**SBI3U - Dihybrid Crosses**

**Learning Target: #6.** I can predict phenotypic and genotypic ratios in monohybrid and dihybrid crosses using Punnett squares.

**Dihybrid Cross**

* Involves 2 genes each consisting of heterozygous alleles

Mendel focused on two traits: **seed shape** and **seed colour**

Seed shape: Round (R) is dominant to wrinkled (r)

Seed colour: Yellow (Y) is dominant to green (y)

Crossed two plants that were BOTH heterozygous for seed shape (Rr) and seed colour (Yy)

a) What are the parent genotypes?

b) What are the parent phenotypes?

c) What are the possible gametes produced by each parent?

d) How many different gamete combinations are produced by crossing the parents?

e) Construct a dihybrid cross.

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f) Determine the frequency of offspring that are homozygous for both traits.

g) Determine the frequency of offspring are round and yellow:.

h) Determine the frequency of offspring that express both recessive traits.

f) Determine the phenotypic ratio of round and yellow : round and green : wrinkled and yellow : wrinkled and green

**Lesson Review:**

1. If we represent fruit fly traits with the following letters: L = long wings, l = short wings, G = grey body colour, g = black body colour, then an organism with the genotype LLGg will display what phenotypic characteristics?

2. The organism with the genotype LLGg will produce how many type(s) of gamete(s)? Show how you came to this conclusion.

3. If T = tall stems, t = short stems, G = green pods, and g = yellow pods, a cross between a plant homozygous for tall stems and heterozygous for pod colour is crossed with a plant with short stems and yellow pod characteristics. Identify the genotypes and phenotypes of the F1 generation. Show your work using the Punnett square.

4. In guinea pigs, black hair colour (B) is dominant and brown hair colour (b) is recessive. Long hair (L) is dominant and short hair is (l) is recessive. Answer the following questions: (a) Diagram the cross: BbLl × BbLL (b) What are the phenotypes of the parent generation? (c) What are the genotypes and phenotypes of the F1 generation?

5. About 70 percent of Canadians get a bitter taste from the drug phenyl thio- carbamide (PTC), while the other 30 percent do not. The ability to taste this drug (T) is a dominant characteristic, while taste-blindness is recessive (t). Tongue-rolling ability is dominant (R), while the inability to roll the tongue is recessive (r). A tongue-rolling woman who is taste-blind has a father who could not roll his tongue but could taste the PTC chemical. She marries a man who can taste PTC but cannot roll his tongue. His mother was taste-blind. Show the possible children this couple could produce. Use a Punnett square to illustrate your answer.