Name _____ Period _____ Date _____

Genetics: Punnett Squares 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. This is called **complete dominance**.

However, some alleles don't completely dominate 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. **Complete dominance**: If a Red (RR) and White flower (rr) were crossbred, resulting in 100% Rr, what phenotype would been seen according to the rules of complete dominance?

2. **Incomplete dominance**: If a Red (RR) and White flower (rr) were crossbred, resulting in 100% Rr, what phenotype(s) would been seen according to the rules of incomplete dominance?

3. **Codominance**: If a Red (RR) and White flower (WW) were crossbred, resulting in 100% RW, what phenotype(s) would been seen according to the rules of codominance?

Incomplete Dominance Practice Problems

Snapdragons are incompletely dominant for color; they have phenotypes red, pink, or white. The red flowers are homozygous dominant, the white flowers are homozygous recessive, and the pink flowers are heterozygous. Give the genotypes for each of the phenotypes, using the letters "R" and " r " for alleles:

a. Red snapdragon genotype: RR

b. Pink snapdragon genotype: Rr

c. White snapdragon genotype: rr

Show genetic crosses between the following snapdragon parents, using the Punnett squares provided, and record the genotypic and phenotypic %'s below:

a. pink x pink

	R	r
R	RR	Rr
r	Rr	rr

Genotypic %: 25/50/25 (1:2:1)
Phenotypic %: 25/50/25 (1:2:1)

b. red x white

	R	R
r	Rr	Rr
r	Rr	Rr

Genotypic %: 100
Phenotypic %: 100

c. pink x white

	R	r
r	Rr	rr
r	Rr	rr

Genotypic %: 50/50 (1:1)
Phenotypic %: 50/50 (1:1)

In horses, some of the genes for hair color are incompletely dominant. Genotypes are as follows: brown horses are BB, white horses are bb, and a Bb genotype creates a yellow-tannish colored horse with a white mane and tail, which is called "palomino". Show the genetic crosses between the following horses and record the genotypic and phenotypic percentages:

a. brown x white

	B	B
b	Bb	Bb
b	Bb	Bb

Genotypic
%: 100 heterozygous (Bb)
Phenotypic
%: 100 palomino

b. brown x palomino

	B
B	BB
b	Bb

	BB
B	BB
b	Bb

Genotypic
%: 50 BB/50 Bb (1:1)
Phenotypic
%: 50 Brown/50 palomino (1:1)

c. palomino x palomino

	B	b
B	BB	Bb
b	Bb	bb

Genotypic
%: 25/50/25 (1:2:1)
Phenotypic
%: 25/50/25 (1:2:1)

Can palominos be considered a purebred line of horses? Why or why not?

Palominos are not purebred. Their genotype is heterozygous. Purebreds have homozygous genotypes.

Which two colors of horse would you want to breed if you wanted to produce the maximum numbers of palominos in the shortest amount of time?

Brown x White (BB x bb) = 100% Palomino

In Smileys, eye shape can be starred (SS), circular (CC), or a circle with a star (CS). Write the genotypes for the pictured phenotypes

CC

SS

CS

Show the cross between a star-eyed and a circle eyed.
What are the phenotypes of the offspring? Circle & Star
What are the genotypes? CS

	C	C
S	CS	CS
S	CS	CS

Show the cross between a circle-star eyed, and a circle eyed.
How many of the offspring are circle-eyed? 2
How many of the offspring are circle-star eyed? 2

	C	S
C	CC	CS
C	CC	CS

Show the cross between two circle-star eyed.
How many of the offspring are circle-eyed? 1
How many of the offspring are circle-star eyed? 2
How many are star eyed? 1

	C	S
C	CC	CS
S	CS	SS