NOTES 5.2

Chapter 5 – Genetics

Lesson 2 – Probability & Punnett Squares

What's the Chance?

Step I - Predict how many times out of 20 your coin will land "heads up" and "tails up".

Heads ☐ Tails ☐

Step 2 - Flip your coin 20 times (carefully and without dropping it!) & record the # of times the coin lands "heads up" and "tails up" after each flip, in the spaces below. (use x's)

Heads ☐ Tails ☐

Results –

Heads ☐ Tails ☐

Q1: How did your results compare to your prediction?

Q2: What are some reasons for differences between your results & your classmate's results?

Modeling Inheritance

So what do you call the chances of a coin landing on "heads or tails"? probability

Q: What is probability?
A: the likelihood that a particular event will occur

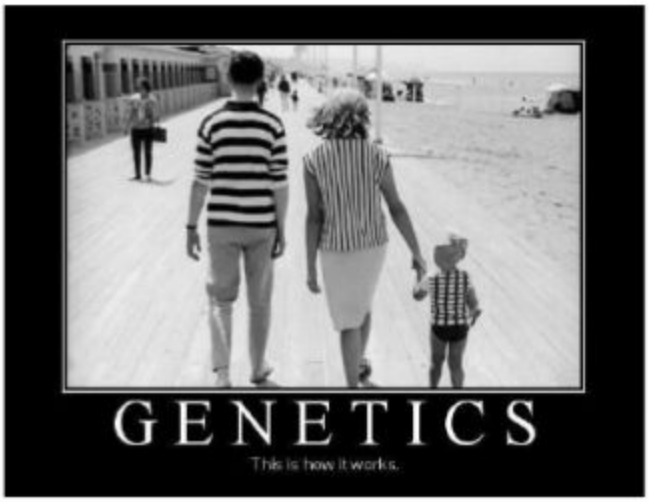
Therefore, the probability that a coin will land –

- "heads up" is I in 2 or 50%
- "tails up" is 1 in 2 or 50%

☑ Q: Why is there a 1 in 2 probability that a tossed coin will land heads up? b/c there are only 2 sides

☑ Q: What is the probability that a coin will land tails up? ½ , 1:2, 50%, 50:50

So, how is probability related to genetics?



NOT!

Think back to Mendel's 1st experiment…

parental generation →
(*P* generation)

TT x tt

This *P* generation will always produce a 4:4 ratio or 100% TALL plants.

1st *filial* generation →
(*F1* generation)

Tt

This F_1 generation will always produce a 3:1 ratio or 75% : 25% TALL plants & short plants.

2nd *filial* generation →
(*F2* generation)

TT, Tt tt

Mendel was the 1st scientist to recognize that the principles of probability can be used to predict the results of genetic crosses or **Punnett squares**.

Q: What is a Punnett square?
A: a chart that shows all the possible combinations of alleles that can result from a genetic cross

Plant breeders and animal breeders use tools to help them predict how often traits will appear in offspring that does not require performing the crosses thousands of times.

Q: Which allele combination(s) will result in tall offspring? **TT, Tt**

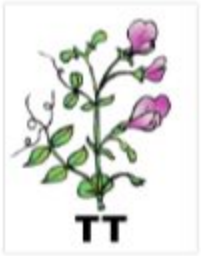
Let's look at Mendel's 1st experiment as a Punnett square –

In this experiment, he crossed a…

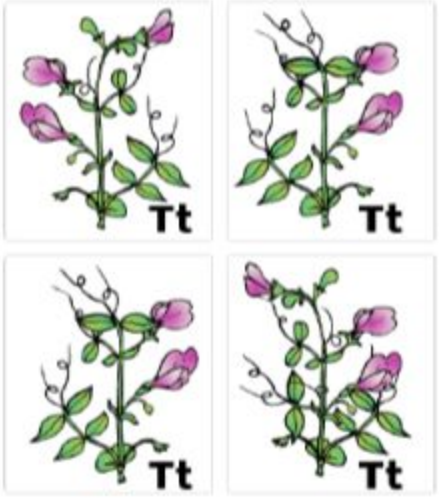
purebred tall pea plant

&

purebred short pea plant



Notice that each side is "added" together to make a new pair of alleles resulting in a new



The most important information gathered from a Punnett square is that of probability.

In the above cross, the probability is divided among 4 squares, each = **25%** or **100%** total.

Ex. black guinea pig (BB) vs. white guinea pig (bb)

	b	b
B	Bb	Bb
B	Bb	Bb

Results

Genotype – **100% Bb**

Phenotype – **100% black**

Q: What is the probability that an offspring in the above cross will have white fur? 0%

Q: If 2 guinea pigs with the alleles Bb are crossed, what is the probability that an offspring will have white fur?

	B	b
B	BB	Bb
b	Bb	bb

Results

Genotype – 1BB:2Bb:1bb

Phenotype – 75% black, 25% white

Punnett Square Practice

Pp X Pp

P = purple
p = white

	P	p
P	PP	Pp
p	Pp	pp

Results

Genotype – 1PP:2Pp:1pp

Phenotype – 75% purple, 25% white

Pp X pp

P = purple
p = white

	p	p
P	Pp	Pp
p	pp	pp

Results

Genotype – 2Pp:2pp

Phen 50% purple, 50% white