Name: **Date:** **Period:**

Practice with Monohybrid Punnett Squares

Read the following passage and answer the questions.

Often times, people will refer to a trait or characteristic such as eye color or hair color as being genetic, but what does the word genetic really mean?

Genetics is termed as the study of heredity and how traits in offspring are based upon those of the parents. **Heredity** is the process in which traits (characteristics that can be passed only from a living thing to its young) are passed from parents to offspring. A **Punnett square** is a grid system that can be set up and used to predict the possible outcomes that may result from the mating process between two individuals, when their genotypes are known. Each cell within the square is representative of one possible genotypic outcome for any offspring. The term **genotype** refers to the genetic make-up of an organism. Genotype is represented by using letters of the alphabet to stand for each **allele** that has been passed from the parents. A capital letter represents the dominant allele and a lowercase letter represents the recessive allele. Alleles are all the forms of a gene for any given trait. There are usually two allele possibilities for every trait. For example: B and b are both alleles for the trait of hair color. Since genotype is the genetic make-up, **phenotype** is the physical result of a gene combination – what can be observed. **Dominance** is when one allele can mask the presence of another (B is the dominant gene for brown hair). **Recessive** refers to a characteristic that is masked by the presence of a dominant allele (b is a recessive gene for blonde hair). The only way to have a recessive trait expressed is to have <u>both alleles be recessive</u> (bb, resulting in the blond hair color).

Homozygous genotype is defined by the occurrence where the paired alleles that are the same for a specific trait, in this case hair color, are identical (BB or bb). If both parents are homozygous, they can each only pass on one allele type to their offspring. This means that all the offspring will have one B and one b allele and will be Bb genotype. This Bb genotype is termed as heterozygous. A **heterozygous genotype** is when the genes that an offspring receives are different, Bb. In this instance, dominance will also be expressed because the offspring will have the dominant trait of brown hair.

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1. Genetics is the study of

2. Traits are characteristic that can be passed only from a to its .

3. The process in which traits are passed from parents to offspring is .

4. Each cell of a Punnett square represents one possible outcome for any offspring of two specific parents.

5. Genotype refers to the make-up of an organism.

6. is the physical trait that is expressed in an individual.

7. are the different forms of a gene for any given trait.

8. For each trait, there are allele possibilities.

9. When the expression of one allele is masked by the presence of another, it is said to be .

10. When an allele masks the presence of another allele, it is said to be .

11. When both alleles of a parent or offspring are identical, one is said to be .

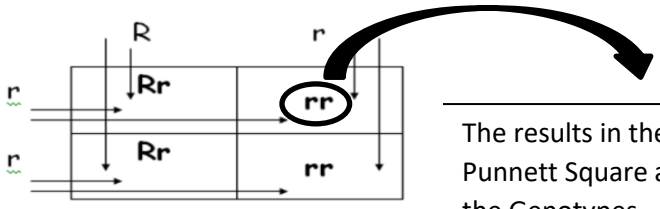
12. A heterozygous genotype is when the alleles present are , such as Bb.

13. It is proper to put the allele before a recessive allele when determining the genotype of the offspring in a Punnett square.

14. For an offspring to a recessive trait, both parents must have at least one

allele in their genotype.

A Punnett square is a diagram that is used to predict an outcome of a particular cross or breeding experiment. It is named after Reginald C. Punnett who devised the approach. The diagram is used by biologists to determine the probability of an offspring having a particular genotype



The results in the Punnett Square are the Genotypes.

For this square the Genotypes are Rr and rr

The Phenotype is determined as a percent chance of inheriting the trait. It is given as a percentage.

If R = Red and r = is white, then, from this cross you would have a 50% chance of Red and a 50% chance of white.

This is calculated by taking 2 divided by 4 (2 Rr out of 4 boxes), or 50%

Practice Problems
Monohybrid Crosses
The parent alleles are set up for you and the dominance of the trait described. Complete the Punnett square and summarize the possible offspring genotypes and phenotypes with percentages and characteristic.

1. Dominant trait: B (brown hair)
Recessive trait: b (blond hair)
Possible Genotypes: **B B and b b**

Possible Phenotypes: **75% brown hair, 25% blond hair**

	B	b
B	**B B**	**B b**
b	**B b**	**b b**

2. Dominant trait: C (circular flower)
Recessive trait: c (square flower)

Possible Genotypes: _____

Possible Phenotypes: _____

	C	c
c		
c		

3. Dominant trait: R (round seed)
Recessive trait: r (wrinkled seed)

Possible Genotypes: _____

Possible Phenotypes: _____

	R	R
r		
r		

4. Dominant trait: W (white fur)
Recessive trait: w (black fur)

Possible Genotypes: _____

Possible Phenotypes: _____

	W	w
W		
w		

5. Dominant trait: T (tall height)
Recessive trait: t (short height)

Possible Genotypes: _____

Possible Phenotypes: _____

	t	t
t		
t		