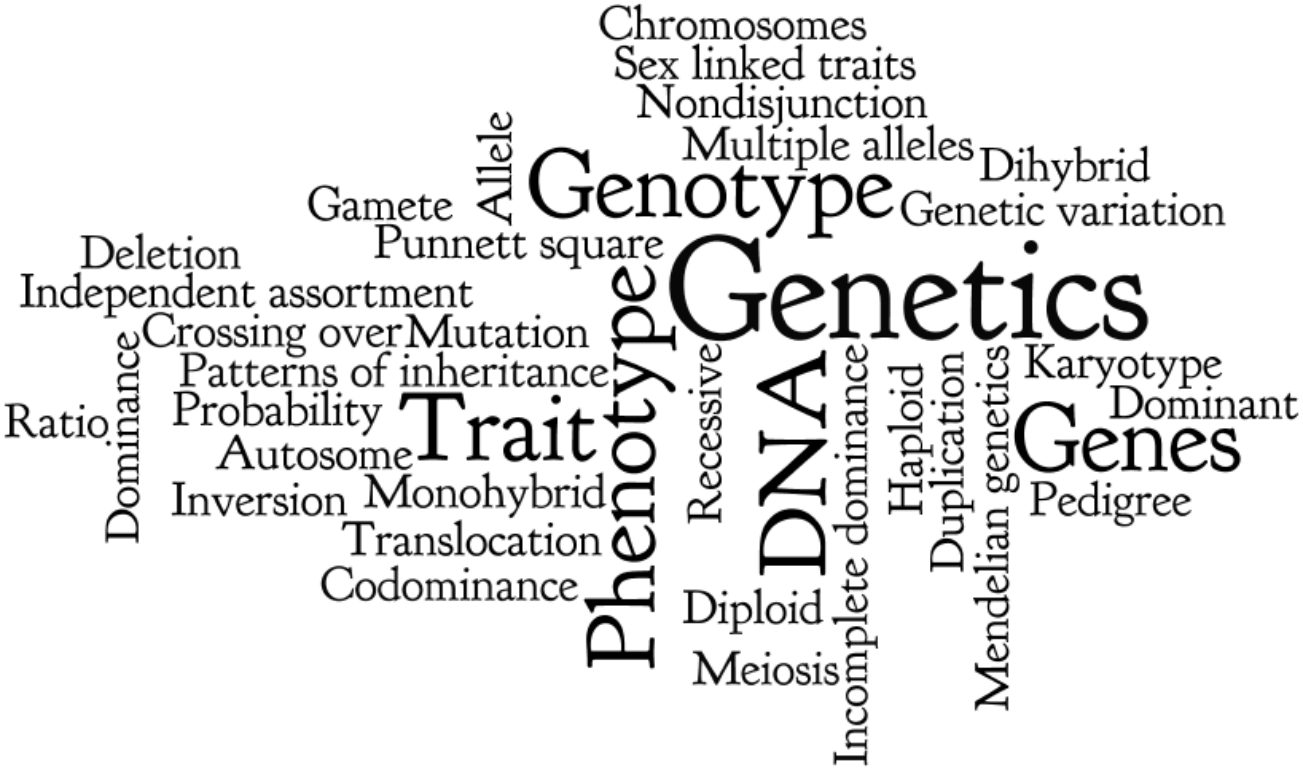

Unit 5: Genetics Notes

Name: _____

Period: _____

Test Date: _____

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Mendelian Genetics Notes

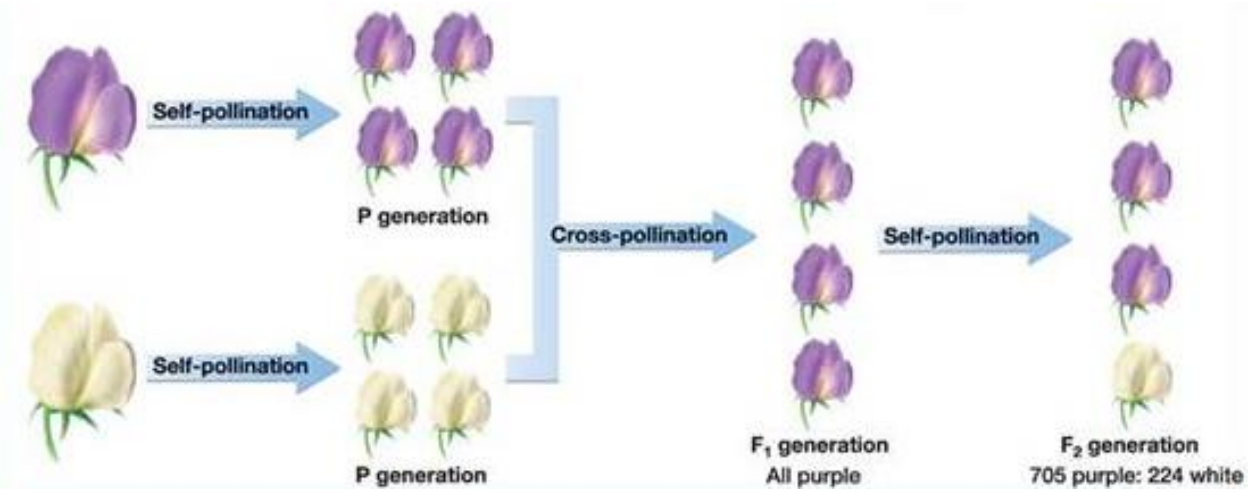
What is Heredity?

What is Genetics?

Gregor Mendel

- ☐ Gregor Mendel studied _____ in the 1800's.
- ☐ He was born in Austria to peasant parents who worked as gardeners.
- ☐ He studied at the University of Vienna and later became a monk.
- ☐ Conducted experiments in the garden studying _____.
- ☐ Observed & recorded _____ from parents to offspring.

Mendel's Experiments



Mendel's Experiments – Hypotheses

An individual has two copies of a gene – one from each _____.

There are different versions of each gene.

For example, the gene for flower color in pea plants can either be purple or white, represented by letters; - _____ and _____.

_____-the different versions of the gene; represented by letters

One allele is dominant, one is recessive…

_____: expressed form of trait (capital allele)

_____: not expressed form of trait (lower case allele)

_____-Having identical alleles for a trait; either two dominant alleles or two recessive alleles

- Homozygous Dominant = BB or TT or QQ
- Homozygous Recessive = bb or tt or qq

_____-Having two different alleles

- Bb or Tt or Qq

_____-the set of alleles that an individual has (the actual genes)

Ex: BB, Tt, or qq

_____-the physical appearance of a trait (how it actually appears)

Ex: Brown eyes or blue eyes; tall or short

Mendel's BIG Conclusions…
The Laws of Heredity

Law of Segregation

- ☐ Two alleles for a trait separate when gametes are formed

Law of Independent Assortment

- ☐ The inheritance of one trait does not influence the inheritance of another trait

Both of these occur during Meiosis*

Let's Practice!

Directions: For each genotype below, indicate whether it is a heterozygous (write: **He**) OR homozygous (write: **Ho**).

1. TT_____ Bb_____ DD_____ Ff_____ tt_____ dd_____

   Dd_____ ff _____ Tt_____ bb_____ BB_____ FF_____

Directions: Determine the phenotype for each genotype using the information provided.

2. Yellow body color is dominant to blue.

   YY _____ Yy _____ yy _____

3. Square shape is dominant to round.

   SS _____ Ss _____ ss _____

Directions: Determine the genotype and phenotype for the trait: teeth (Y – yellow, y – white).

4.	Genotype	Phenotype
Homozygous dominant	_____	_____
Homozygous recessive	_____	_____
Heterozygous	_____	_____

5. **Directions**: Circle the choices that are examples of each word.

