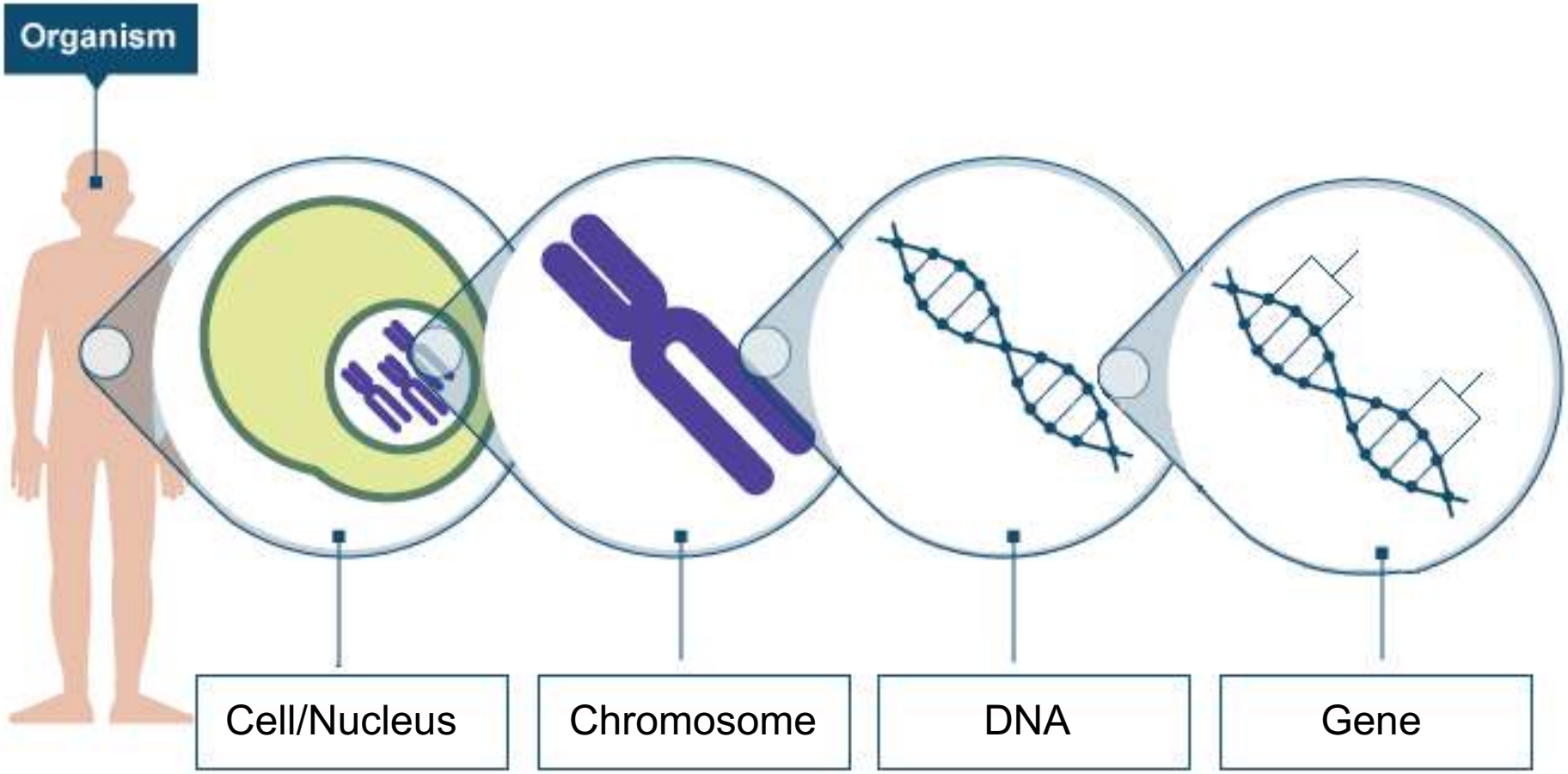
Essential Question: How is the combination of genes important in determining the inheritance of biological traits?

Standards:

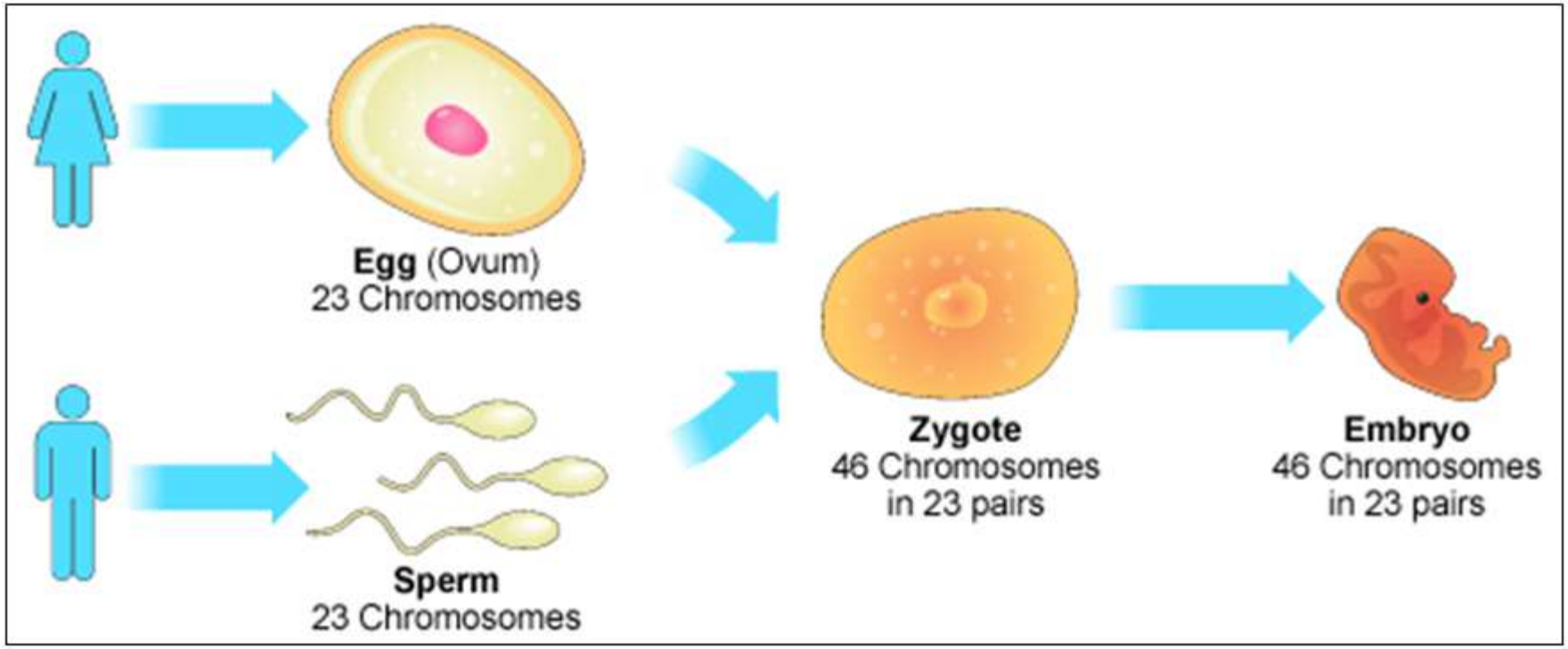
S7L3a. Explain the role of genes and chromosomes in the process of inheriting a specific trait.

S7L3c. Recognize the selective breeding can produce plants and animals with desired traits.

