

## Will You “Corner the Market” or Lose your Farm?

### Task:

You are a farmer trying to grow a particular species of corn. The corn is a mutant form that produces an extra sweet, buttery tasting kernel. You borrowed money from the bank to try to selectively breed this crop. Since you will be marketing the corn as totally organic, you can only rely on selective breeding techniques to produce your crop. The bank loan agreement stipulates that payments must start after your fifth year. In order to generate a profit and begin paying back your loan, your fifth year crop must have at least a 58% yield of the desired trait. If this is not achieved, you will have to forfeit your land because the bank will gain legal possession of your farm which has been in your family for seven generations! Happy Farming & Good Luck!

### Materials:

32 red beads	25 Blue beads	7 pink beads
2 white beads	brown paper bag	

### Procedure:

- Step 1: Count beads to determine if you have the correct number of each color. If not, please see the teacher to get the missing beads required.
- Step 2: Place all the beads into the brown paper bag. Gently shake the bag to mix contents.
- Step 3: Have your partner reach into the bag (without looking) and randomly pick out two beads.
- Step 4: Place the beads together on the table. This represents one plant in your crop. Repeat the process until all the beads are used. Your partner should be documenting the genotype of each plant in your crop on a data table. This data is known as Year 1.
- Step 5: Using the key, on your data table, cross out any genotype that is not viable for next year's seasonal planting. Discard those plants' genes (beads) into the waste cup. Return the viable plants genes to the brown paper bag which will represent the genome for the next generation of crops.
- Note:** *For every plant representing the desirable trait (Two Pink Beads) add two pink beads to the brown paper bag adding to the genome of the next generation.*
- Step 6: Repeat steps 3 – 5 for each generation until you have reached generation six. Label each year's crop accordingly.
- Step 7: Calculate the % yield of the desired trait for each generation.
- Step 8: Conclude if you have “Cornered the Market” or if you have Lost Your Farm.

**Key:**  
**Red = Dominant Gene**  
**Blue = Recessive Gene**  
**Pink = Desired Trait**  
**White = Lethal Gene**

*Note: the desired trait is a recessive trait therefore, the desired plant is a Pink-Pink genotype*

<b>Genotype</b>	<b>Phenotype / Visible Trait</b>	<b>Action</b>
Red - Red	Dark Green Plant	Discard genes
Blue - Blue	Yellow plant with dark green variegated leaves	Discard genes
Red - Blue	Green plant which later produces less sweet kernels	Replant genes
Pink - Pink	Green plant which later produces buttery sweet kernels	Replant Genes
White - Red	Lethal combination	Discard Red Replant White
White - Blue	Lethal combination	Discard Blue Replant White
White - Pink	Lethal combination	Discard Pink Replant White
White - White	Lethal combination	Discard Both White Genes