

MENDEL'S LAWS AND MONOHYBRID CROSSES

Day 1

UNIT 6 : GENETICS

Bell-Ringer

One of the accepted scientific theories describing the origin of life on Earth is known as chemical evolution. According to this theory, which of the following events would need to occur first for life to evolve?

7 MINUTES
FOR #'s 1-3

Do it
Now!

- a) Onset of photosynthesis
- b) Origin of genetic material
- c) Synthesis of organic molecules
- d) Formation of the plasma membrane

- 1) **GIST:** In one sentence, explain what the question is about (2 points)
- 2) **Eliminate** 2 incorrect answers (1 point) and explain **WHY** they are incorrect (2 points)
- 3) **Choose** the correct answer choice (1 point) and explain **WHY** (4 points)
- 4) **Reflect:** (3 points) I was (correct/incorrect) because...

Bell-Ringer

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c. Synthesis of organic molecules

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Bio Blitz

Get your stuff off your desk!

Unit 6 Genetics

Day 1: Mendel's laws and punnett squares

Day 2: Other patterns of inheritance

Day 3: Pedigrees and genetic disorders

Day 4: Mendel's Laws Lab day!

Day 5: Biotechnology

Day 6: DNA structure

Day 7: DNA replication

Day 8: Introduction to transcription and translation

Day 9: Transcription

Day 10: Translation

Day 11: Mutations Lab day!

Day 12: Test

What are we learning today?

Benchmark

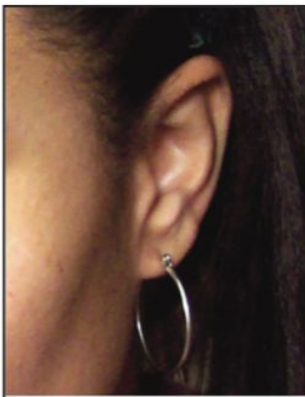
SC.912.L.16.1 Use Mendel's laws of segregation and independent assortment to analyze patterns of



Objectives

- ✓ Students will understand the role of probability in genetics.
- ✓ Students will understand and be able to use the essential vocabulary of genetics.
- ✓ Students will use a Punnett square to predict the outcome of a monohybrid cross.

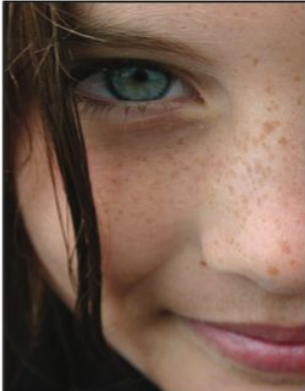
**ex. if a blue eyed person
and a brown eyed person
have a baby, what color
will their kid's eyes be?**



Attached earlobes



Can roll



Freckles



Naturally curly hair



Cleft chin



Allergies



Cross left thumb
over right



Can see red &
green

**How do we predict how
traits get passed down?**

Mendel's Laws

- Name: **Gregor Mendel**
- Nickname: **Father of Genetics**
- Mendel has contributed to biology by **studying the inheritance of traits in pea plants**



Mendel's Laws: fill in your notesheet

1. **Dominance**: one form of trait will overpower the other

2. **Segregation**: alleles separate in gamete formation

3. **Independent assortment**: traits separate independently into gametes

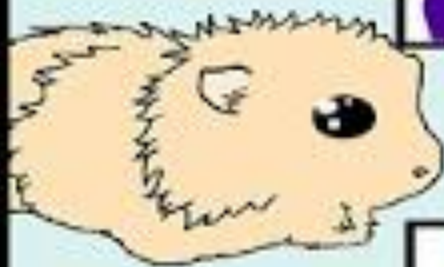
Vocabulary

- **Fill out your notes while watching the video**
- <https://www.youtube.com/watch?v=i-0rSv6oxSY&list=PLwL0Myd7Dk1Hj8WCDlDVBlkqT-ZVdj7Js>