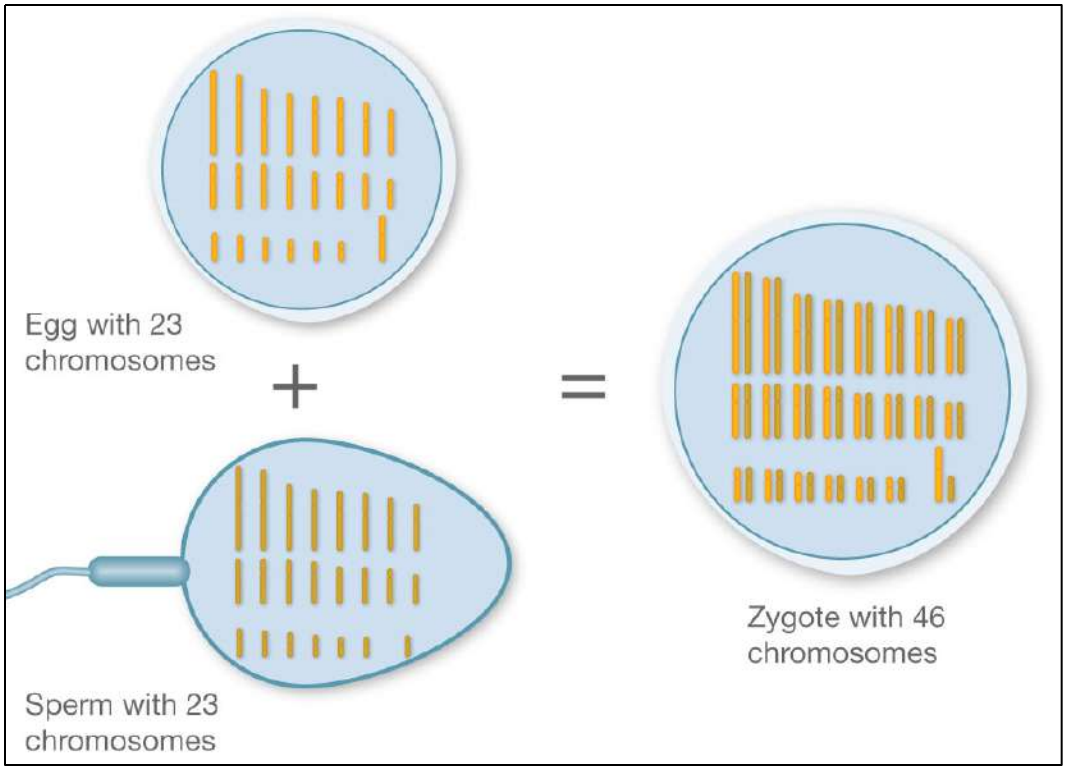
Let's Review...



Sexual Reproduction and Heredity



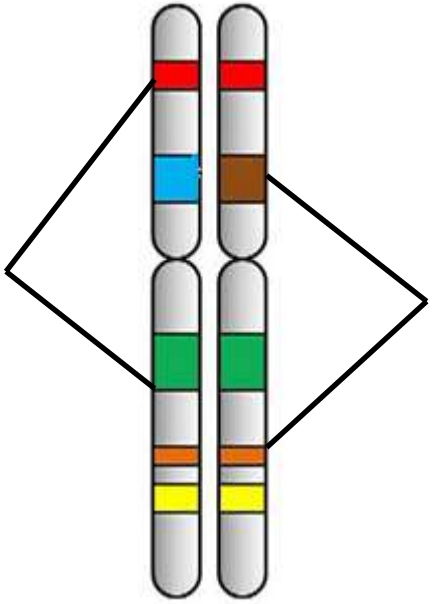
Sexual Reproduction and Heredity



Humans have 46 total chromosomes in 23 pairs. One chromosome of each pair comes from each parent.

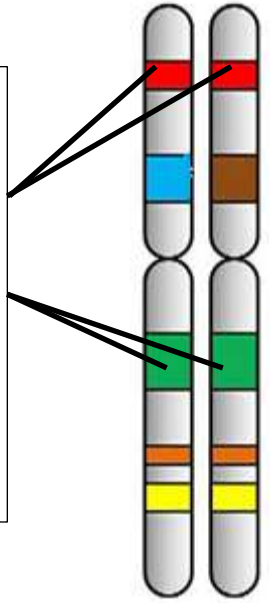
Chromosomes

Genes



Genes

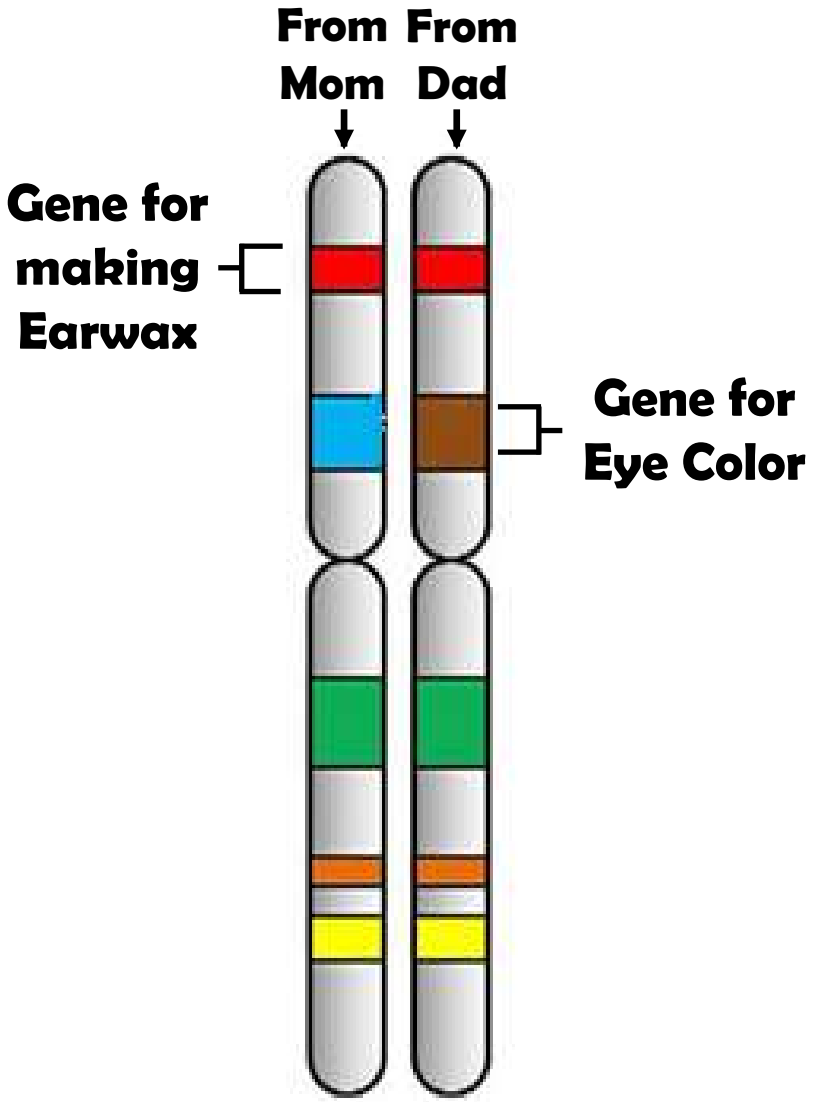
Each set of Genes codes for a different trait



Review of Concepts

http://learn.genetics.utah.edu/content/inheritance/intro/

Chromosome Pair

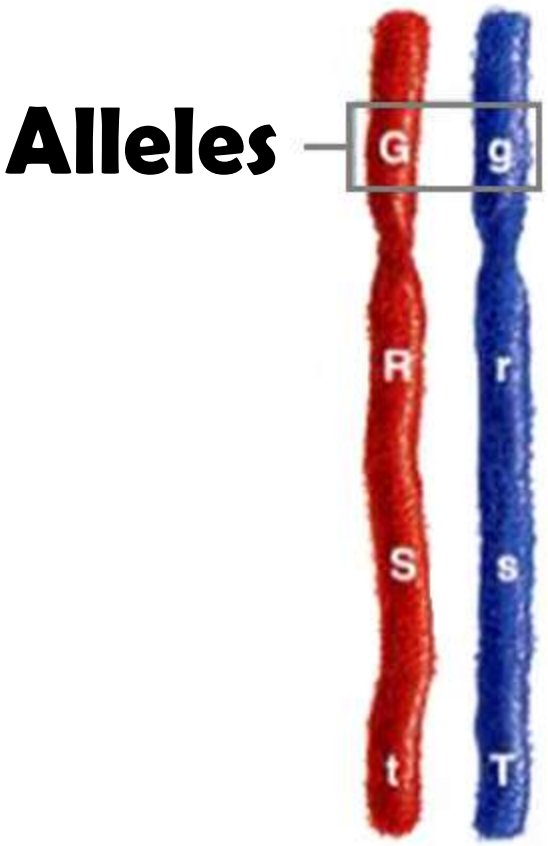


While both chromosomes have the same genes, they can have different forms of these genes.

