guinea pig is BbSs and the female is the same BbSs. (BbSs x BbSs). A brown and black crayon will help.

B=Black fur b=brown fur S=Short fur s=long fur

Gametes Female → Male↓	BS	Bs	bS	bs
BS				
Bs				
bS				
bs				

How many Guinea Pigs were?:

Black and Short  :_____	Black and Long  _____
Brown and Short  :_____	Brown and Long  _____

Please complete the dihybrid cross below and record the probability of the outcomes in the ratio part at the bottom. Purple is dominant over white, and Smooth is dominant over wrinkled.

PPSS = Purple Smooth, PpSs = Purple Smooth, PPss = Purple wrinkled, ppSs= White Smooth, and ppss = White Wrinkled

Heterozygous X Heterozygous

Heterozygous parent (PpSs)

Heterozygous parent (PpSs)	PS	Ps	pS	ps
PS			PpSS	
Ps				
pS				
ps				

P – Purple
p- White

S – Smooth
s - wrinkled

Phenotype: Purple Smooth _____ _____ _____

Ratio: _____ : _____ : _____ : _____

Part 5 Lesson 7 Triple Cross

SsYyAa x SsYyAa

	SYA	SYa	SyA	Sya	sYA	sYa	syA	sya
SYA								
SYa								
SyA								
Sya								
sYA								
sYa								
syA								
sya								

Phenotypes:

Out of 64 births.

- Dominant S, Y, A - normal: SSYYAA, SsYyAa
- albinos: SsYyaa, SSYYaa
- anerythristic: SsyyAa, SSyyAa
- striped: ssYYAA, ssYyAa
- snow: Ssyyaa, SSyyaa
- striped-albino: ssYyaa, ssYYaa
- striped-anery: ssyyAA, ssyyAa
- striped-snow: ssyyaa

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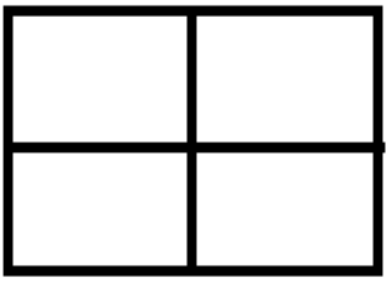
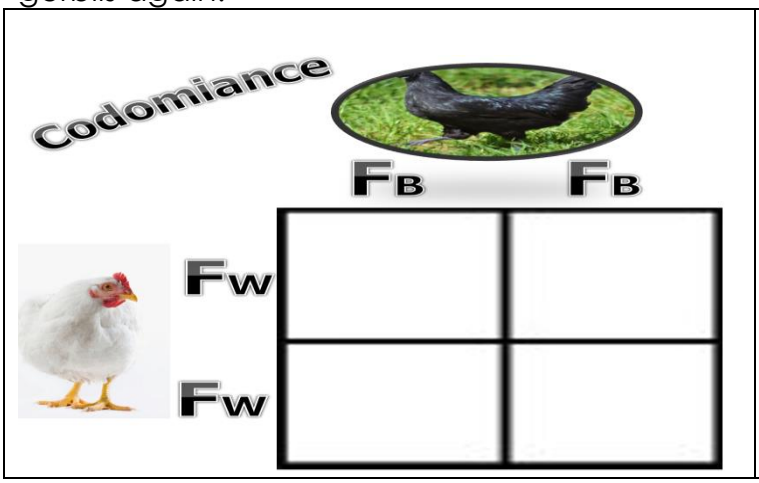
Part 5 Lesson 8 Codominance and Incomplete Dominance

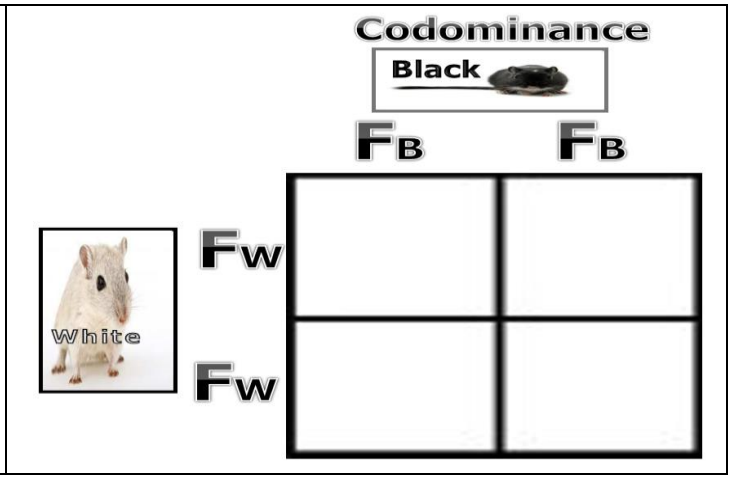
Codominance is a relationship among _____ where both alleles contribute to the _____ of the heterozygote.

Determine the phenotype and genotype of the offspring if the mother is bald Xb Xb as well as the father (XB Yb). Illustrate the probability of their children having pattern baldness using Punnett square. bb=bald

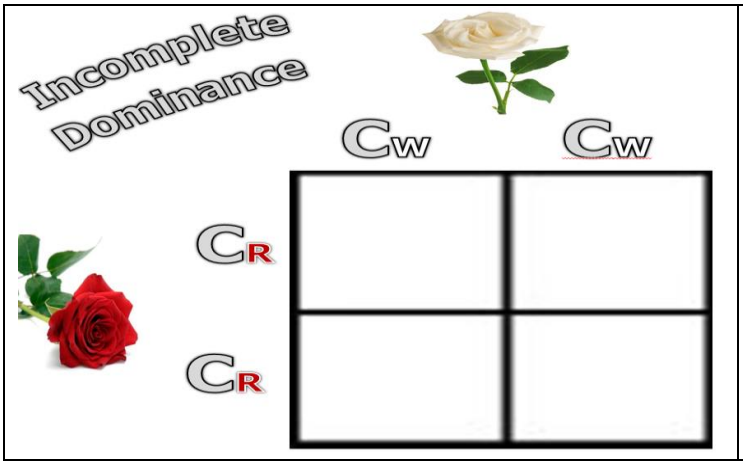


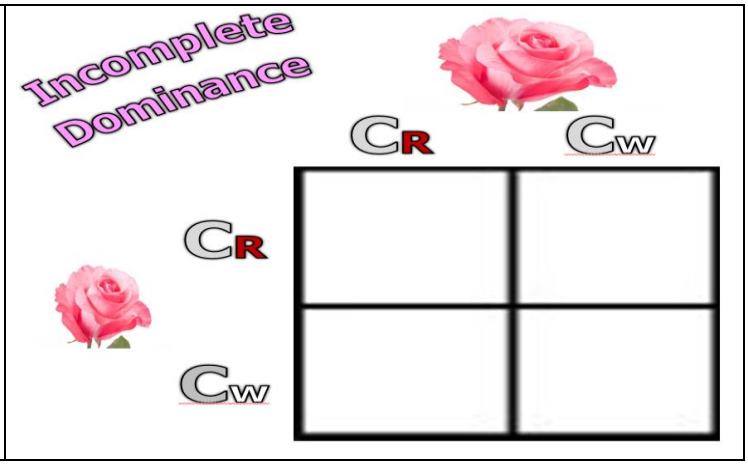
Please complete the Punnett Square Below? What's the probability that the offspring will be White Chickens FwFw, Black Chickens FbFb, or Checkered Chickens FbFw? Then figure out gerbils again.





Incomplete Dominance: One allele for a specific trait is not completely _____ over the other. What type of roses will result below?
CRCR = Red, CRCW = Pink, CWCW = White





Complete as described in the video in the slideshow with the "Fluffys" Need, blue, yellow and green marker, crayon, or colored pencil.

Genotype	Complete Dominance	Codominance	Incomplete dominance
C_BC_B			
C_YC_Y			
C_BC_Y			

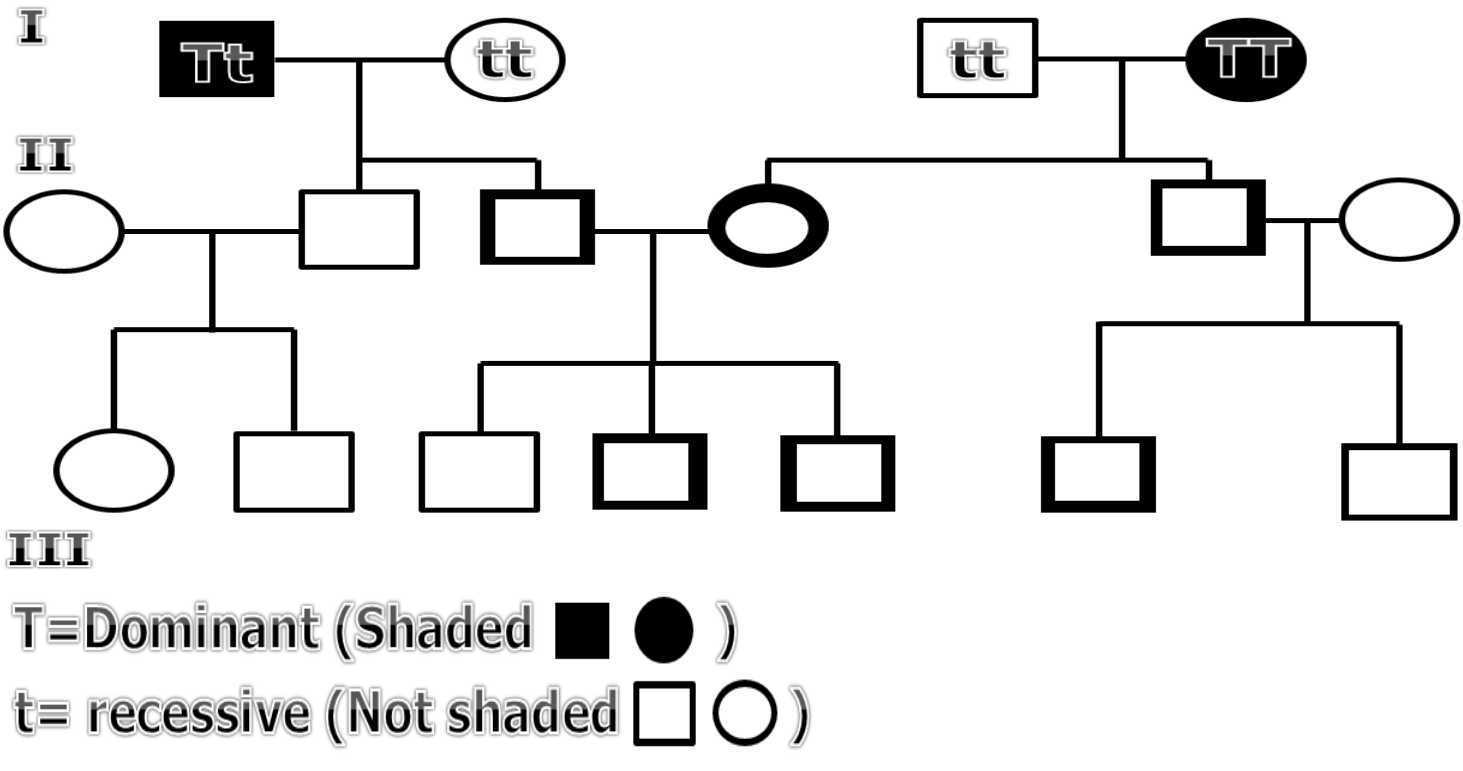
Mendel's Laws of Heredity:

- 1) The Law of Segregation: Each inherited _____is defined by a _____pair. Parental genes are randomly separated to the sex cells so that sex cells contain only _____gene of the pair. Offspring therefore inherit one genetic _____from each parent when sex cells unite in f_____.
- 2) The Law of Independent Assortment: _____ for different traits are sorted _____from one another so that the inheritance of one trait is not _____ on the inheritance of another.
- 3) The Law of Dominance: An organism with alternate forms of a gene will express the form that is _____.
-

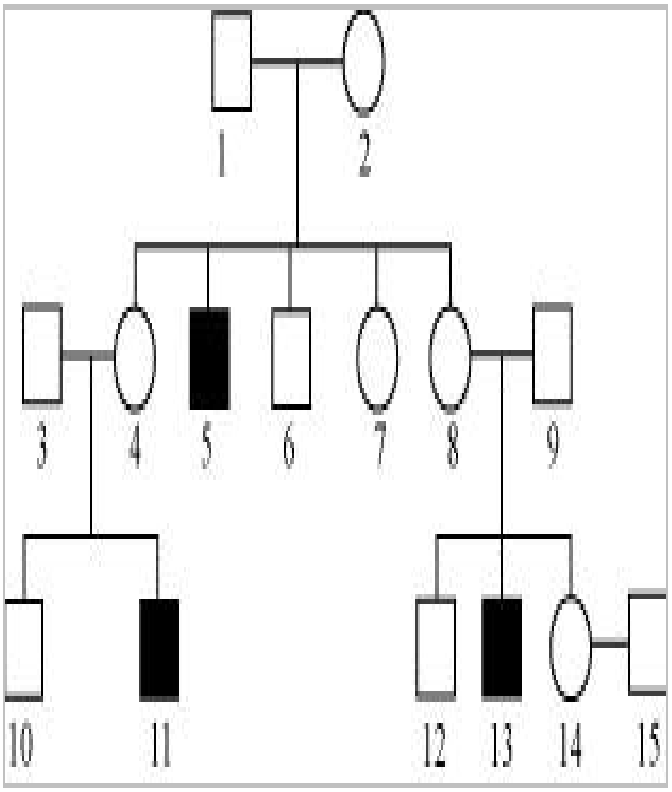
Part 5 Lesson 9 Pedigree's and Lesson 10 Wrap-Up

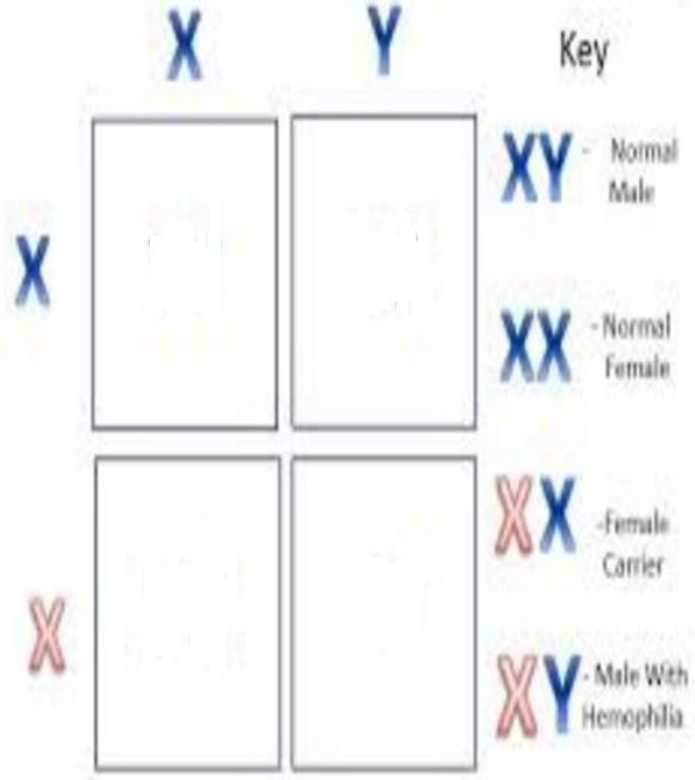
Pedigree Chart: A diagram that shows the occurrence and appearance or p_____ of a particular g_____ or organism and its ancestors from one generation to the next.

Please complete the Pedigree below as we do it in class. Color Blindness



Hemophilia is a sex-linked recessive disorder of humans in which the ability of the blood to clot is severely reduced. The pedigree chart below shows the inheritance of hemophilia in a family. Study the patterns of inheritance and answer the questions below. □ = male, o= female. ■ =affected male,





◊ **Which numbers are females? _____**
◊ **Which numbers are males?_____**
◊ **How many children did 1 and 2 have? _____**
◊ **Which child from 1 and 2 had hemophilia?_____**
◊ **Does number 7 have hemophilia?_____**
◊ **How many children did 8 and 9 have?_____**
◊ **Which children (4,5,6,7,8) are carries of hemophilia? Shade them with** ◑
◊ **Was 1 or 2 a carrier of hemophilia? Shade which one.**
◊ **Is hemophilia more common in men or women?_____**
◊ **Are women more often carriers or affected with hemophilia?_____**
◊ **Number 14 and 15 have a male child with hemophilia. Was number 14 a carrier? _____**
◊ **What was the probability that they (14 and 15) would have a child with hemophilia?** ◊
Complete the Punnett Square above to find out? _____% chance

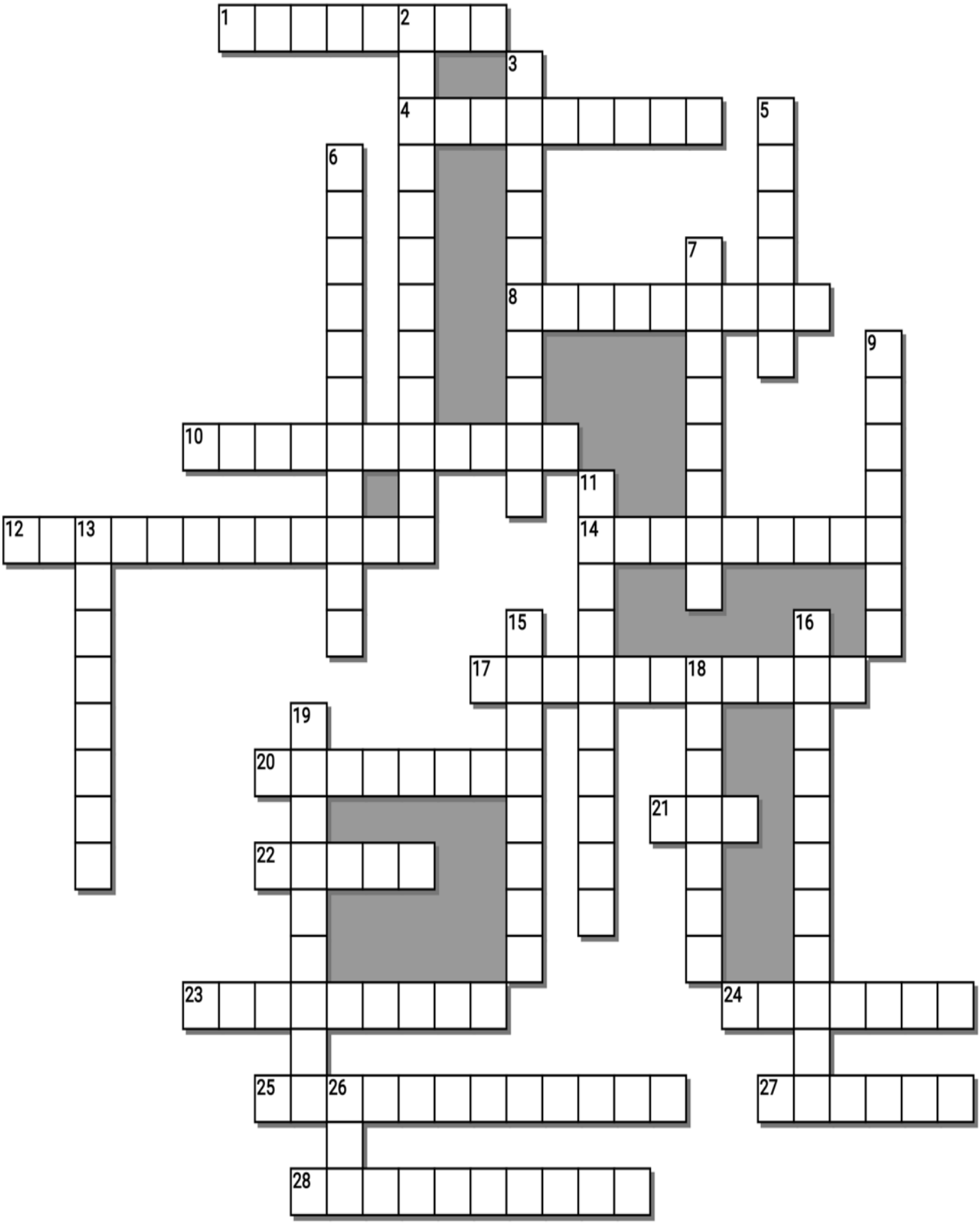
ALLELES, ASSORTMENT, CODOMINANCE, DARWIN, DOMINANCE, GENES, HEREDITY, HETEROZYGOUS, HOMOZYGOUS, INCOMPLETE, MENDEL, MODIFICATION, PEA, PEDIGREE, PUNNETT, PUREBRED, REPRODUCTION, SEGREGATION, SELECTIVE, STEVENS, TWO, DOMINANT , GENOTYPE, PHENOTYPE, POLYGENIC, PROBABILITY, RECESSIVE, SEGREGATION

Across

1. Always produce offspring with the same trait as the parent.
4. An organism's _____ is its physical appearance or its visible traits.
8. Most traits are _____, controlled by one or more genes with six alleles.
10. Genetics deals heavily with _____, or the likelihood that a particular event will occur.
12. Descent with : The passing on of traits from parent organisms to their offspring. Offspring will display small changes.
14. The intentional breeding of organisms with desirable traits in an attempt to produce offspring with similar desirable characteristics or with improved traits.
17. Law of _____ (Heredity), states that allele pairs separate or segregate during gamete formation, and randomly unite at fertilization.
20. An organism's _____ is its genetic makeup, or allele combinations.
21. Mendel work with these type of plants
22. Today's scientists call the factors that control traits _____.
23. The Law of _____: An organism with alternate forms of a gene will express the form that is dominant.
24. _____ Square: A diagram that is used to determine the outcome of a particular cross (Probability / likelihood that that particular event / cross will occur)
25. This has two different alleles
27. The Father of Modern Genetics, First name Gregor
28. This has two of the same alleles