Genetic Series - Video 1



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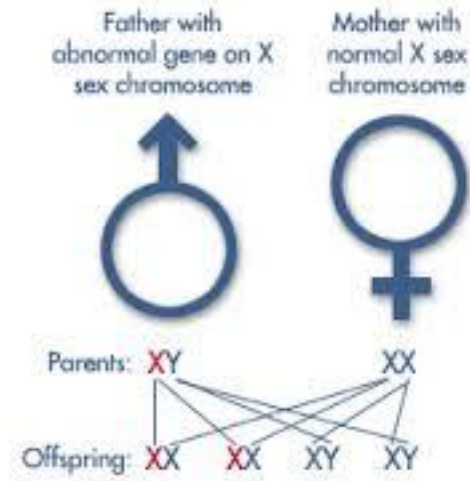
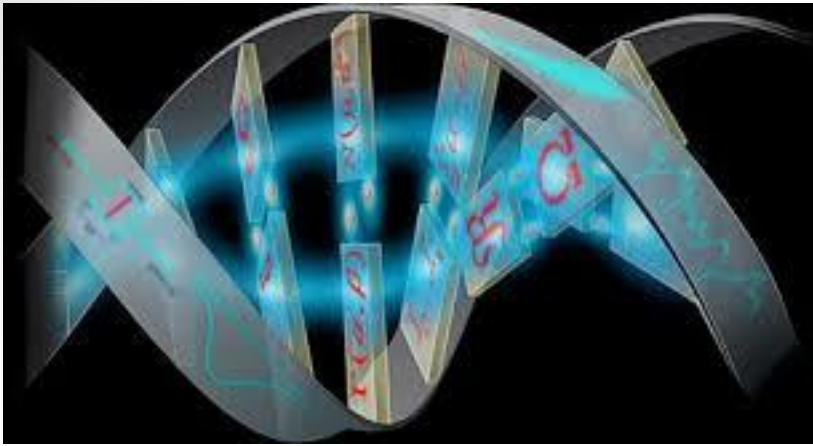


