# Biology

## Genetics & Probability

Name:_____ Block:_____

We spent an entire class period working through probabilities using dice, cards, and coins. How does that relate to genetics? We are going to look at several examples to help you understand the link between the two, starting with the coins.

1. Using two coins, calculate the probabilities of all possible outcomes. Then write them as a ratio.

Coin A Heads = ½
Coin A Tails = ½
Coin B Heads = ½
Coin B Tails = ½

$A_hxB_h = ½ \times ½ = ¼$
$A_hxB_t = ½ \times ½ = ¼$
$A_txB_h = ½ \times ½ = ¼$
$A_txB_t = ½ \times ½ = ¼$

$¼ + ¼ = 2/4$

Because $A_hB_t$ and $A_tB_h$ are the same result, we add the two probabilities for the total of one coin heads

We can then write a ratio because all of the denominators are the same:
1HH:2HT:1TT

2. Using one normal coin and one double-headed coin, calculate the probabilities of all possible outcomes then write them as a ratio.

Coin A Heads =
Coin A Tails =
Coin B Heads =
Coin B Tails =

3. Using two double-sided coins (one heads, one tails) calculate the probabilities of all possible outcomes then write them as a ratio.

Coin A Heads =
Coin A Tails =
Coin B Heads =
Coin B Tails =

4. If a mother has a widow's peak and has two different alleles for this trait (Ww), and a father does not have a widow's peak (ww), calculate the probabilities for their offspring having widow's peaks and write the results as a ratio.

Prob $W_{mom}$ =
Prob $w_{mom}$ =
Prob $W_{dad}$ =
Prob $w_{dad}$ =

Prob $W_mW_d$ =
Prob $W_mw_d$ =
Prob $w_mW_d$ =
Prob $w_mw_d$ =

5. If both parents have one dominant (R) and one recessive (r) allele for eye shape, calculate the probabilities for the eye shape of their possible offspring and write the results as a ratio.

Prob $R_{mom}$ =
Prob $r_{mom}$ =
Prob $R_{dad}$ =
Prob $r_{dad}$ =

6. If one parent has two dominant alleles for ear lobes and one has two recessive alleles for ear lobes, calculate the probabilities for the ear lobes of their possible offspring and write the results as a ratio.