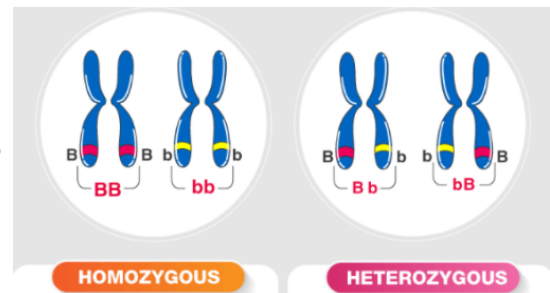


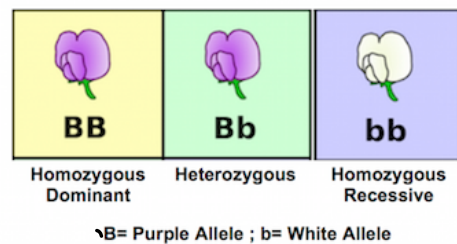
Tutorial: Monohybrid Cross

Important terms

Homozygous vs. Heterozygous

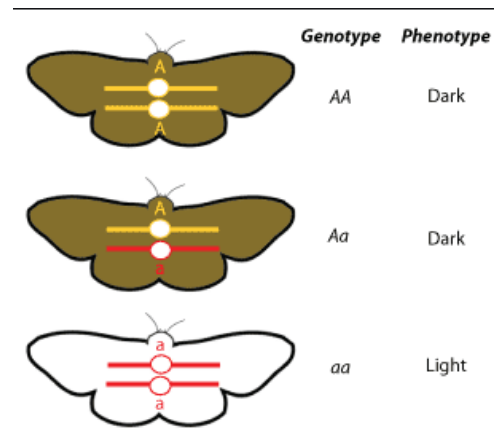
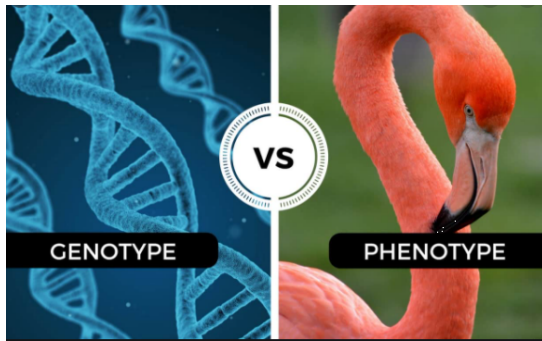


Dominant vs. Recessive



1. Tutoria Notes1 - Monohybrid Cross (work shown)

Phenogype vs. Genotype



- In 1905 the first textbook of genetics was written by Reginald Crundall Punnett called "Mendelism".
- The text included a grid for predicting the outcome of a cross, now known as a **Punnett square**.

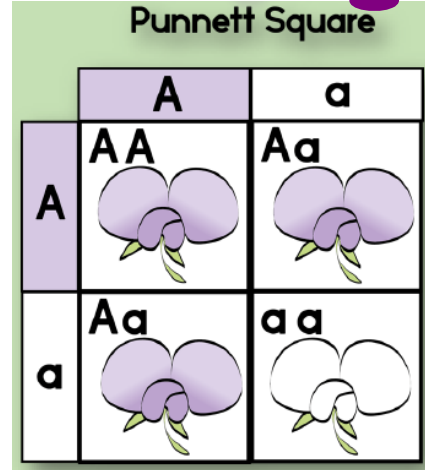


1. Tutorials - Monohybrid Cross (work shown)

Punnett Squares Introduction:

- Are a tool that help scientists figure out:
 1. all the possible combinations of alleles an offspring can have
 2. the probability of each allele combination in the offspring.

Hmm... this matches Mendel's ratio for the F₂ generation.





Intro. to Using Punnett Squares:

Example Genetic Cross:
 A heterozygous tall pea plant is crossed to another heterozygous tall plant. Tall is dominant over short. Calculate the phenotype and genotype ratios of their offspring.

1 Which trait/allele is dominant?
Tall
 Which trait/allele is recessive?
Short

2 Write each parent's phenotype, genotype, and individual alleles.


 Parent #1:
 Phenotype: tall
 Genotype: Tt
 Alleles: T, t


 Parent #2:
 Phenotype: tall
 Genotype: Tt
 Alleles: T, t

>

1. Tutoria Notesl - Monohybrid Cross (work shown)

3 Fill in the parent alleles on the top and left side of the Punnett square.

4 Fill each box with the allele from one top parent and the allele from the left parent

5 Write the genotype ratio in the offspring by counting how many of each genotype are in the Punnett Square's offspring boxes.

Genotype Ratio:
 $1TT : 2Tt : 1tt \rightarrow \frac{1}{4}TT : \frac{2}{4}Tt : \frac{1}{4}tt$

6 Write the phenotype ratio using the genotype ratio.

Phenotype Ratio:
 $3\text{ tall} : 1\text{ short}$

Make sure to answer the question!!

| | | |
|---|----|----|
| | T | t |
| T | TT | Tt |
| t | Tt | tt |


Key is Knowing what you are being asked for!!