Monohybrid Crosses

With the Amoeba Sisters

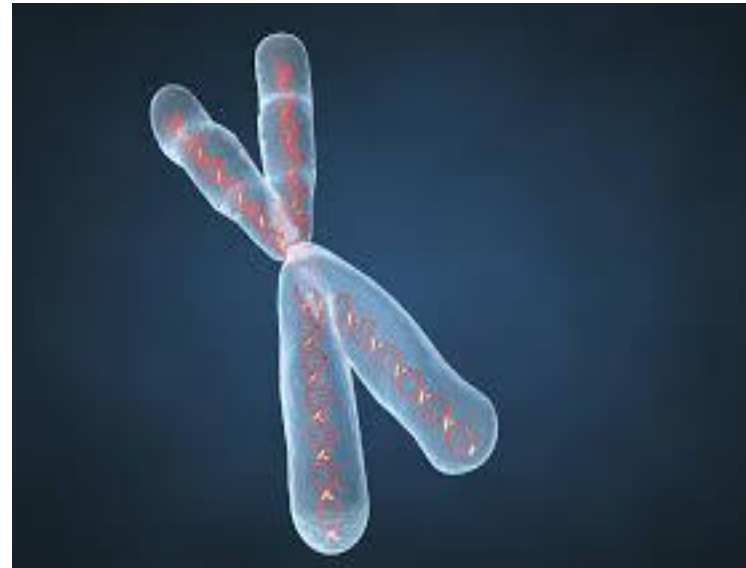
*Let's do 2 example
problems together

*fill in Punnett square in
your worksheet

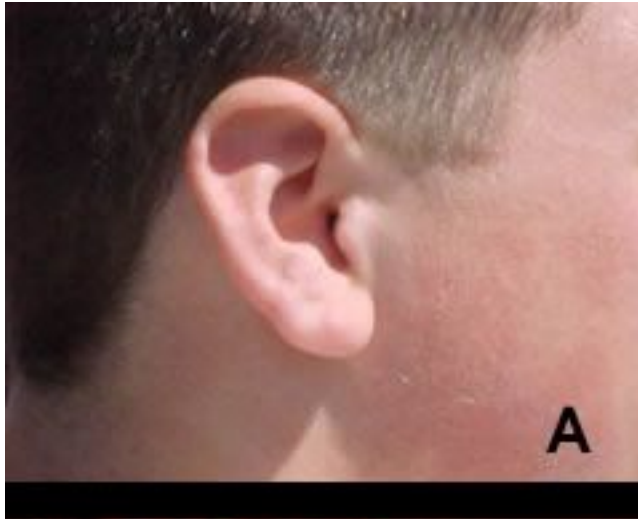


4.1 Introduction to Genetics

Welcome to the real YOU!



Genetics & You



Earlobes?



Detached



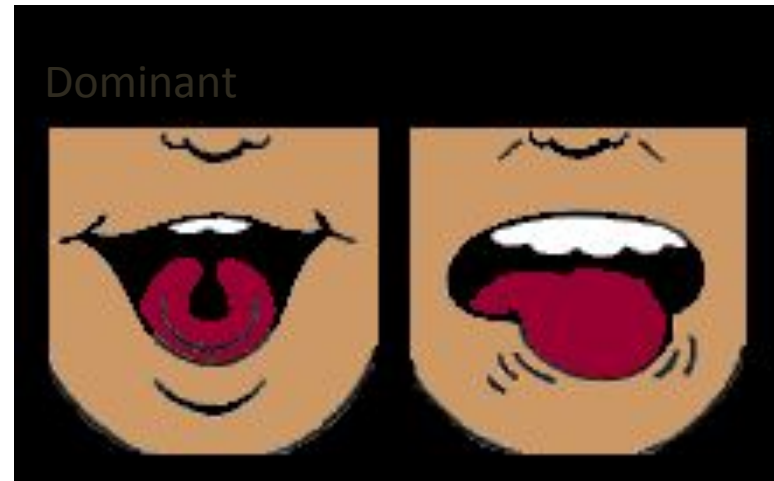
Attached

Dominant

Genetics & You



Tongue Roll?



Genetics & You



Dimples?



Recessive

Genetics & You



Cleft chin?



Genetics & You

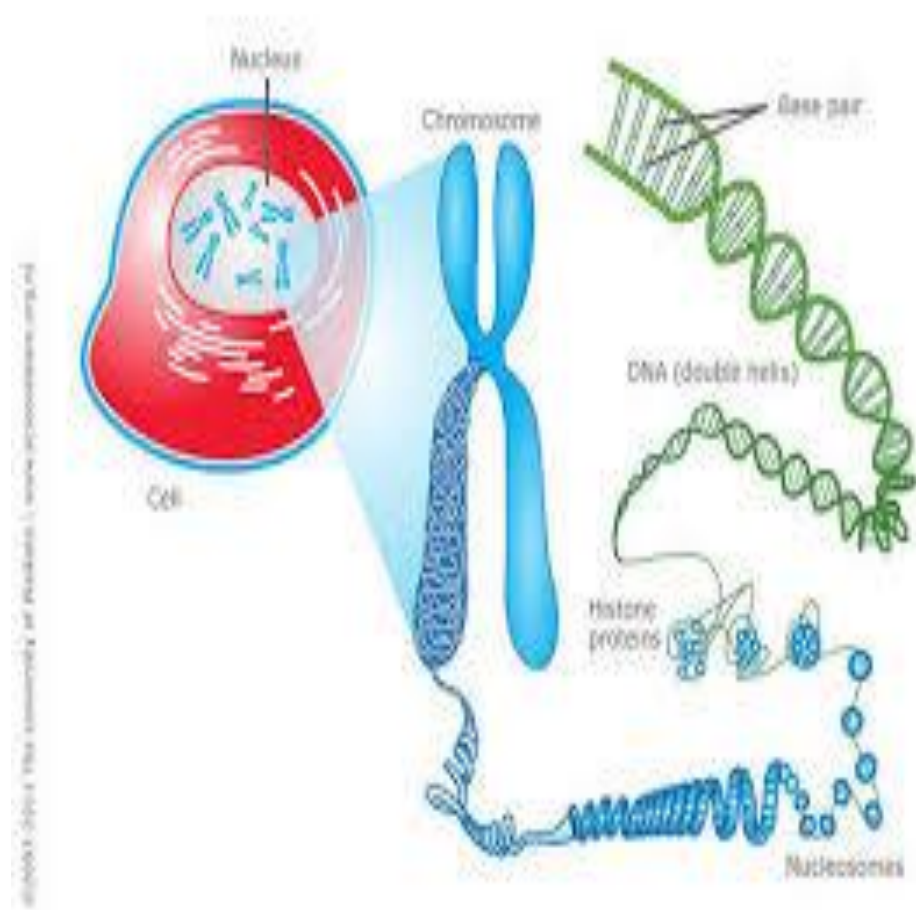
Widow's Peak?