Down

2. Mendel knew that the female contributes one factor, while the male contributes the other factor in sexual _____.
3. _____ Dominance: One allele for a specific trait is not completely dominant over the other.
5. _____ found that nature is just like selective breeding but is done automatically. – The environment decides who lives and dies.
6. The Law of _____ : Each inherited trait is defined by a gene pair. Parental genes are randomly seperated to the sex cells so that sex cells contain only one gene of the pair. Offspring therefore inherit one genetic allele from each parent when sex cells unite in fertilization.
7. A diagram that shows the occurrence and appearance or phenotype of a particular gene or organism and its ancestors from one generation to the next
9. Biologist Nettie _____1905 Discovered the X and Y chromosome and answered the thousand year old question of why boys become boys and girls become girls.
11. The Law of Independent _____: Genes for different traits are sorted separately from one another so that the inheritance of one trait is not dependent on the inheritance of another.
13. A _____ allele is one whose trait always shows up in the organism when the allele is present.
15. When you pass traits from parents to offspring
16. A relationship among alleles where both alleles contribute to the phenotype of the heterozygote.
18. Scientists call the different forms of gene_____
19. A _____ allele is covered up when the dominant allele is with it. A hybrid has two different alleles.
26. Dihybrid Cross: A cross that involves ____ sets of characteristics.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Genetics Review GAME

1-20 = 5 pts Lesson 11 Review Game

*20-*25 * = Bonus + 1 pt,

(Secretly write owl in correct space +1 pt) Score ____ / 100

Final Question = 5 pt wager

MEN DULL	TYPO	HOT LOTTO	THINK INSIDE THE BOX	FAMILY TIES Bonus round 1 pt each
1)	6)	11)	16)	*21)
2)	7)	12)	17)	*22)
3)	8)	13)	18)	*23)
4)	9)	14)	19)	*24)
5)	10)	15)	20)	*25)

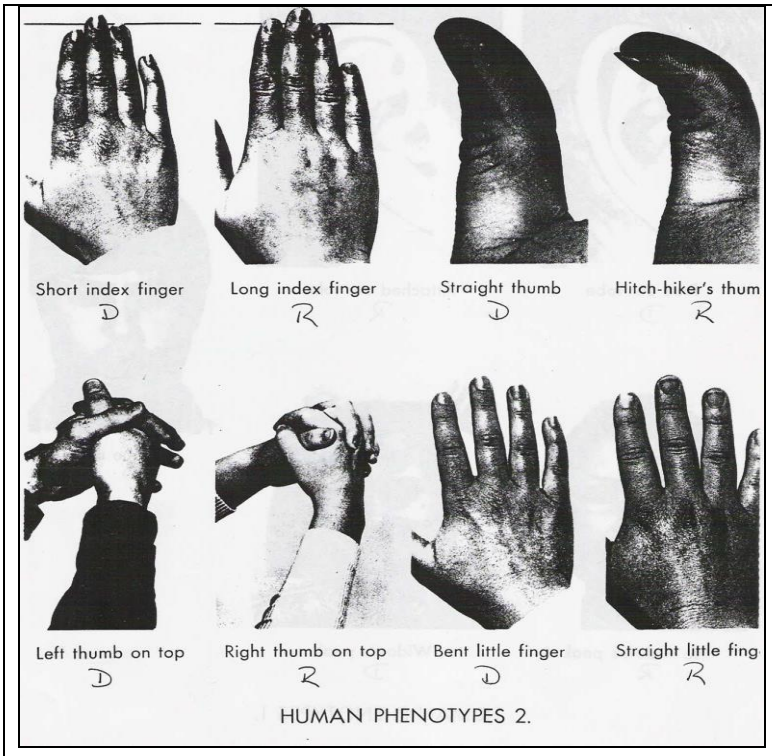
Final Question Wager ___ /5 Answer: _____

Part 5 Genetics

Name:
Due:

Part 5 Lesson 1 Intro to Genetics and Mendel

Circle what human phenotypes you display? Answers will vary based on student phenotypes



Widows Peak No Widows Peak

Can you mark your bingo sheet? Any Bingo's? First one to say BINGO may get a prize.
Answers will vary based on student phenotypes

B	I	N	G	O
Dimples	No Freckles	I have a different trait than the person sitting next to me	Alergies	Hitch hikers thumb
No Finger Hair	Cleft chin	Trait in common - Left	No Dimples	Widows Peak
Finger Hair	Curly hair	Free!	Shared trait - Left	I cross my right thumb over my left when I clasp my hands
No Dimples	Second Toe Longest	Can not roll tongue	Right Handed	First Toe Longest
No finger Hair	Straight hairline	Trait in common - Right	Detached earlobes	I cross my left thumb over my right when I clasp my hands

Please record some information about the person below

Gregor Mendel is best known for his work with his pea plants in the abbey gardens. He spent about seven years planting, breeding and cultivating pea plants in an experimental part of the abbey garden that was started by the previous abbot. Through meticulous record-keeping, Mendel's experiments with pea plants became the basis for modern genetics.

Mendel chose pea plants as his experimental plant for many reasons. First of all, pea plants take very little outside care and grow quickly. They also have both male and female reproductive parts, so they can either cross-pollinate or self-pollinate. Perhaps most importantly, pea plants seem to show one of only two variations of many characteristics. This made the data much more clear-cut and easier to work with.

Mendel's first experiments focused on one trait at a time, and on gathering data on the variations present for several generations. These were called monohybrid experiments. He studied a total of seven characteristics. His findings showed that there were some variations that were more likely to show up over the other variations. When he bred purebred peas of differing variations, he found that in the next generation of pea plants one of the variations disappeared. When that generation was left to self-pollinate, the next generation showed a 3 to 1 ratio of the variations. He called the one that seemed to be missing from the first filial generation "recessive" and the other "dominant," since it seemed to hide the other characteristic.

These observations led Mendel to the law of segregation. He proposed that each characteristic was controlled by two alleles, one from the "mother" and one from the "father" plant. The offspring would show the variation it is coded for by the dominance of the alleles. If there is no dominant allele present, then the offspring shows the characteristic of the recessive allele. These alleles are passed down randomly during fertilization.

Scoville, H. (2019, August 17). *Gregor Mendel's unique experiments made him the father of Genetics*. ThoughtCo. Retrieved July 20, 2022, from https://www.thoughtco.com/about-gregor-mendel-1224841

Gregor Mendel: The father of modern genetics. He counted his results and kept "almost too perfect" statistical notes, much like your science journal. The year was 1851, a young priest from Vienna studied mathematics and science at the university. Upon finishing, he went back to priesthood and tended a garden outside of the monastery. He worked with pea plants and became curious as to why some pea plants had different characteristics or Traits.

Selective Breeding: The intentional breeding of organisms with desirable traits in an attempt to produce offspring with similar desirable characteristics or with improved traits.

Descent with Modification: The passing on of traits from parent organisms to their offspring. Offspring will display small changes.

Darwin found that nature is just like selective breeding but is done automatically.

- The environment decides who lives and dies.

Part 5 Lesson 2 Alleles, Mendel and More terms

Mendel seemed to notice that pea plants tended to pass traits from parents to offspring, which is called heredity.

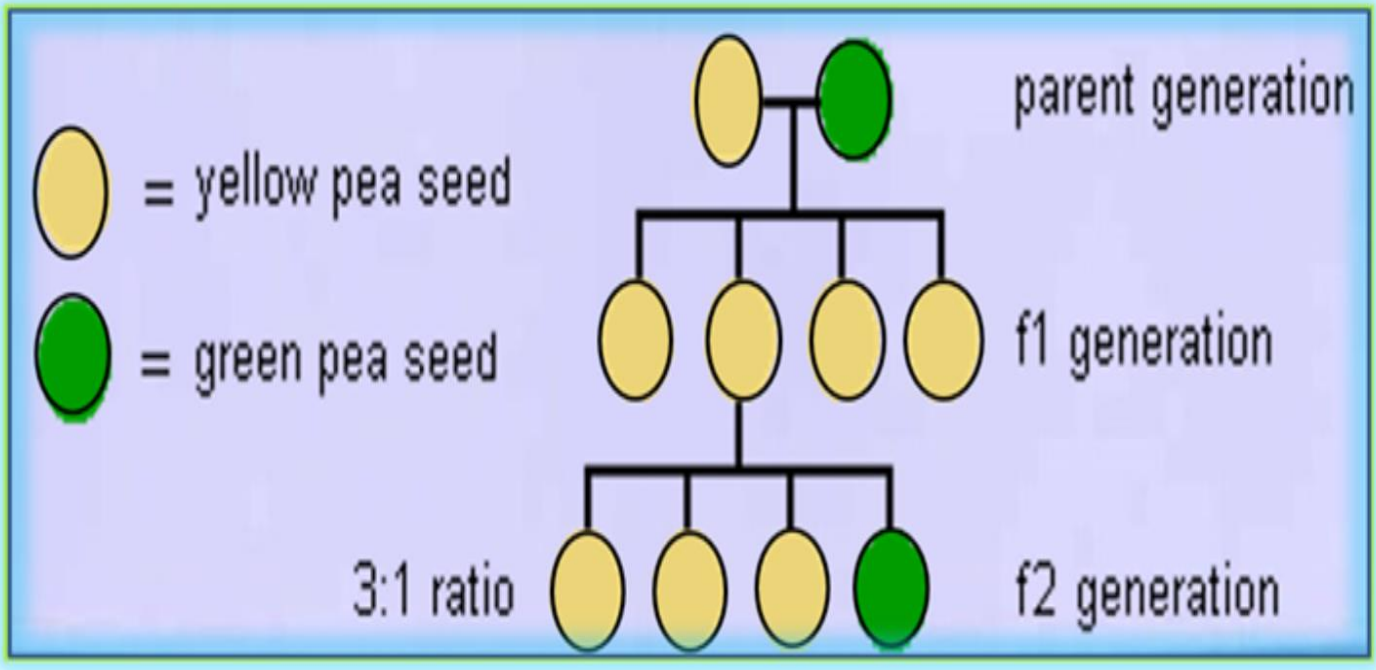
Law of segregation (Heredity), states that allele pairs separate or segregate during gamete formation, and randomly unite at fertilization.

- A gene can exist in more than one form.
- Organisms inherit two alleles for each trait.
- When gametes are produced (by meiosis), allele pairs seperate leaving each cell with a single allele for each trait.

Mendel started doing experiments with purebred plants, or plants that always produce offspring with the same trait as the parent. For example, short pea plants always produce short offspring. Mendel then decided to cross short pea plants with tall pea plants.