For example, in the chromosome to the left one form of the gene for eye color will give you blue eyes and the other form will give you brown eyes.

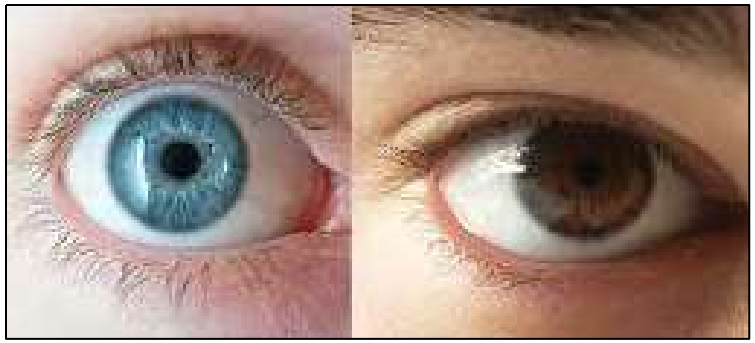
The various forms of the same gene are called Alleles.

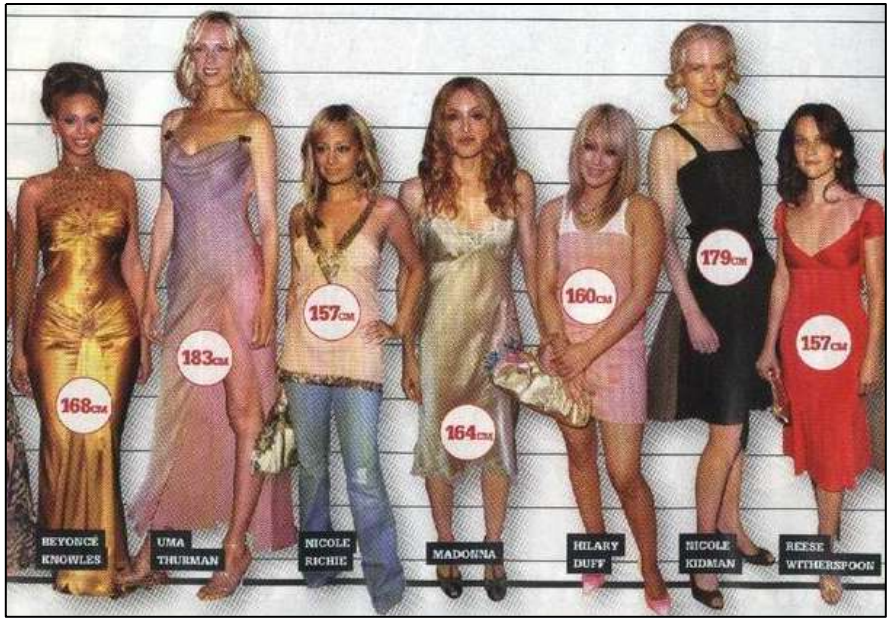
Alleles are usually represented by letters.



Phenotype

An organism's phenotype describes the physical characteristics that can be observed.

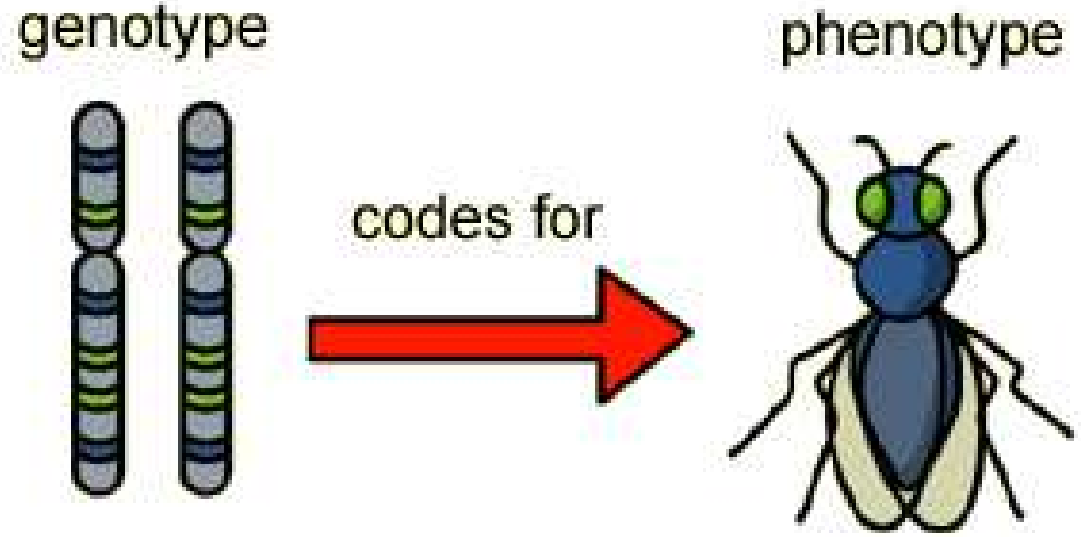




https://www.23andme.com/gen101/phenotype/

Genotype

An organism's genotype describes the actual genes an organism has. Your genotype is not always obvious from your phenotype.