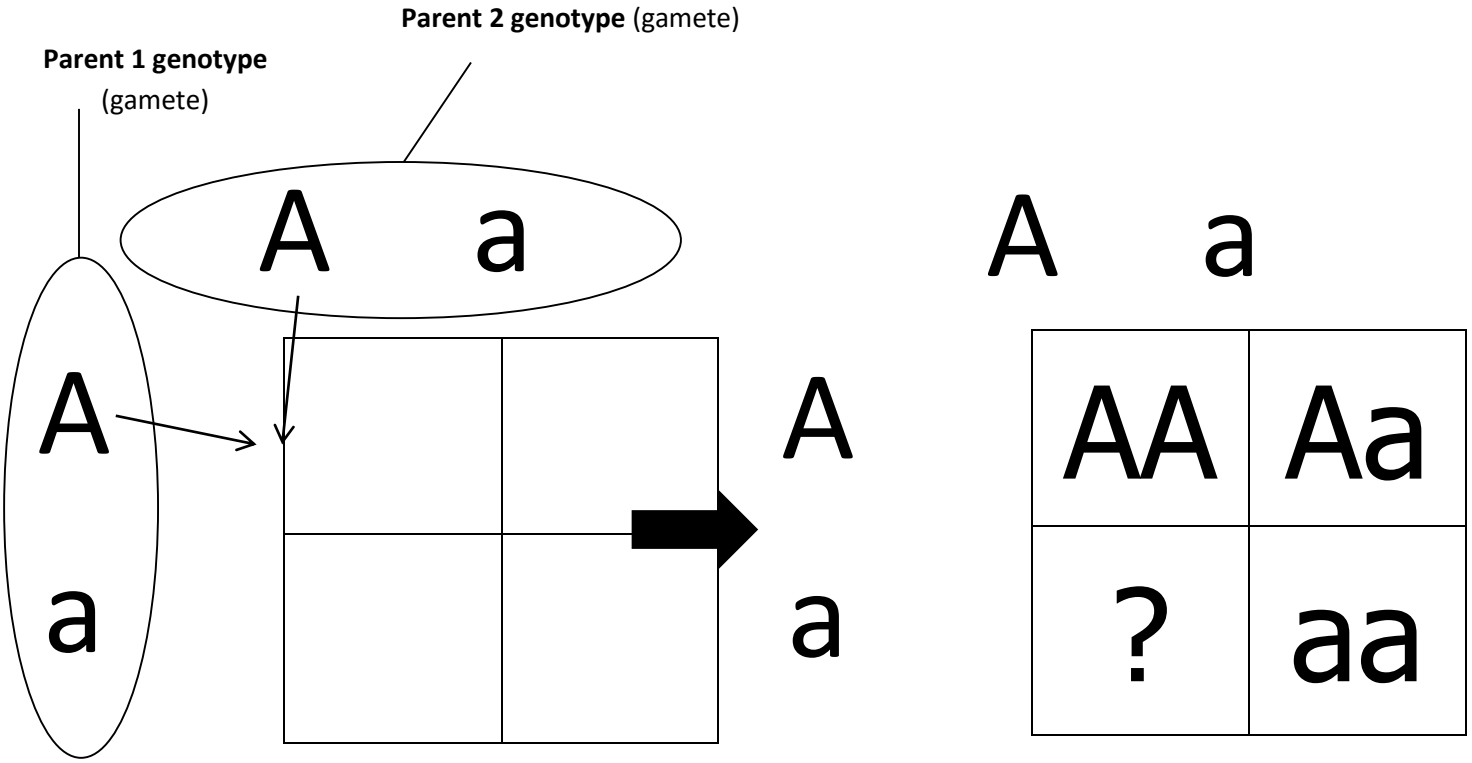
a. Dominant allele
   D e k L N o R S
b. Recessive allele
   M n d F G n k P
c. Homozygous (pure) dominant
   AA Gg KK mm pp Rr TT Hh
d. Homozygous (pure) recessive
   Ee Ff HH Oo qq Uu ww LL
e. Heterozygous (hybrid)
   HH Rr aa Yy Bb LL tt Tt
f. Offspring combinations in which dominant genes are expressed
   AA Dd EE ff Jj RR Ss kk
g. Offspring combinations in which recessive genes are expressed
   aa Gg Ff KK Oo PP ss tt

Monohybrid Crosses

Punnett Squares and Monohybrid Crosses

A **Punnett square** is a simple diagram used to predict the expected result of a single genetic cross. These types of crosses consider one pair of contrasting traits between two individuals and are known as **monohybrid crosses**. For example, a monohybrid cross is a cross between a plant with yellow seed color and a plant with green seed color, or a cross between two plants both with yellow seed color. A Punnett square allows you to consider and predict all possible combination of offspring for that particular cross.

The Punnett square below shows a heterozygous (Aa) parent crossed with another heterozygous parent:



How are Punnett Squares completed?

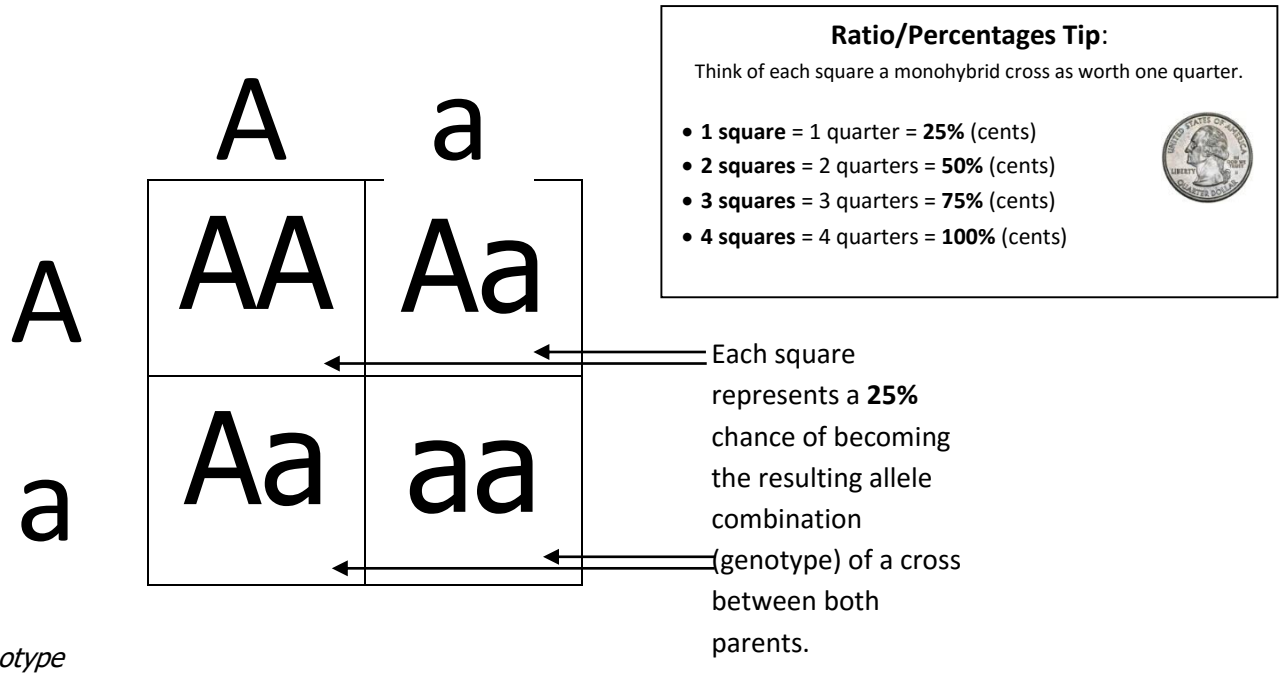
The squares of the Punnett square are filled in using the same method used to complete the multiplication table. What would be the genotype found in the square containing a question mark? The genotype would be "Aa", one allele from each parent, "a" from parent 1 and "A" from parent 2.

For an animation of how to complete Punnett squares visit:
http://www.dnalc.org/resources/genescreen/punnett-empty.html

What information can be gained from a Punnett Square?