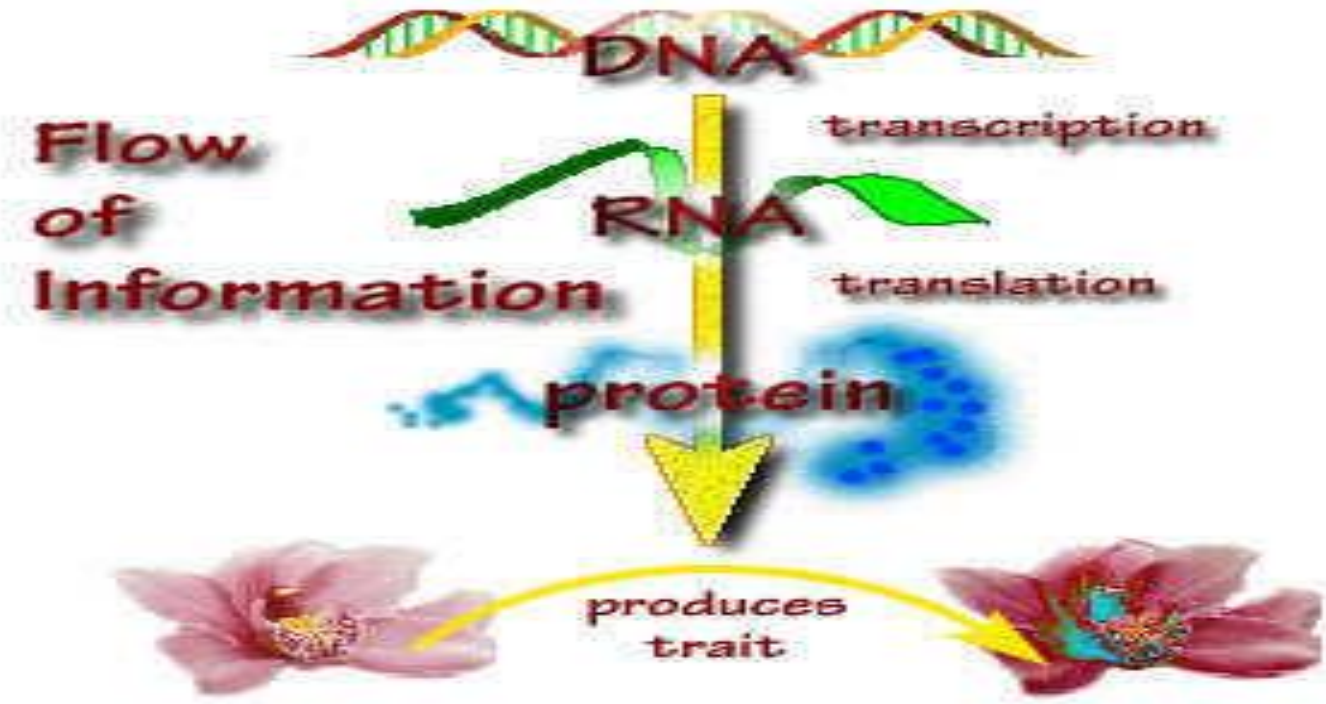
What do you think Mendel got when he bred tall and short? Answers will vary A.) Medium sized plants. B.) Half tall, and half short. C.) All Short D.) All Tall E.) They won't germinate	What do you think Mendel got when he bred all of thje tall offspring? A.) Medium sized plants. B.) Most tall and some short. C.) All Short D.) All Tall E.) They won't germinate.

Please write about Gregor Mendel and his research with pea plants and early genetics using this diagram. What is so significant when comparing the f_1 and f_2 generation?



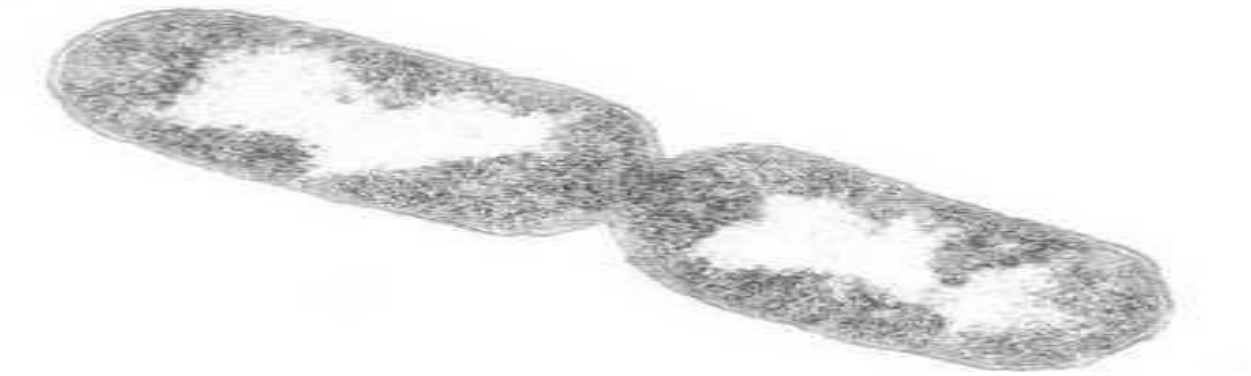
Mendel did experiments with various characteristics or phenotypes. In each case, one value of the characteristic disappeared in the F1 plants and then showed up again in the F2 plants. 75% percent of F2 plants had one value of the characteristic and 25% percent had the other value. Based on these observations, Mendel formulated his first law of inheritance. This law is called the law of segregation. It states that there are two factors controlling a given characteristic, one of which is dominant, and the other which is recessive. The factors separate and go to different gamete when a parent reproduces.

An organism's phenotype is its physical appearance or its visible traits. An organism's genotype is its genetic makeup, or allele combinations.



From all of Mendel's' results, he reasoned that individual factors must control the inheritance of traits in peas. Mendel knew that the female contributes one factor, while the male contributes the other factor in sexual reproduction.

What type of reproduction are these bacteria doing? Binary Fission: The process by which a bacterium multiplies by splitting in two. In asexual reproduction, one individual produces offspring that are genetically identical to itself.



Today's scientists call the factors that control traits genes. Scientists call the different forms of gene alleles.

Part 5 Lesson 3 Alleles

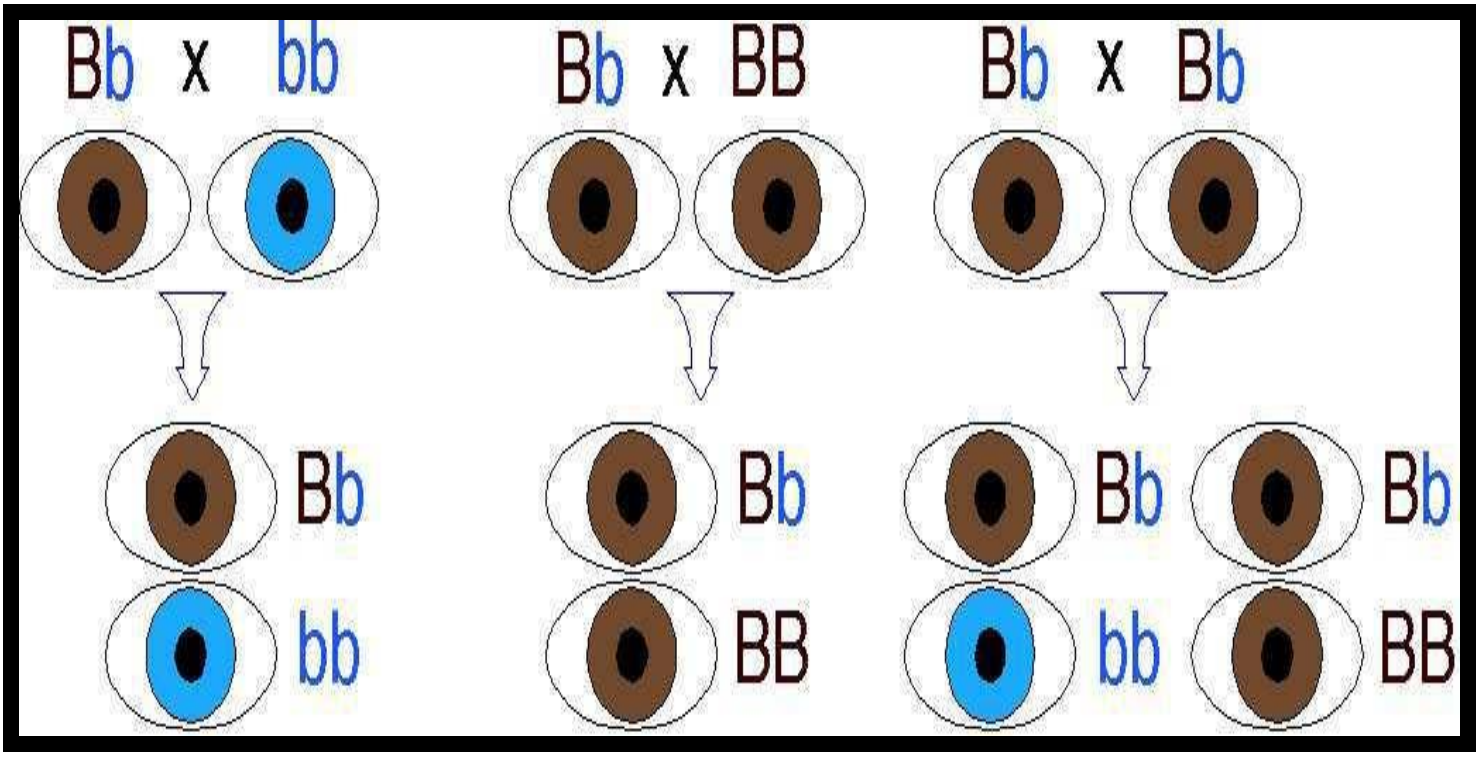
A dominant allele is one whose trait always shows up in the organism when the allele is present. A recessive allele is covered up when the dominant allele is with it. A hybrid has two different alleles.

Most traits are polygenic, controlled by one or more genes with six alleles.

- Height, eye color, skin color, are all controlled by multiple alleles.

T = Dominant
t = Recessive
TT = Two dominant
tt = Two recessive
Tt = One dominant, one recessive

Please sketch in the correct eye Color if Brown color (B) is dominant and (b) blue color is recessive.



Which letter below best describes heredity? A.) When the female contributes one factor, while the male contributes the other. B.) An organism's physical appearance or visible traits. C.) When traits are passed from parents to offspring. D.) Factors that control traits. E.) Allele that is covered up when the dominant allele is with it.	Which letter below best describes a gene? A.) Allele that is covered up when the dominant allele is with it. B.) An organism's physical appearance or visible traits. C.) Factors that control traits. D.) When the female contributes one factor, while the male contributes the other.
Which letter below best describes Mendel's Law of Segregation? A.) An organism's physical appearance or visible traits. B.) When allele pairs separate during gamete formation, and randomly unite at fertilization. C.) When traits are passed from parents to offspring. D.) An organism's genetic makeup, or allele combinations. E.) Allele that is covered up when the dominant allele is with it.	Which letter below best describes an allele? A.) An organism's genetic make-up. B.) An organism's physical appearance or visible traits. C.) When traits are passed from parents to offspring. D.) The different forms of a gene. E.) Alleles do not exist in nature.

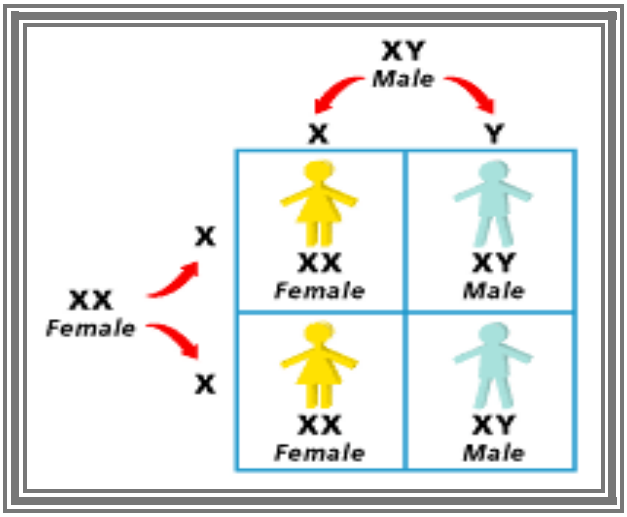
Mendel's Laws of Heredity:

- 1) The Law of Segregation: Each inherited trait is defined by a gene pair. Parental genes are randomly separated to the sex cells so that sex cells contain only one gene of the pair. Offspring therefore inherit one genetic allele from each parent when sex cells unite in fertilization.
- 2) The Law of Independent Assortment: Genes for different traits are sorted separately from one another so that the inheritance of one trait is not dependent on the inheritance of another.
- 3) The Law of Dominance: An organism with alternate forms of a gene will express the form that is dominant.