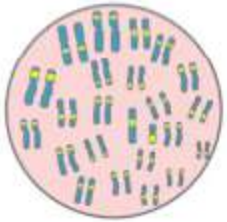


Phenotype and Genotype

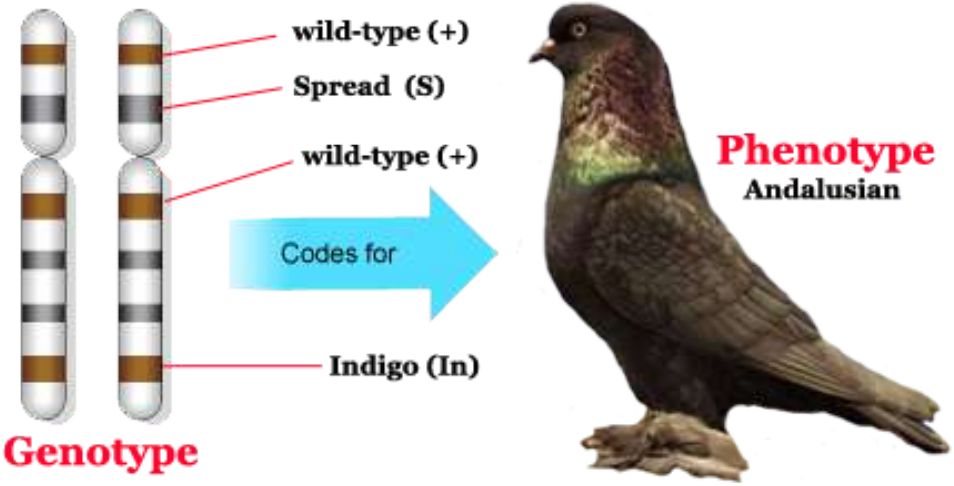
Genotype =

Phenotype =

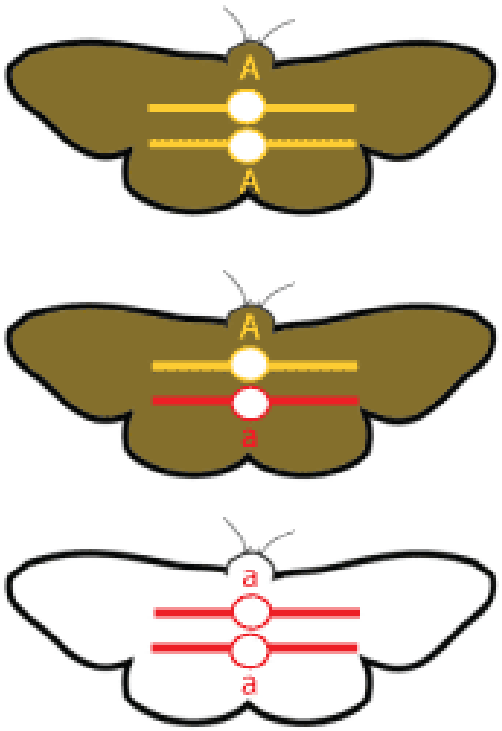
A *genotype* is the genetic makeup of a person



A *phenotype* is the physical manifestation of an inherited trait or disease



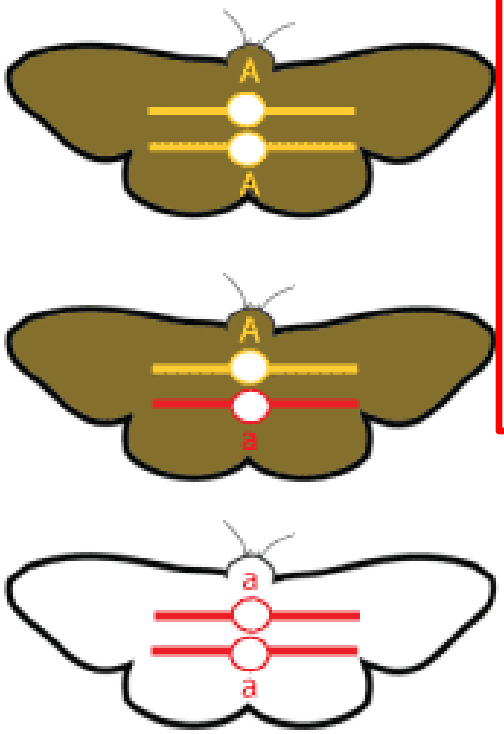
Alleles, Phenotype and Genotype



Genotype	*Phenotype*
AA	Dark
Aa	Dark
aa	Light

Genotypes	Phenotypes
AA	Yellow
Aa	Yellow
aa	Green

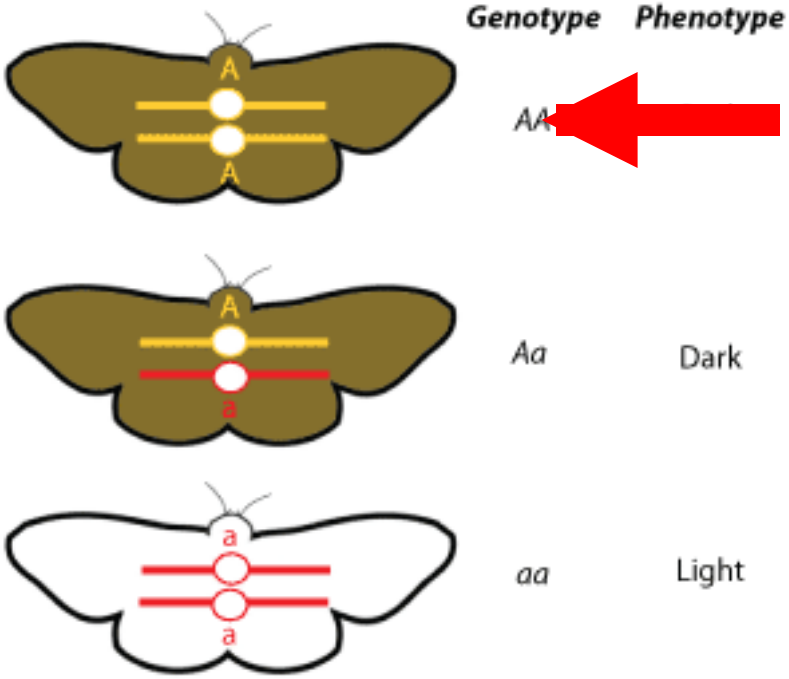
Sometimes your genes contain information that is not expressed in your phenotype.



Genotype	*Phenotype*
AA	Dark
Aa	Dark
aa	Light

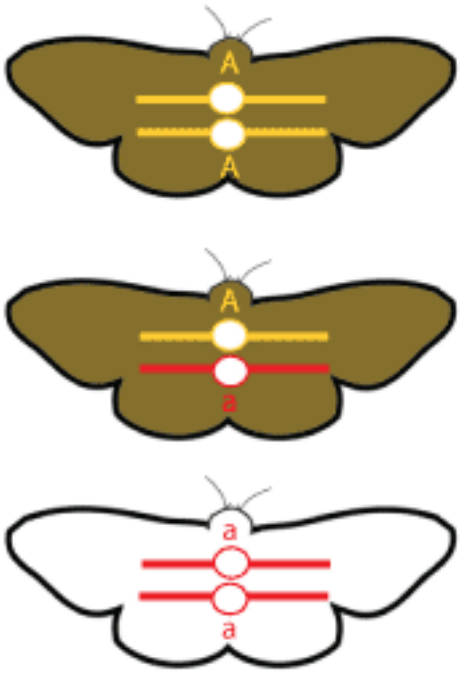
Genotypes	Phenotypes
AA	Yellow
Aa	Yellow
aa	Green

A Dominant allele is one that is expressed in the phenotype even if only one copy is present in the genotype [represented by a Capital Letter]



Genotypes	Phenotypes
AA	Yellow
Aa	Yellow
aa	Green

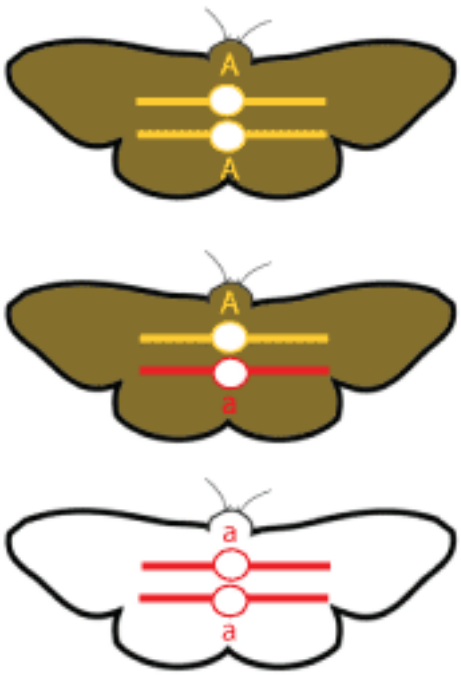
A Recessive allele is one that is expressed in the phenotype only when two copies of it are present [represented by a lower case Letter]