Dominant



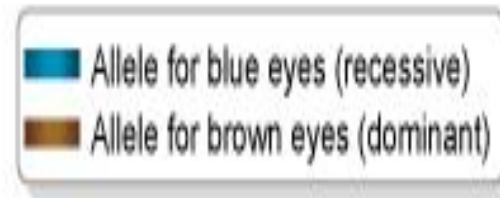
Vocab Attack!

- Chromosomes: made up of genes
- Genes: made up of traits
- Traits: physical characteristics caused by DNA
 - Ex: hair/eye color, height



Alleles

- Alleles: Different forms of a gene
- Humans have 2 alleles in every gene (one from mom and one from dad)



Individual A:
heterozygous



Individual B:
homozygous



Individual C:
homozygous
recessive

Dominant vs. Recessive Alleles

- **Dominant Allele**

- Trait shown
- Capital Letter
 - Ex: TT (tall) or Tt (Tall)

- **Recessive Allele**

- Trait not seen
- Lowercase letters
 - Ex: tt (short)



Recessive



Dominant

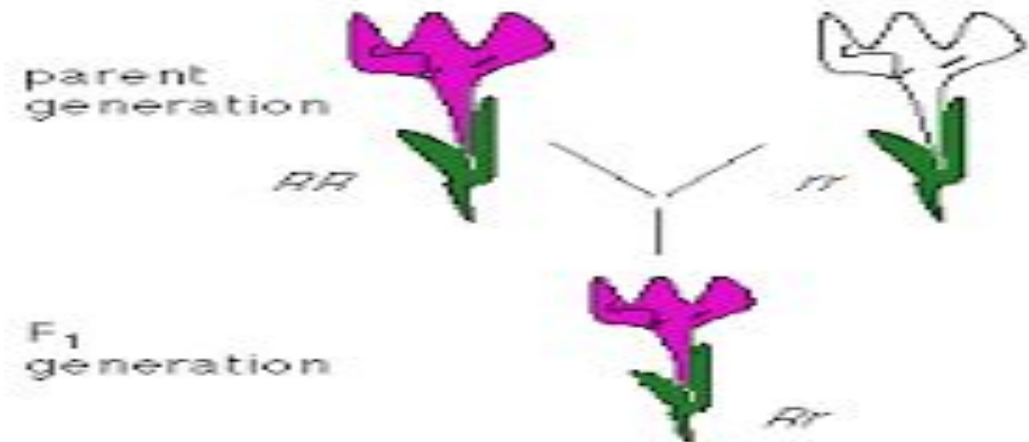
Homozygous vs. Heterozygous

- **Homozygous**

- Both alleles are the same
 - AA-homozygous dominant
 - aa- homozygous recessive

- **Heterozygous**

- Each allele is different
 - Bb=
heterozygous



Heterozygous or Homozygous?