Clues from Relatives
 A young striped zebrafish had a striped father and a spotted mother. Stripes is dominant over spots.

ss

What is the genotype of the young striped zebrafish?
 Ss

Because the young fish has stripes and its mother was homozygous for the recessive trait (spots), you can tell that the young fish is a heterozygote. It must have inherited one recessive allele from its mother.



"Hybrid" means heterozygous. In this example, because the heterozygote shows the dominant trait, brown hair is the dominant trait.

"Hybrid"
 An albino male mouse is mated with a hybrid brown-haired female mouse.

bb

What is the genotype of the female parent?
 Bb

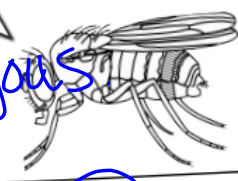
1. Tutoria Notesl - Monohybrid Cross (work shown)

"True-breeding"

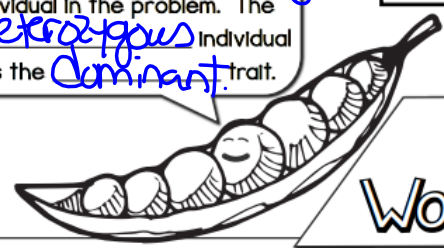
A true breeding brown bodied male fly mates with a white-bodied female fly. The brown body allele is dominant over the white body allele. (Use B for brown and b for white)

What is the genotype of the male parent fly?
BB

"True -breeding" means homozygous



To figure out which allele is dominant, look at the phenotype of a heterozygous individual in the problem. The heterozygous individual has the dominant trait.



Dominant or Recessive? Rr

A heterozygous round-seed pea plant is crossed with a wrinkled-seeded pea plant.

Which allele is dominant?
round

Simple Mendelian Word Problem Clues

Test Cross: Goldfish





Your friend gives you two new goldfish!

What are their genotypes?



Bubble eye →





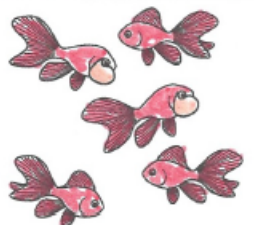
Normal eye

How can you figure out the bubble-eyed goldfish's genotype?

Scientists do test crosses to see if an individual organism is heterozygous or homozygous dominant for a particular trait.

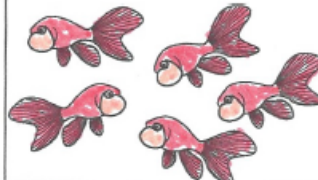
They cross the individual with the unknown genotype with a homozygous recessive individual.

Offspring Possibility #1



Parents must be:
bb and Bb

Offspring Possibility #2



Parents must be:
bb and BB

1. Tutoria Notesl - Monohybrid Cross (work shown)

Practice Question #1: * Pause the video for more time!

In a certain species of animal, black fur (B) is dominant over brown fur (b). Predict the genotypes and phenotypes of the offspring whose parents are both heterozygous for black fur.

What do you need to know?

Dominant trait/allele: B

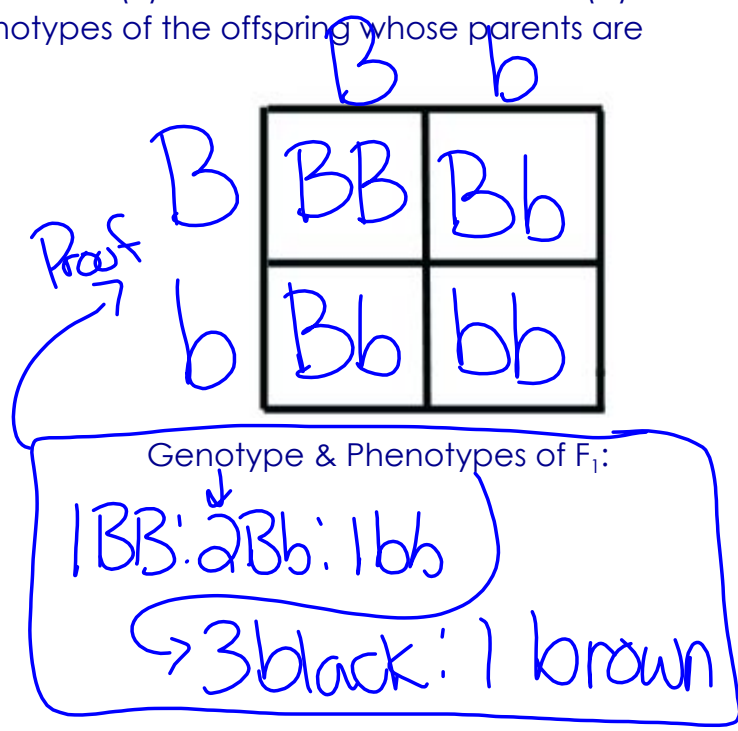
Recessive trait/allele: b

Phenotype of P Generation:

Black (both)

Genotype of P Generation:

Bb x Bb



Practice Question #2: * Pause the video for more time!

What are the genotypes and phenotypes of offspring when one parent is homozygous black and the other is homozygous brown?

What do you need to know?

Dominant trait/allele: B (Black)

Recessive trait/allele: b (Brown)

Phenotype of P Generation:

Black x Brown

Genotype of P Generation:

BB x bb