Genotype	Phenotype
AA	Dark
Aa	Dark
aa	

Genotypes	Phenotypes
AA	Yellow
Aa	Yellow
aa	Green

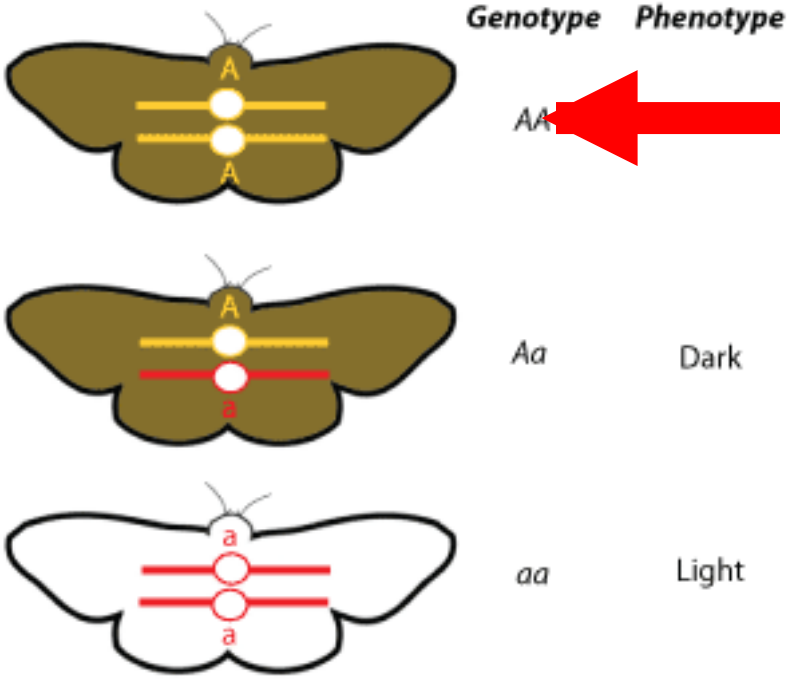
If one chromosome in the pair contains a dominant allele and the other contains a recessive allele, the dominant allele will be expressed in your phenotype.



Genotype	*Phenotype*
AA	Dark
Aa	Dark
aa	Light

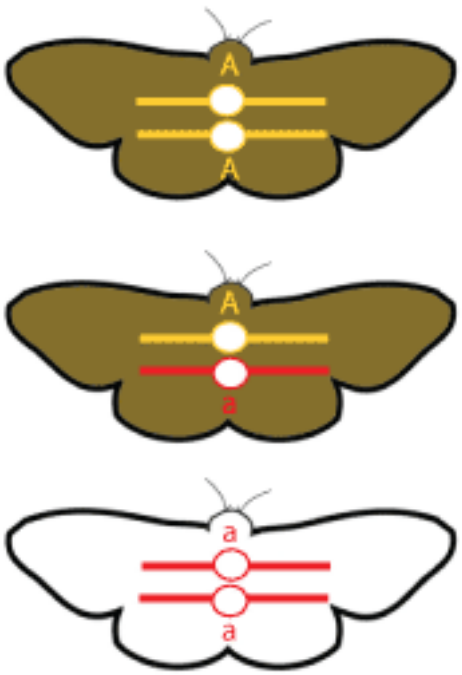
Genotypes	Phenotypes
AA	Yellow
Aa	Yellow
aa	Green

Alleles that have the same form of the same gene [two capital or two lower case letters] are called <u>Homozygous or Pruebred</u>



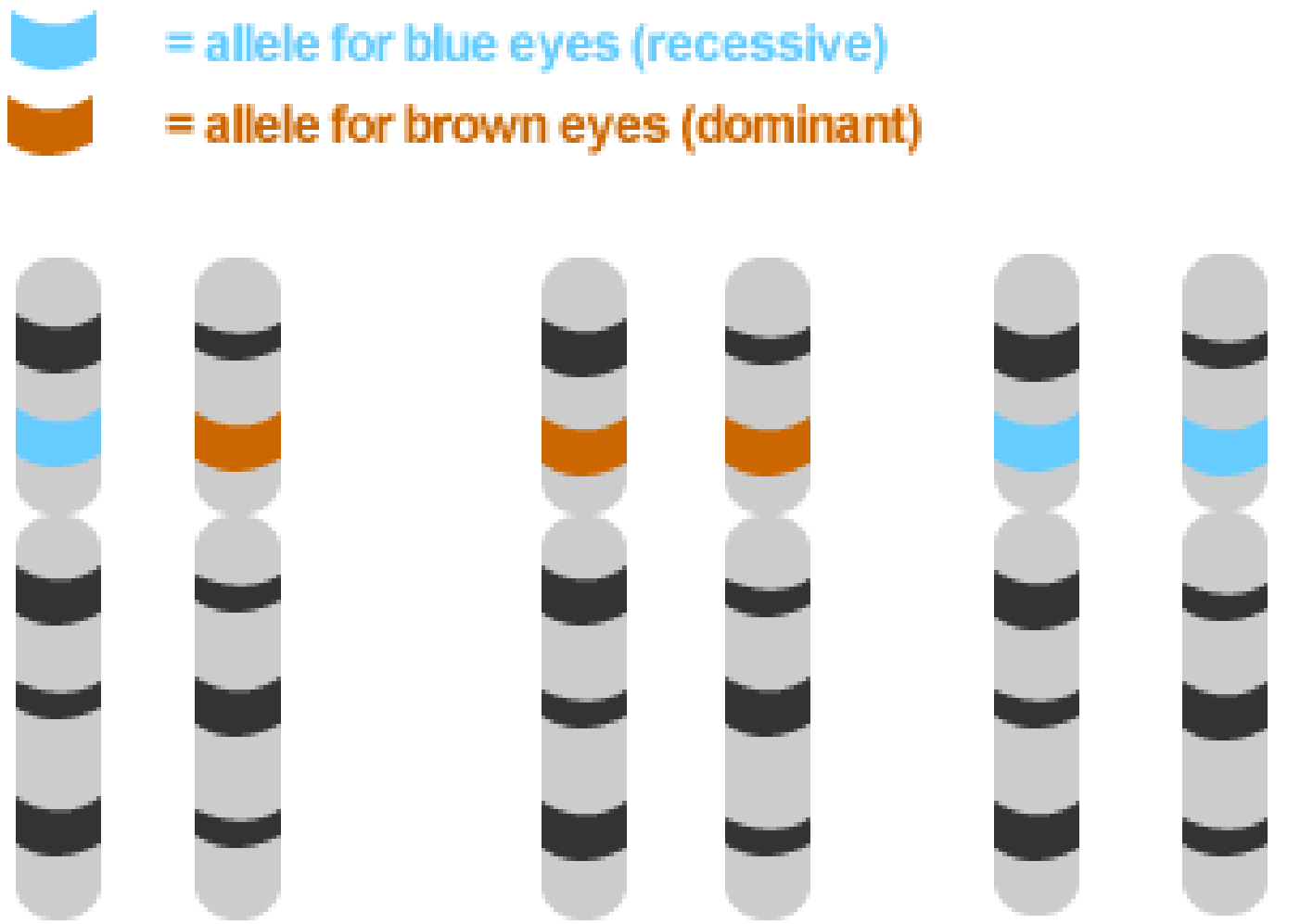
Genotypes	Phenotypes
AA	Yellow
Aa	Yellow
aa	Green

Alleles that have two different forms of the same gene [a capital and a lower case letter] are called <u>Heterozygous or Hybrid</u>



Genotype	*Phenotype*
AA	Dark
Aa	
aa	Light

Genotypes	Phenotypes
AA	Yellow
Aa	Yellow
aa	Green


= allele for blue eyes (recessive)
= allele for brown eyes (dominant)
Individual A:
Heterozygous
(will have brown eyes)
Individual B:
Homozygous
(for brown eyes)
Individual C:
Homozygous
(for blue eyes)

INCOMPLETE DOMINANCE

- When both alleles are present and are both expressed in the phenotype.
- The hybrid is a blend of both alleles.
- Example: A white flower and a red flower making a pink flower