Probability of Genotype and Phenotype

A Punnett square is used to predict the outcome of a cross. The probability of these outcomes (genotype and phenotype of the offspring) can be expressed as either ratios and/or percentages. A **ratio** represents, for every amount of one thing, how much there is of another thing. For example, if one has 3 oranges and 1 lemon in a fruit bowl, the ratio of oranges to lemons is 3:1. A **percentage** is a ratio expressed "out of 100". In the same example of the fruit bowl, 75% of the fruit are oranges and 25% of the fruit are lemons.



Genotype

The ***genotypic ratio*** describes the number of times a genotype would appear in the offspring. The **probability of a genotype** is expressed as a percentage.

In the above example the genotypic ratio is: **1 AA: 2 Aa: 1 aa**

In the above example the genotypic probability of each offspring is: **25% AA, 50% Aa, 25% aa**

Phenotype

The ***phenotypic ratio*** describes the number of times a phenotype would appear in the offspring. The **probability of a phenotype** is expressed as a percentage.

In the above example, suppose that A (red) is dominant to a (white).

The phenotypic ratio is: **3 red: 1 white**

The phenotypic probability of each offspring is: **75% red, 25% white**

The Mutata Creatures from Planet X

A new species has been discovered on Planet X. They seem to pass on genetic traits similar to the methods employed in human genetics. Mutata creatures have dominant alleles represented by capital letters, and recessive alleles represented by lower-case letters. Like humans, if a dominant allele is present, it will be expressed. The only way for a recessive allele to be expressed is if there are two recessive alleles (and no dominant alleles) present.

You will be creating your own Mutata baby by completing a series of Punnett Squares to see which genotype (genetic makeup) and phenotype (physical traits) are possessed by your creature. Follow the guidelines listed below:

1. Fill in and complete each Punnett Square according to the information given for each trait.
    a. Remember, the Law of Independent Assortment…each trait is "picked" separately from one another, which is why each trait has its own Punnett Square!
2. Each genetic cross will give you four possible genotypes. To find out which one your Mutata baby will inherit, close your eyes and randomly point to one…then circle/highlight it.
    a. Why close your eyes and point?!?! Well, it's random isn't it? You never know which one your baby will inherit...it's just chance!
3. Beside each Punnett Square, state the genotype of the randomly selected gene that your baby inherited. List both the alleles (letters) and whether they are homozygous dominant, heterozygous, or homozygous recessive. Also state the phenotype that will be expressed by your Mutata…that is, what the genes are going to make your baby look like.
4. Once you have completed all of the Punnett Squares, and listed all of the genotypes and phenotypes, draw your Mutata baby that you just created! Make sure your drawing includes <u>all</u> of the traits that your baby inherited.

Your grade will be determined by the accuracy of the Punnett Squares, accuracy of genotype and phenotype labeling, whether all the traits were drawn on your Mutata creature, neatness of all work, and creativity (a name for your baby perhaps?). Everyone should have a different creature, so we will see a large amount of variation.

The table of traits is listed on the back...get started creating your own little creature!

Trait	Alleles
Fat	F
thin	f
Horns (2)	H
no horns	h
Giant ears	G
tiny ears	g
Wings	W
no wings	w
Tail	T
no tail	t
3 Eyes	E
2 eyes	Ee
1 eye	e
2 Legs	L
4 legs	l
Long Arms	A
short arms	a
Curly hair	Q
straight hair	q
Blue skin	B
Red skin	R
Blue & Red Spotted Skin	BR

Create your Mutata Creature!

1. Shape: dad is homozygous dominant and mom is thin.

Dad

Mom

Your Mutata's…

Genotype: _____

Phenotype: _____

2. Horns: both dad and mom are heterozygous for horns.

Dad

Mom

Your Mutata's…

Genotype: _____

Phenotype: _____

3. Ears: dad has tiny ears and mom has Giant ears, but carries the gene for tiny ears.

Dad

Mom

Your Mutata's…

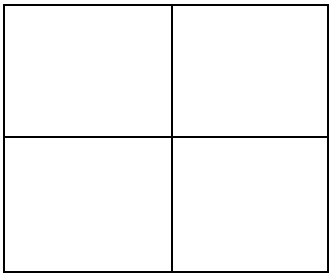
Genotype: _____

Phenotype: _____

4. Wings: dad is homozygous dominant and mom is homozygous recessive.

Dad

Mom



Your Mutata's…

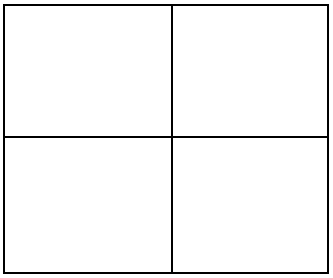
Genotype: _____

Phenotype: _____

5. Tail: both parents have tails; dad carries the gene for no tail while mom has a tail and does NOT carry the "no tail" gene.

Dad

Mom



Your Mutata's…

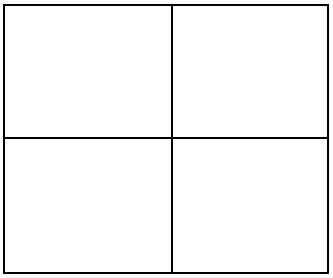
Genotype: _____

Phenotype: _____

6. Eyes: mom has only one eye and dad has two.

Dad

Mom



What type of pattern of inheritance is this?

_____

Your Mutata's…

Genotype: _____

Phenotype: _____

7. Legs: both mom and dad have 2 legs and have heterozygous alleles.

Dad

Mom

Your Mutata's…

Genotype: _____

Phenotype: _____

8. Arm Length: dad is homozygous dominant for long arms, while mom is homozygous recessive for short arms.

Dad

Mom

Your Mutata's…

Genotype: _____

Phenotype: _____

9. Hair: dad is homozygous recessive and mom is heterozygous.

Dad

Mom

Your Mutata's…

Genotype: _____

Phenotype: _____

10. Skin Color: dad has Red skin and mom has Blue skin.

Dad

Mom

What type of pattern of inheritance is this?

_____

Your Mutata's…

Genotype: _____

Phenotype: _____

One last thing: is your Mutata baby going to be a boy or a girl?!?! Raise your hand and I'll come by with a coin…if it lands on heads, you'll have a female Mutata; if it lands on tails, you'll have a male! So are you having a boy or a girl? _____

Why is this a good way to "predict" the sex of a baby? Explain.

Good luck….I can't wait to see your Mutata creatures! ☺

Patterns of Inheritance Notes

Mendelian Genetics

Mendelian genetics shows a pattern where a clear _____ trait masks a recessive trait.

Cleft chins, dimples, and freckles are all examples of traits that follow Mendelian patterns.

Example: Dimples (D) are dominant over no dimples (d)

Cross two parents that are heterozygous for dimples.
Complete the ratios for genotype and phenotype.

Genotypes:

Phenotypes:

Incomplete Dominance

Occurs when the _____ allele combination results in a _____ of the dominant and recessive trait.

Straight, wavy and curly hair is one example of incomplete dominance.

Another example is carnation color. If the red and white alleles are both present, the resulting offspring will be pink (a blend of red and white).

Example:

Red flower color (R) is incompletely dominant over white flower color (r) in carnations.

Cross two parents that are heterozygous for flower color.

Genotypes:

Phenotypes:

Co-dominance

Occurs when _____ alleles are expressed when the heterozygous allele combination is present.

Not a Blend!!

Human blood is an example of co-dominance. A and B alleles are both dominant over the recessive allele, O. If both the A and B alleles are present, both will be expressed.

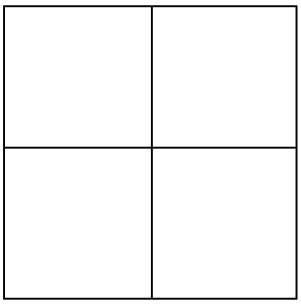
Example:

Red flower color (R) is incompletely dominant over white flower color (r) in carnations.

Cross two parents that are heterozygous for flower color.

