

# Genetics

- Genetics is the study of heredity, or passing characteristics from parent to offspring.
- Genes are found on chromosomes
- You inherit 2 copies of every gene, one from each parent
- Each copy is called an allele (Ex: T or t)
- ★ • These alleles determine what proteins get made = what traits you show



## Important Rules in Genetics

- Dominant alleles hide the recessive alleles There are 3 possible combinations of alleles (genotypes):
  - Homozygous dominant (TT)
  - Heterozygous (Tt)
  - Homozygous recessive (tt)
- Homozygous= true breeding    Heterozygous= hybrid
- Two ways to describe a trait:
  - Genotype: the actual alleles found on the genes (ex. TT, Tt, tt)
  - Phenotype: the physical trait caused from the genes (ex. Tall, short)

## GP: Practice with Genetics Vocak

### GP: Practice with Genetics Vocabulary!

1. Circle the dominant alleles:	A G h j K M I o p F t T
2. Circle the recessive alleles:	g t H J T F R E V g Q y
3. Circle if it is true breeding:	GG Hh Tt tt rr Rr EE KK Ee
4. Circle if the recessive is expressed:	Qq ee ff vv aa Ss Xx Cc Bb
5. Circle the homozygous genotypes:	GG Ff Rr Tt VV uu II Hh Ww Gg
6. Circle the heterozygous genotypes:	Ii Oo Pp RR Ee Hh Mm Nn Tt Uu
7. Circle the phenotypes:	Blue long lashes tall Gg Ee brown eyes
8. Circle the genotypes:	Jj YY Red Hair Oo short yellow flowers

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## Probability

- Genetics can be described by probability! Probability is the chance of something happening.
- In order to make probability easy to see, geneticists use a Punnett Square.



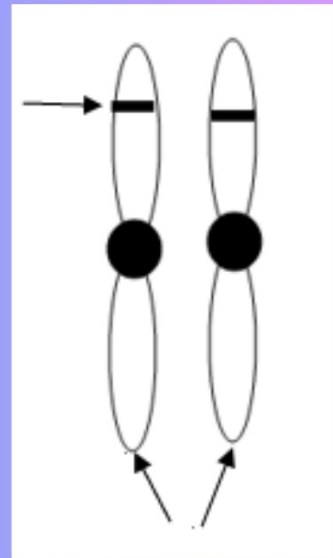
## Dominant Alleles and Recessive Alleles:

Dominant Traits: tall stems, green pods, yellow seeds, round seeds

Recessive Traits: short stems, yellow pods, green seeds, wrinkled seeds

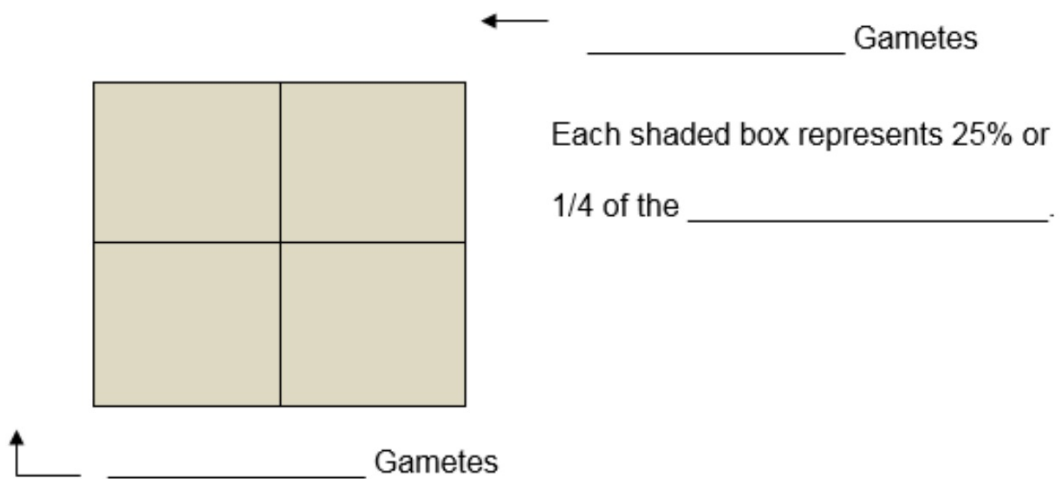
\*Always use the first letter of the dominant trait. Capitalized for dominant and lowercase for recessive.

Ex: T or t



Trait	Height	Pod Color	Seed Color	Seed Shape
D				
R				

## How to Read:



## Monohybrid cross: Involves \_\_\_ trait (Mono= \_\_\_\_\_)

A heterozygous black dog (Bb) mates with a recessive tan dog (bb)

•Dominant: \_\_\_\_\_ Recessive: \_\_\_\_\_

•Genotypes:


•Phenotypes:



In humans, blue eyes are recessive to brown eyes, and is represented by the letter b. What is the result of a cross between a homozygous brown eyed woman and a heterozygous brown eyed man?

•Dominant: \_\_\_\_\_ Recessive: \_\_\_\_\_

•Genotypes:

•Ratio:


Phenotypes:

Ratio:

Are there any blue-eyed children?

Do any of the children “carry” the allele for blue eyes?

## Generations:

P Generation= Original parents

$P \times P = F_1$  (first filial generation)

$F_1 \times F_1 = F_2$  (second filial generation)

	P	P		T	T	
P	F <sub>1</sub>	F <sub>1</sub>	=	t	Tt	Tt
P	F <sub>1</sub>	F <sub>1</sub>		t	Tt	Tt
	F <sub>1</sub>	F <sub>1</sub>			T	t
F <sub>1</sub>	F <sub>2</sub>	F <sub>2</sub>	=	T	TT	Tt
F <sub>1</sub>	F <sub>2</sub>	F <sub>2</sub>		t	Tt	tt

Ex: If a homozygous brown eyed person is crossed with a homozygous blue eyed person. What is the percentage of blue eyed offspring in the  $F_2$  generation?



Who was Gregor Mendel?

An Austrian monk who studied pea plants and is known as the "Father of Genetics." Through his work he developed three principles of inheritance.



1822-1884

## **Law of Dominance**

In cases in which two or more forms (alleles) of a gene for a single trait exists, some of the genes may be dominant and cover up other that are recessive.

## **Law of Segregation**

In most sexually reproducing organisms, each adult has 2 copies of each trait, one from each parent. These genes are separate from each other when gametes are formed during meiosis.

## **Law of Independent Assortment**

The alleles for different genes usually segregate independently of one another.