CODOMINANCE

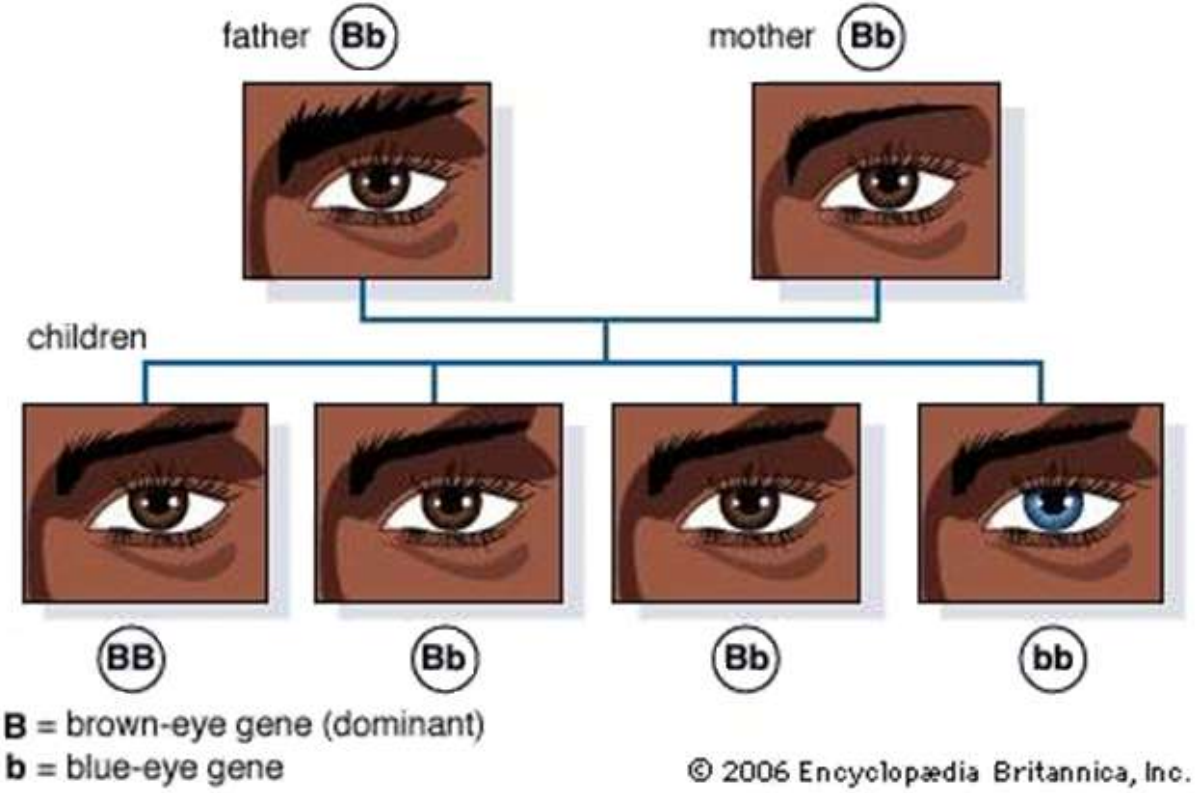
- both alleles are equally strong and both alleles are visible in the hybrid genotype.

Example: A black cow and a white cow create a black and white cow.

Genotype, Phenotype, Homozygous and Heterozygous Practice handouts

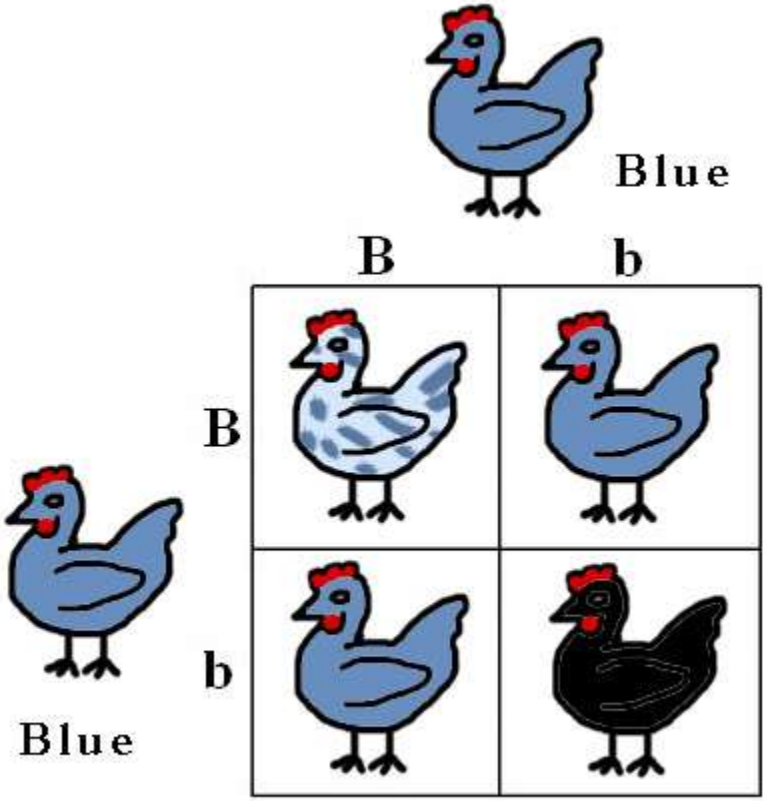
Genetic With a Smile

How does the combination of parent alleles affect offspring?



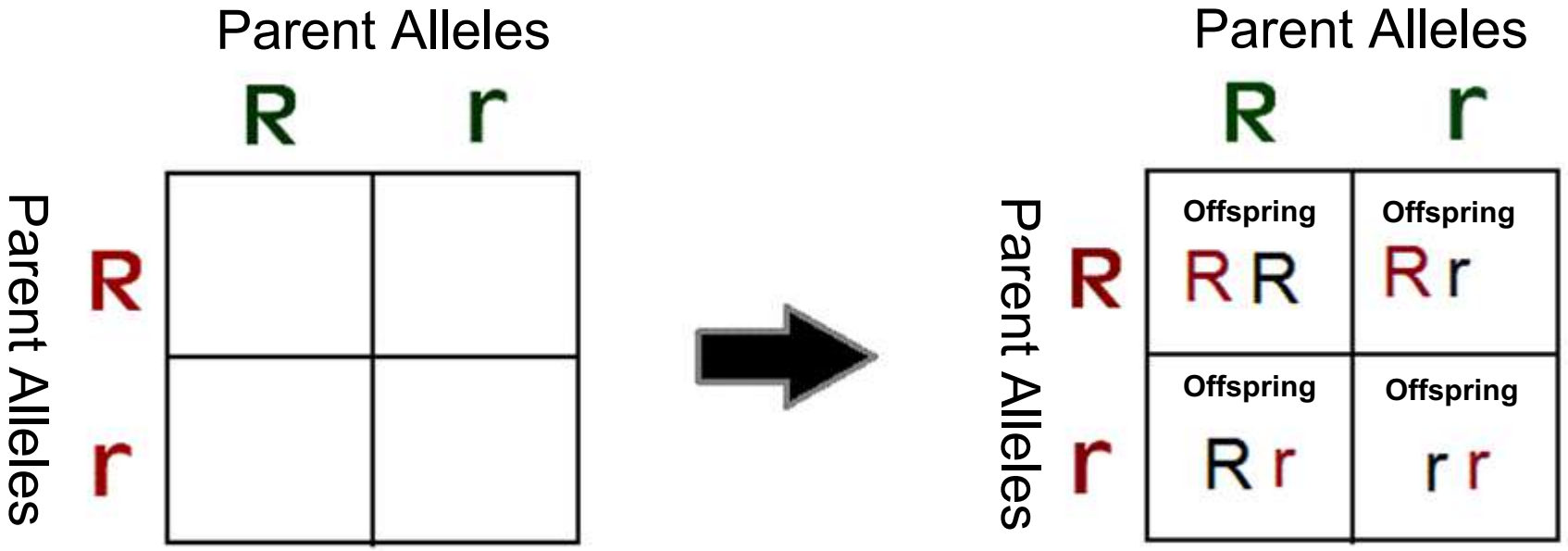
A Punnett Square is used to show the possible combination of genes.