Genotypes:

Phenotypes:



Sex-Linked Traits

Occurs when a trait is passed on from generation to generation on one of the sex-determining chromosomes (X, Y)

The dominant and recessive representative alleles are written as superscripts on the X and Y.

Female Genotype:

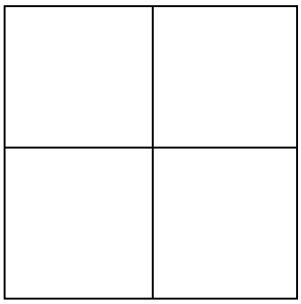
Male Genotype:

Only females can be carriers of X-Linked traits. What is a carrier?

Why can't males be carriers of X-Linked traits?

Example:

Cross a female carrier for colorblindness with a normal male. List the possible phenotypes.



Polygenic Traits

Occurs when several genes influence a trait. The genes may be on the same chromosome or on different chromosomes

Eye color, height, weight, and hair and skin color are all polygenic traits.

Multiple Alleles

Genes with three or more alleles are said to have multiple alleles.

Human blood has 3 alleles: A, B, and O.

Dihybrid Gametes Notes

1. Set up a Punnett square using the following information:
   Tall plants = D. Dwarf plants = d
   Purple flowers = W. White flowers = w
   Cross a homozygous dominant parent (DDWW) with a homozygous recessive parent (ddww)

Gametes using **Foil Method**

Parent 1 Genotype: _____

Use foil to find the gametes

Parent 1 Gametes: _____ -_____ -_____ -_____

Parent 2 Genotype: _____

Use foil to find the gametes

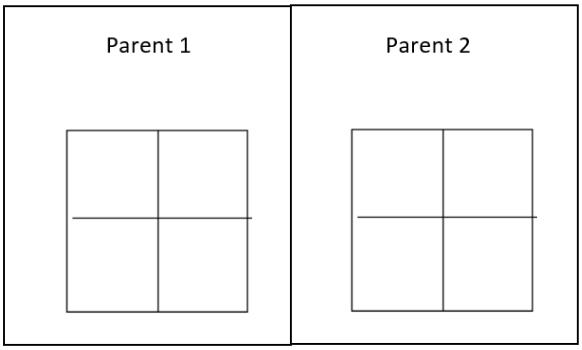
Parent 1 Gametes: _____ -_____ -_____ -_____

Gametes using **Punnett Square Method**

Parent 1 Genotype: _____

Parent 2 Genotype: _____

Use the Punnett square to find the gametes



2. Set up a Punnett square using the following information:
   Black fur in guinea pigs = B. White fur in guinea pigs = b
   Rough fur in guinea pigs = R. Smooth fur in guinea pigs = r
   Cross a heterozygous parent (BbRr) with a heterozygous parent (BbRr)

Gametes using **Foil Method**

Parent 1 Genotype: _____

Use foil to find the gametes

Parent 1 Gametes: _____ -_____ -_____ -_____

Parent 2 Genotype: _____

Use foil to find the gametes

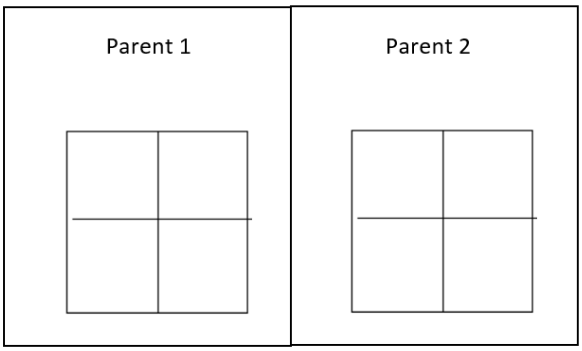
Parent 1 Gametes: _____ -_____ -_____ -_____

Gametes using **Punnett Square Method**

Parent 1 Genotype: _____

Parent 2 Genotype: _____

Use the Punnett square to find the gametes



Dihybrid Cross Gamete Practice

Instructions: Read about the genotypes and phenotypes of each parent. Find the gametes that are produced from each parent. Some problems are setup for foil while others use small Punnett squares, **you must use the specified method.**

1. In peas, round seed shape (R) is dominant to wrinkled seed shape (r), and yellow seed color (Y) is dominant to green seed color (y). A pea plant which is homozygous round seed and has green seed color is crossed with a pea plant that is heterozygous round seed shape and heterozygous yellow seed color.

Parents' Genotype: _____ ____ X _____

Use foil method to find gametes

Gametes: Female Male

_____ _____

_____ _____

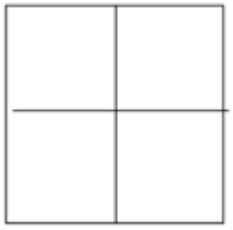
_____ _____

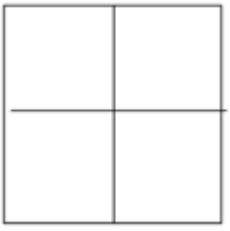
_____ _____

2. In carnations, red color (R) is dominant to white (r), and tall stems (T) are dominant to short stems (t). Find the gametes of two parental carnations heterozygous for color and height.
3. Parents' Genotype: _____ X _____

