

Mendelian Genetics Day 2

**Solving Genetics Problems:
*Single Trait Crosses***

Law of Probability

- Probability expresses the chances that a particular event or outcome will happen.
 - *Probability only applies to “random chance events”*
 - Examples of random chance events:
 - *Rolling dice, picking a certain card from a deck, or winning a raffle*

$$\text{Probability of a particular outcome} = \frac{\text{\# of desired outcomes}}{\text{\# of possible outcomes}}$$

The probability of getting heads when flipping a coin is...

$$\frac{1 \text{ (head)}}{2 \text{ (possible sides)}}$$

Ratio: a comparison of the amount of one thing to the amount of another thing.

Example: What is the ratio of heads to tails (heads:tails) on a nickel? **1:1**

How do you read the ratio?

– “The ratio of heads to tails is 1 to 1.”

- What is the ratio of boys to girls (boys:girls) in this class?
- If you add the numbers in the ratio it must equal the total.
 - Example: the ratio of boys:girls must add up to the total number of students in this class.

Probability vs. Ratio

- Probability and Ratio are NOT the same thing...
- The probability of flipping heads on a coin is $\frac{1}{2}$
- The ratio of heads to tails on a coin is 1:1.

Steps for Solving Genetics Problems

1. Assign letters to the alleles.

- Ex: H = curly hair, h = straight hair

2. Write the cross showing phenotypes & genotypes of the parents.

- Ex: Heterozygous curly x straight hair

Hh x hh

Steps for Solving Genetics Problems

3. Set up a Punnett square to find the possible offspring of the cross.

	h	h
H	Hh	Hh
h	hh	hh

4. Answer the question in the problem.

We'll practice this next...

Practice Genetics Problem #1

In humans the ability to roll their tongue is a dominant trait and non-tongue rolling is a recessive trait. Mary is a heterozygous tongue roller and marries Francisco who is also a heterozygous tongue roller. What is the probability their children will not be able to roll their tongue?

1. Assign letters for the alleles:

T = tongue roller t = non tongue roller

2. Write the cross with phenotypes & genotypes of the parents:

Phenotypes....

homozygous tongue roller X non tongue-rolling

Genotypes....

TT X tt

3. Set up a Punnett square to find the possible offspring of the cross.

	T	t
T	TT	Tt
t	Tt	tt

How many possible offspring are shown in the Punnett square?

4 possible offspring

What are the possible genotypes of the offspring?

TT, Tt, tt

What are the possible phenotypes of the offspring?

Tongue roller or non tongue roller

4. Answer the question in the problem.

What is the probability their children will not be able to roll their tongue?

Answer:

The probability the children can't roll their tongue is

$$\frac{1}{2}$$

	T	t
T	TT	Tt
t	Tt	tt

Practice Genetics Problem #2

In an alien species from the planet Zoltaire, blue skin (B) is dominant and orange skin (b) is recessive.

What are the phenotypes of the offspring if a homozygous blue female is crossed with an orange male?

1. Assign letters for the alleles: B = blue skin
b = orange skin

2. Write the cross with phenotypes & genotypes of the parents:

Phenotypes....

homozygous blue female X orange male

Genotypes....

BB X bb

3. Set up Punnett square to find the possible offspring of the cross.

How many possible offspring are shown in the Punnett square?

4 possible offspring

	B	B
b	Bb	Bb
b	Bb	Bb

What are the possible genotypes of the offspring?

Bb

What are the possible phenotypes of the offspring?

Blue skin

4. Answer the question in the problem.

What are the phenotypes of the offspring?

Answer:

The phenotypes for all of the offspring will be blue skin.

	B	B
b	Bb	Bb
b	Bb	Bb