Most traits are polygenic, controlled by one or more genes with six alleles.

- Height, eye color, skin color, are all controlled by multiple alleles.

Punnett Square: A diagram that is used to determine the outcome of a particular cross (Probability / likelihood that that particular event / cross will occur)

Please use complete the Punnett square and then describe which gender controls the sex of the child in humans? Please respond on the lines below. Answer! The male, he is the only one who carries the Y chromosome. If he gives the X it is female, if he gives the Y it is male. The woman is XX and can only give the X	

Sex Chromosome: A chromosome involved with determining the sex of an organism, typically one of two kinds. (X,Y)

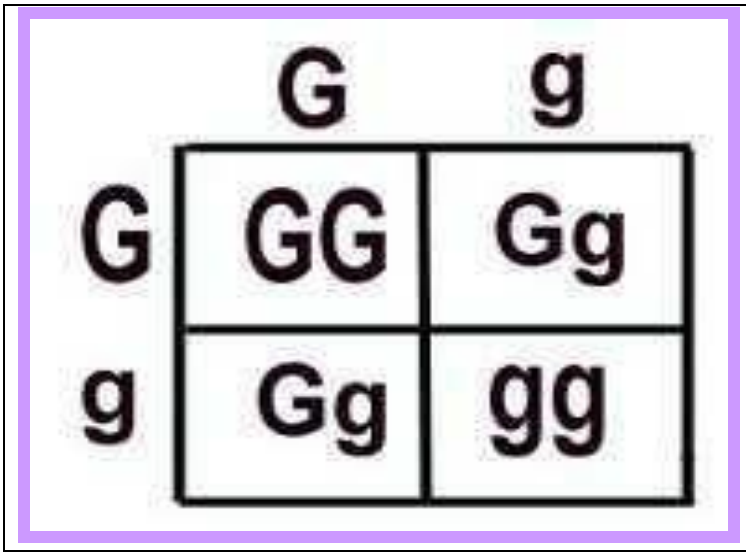
Biologist Nettie Stevens1905 Discovered the X and Y chromosome and answered the thousand year old question of why boys become boys and girls become girls.

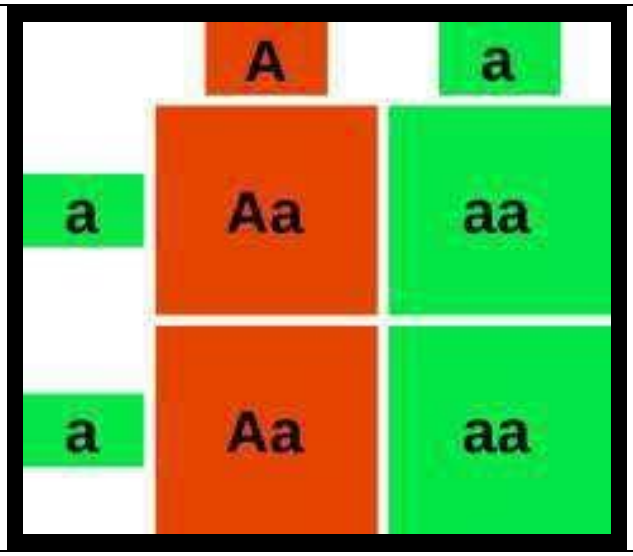
Part 5 Lesson 4 Probability and Punnett Squares

Genetics deals heavily with probability, or the likelihood that a particular event will occur.

Please record which boxes in the Punnett Square are….

Homozygous- Has two identical alleles TT or *tt*
Homozygous Dominant: All dominant (TT)
Homozygous Recessive: All recessive (tt)
Heterozygous- Has two different alleles Tt





Built-In Quiz: Word Bank=Homozygous recessive, homozygous dominant, heterozygous

1) Homozygous Dominant	2) Homozygous Recessive	3) Heterozygous	4) Heterozygous
5) Homozygous Dominant	6) Heterozygous	7) Homozygous Recessive	8) Homozygous Dominant
9) Heterozygous and Homozygous Dminant	10) Homozygous Recessive and Heterozygous	*11) Princess Bride	

Designing your Child Part 5 Lesson 4 Project

Please partner up with a member of the opposite sex. If numbers don't work than the remaining students can work solo. Determine the genotype by flipping a coin and looking at the letters on the left (Ex. H or h). Male flips coin and female flips coin. Record a capital letter if you flip a heads, or lower case letter if you flip a tails. Genotype will determine the phenotype.

Heads =Dominant (Capital Letter)
Tails = Recessive (Lower Case Letter)

Trait	Male	Fem	Genotype	Phenotype	Phenotype	Phenotype
Hair (H or h)	H	H	Hh	HH – Lots of Hair	Hh- Average Hair	hh – Bald
Widows Peak	W	W	WW	WW-Widows Peak	Ww-Widows Peak	www- No Widows Preak
Ears (E or e)	e	e	ee	EE – Big Ears	Ee – Average Ears	ee – Small ears
Earlobes				EE- Unattached	Ee- Unattached	ee-attached
Hairy Ears (J or j)				JJ – No hair on ears	Jj – No hair on ears	jj- hairy ears
Head (U or u)				UU – Wide head	Uu – Average head	uu – Small head
Nose (N or n)				NN – Large Nose	Nn – Average Nose	nn – Small nose
Eyes (E or e)				EE – Large eyes	Ee–Average eyes	ee – squinty eyes
Eye Color (B or b)				BB – Brown Eyes - If either parent has brown eyes	Bb - Brown Eyes - If either parent has brown eyes	bb – Blue eyes Only if both parents have blue eyes.
Eye Brows (B or b)				BB – Large bushy eyebrows	Bb – Average eyebrows	bb – Unibrow
Eye Brow Color				BB – Darker than hair	Bb – Same as hair	Bb – lighter than hair
Eye Shape (E or e)				EE- Rounded Eyes	Ee-Rounded Eyes	ee- Almond shaped
Eye Distance (D or d)				DD- Close together	Dd – Average	Dd – far apart
Eye Lashes (L or l)				LL – Long eyelashes	Ll -Average	ll – Short and stubby
Facial Hair (F or f)				FF – Lots of facial hair	Ff – No facial hair	ff – No facial hair
Lips (L or l)				LL – Huge lips	Ll – Average lips	ll – Small thin lips
Chin (C or c)				CC – Large square chin	Cc – Rounded chin	cc – Chubby chin
Dimples (D or d)				DD – Dimples	Dd – Dimples	Dd – No dimples
Cleft Chin				CC-Cleft	Cc-Cleft	cc – No cleft
Eyesight (E or e)				EE – No glasses needed	Ee – No glasses needed	ee – Eyeglasses are needed.
Freckles (F or f)				FF – Lots of freckles	Ff – Lots of Freckles	ff – No freckles
Hair Color (H or h)				HH – Dark hair	Hh – Dark hair	hh – Light hair
Hitch hikers Thumb				TT-Hitch Hikers Thumb	Tt-Hitch Hikers Thumb	tt- No Hitch Hikers Thumb
Ear Wax (E or e)				EE- Wet ear wax	Ee-Wet ear wax	ee-Dry ear wax
Taste PTC Paper (P or p)				PP-Can taste PTC	Pp-Can taste PTC	pp-Cannot Taste PTC
Teeth (T or t)				TT- No gap in teeth	Tt – No Gap in teeth	tt- gap in front teeth
Color Blindness (C or c)				CC-No color blindness	Cc – No color blindness	cc – Mild color blindness (green / blue)

To determine gender – Male roles a coin as only the male can determine the sex of the child. If the male roles a heads than the offspring is a boy as heads will represent the Y chromosome.
The Gender is _____ The Name is _____ _____ _____

Please complete the Punnett Squares below. Part 5 Lesson 4 Punnett Squares

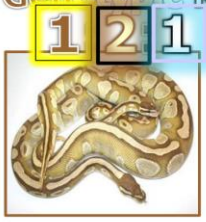
- Let's try one Punnett Square.

Phenotypic Ratio

3:1

Genotypic Ratio

1 2 1



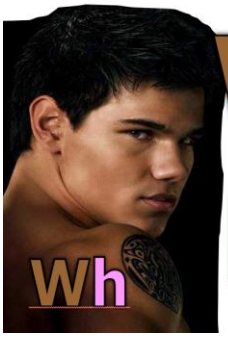
	B	b
B	BB	Bb
b	Bb	bb

Which is which?

Punnett Square "Twilight"

– What would the offspring of Jacob and Renesmee be…?

- W = Werewolf
- V = Vampire
- h = Human



	V	h
W	VW Vampwolf?	Wh Werewolf Human
h	Vh Vampire Human	hh Human

The F1 Generation (Two black gerbils)
One homozygous dominant (black)
One heterozygous (black)

- Do the Punnett Square, BB and Bb (F1)
  - B = Black Dominant
  - bb = White Recessive

	B	b
B	BB	Bb
B	BB	Bb

Note:

Phenotypic Ratio is 4:0

Genotypic Ratio is 2:2 (BB and Bb)

- Probability of outcome is: All black gerbils

The F2 Generation (Both black gerbils heterozygous)

F2

- Do the Punnett Square, Bb and Bb
  - B = Black Dominant
  - bb = White Recessive

	B	b
B	BB Homozygous Dominant	Bb Heterozygous
b	Bb Heterozygous	bb Homozygous recessive

Phenotypic ratio was 3:1,

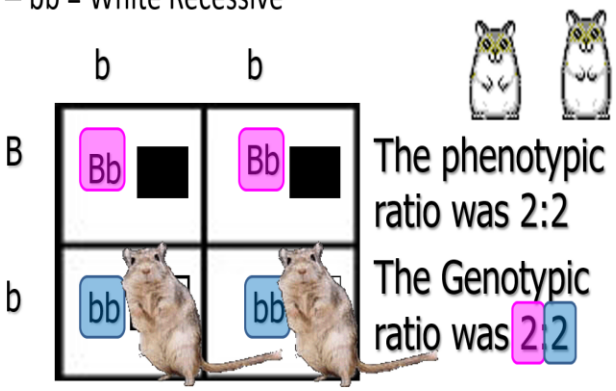
The Genotypic ratio was 1 2 1

- Probability of outcome is: Three black gerbils and one white gerbil

The F3 Generation (One heterozygous black gerbil and one homozygous recessive white gerbil)

- Do the Punnett Square, Bb and bb
  - B = Black Dominant
  - bb = White Recessive

F3



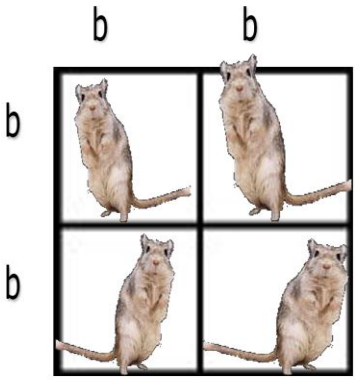
The phenotypic ratio was 2:2

The Genotypic ratio was 2:2

The F4 Generation (Two homozygous recessive white gerbils)

- Do the Punnett Square, bb and bb
  - B = Black Dominant
  - bb = White Recessive

F4



The phenotypic ratio is 4:0

The genotypic ratio is 4:0

What would happen if we went back to the pet store and got two homozygous dominant black gerbils over four generations? What would the color be? Explain.
All will be black because the two gerbils were BB homozygous dominant. If we started with black purebred offspring, they would always be black

Part 5 Lesson 6 and 7 Dihybrid Crosses
Dihybrid Cross: A cross that involves two sets of characteristics.