Use the provided Punnett squares to setup gametes

Gametes: Female Male





_____ _____

_____ _____

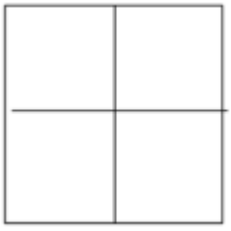
_____ _____

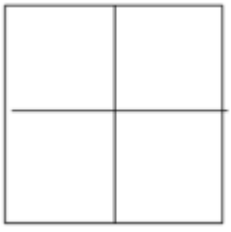
_____ _____

4. Parents' Genotype: BbHh X bbHH

Use the provided Punnett squares to setup gametes

Gametes: Female Male





_____ _____

_____ _____

_____ _____

_____ _____

5. Parents' Genotype: Ggdd X GGDd

Use foil method to find gametes

Gametes: Female	Male
_____	_____
_____	_____
_____	_____
_____	_____

6. Parents' Genotype: aaMm X AAmm

Use foil method to find gametes

Gametes: Female	Male
_____	_____
_____	_____
_____	_____
_____	_____

Dihybrid Cross Notes

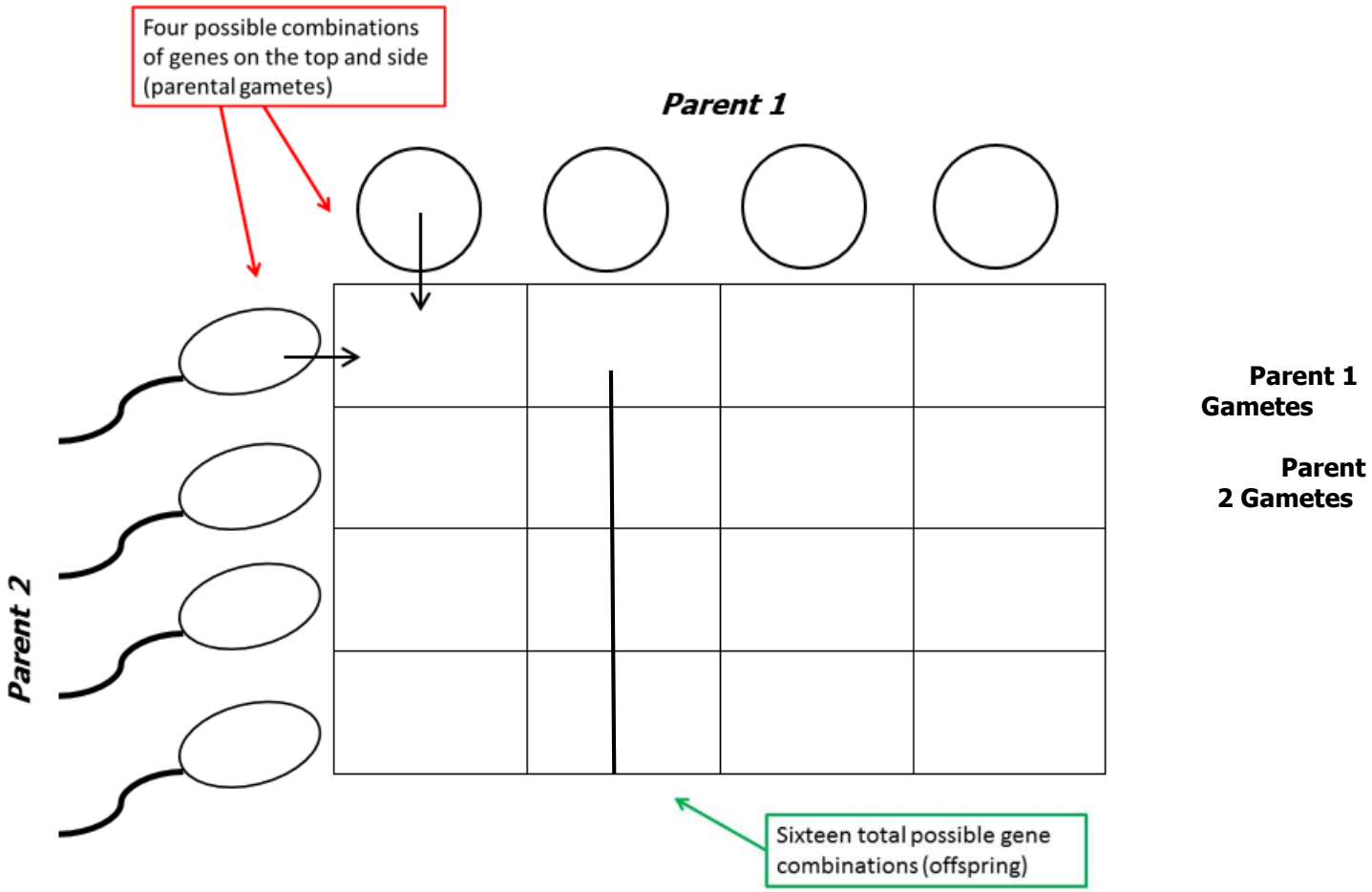
Mendel's law of _____ _____.

_____ of one trait can _____ independently during the formation of gamete.

-OR-

Just because you got your dad's "tall" gene _____ mean you will get his _____ gene.

Will a regular Punnett Square work?_____



The Facts:

R = round
r = wrinkled

Y = yellow
y = green

Both plants he is starting with are RrYy

Phenotypes:

Yellow/Round: _____ / _____ or _____%

Yellow/Wrinkled: _____ / _____ or _____%

Green/Round: _____ / _____ or _____%

Green/Wrinkled: _____ / _____ or _____%

Should the farmer cross these peas if he wants green round peas?_____Why?

1. Set up a punnett square using the following information:
   Dominate allele for tall plants = T Recessive allele for dwarf plants = t
   Dominate allele for purple flowers = G Recessive allele for white flowers = g
   Cross a homozygous dominate parent (TTGG) with a homozygous recessive aren't (ttgg)

Setup your Gametes

Gametes using Foil Method

Parent 1 Genotype: _____

Use foil to find the gametes

Parent 1 Gametes: _____ -_____ -_____ -_____

Parent 2 Genotype: _____

Use foil to find the gametes

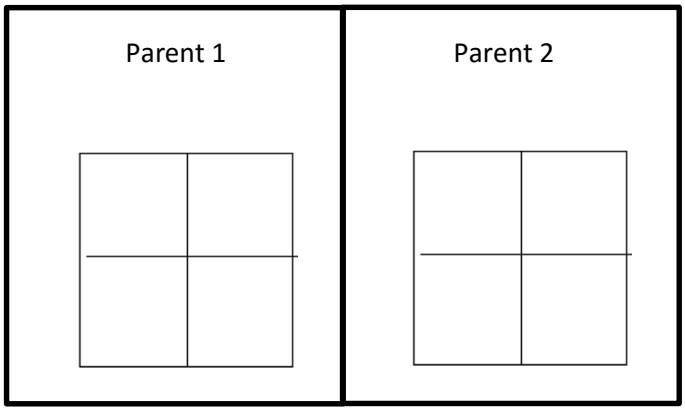
Parent 1 Gametes: _____ -_____ -_____ -_____

Gametes using Punnett Square Method

Parent 1 Genotype: _____

Parent 2 Genotype: _____

Use the Punnett square to find the gametes



2. Using the punnett square in question #1:

a. What is the probability of producing tall plants with purple flowers? _____

Possible genotype(s)? _____

b. What is the probability of producing dwarf plants with white flowers? _____

Possible genotype(s)? _____

c. What is the probability of producing tall plants with white flowers? _____

Possible genotype(s)? _____

d. What is the probability of producing dwarf plants with purple flowers? _____

Possible genotype(s)? _____

3. Set up a punnett square using the following information:
   Dominate allele for black fur in guinea pigs = H. Recessive allele for white fur in guinea pigs =h
   Dominate allele for rough fur in guinea pigs = A. Recessive allele for smooth fur in guinea pigs= a
   Cross a heterozygous parent (HhAa) with a heterozygous parent (HhAa)

Setup your Gametes

Gametes using Foil Method

Parent 1 Genotype: _____

Use foil to find the gametes

Parent 1 Gametes: _____ -_____ -_____ -_____

Parent 2 Genotype: _____

Use foil to find the gametes

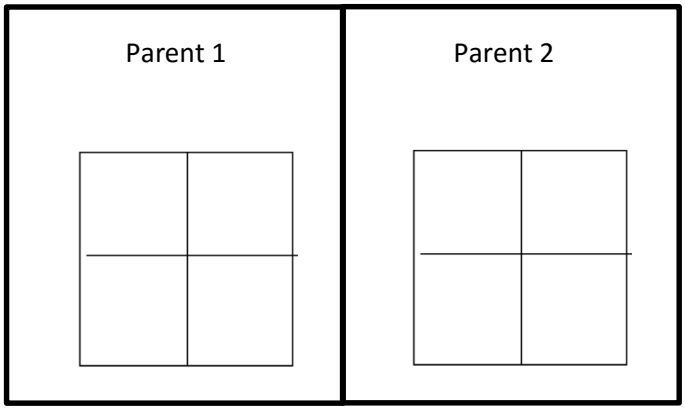
Parent 1 Gametes: _____ -_____ -_____ -_____

Gametes using Punnett Square Method

Parent 1 Genotype: _____

Parent 2 Genotype: _____

Use the Punnett square to find the gametes



4. Using the punnett square in question #3:

a. What is the probability of producing guinea pigs with black, rough fur? _____

Possible genotype(s)? _____

b. What is the probability of producing guinea pigs with black, smooth fur? Possible genotype(s)?

_____

c. What is the probability of producing guinea pigs with white, rough fur? Possible genotype(s)?

_____

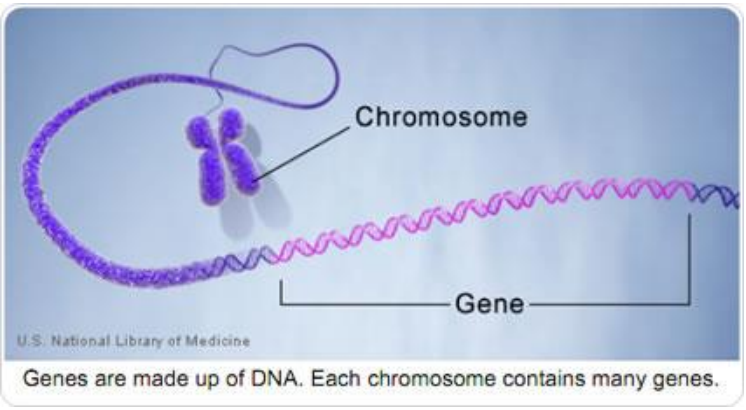
d. What is the probability of producing guinea pigs with white, smooth fur? Possible genotype(s)?