- HH
- Aa
- AA
- aa
- Bb
- bb



Genotype vs. Phenotype

- Genotype

- Genetic makeup of an organism (alleles)
- Ex: Tt

- Phenotype

- Physical appearance of an organism
 - Tt= tall



What is the genotype and phenotype? (Pink hair is dominant)



Higher Level: Genetics Terminology

- **P generation: these are the original parents**
 - (like your parents)
- **F1: these are the offspring of the P generation**
 - The “kids” of the P generation
 - (like you)
- **F2: these are the offspring of the F1 generation**
 - (like your future children/grandchildren of the P generation)

Example Problem #1

In dragons, a tail spike (T) is dominant over no tail spike (t). A dragon who is homozygous recessive for this trait mates with a dragon who is heterozygous. What will be the genotype and phenotype of the first generation?

Parental (P Generation) Analysis			Offspring (F ₁ Generation) Analysis		
	Genotype	Phenotype	Genotype	Fraction	Percentage
Parent	tt	No tail spike	Tt	1/2	50%
Parent	Tt	Tail spike	tt	1/2	50%
tt x Tt			TT	0	0%
			Ratio: 1:1		
Parental (P Generation) Analysis			Offspring (F ₁ Generation) Analysis		
	Genotype	Phenotype	Phenotype	Fraction	Percentage
	t		Tail spike	1/2	50%
T	Tt	Tt	No tail spike	1/2	50%
t	tt	tt			
			Ratio: 1:1		



Example Problem #2

In aliens, green fur (g) is a recessive trait and purple fur (G) is dominant. An alien couple decides to have children, and both aliens are heterozygous. Could the alien couple have a green furred baby?

Parental (P Generation) Analysis			Offspring (F ₁ Generation) Analysis		
	Genotype	Phenotype	Genotype	Fraction	Percentage
Parent	Gg	Purple fur	GG	1/4	25%
Parent	Gg	Purple fur	Gg	1/2	50%
Gg x Gg			gg	1/4	25%
			Ratio: 1:2:1		
Parental (P Generation) Analysis			Offspring (F ₁ Generation) Analysis		
	G	g	Phenotype	Fraction	Percentage
G	GG	Gg	Purple fur	3/4	75%
g	Gg	gg	Green fur	1/4	25%
			Ratio: 3:1		



Practice Problems

- **15 MINUTES to complete the practice problems**
- **You may consult with your partner but NO COPYING**
- **Try to do the last two problems without looking at your notes**

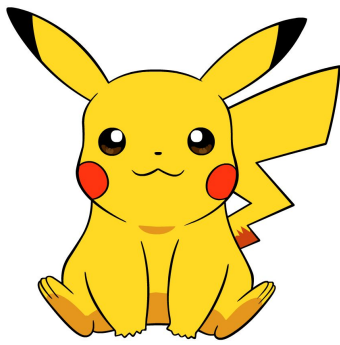
Remember....

Steps to make a Punnett square

- 1) Determine the genotypes of the parent organisms
- 2) Write down your "cross" (mating)
- 3) Draw a Punnett square
- 4) "Split" the letters of the genotype for each parent & put them "outside" the Punnett square
- 5) Determine the possible genotypes of the offspring by filling in the p-square
- 6) Summarize results (genotypes & phenotypes of offspring)

15 minute timer

15:00



Exit Ticket

7 MINUTES
SILENT,
INDEPENDENT
WORK
TALKING OR
PHONE = ZERO

In pikachus, thick tails (T) are the dominant trait over thin tails (t). A heterozygous pikachu mates with a homozygous recessive pikachu.

- 1. What are the parent genotypes and phenotypes?**
- 2. Show a punnett square cross**
- 3. What is the genotype percentage and ratio of offspring?**
- 4. What is the phenotype percentage and ratio of offspring?**

15 minute timer

15:00

Home Learning

Flipping the classroom reading:

Patterns of Inheritance

Due next class!