Please complete the dihybrid cross below and record the probability of the outcomes at the bottom. The husband is BGbg and the wife is the same BGbg. (BGbg x BGbg). Use a brown, green, and blue crayon to assist you.
B=Brown Eyes (Dominant) G=Green Eyes b= Blue Eyes

	BG	Bg	bG	bg
BG	BBGG	BBGg	BbGG	BbGg
Bg	BBGg	BBgg	BbGg	Bbgg
bG	BbGG	BbGg	bbGG	bbGg
bg	BbGg	Bbgg	bbGg	bbgg

12 : 3 : 1

What's the probability that the offspring will have…

Brown Eyes 12	Green Eyes 3	Blue Eyes 1
		

Please complete the dihybrid cross below and record the probability of the outcomes at the bottom. The Male Guinea pig is BbSs and the female is the same BbSs. (BbSs x BbSs). A brown and black crayon will help.

B=Black fur b=brown fur S=Short fur s=long fur

Brown fur / short 3 | 9 | Black fur / short

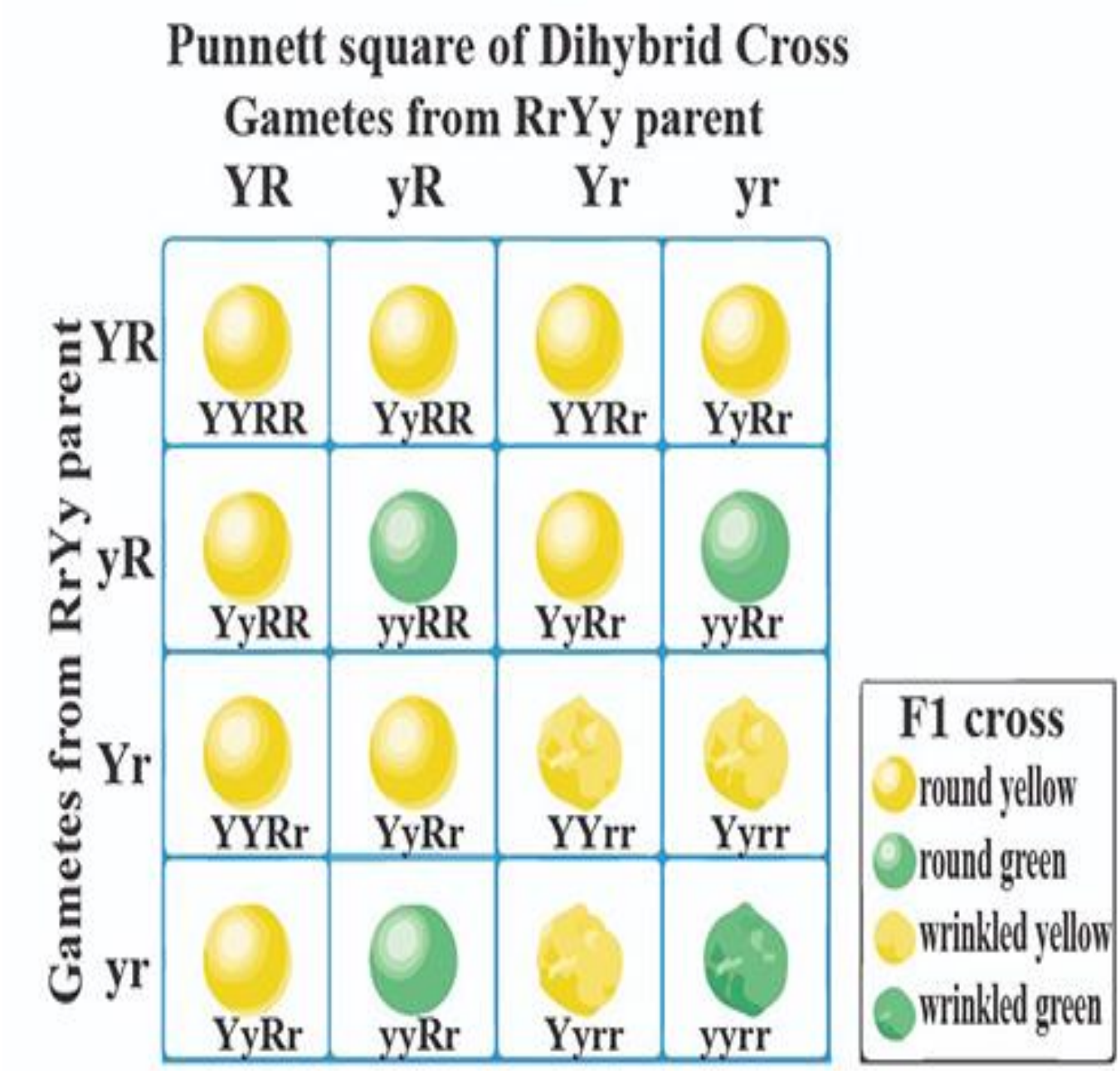
Brown fur / long 1 | 3 | Black fur / Long

Guinea pig male \ Gametes	BS	Bs	bS	bs
BS	BBSS	BBSs	BbSS	BbSs
Bs	BBSs	BBss	BbSs	Bbss
bS	BbSS	BbSs	bbSS	bbSs
bs	BbSs	Bbss	bbSs	bbss

How many Guinea Pigs were?:

Black and Short :9	Black and Long 3
Brown and Short :3	Brown and Long 1

Please complete the dihybrid cross below and record the probability of the outcomes in the ratio part at the bottom. Purple is dominant over white, and Smooth is dominant over wrinkled.



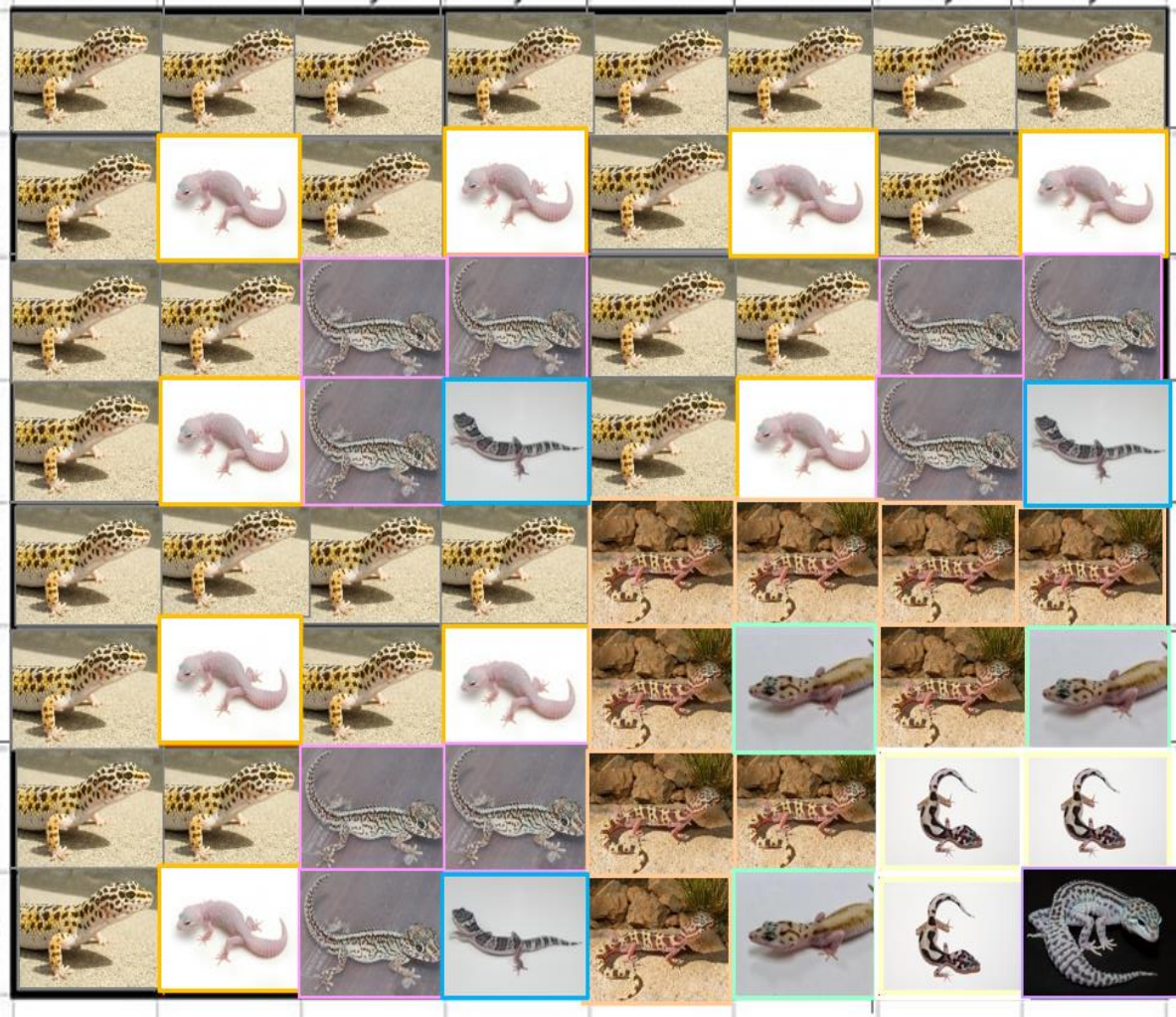
9 Yellow Rounded, 3 Round Green, 3 Yellow Wrinkled, 1 Green Wrinkled

Part 5 Lesson 7 Triple Cross

34

triple-het x triple-het cross

SsYyAa x SsYyAa



Phenotypes:

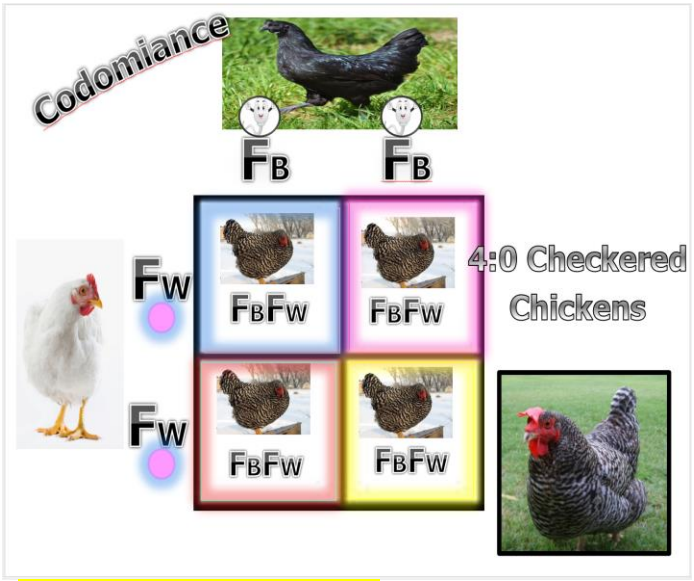
Out of 64 births.