_____

DNA NOTES

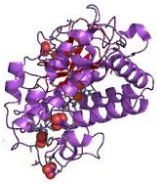
DNA carries the genetic information in all living organisms, including humans, other animals, plants, and bacteria.

Each cell in your body has a **nucleus** with multiple chromosomes. Each **chromosome** contains a **DNA** molecule with multiple **genes**. Each **gene** is a segment of DNA that provides the instructions for making a protein. A cell needs many different types of **proteins** to function.



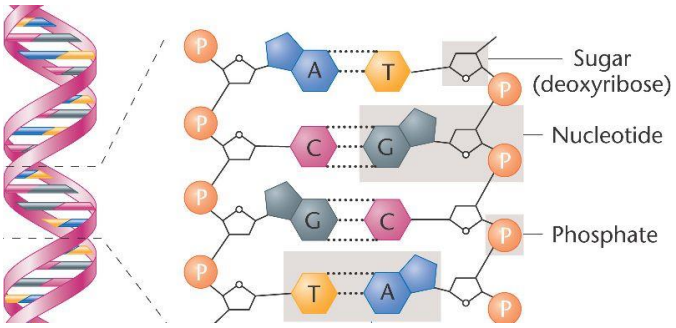
Genes are made up of DNA. Each chromosome contains many genes.

The genes in our DNA influence our characteristics by giving the instructions for making the proteins in our bodies. For example, as shown in the chart below, two different versions of a gene give the instructions for producing either normal or defective versions of a protein enzyme which result in either normal skin and hair color or albinism.

DNA	→	**Protein**	→	**Characteristic**
	→		→	
Version of the <u>gene</u> that provides instructions to make normal protein enzyme	→	<u>Normal enzyme</u> that makes the pigment molecule in skin and hair	→	Normal skin and hair color
Version of the <u>gene</u> that provides instructions to make defective enzyme	→	<u>Defective enzyme</u> that does not make this pigment molecule	→	Albinism (very pale skin and hair)

This diagram shows a short section of a DNA double helix with a diagram of four nucleotides in each strand of the double helix. Each **<u>nucleotide</u>** has:

- a phosphate group (P) and a sugar molecule (represented by a pentagon) in the backbone of the DNA strand
- one of the four bases (**A** = adenine, **C** = cytosine, **G** = guanine, <u>or</u> **T** = thymine)



(http://bio3400.nicerweb.com/Locked/media/ch01/01_08-DNA_double_helix.jpg)

All of the nucleotides in DNA are the same except for the nitrogenous base they contain.

This flowchart below shows how the sequence of nucleotides in a gene encodes the genetic information and influences an organism's characteristics.

<u>sequence of nucleotides in the DNA of a gene</u>

↓

determines the <u>sequence of amino acids in a protein</u>

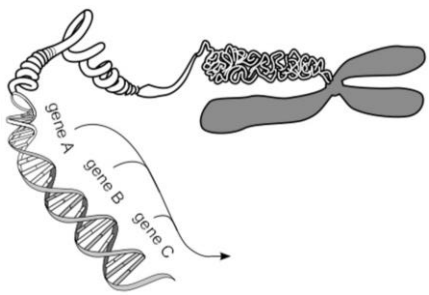
↓

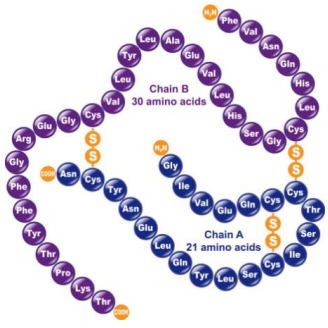
determines the <u>structure and function of the protein</u>
(e.g. normal vs. defective enzyme to make skin pigment)

↓

influences the <u>characteristics</u> or traits of the organism
(e.g. normal skin pigmentation vs. albino)

DNA (Chromosomes) → Proteins → Physical Traits





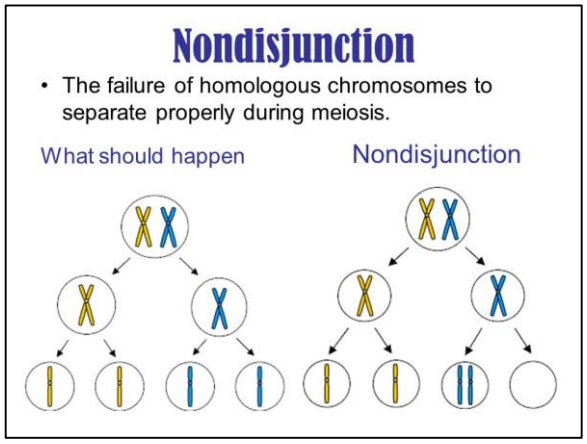
Mutations Notes

Mutations are heritable changes in genetic information. There are two categories of mutations: gene mutations and chromosomal mutations.

- Gene mutations produce changes in a single gene.
- Chromosomal mutations produce changes in the number or structure of chromosomes. They include deletions, duplications, inversions, translocations and non-disjunction.

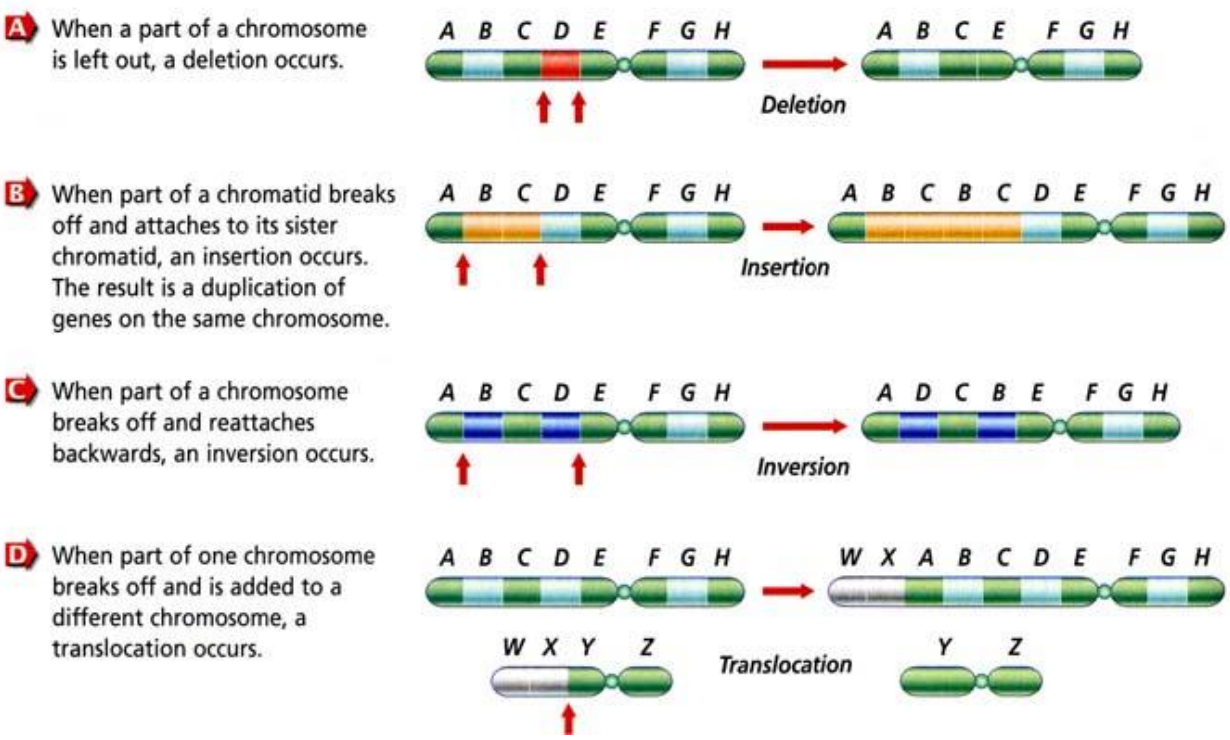
Effects of Mutations

Genetic material can be altered by natural events or by artificial means. Errors can be made during replication. Environmental conditions may increase the rate of mutation. **Mutagens** are chemical or physical agents in the environment that cause mutations.



