

# MONOHYBRID PUNNETT SQUARE PRACTICE

## Background:

A Punnett Square is a visual tool used by scientists to determine the possible combinations of genetic alleles in a cross. Since genes are inherited randomly and independently, Punnett Squares are useful for looking at just one gene combination (monohybrid) or a whole series of combinations (dihybrid for two traits, etc.)

To make a Punnett Square, draw a box and then divide it into four smaller squares. On the top of the box write the letters that correspond with the alleles for one parent. Write the alleles for the other parent along the left side of the box. Use an upper case letter for a dominant allele and a lower case letter for a recessive allele. Fill in the smaller squares with the alleles from the corresponding rows and columns. The resulting alleles combinations are the possible genotypes for the offspring from that cross.

## Example:

A green pea plant (GG) is being crossed with a green pea plant (Gg).

	<b>G</b>	<b>G</b>	
<b>G</b>	GG	GG	<b>Genotypes: 50% GG, 50% Gg</b> <b>Phenotypes: 100% green</b>
<b>g</b>	Gg	Gg	

## Activity:

Use the provided Punnett Squares to determine the genotypes and phenotypes of each cross.

1. A green pea plant (Gg) is crossed with a yellow pea plant (gg).
2. A tall plant (TT) is crossed with a tall plant (Tt).
3. A tall plant (Tt) is crossed with a short plant (tt).
4. A red flower (Rr) is crossed with a white flower (rr).

5. A white flower (rr) is crossed with a white flower (rr).

6. A black chicken (Bb) is crossed with a black chicken (Bb).

***For the following problems, list the parent genotypes, draw and fill in a Punnett square, and then list the offspring genotypes and phenotypes.***

7. A homozygous dominant brown mouse is crossed with a heterozygous brown mouse (tan is the recessive color).

8. Two heterozygous white (brown fur is recessive) rabbits are crossed.

9. Two heterozygous red flowers (white flowers are recessive) are crossed.

10. A homozygous tall plant is crossed with a heterozygous tall plant (short is the recessive size).

11. A heterozygous white rabbit is crossed with a homozygous brown rabbit.

# MONOHYBRID PUNNETT SQUARE SOLUTIONS

1. A green pea plant (Gg) is crossed with a yellow pea plant (gg).

	<b>G</b>	<b>g</b>	
<b>g</b>	Gg	gg	<b>Genotypes:</b> 50% Gg, 50% gg <b>Phenotypes:</b> 50% green, 50% yellow
<b>g</b>	Gg	gg	

2. A tall plant (TT) is crossed with a tall plant (Tt).

	<b>T</b>	<b>T</b>	
<b>T</b>	TT	Tt	<b>Genotypes:</b> 50% TT, 50% Tt <b>Phenotypes:</b> 100%
<b>t</b>	Tt	tt	

3. A tall plant (Tt) is crossed with a short plant (tt).

	<b>T</b>	<b>t</b>	
<b>t</b>	Tt	tt	<b>Genotypes:</b> 50% Tt, 50% tt <b>Phenotypes:</b> 50% tall, 50% short
<b>t</b>	Tt	tt	

4. A red flower (Rr) is crossed with a white flower (rr).

	<b>R</b>	<b>r</b>	
<b>r</b>	Rr	rr	<b>Genotypes:</b> 50% Rr, 50% rr <b>Phenotypes:</b> 50% red, 50% white
<b>r</b>	Rr	rr	

5. A white flower (rr) is crossed with a white flower (rr).

	<b>r</b>	<b>r</b>	
<b>r</b>	rr	rr	<b>Genotypes:</b> 100% rr <b>Phenotypes:</b> 100% white
<b>r</b>	rr	rr	

6. A black chicken (Bb) is crossed with a black chicken (Bb). The recessive color is white.

	<b>B</b>	<b>b</b>	
<b>B</b>	BB	Bb	<b>Genotypes:</b> 25% BB, 50% Bb, 25% bb <b>Phenotypes:</b> 75% black, 25% white
<b>b</b>	Bb	bb	

7. A homozygous dominant brown mouse is crossed with a heterozygous brown mouse. The recessive color is tan.

	<b>B</b>	<b>B</b>	<i>The parents' genotypes are BB and Bb. The offspring's genotypes are 50% BB, 50% Bb, which means their phenotypes are 100% brown.</i>
<b>B</b>	BB	Bb	
<b>b</b>	Bb	Bb	

8. Two heterozygous white (brown fur is recessive) rabbits are crossed.

	<b>W</b>	<b>w</b>	<i>The parents' genotypes are Ww and Ww. The offspring's genotypes are 25% WW, 50% Ww, and 25% ww, which means their phenotypes are 75% white and 25% brown.</i>
<b>W</b>	WW	Ww	
<b>w</b>	Ww	ww	

9. Two heterozygous red flowers (white flowers are recessive) are crossed.

	<b><i>R</i></b>	<b><i>r</i></b>	<b><i>The parents' genotypes are Rr and Rr. The offspring's genotypes are 25% RR, 50% Rr, and 25% rr, which means their phenotypes are 75% red and 25% white.</i></b>
<b><i>R</i></b>	RR	Rr	
<b><i>r</i></b>	Rr	rr	

10. A homozygous tall plant is crossed with a heterozygous tall plant (short is the recessive size).

	<b><i>T</i></b>	<b><i>T</i></b>	<b><i>The parents' genotypes are TT and Tt. The offspring's genotypes are 50% TT and 50% Tt, which means their phenotype is 100% tall.</i></b>
<b><i>T</i></b>	TT	Tt	
<b><i>t</i></b>	Tt	Tt	

11. A heterozygous white rabbit is crossed with a homozygous brown rabbit.

	<b><i>W</i></b>	<b><i>w</i></b>	<b><i>The parents' genotypes are Ww and ww. The offspring's genotypes are 50% Ww and 50% ww, which means their phenotypes are 50% white and 50% brown.</i></b>
<b><i>w</i></b>	Ww	ww	
<b><i>w</i></b>	Ww	ww	