27 -		- normal SSYYAA
9 -		- albinos SSYYaa
9 -		- anerythristic SSyyAa
9 -		- striped ssYYAA
3 -		- snow Ssyyaa
3 -		- striped-albino ssYYaa
3 -		- striped-anery ssyyAa
1 -		- striped-snow ssyyaa

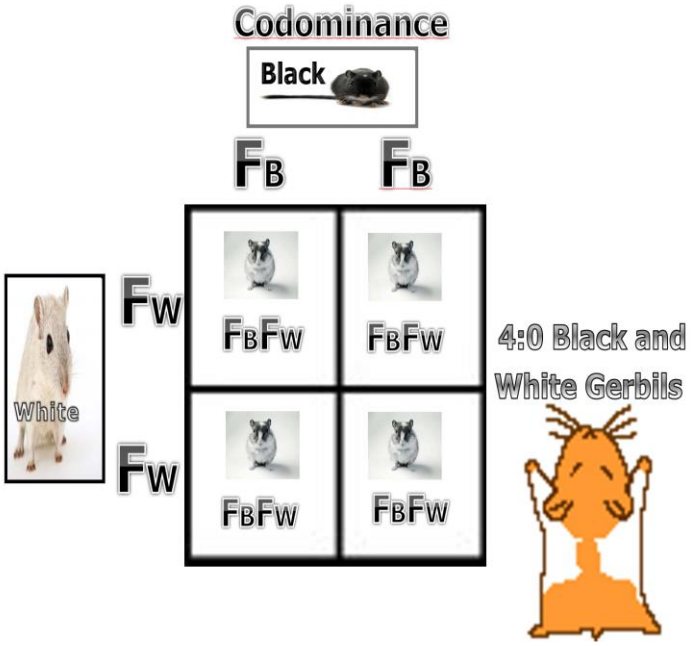
Part 5 Lesson 8 Codominance and Incomplete Dominance

Codominance is a relationship among alleles where both alleles contribute to the phenotype of the heterozygote.

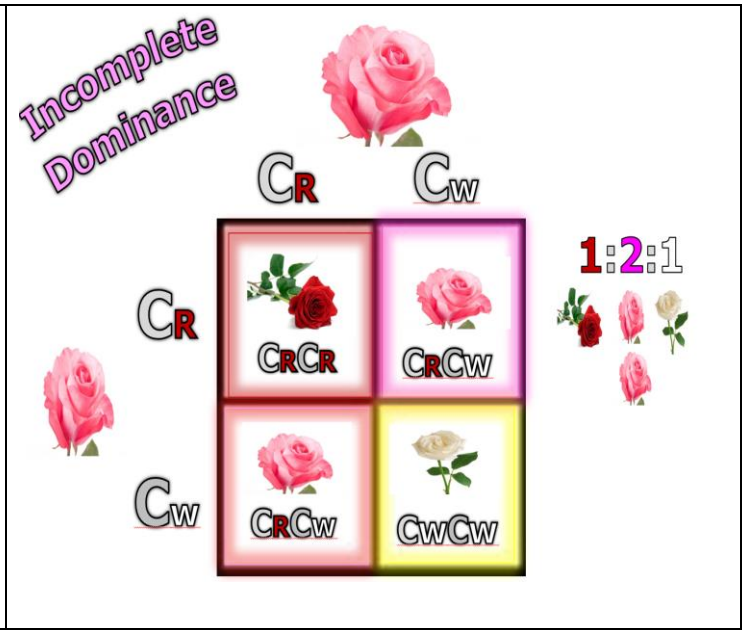
Please complete the Punnett Square Below? What's the probability that the offspring will be White Chickens FwFw, Black Chickens FbFb, or Checkered Chickens FbFw? Then figure out gerbils again.



4:0 All Checkered Chickens

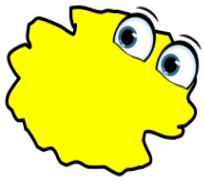


Incomplete Dominance: One allele for a specific trait is not completely dominant over the other. What type of roses will result below?
CRCR = Red, CRCW = Pink, CWCW = White



Complete as described in the video in the slideshow with the "Fluffys" Need, blue, yellow and green marker, crayon, or colored pencil.

Complete as described in the video in the slideshow with the "Fluffys" Need, blue, yellow and green marker, crayon, or colored pencil.

Genotype	Complete Dominance	Incomplete Dominance	Codominance
C_BC_B			
C_YC_Y			
C_BC_Y			

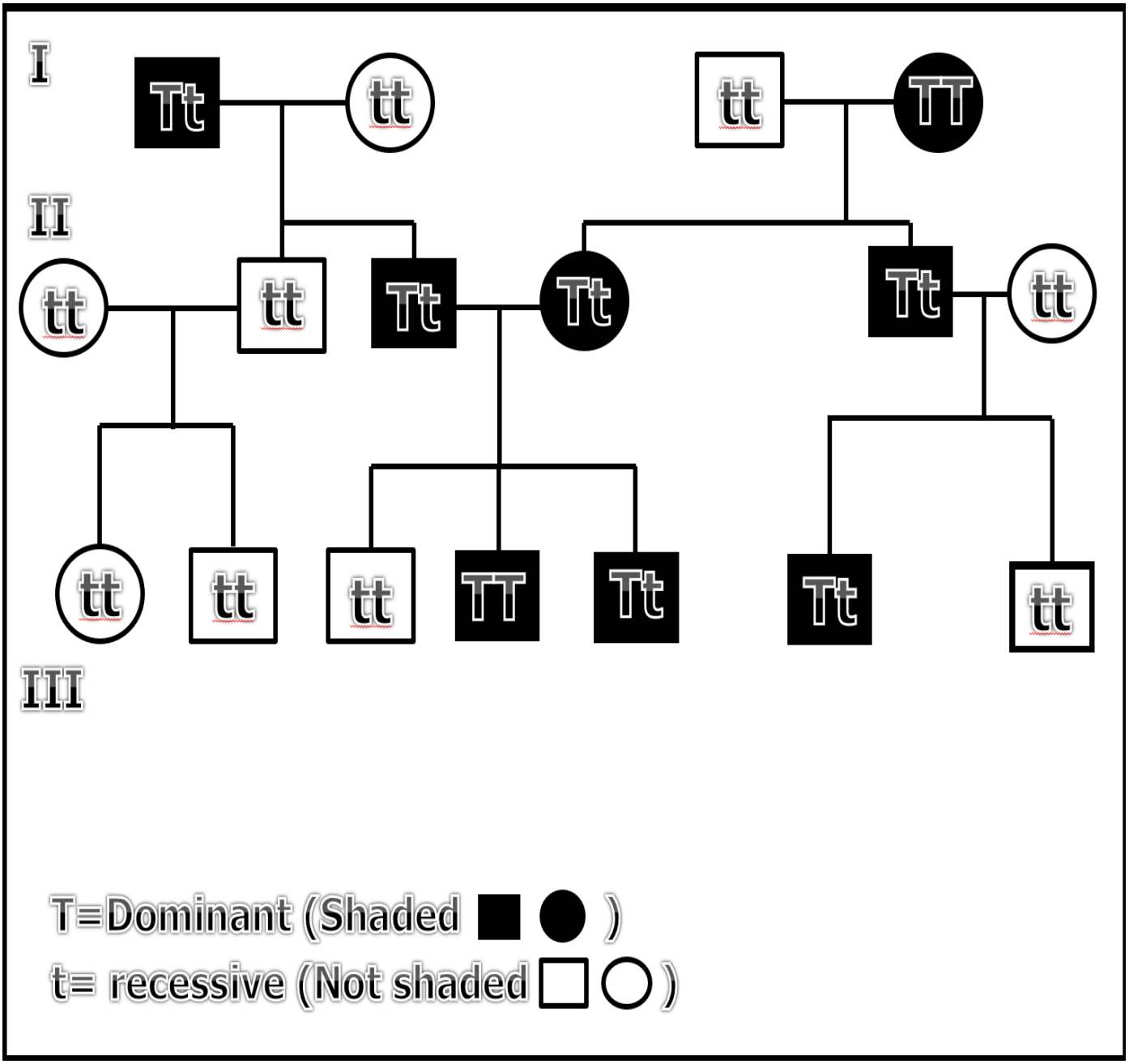
Mendel's Laws of Heredity:

- 1) The Law of Segregation: Each inherited trait is defined by a gene pair. Parental genes are randomly separated to the sex cells so that sex cells contain only one gene of the pair. Offspring therefore inherit one genetic allele from each parent when sex cells unite in fertilization.
- 2) The Law of Independent Assortment: Genes for different traits are sorted separately from one another so that the inheritance of one trait is not dependent on the inheritance of another.
- 3) The Law of Dominance: An organism with alternate forms of a gene will express the form that is dominant.

Part 5 Lesson 9 Pedigree's and Lesson 10 Wrap-Up

Pedigree Chart: A diagram that shows the occurrence and appearance or phenotype of a particular gene or organism and its ancestors from one generation to the next.

Please complete the Pedigree below as we do it in class. Color Blindness



Hemophilia is a sex-linked recessive disorder of humans in which the ability of the blood to clot is severely reduced. The pedigree chart below shows the inheritance of hemophilia in a family. Study the patterns of inheritance and answer the questions below. □ = male, o= female. ■ =affected male,

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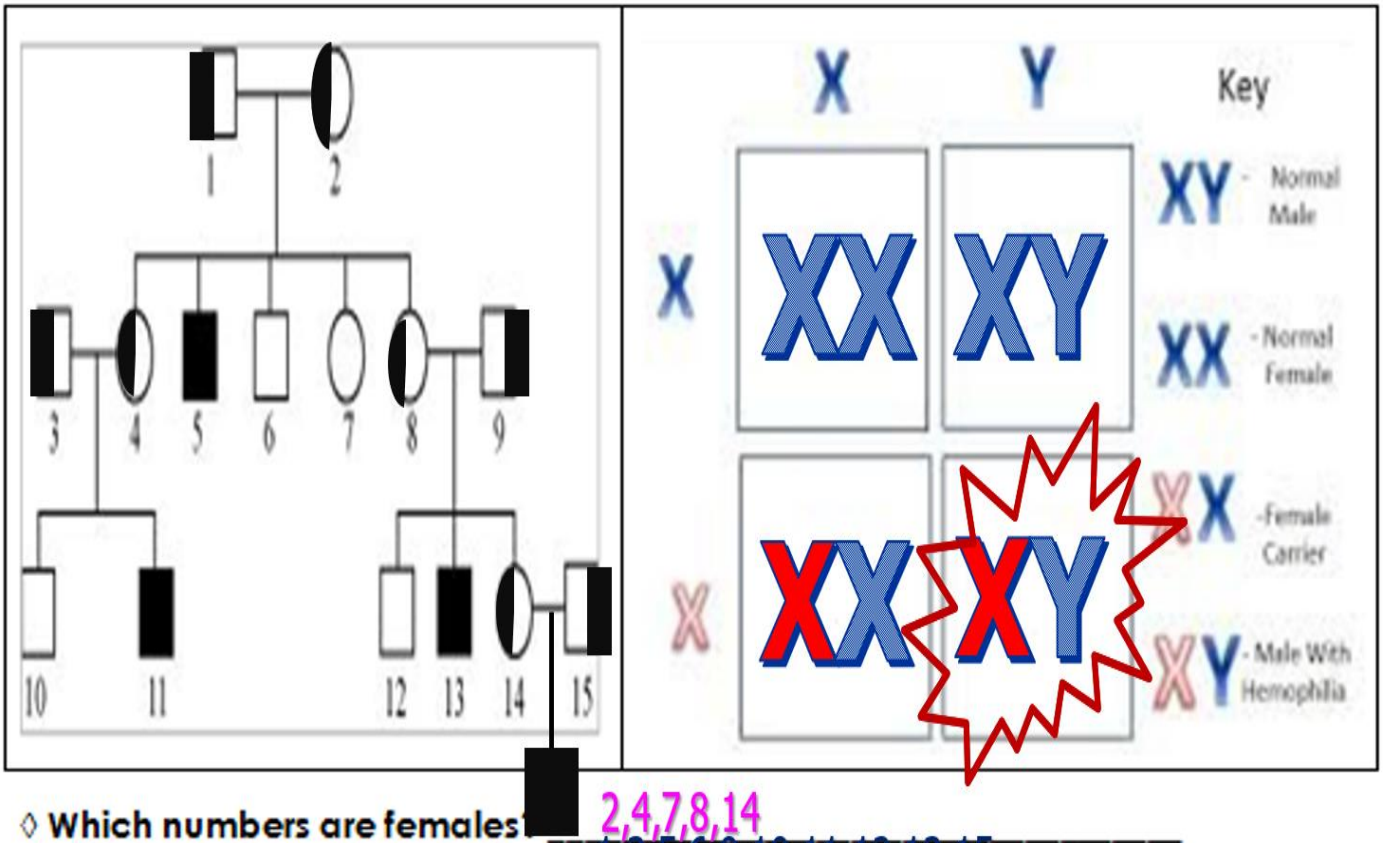