The effects of mutations on genes vary widely:

- Some mutations have little or no effect.
- Some mutations produce beneficial variations. One example is **polyploidy** in plants, in which an organism has extra sets of chromosomes. Polyploid plants are often larger and stronger than diploid plants. Mutations can also produce proteins with new or altered functions that can be useful to organisms in different or changing environments and therefore selected for through natural selection.
- Some mutations negatively disrupt gene function or dramatically change protein structure. Genetic disorders such as sickle cell disease can result.



Karyotypes Notes

Define

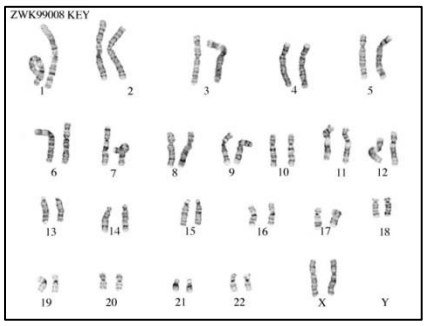
Explain

Karyotype

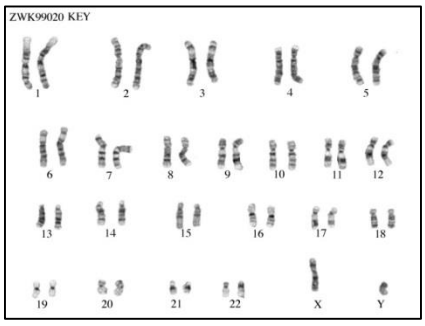
Describe

Example of Use

Normal Female Karyotype



Normal Male Karyotype



Karyotype Scavenger Type

Disorder	Description of Disorder	How is the chromosome affected?
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Meiosis Notes

Reducing the Number of Chromosomes

Meiosis is a type of cell division that reduces the number of chromosomes in the parent cell by half and produces four gamete cells. This process is required to produce egg and sperm cells for sexual reproduction. During reproduction, when the sperm and egg unite to form a single cell, the number of chromosomes is restored in the offspring.

Meiosis begins with a parent cell that is **diploid**, meaning it has two copies of each chromosome. The parent cell undergoes one round of DNA replication followed by two separate cycles of nuclear division. The process results in four daughter cells that are **haploid**, which means they contain half the number of chromosomes of the diploid parent cell.

Creating Genetic Variation

Meiosis not only helps ensure that our offspring have the right number of chromosomes; it also contributes to the creation of genetic variation. This is due to two processes: **independent assortment** and **crossing over**. Essentially, these processes shuffle **alleles** during gamete formation and create genetic variation. In addition, sexual reproduction randomly combines gametes from two different parents. These processes create variations in a species and are considered beneficial.

Independent Assortment

During meiosis, cells are split so that genetic information is divided up into multiple gametes. The genetic information a person receives from each parent is randomly divided, and this random distribution of paternal and maternal chromosomes is called **independent assortment**.

As the two chromosomes are separated they are independently and randomly pulled to the poles. As a result, chromosomes holding different alleles are grouped together each time meiosis occurs. However, each group of chromosomes contains one chromosome of each type and a full complement of genes.

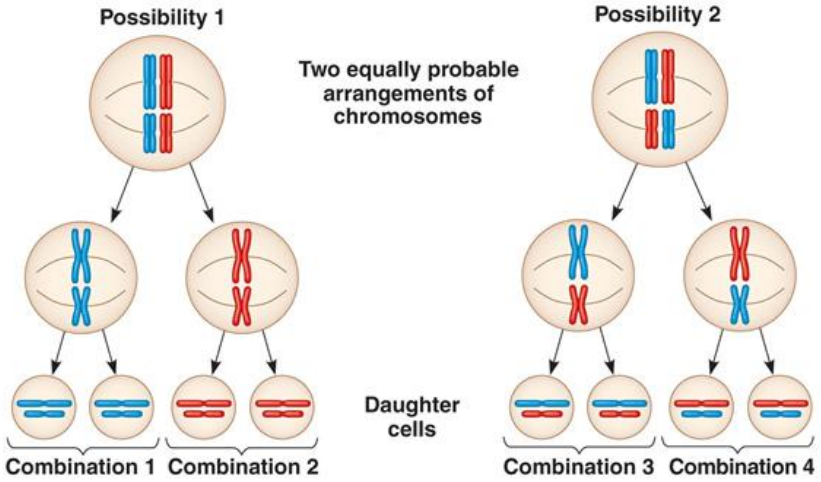


Figure 1. Independent Assortment. The figure shows two equally probable arrangement of possibilities of the chromosomes before division. This random assortment increases genetic variation in the gametes.

Crossing Over

Crossing over is the exchange of genetic material between homologous chromosomes. The regions exchanged are usually located at the tips of the chromosomes, but may be located in any region of a chromosome. As long as equally sized segments of the chromosomes, containing the same genes break off and switch positions, no chromosomal damage is done.

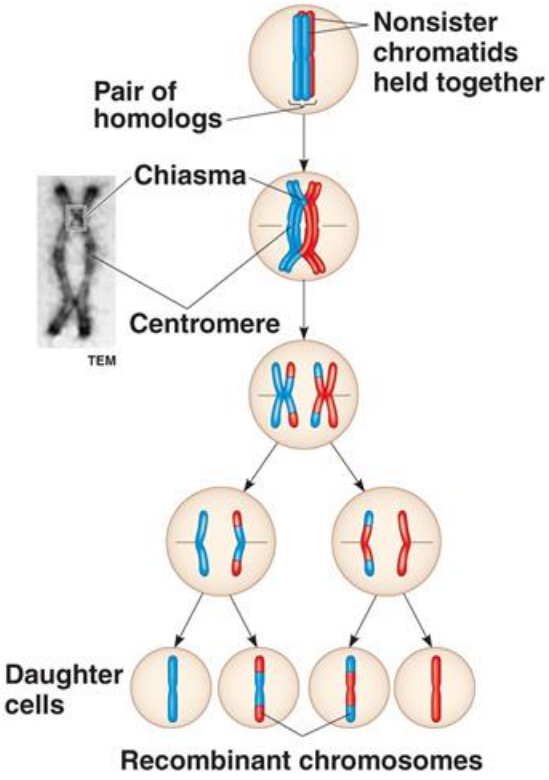


Figure 2. Crossing Over. The figure shows the process of crossing over. Notice that the genetic material from one chromosome is exchanged with the genetic material on its homologous chromosome. This exchange increases genetic variation in the gametes.

Meiosis Results In

Sperm **Egg**

Pedigree Notes

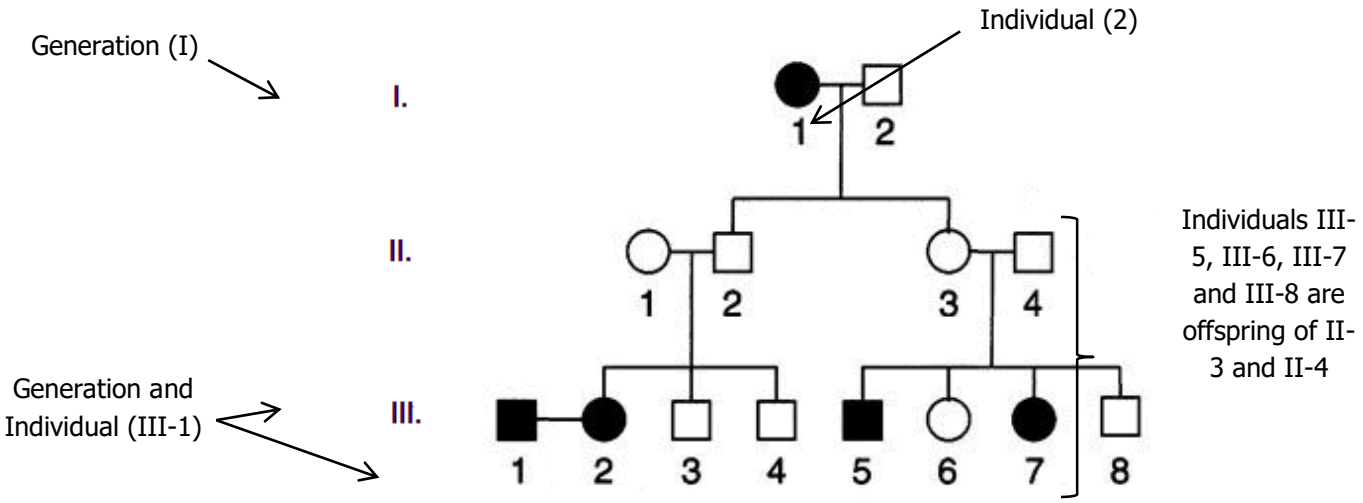
What is a pedigree?