A Punnett Square is used to illustrate how a parent's alleles might combine in offspring.



Punnett Square

https://www.youtube.com/watch?v=V_pl5lcSUFg



Let's Look at this Example

Father shows Double Tail

Mother carries Double Tail
but shows Normal Tail
(since it's most dominant)

	D	D
D	DD  Shows Double Tail and is a dominant carrier	DD  Shows Double Tail and is a dominant carrier
d	Dd  Shows Normal Tail but carries Double Tail	Dd  Shows Normal Tail but carries Double Tail

What percent of the offspring will have a double tail?

2 out of 4 squares have a double tail = 50%

What percent of the offspring will have a normal tail?

2 out of 4 squares have a normal tail = 50%

Father shows Double Tail

Mother carries Double Tail but shows Normal Tail (since it's most dominant)

	D	D
D	DD  Shows Double Tail and is a dominant carrier	DD  Shows Double Tail and is a dominant carrier
d	Dd  Shows Normal Tail but carries Double Tail	Dd  Shows Normal Tail but carries Double Tail

With a seat partner, examine the following Punnett Square where B is dominant for brown eyes and b is recessive for blue eyes.

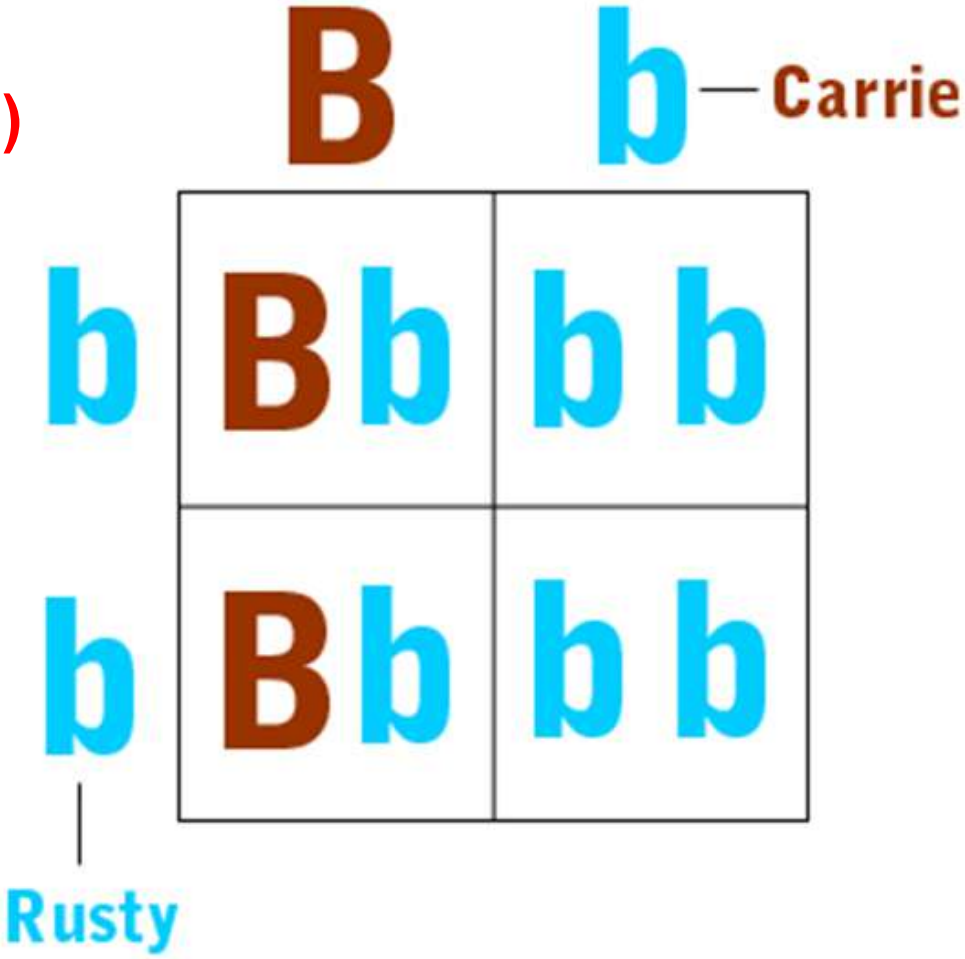
1. Identify the parent alleles. **Bb and bb**

2. Which parent's alleles are homozygous? **Rusty (bb)**

3. Identify the heterozygous alleles? **Bb**

4. What percent of Rusty and Carrie's offspring will have Brown eyes? **50%**

5. What percent of Rusty and Carrie's offspring will have Blue eyes? **50%**



Incomplete dominance :

Homozygous

Homozygous

	R	R
W	RW	RW
W	RW	RW

Codominance :

Homozygous

Homozygous

	W	W
B	BW	BW
B	BW	BW

Punnett Squares and Combination of Genes Activities

[see resources]

