**Punnett Squares**

**Introduction**

Hair color in cattle involves several genes. Let's consider how one of these genes might be inherited. For this lab, assume that the other genes are not involved. Suppose one of the genes determines whether the basic color of a cow will be white or red.

Let the allele for red be \( R \), and the allele for white be \( r \).

\( R \) is dominant and \( r \) is recessive.

Homozygous animals are the color determined by the allele they have.

Heterozygous animals are the color of the dominant allele they have.

Here is a chart for the different color combinations:

<table>
<thead>
<tr>
<th>Color</th>
<th>Allele</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>( RR, Rr )</td>
</tr>
<tr>
<td>White</td>
<td>( rr )</td>
</tr>
</tbody>
</table>

**Materials**

pencil

**Procedure**

**Part 1**

1. Draw a Punnett square that shows the results of a cross between a homozygous red bull (\( RR \)) and a heterozygous red cow (\( Rr \)). Be certain to title your Punnett square and indicate each parent.

2. Examine the results of your cross and determine the ratios of the genotypes (combination of alleles) and phenotypes (visible traits) for hair color resulting from this cross.

3. In your Science Notebook, draw another Punnett square that shows a cross between a heterozygous red bull (\( Rr \)) and a heterozygous red cow (\( Rr \)). Determine the ratios of the genotypes and phenotypes for hair color resulting from this cross.
4. In your Science Notebook, draw a third Punnett square that shows a cross between a homozygous white bull \((rr)\) and a homozygous white cow \((rr)\). Determine the ratios of the genotypes and phenotypes for hair color resulting from this cross.
Questions

1. What conclusions can you draw about the results of your first cross, between a homozygous red bull (RR) and a heterozygous red cow (Rr)?

2. What conclusions can you draw about the results of your second cross, between a heterozygous red bull (Rr) and a heterozygous red cow (Rr)?

3. What conclusions can you draw about the results of your third cross, between a homozygous white bull (rr) and a homozygous white cow (rr)?