A pedigree is a visual representation of how a trait is passed on through generations in a family. It is a graphic representation of a family tree.

What information can a pedigree tell you?

A pedigree shows individuals of a family over multiple generations and the relationships between them (marriage, children, etc.). A pedigree also shows the sex of each family member and whether or not they exhibit the trait in question or whether they are a carrier of the trait. Analysis of a pedigree can tell you if a trait is passed on genetically, if the alleles responsible for the trait are dominant or recessive, and if the trait is sex-linked.

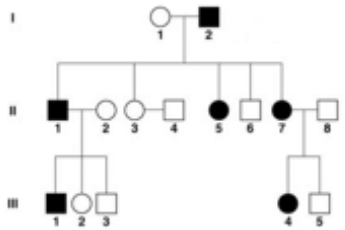
How do you read a pedigree?



Pedigree Key

Symbol	Description
	Unaffected Male
	Unaffected Female
	Affected Male
	Affected Female
	Carrier Male
	Carrier Female
	Mating Pair

Autosomal Dominant



- Who will express the trait more often… Males or Females?

They are equally likely to have the trait

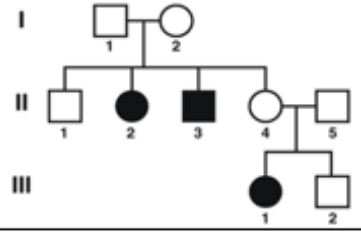
- Does the trait occur every generation or skip generations?

Occurs every generation

- Which genotypes express the trait?

Homozygous Dominant or Heterozygous

Autosomal Recessive



- Who will express the trait more often… Males or Females?

They are equally likely to have the trait

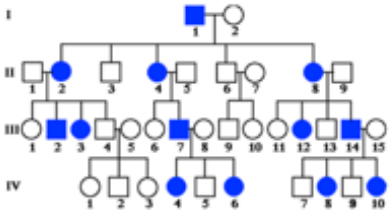
- Does the trait occur every generation or skip generations?

Skips generations

- Which genotypes express the trait?

Homozygous Recessive

Sex-Linked Dominant



- Will all daughters of males with the trait inherit the trait?

YES!…Why?

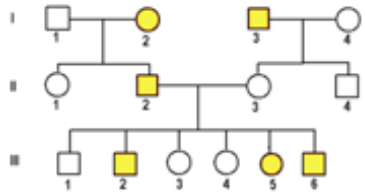
- Can males pass the trait on to their sons?

NO!

- Will all daughters and sons of females with the trait inherit the trait?

Depends on the mother's genotype

Sex-Linked Recessive



- Is the trait more common in **Males** than **Females? Why?**

Males

- If a Male has the trait what will be genotype of his **daughters**?

Heterozygous (Carriers)

- What is the chance that a son of a female carrier will inherit the trait?

50%

UNIT 5: HEREDITY VOCABULARY

1. Allele – any of the alternative forms of a gene that occurs at a specific place on a chromosome
2. Autosome – chromosome that contains genes for characteristics no directly related to the sex of the organism
3. Chromosomal analysis – a test that evaluates the number and structure of a person's chromosomes in order to detect abnormalities.
4. Chromosome – long, continuous thread of DNA that consists of numerous genes and regulatory information
5. Codominance – heterozygous genotype that equally expresses the traits from both alleles
6. Crossing over – exchange of chromosome segments between homologous chromosomes during meiosis I
7. Deletion mutation – type of mutation which can be chromosomal or gene: chromosomal – a part of the chromosome is missing; gene – one nitrogen base is missing
8. Deoxyribonucleic Acid (DNA)-is a molecule that carries the genetic instructions used in the growth, development, functioning and reproduction of all known living organisms and many viruses.
9. Dihybrid cross- mating between organisms involving two pairs of contrasting traits
10. Dominant – allele that is expressed when two different alleles are present in an organism's genotype
11. Duplication Mutation-mutation involving the production of one or more copies of any piece of DNA, including sometimes a gene or even an entire chromosome.
12. Gamete – sex cell; an egg or a sperm cell
13. Gene-a distinct sequence of nucleotides forming part of a chromosome, the order of which determines the order of monomers in a polypeptide or nucleic acid molecule which a cell (or virus) may synthesize.
14. Genetic Change-any change in structure (breakage, change in sequence) of a gene.
15. Genetic Code-he nucleotide triplets of DNA and RNA molecules that carry genetic information in living cells.
16. Genetics-the study of heredity and the variation of inherited characteristics.
17. Genome-the complete set of genes or genetic material present in a cell or organism.
18. Genotype – collection of all of an organism's genetic information that codes for traits
19. Heterozygous-a pair of genes where one is dominant and one is recessive — they're different.
20. Homozygous-having identical pairs of genes for any given pair of hereditary characteristics.
21. Incomplete dominance – heterozygous phenotype that is a blend of the two homozygous phenotypes
22. Independent Assortment-the principle, originated by Gregor Mendel, stating that when two or more characteristics are inherited, individual hereditary factors assort independently during gamete production, giving different traits an equal opportunity of occurring together.
23. Insertion Mutation-A chromosome abnormality in which material from one chromosome is *inserted* into another nonhomologous chromosome
24. Inversion Mutation– type of chromosomal mutation in which a part of the chromosome is inserted backwards
25. Karyotype – image of all of the chromosomes in a cell

26. Meiosis – form of nuclear division that divides a diploid cell into haploid cells; important in forming gametes for sexual reproduction
27. Mendelian genetics - trait that is controlled by a single location in an inheritance pattern & shows only the dominant/recessive pattern of inheritance
28. Monohybrid cross- mating between organisms that involves only one pair of contrasting traits
29. Mutation-the changing of the structure of a gene, resulting in a variant form that may be transmitted to subsequent generations, caused by the alteration of single base units in DNA, or the deletion, insertion, or rearrangement of larger sections of genes or chromosomes.
30. Nondisjunction – error in meiosis in which homologous chromosomes fail to separate
31. Non-Mendelian Inheritance-a general term that refers to any pattern of inheritance in which traits do not segregate in accordance with Mendel's laws.
32. Pedigree – chart of the phenotypes and genotypes in a family that is used to determine whether an individual is a carrier of a recessive allele
33. Phenotype – collection of all of an organism's physical characteristics
34. Probability-the extent to which an event is likely to occur, measured by the ratio of the favorable cases to the whole number of cases possible.
35. Ratio - Relation in the number between two similar things (4:0 or 2:2 or 3:1)
36. Recessive – allele that is not expressed unless two copies are present in an organism's genotype
37. Sexual reproduction-the production of new living organisms by combining genetic information from two individuals of different types (sexes).
38. Sex-linked traits – traits that are located on the X or Y chromosome
39. Trait – characteristic that is inherited
40. Translocation Mutation – chromosomal mutation in which a chromosome fragment moves from one chromosome to another