◊ Which numbers are females? 2,4,7,8,14
◊ Which numbers are males? 1,3,5,6,9,10,11,12,13,15
◊ How many children did 1 and 2 have? 5 Children
◊ Which child from 1 and 2 had hemophilia? Number 5
◊ Does number 7 have hemophilia? No
◊ How many children did 8 and 9 have? 3 Children

◊ Which children (4,5,6,7,8) are carries of hemophilia? Shade them with ◑
◊ Was 1 or 2 a carrier of hemophilia? Shade which one. Both Carriers
◊ Is hemophilia more common in men or women? Men have, women carry
◊ Are women more often carriers or affected with hemophilia? Carriers
◊ Number 14 and 15 have a male child with hemophilia. Was number 14 a carrier? Yes ◊ What was the probability that they would have a child with hemophilia. ◊ Do the Punnett Square above to find out? 3:1

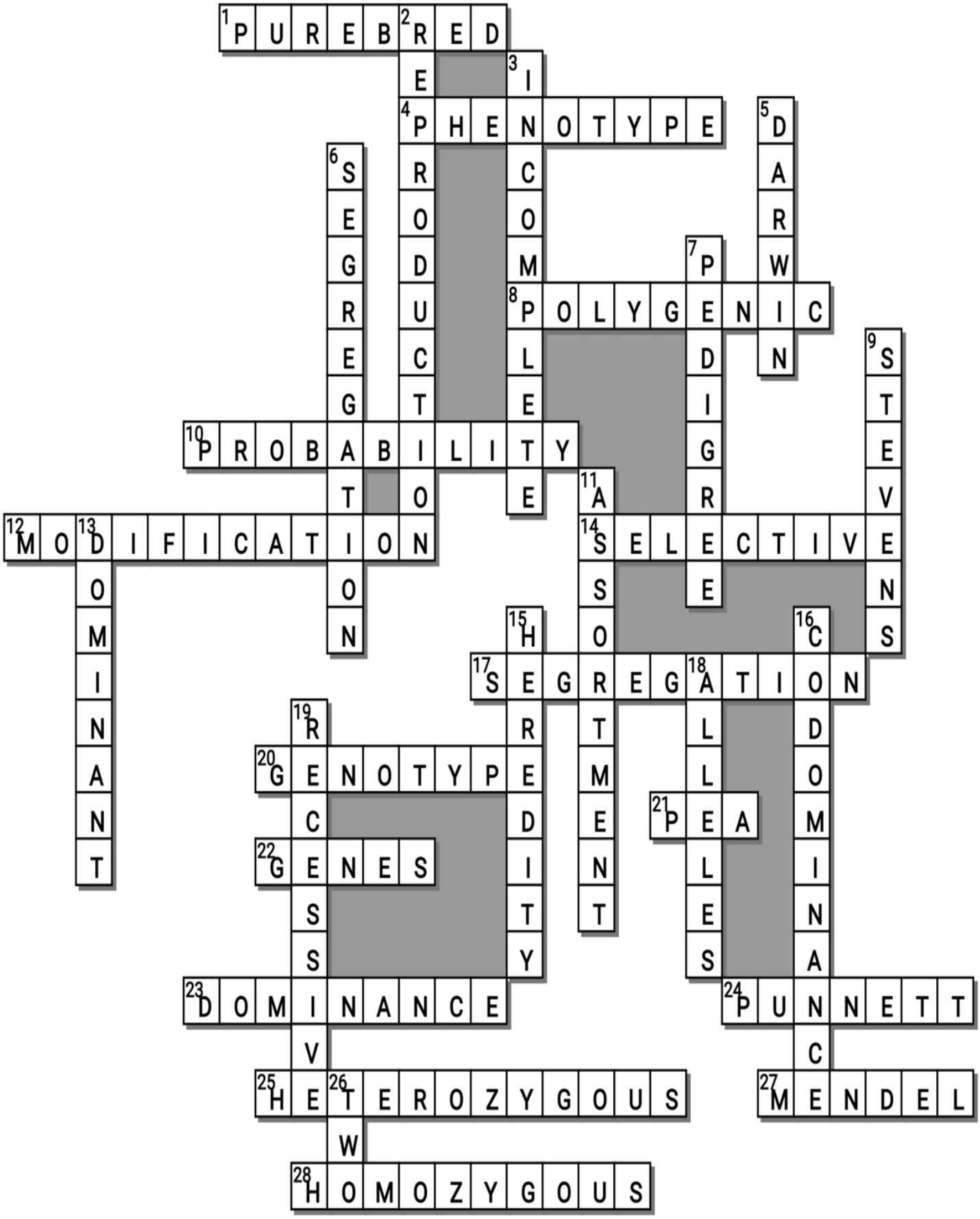
ALLELES, ASSORTMENT, CODOMINANCE, DARWIN, DOMINANCE, GENES, HEREDITY, HETEROZYGOUS, HOMOZYGOUS, INCOMPLETE, MENDEL, MODIFICATION, PEA, PEDIGREE, PUNNETT, PUREBRED, REPRODUCTION, SEGREGATION, SELECTIVE, STEVENS, TWO, DOMINANT , GENOTYPE, PHENOTYPE, POLYGENIC, PROBABILITY, RECESSIVE, SEGREGATION

Across

1. Always produce offspring with the same trait as the parent.
4. An organism's _____ is its physical appearance or its visible traits.
8. Most traits are _____, controlled by one or more genes with six alleles.
10. Genetics deals heavily with _____, or the likelihood that a particular event will occur.
12. Descent with : The passing on of traits from parent organisms to their offspring. Offspring will display small changes.
14. The intentional breeding of organisms with desirable traits in an attempt to produce offspring with similar desirable characteristics or with improved traits.
17. Law of _____ (Heredity), states that allele pairs separate or segregate during gamete formation, and randomly unite at fertilization.
20. An organism's _____ is its genetic makeup, or allele combinations.
21. Mendel work with these type of plants
22. Today's scientists call the factors that control traits _____.
23. The Law of _____: An organism with alternate forms of a gene will express the form that is dominant.
24. _____ Square: A diagram that is used to determine the outcome of a particular cross (Probability / likelihood that that particular event / cross will occur)
25. This has two different alleles
27. The Father of Modern Genetics, First name Gregor
28. This has two of the same alleles

Down

2. Mendel knew that the female contributes one factor, while the male contributes the other factor in sexual _____.
3. _____ Dominance: One allele for a specific trait is not completely dominant over the other.
5. _____ found that nature is just like selective breeding but is done automatically. – The environment decides who lives and dies.
6. The Law of _____ : Each inherited trait is defined by a gene pair. Parental genes are randomly seperated to the sex cells so that sex cells contain only one gene of the pair. Offspring therefore inherit one genetic allele from each parent when sex cells unite in fertilization.
7. A diagram that shows the occurrence and appearance or phenotype of a particular gene or organism and its ancestors from one generation to the next
9. Biologist Nettie _____1905 Discovered the X and Y chromosome and answered the thousand year old question of why boys become boys and girls become girls.
11. The Law of Independent _____: Genes for different traits are sorted separately from one another so that the inheritance of one trait is not dependent on the inheritance of another.
13. A _____ allele is one whose trait always shows up in the organism when the allele is present.
15. When you pass traits from parents to offspring
16. A relationship among alleles where both alleles contribute to the phenotype of the heterozygote.
18. Scientists call the different forms of gene_____
19. A _____ allele is covered up when the dominant allele is with it. A hybrid has two different alleles.
26. Dihybrid Cross: A cross that involves ____ sets of characteristics.


1 PUREBRED
2 RED
3 I
4 PHENOTYPE
5 DARWIN
6 SEGREGATION
7 P
8 POLYGENIC
9 STEVENS
10 PROBABILITY
11 A
12 MODIFICATION
13 DOMINANT
14 SELECTIVE
15 HORTMENT
16 CROSS
17 SEGREGATION
18 ALLELES
19 RECESSIVE
20 GENOTYPE
21 PEA
22 GENES
23 DOMINANCE
24 PUNNETT
25 HETEROZYGOUS
26 TERROZYGOUS
27 MENDEL
28 HOMOZYGOUS

Genetics Review GAME

1-20 = 5 pts Lesson 11 Review Game
*20-*25 * = Bonus + 1 pt,
(Secretly write owl in correct space +1 pt) Score ____ / 100
Final Question = 5 pt wager

MEN DULL	TYPO	HOT LOTTO	THINK INSIDE THE BOX	FAMILY TIES Bonus round 1 pt each
1) Gregor Mendel	6) Genotype	11) Punnett Square	16) 3:1 Tall to Short	*21) Sheen, Martin and Charlie
2) Letter D Heredity	7) DNA->RNA-> Protein	12) XY = Male	17) 2:2 Tall to Short	*22) Minnesota Twins
3) Letter B Pure Bred (Owl+1pt)	8) Genes	13) Probability	18) C and B are Brown with Red Eyes, D is black with red Eyes, E is Black with Brown Eyes	*23) Williams Sisters Serena and Venus
4) 3:1 Ratio 3 Tall, 1 Short	9) Letter B Dominant Allele	14) Letter E Homozygous Dominant and Heterozygous	19) Codominance	*24) Billy Ray and Miley Cyrus
5) Phenotype	10) Recessive Allele	15) Sexual Reproduction	20) Letter C Incomplete Dominance	*25) JFK and Ted Kennedy

Final Question Wager ___ /5 Answer: 2:2 ratio

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