Name: KEY

Incomplete Dominance Punnett Square Practice

Most genetic traits have a stronger, dominant allele and a weaker, recessive allele. In an individual with a heterozygous genotype, the dominant allele shows up in the offspring and the recessive allele gets covered up and doesn't show; we call this **complete dominance**.

However, some alleles don't completely dominant others. In fact, some heterozygous genotypes allow both alleles to partially show by blending together how they are expressed; this is called **incomplete dominance**. Other heterozygous genotypes allow both alleles to be completely expressed at the same time like spots or stripes; this is called **codominance**. Examples of each are listed below.

1. Write what each type would be if they were heterozygous.
   a. Complete dominance: if a red (RR) and a white flower (rr) were bred, resulting in 100% heterozygous offspring (Rr), what phenotype would be seen according to the rules of COMPLETE dominance?
      Heterozygous phenotype: Red flower
   b. Incomplete dominance: if a red (RR) and white flower (rr) were bred, resulting in 100% heterozygous offspring (Rr), what phenotype would be seen according to the rules of INCOMPLETE dominance?
      Heterozygous phenotype: Pink flower
   c. Codominance: if a red (RR) and white flower (WW) were bred, resulting in 100% heterozygous offspring (RW), what phenotype would be seen according to the rules of CODOMINANCE?
      Heterozygous phenotype: both red and white mixed flowers, like stripes or spots.

Use a Punnett Square to predict the offspring of the following matches.

2. Snapdragons are incompletely dominant for color. They will have red, pink, or white flowers. The red flowers are homozygous dominant, the white flowers are homozygous recessive, and the pink flowers are heterozygous. Write the genotypes for each phenotype using the letters "R" and "r".

Red snapdragon: RR Pink Snapdragon: Rr White Snapdragon: rr.

a. Pink x Pink

	R	r
R	RR	Rr
r	Rr	rr

Genotypic Ratios:
RR-1/4
Rr-2/4 or 1/2
rr-1/4
Phenotypic Ratios:
Red-1/4
Pink-2/4 or ½
White-1/4

b. Red x White

	R	R
r	Rr	Rr
r	Rr	Rr

Genotypic Ratios:
Rr-4/4

Phenotypic Ratios:

Pink-4/4

c. Pink x White

	R	r
r	Rr	rr
r	Rr	rr

Genotypic Ratios:
Rr-2/4 or 1/2
rr-2/4 or 1/2
Phenotypic Ratios:
Pink-2/4 or ½
White-2/4 or ½

3. In horses, some of the genes for hair color are incompletely dominant. They will have brown horses, white horses or horses with a yellow-tannish colored with a white mane and tail called a "palomino". The brown horses are homozygous dominant, white horses are homozygous recessive and the palomino is heterozygous. Write the genotype for each phenotype using the letters "B" and "b".

Brown: BB Palomino: Bb White: bb .

a. Brown x White

	B	B
b	Bb	Bb
b	Bb	Bb

Genotypic Ratios:
Bb-4/4
Phenotypic Ratios:
Palomino-4/4

b. Brown x Palomino

	B	B
B	BB	BB
b	Bb	Bb

Genotypic Ratios:

BB-2/4 or ½
Bb-2/4 or 1/2
Phenotypic Ratios:

Brown-2/4 or ½
Palomino-2/4 or 1/2

c. Palomino x Palomino

	B	b
B	BB	Bb
b	Bb	bb

Genotypic Ratios:

BB-1/4
Bb-2/4 or ½
bb-1/4
Phenotypic Ratios:

Brown-1/4
Palomino-2/4 or ½
White-1/4

d. Can palominos be considered a purebred line of horses? Why or why not?
No palominos cannot be considered a purebred line of horses because they are a heterozygous mix of coat color.

e. Which two colors of horse would you want to breed if you wanted to produce the maximum number of palominos?
If you wanted to produce the maximum amount of palomino colored horses, you should breed a white and a brown horse together because no matter what the genetic combination is, the offspring will be guaranteed to have the palomino coloring.