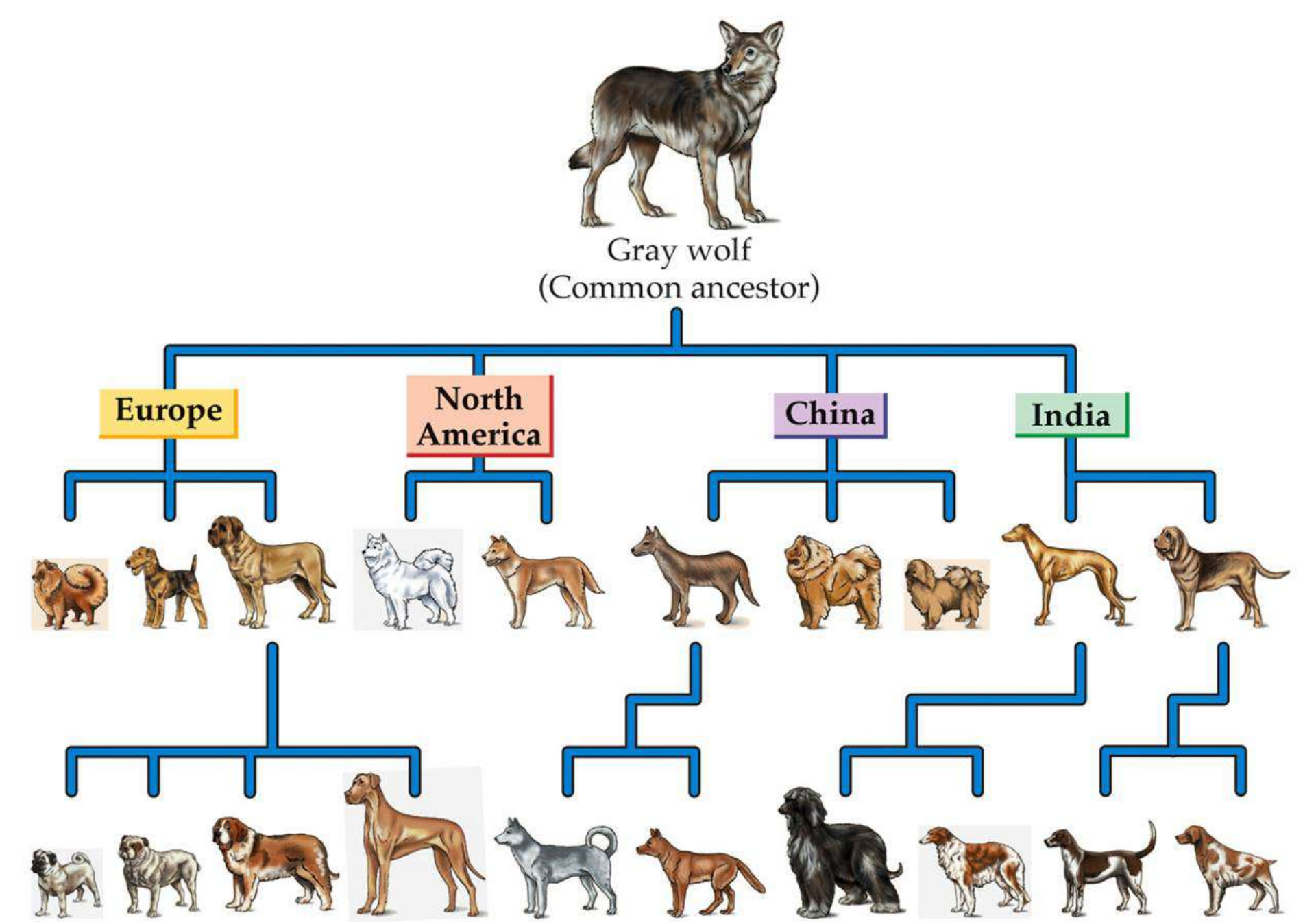
Genetics Rap

https://www.youtube.com/watch?v=_IOIx__UJ5g

Video Clip Reviewing Genetics

https://www.youtube.com/watch?v=Mehz7tCxjSE

Selective Breeding is the process of selecting and breeding parent organisms to pass on particular trait to offspring.



Mastiff

Big and strong, but lacked speed and aggression

Bulldog

Fast and aggressive, but lacked strength

Bullmastiff

Big, strong, fast, and aggressive

Selective Breeding Activities

[see resources]

Combination of Genes

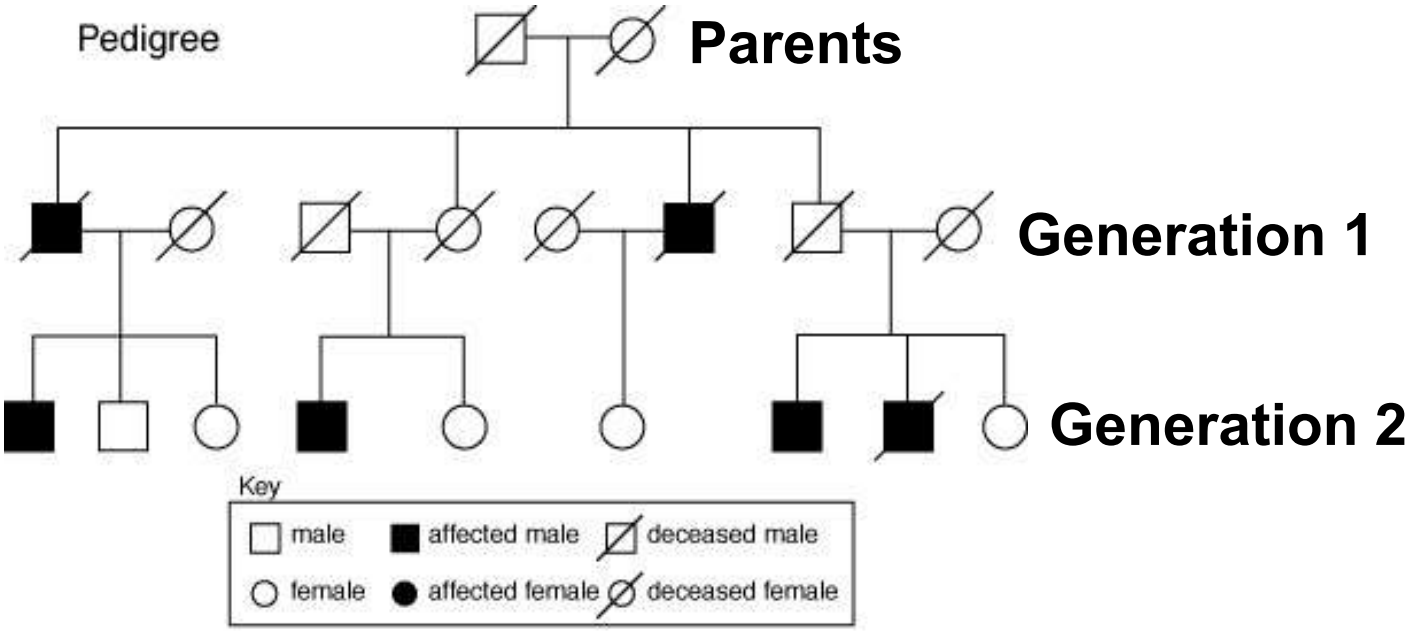
- Differences or variations in DNA are what make one organism different from another
- Sometimes there are accidental changes in DNA. These changes can then be passed to offspring
- Mutations are any changes in DNA

Mutation Activities

[see resources]

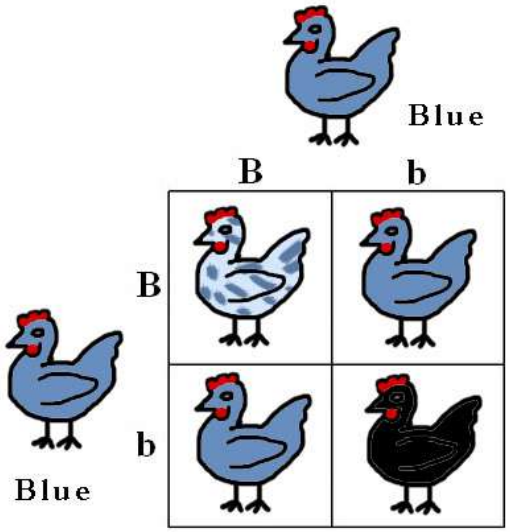
Pedigree

A pedigree is a tool geneticists use to trace genetic traits through a family.



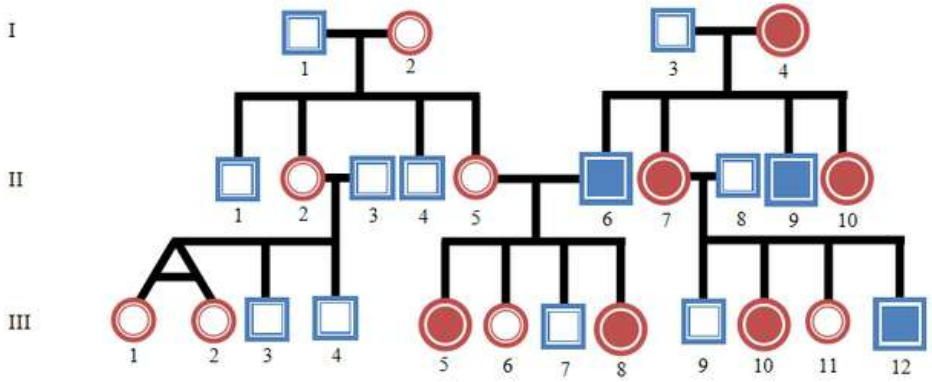
Punnett Square

A Punnett Square illustrates the probability of what could happen concerning a trait when organisms sexually reproduce.



Pedigree

A Pedigree illustrates what has happened during several generations of reproduction related to the same trait.



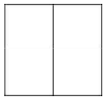
Pedigree Activities

[see resources]

Combination of Genes Summarizer

Combination of Genes Summarizer Name _____ Date ____ Period __

1. The presence of hair on the middle section of the fingers (H) is a dominant trait in humans. Two parents with this dominant trait have children. Some of the children have this trait, and some children do not. Draw a Punnett Square below including the parent alleles and possible offspring.



2. What percent of the offspring are homozygous for the presence of hair on the middle section of the fingers?

3. What percent of the offspring are heterozygous for the presence of hair on the middle section of the fingers?

4. What percent of the offspring are homozygous for the absence of hair on the middle section of the fingers?

Combination of Genes Summarizer Name _____ Date ____ Period __

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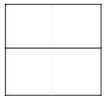

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