Name _____ Date _____

PUNNETT SQUARES

A **Punnett square** is a chart that represents a cross, or breeding event, between two organisms. It uses letters to represent an organism's **genotype**, or combination of **alleles**, for a specific gene.

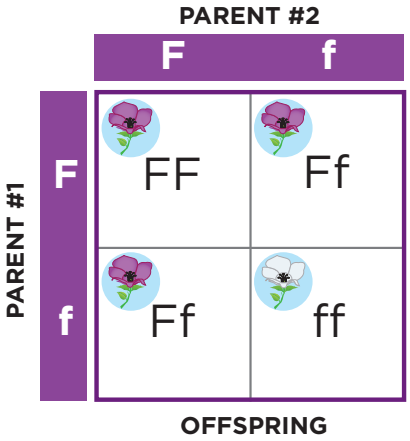
An organism's genotype determines its **phenotype**, which is its observable version of a trait. A **dominant allele** causes the dominant version of the trait to appear, even when the organism also has a recessive allele for the gene. A **recessive allele** causes the recessive version of the trait to appear only when the organism does not have any dominant alleles for the gene.

Let's look at an example! Here is an example of a Punnett square of the flower color gene in pea plants, where the gene for flower color has two alleles. The allele for purple flowers (F) is dominant over the allele for white flowers (f).

You can see that the parent genotypes are both Ff. So, both parents have a **heterozygous genotype**, meaning they both have two different alleles. A **homozygous genotype** would mean that an organism has two of the same alleles.

The boxes inside the Punnett square show that these parents can produce offspring with the genotype FF, Ff, or ff.

The offspring's genotype will determine the phenotype. Here, the genotypes FF and Ff will result in the dominant phenotype, purple flowers, since F is the dominant allele. The genotype ff will result in the recessive phenotype, white flowers, since f is the recessive allele.



Follow the directions below to learn more about Punnett squares!

1. Some pea plants have round seeds while other pea plants have wrinkled seeds. The gene for pea shape has two alleles. The allele for round seeds (R) is dominant over the allele for wrinkled seeds (r).

a. In the Punnett square to the right, how many boxes represent offspring that are homozygous for the seed shape gene?

	R	r
R	RR	Rr
r	Rr	rr

b. How many boxes represent offspring that are heterozygous for the seed shape gene?

c. Shade in the boxes that represent offspring with round seeds. Explain how you knew which boxes to shade in.

PUNNETT SQUARES

Keep going! Answer the following questions.

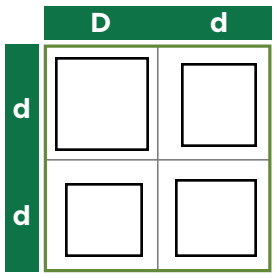
2. Some humans have wet earwax while other humans have dry earwax. The gene for earwax type has two alleles. The allele for wet earwax (D) is dominant over the allele for dry earwax (d).

a. Fill in the Punnett square to the right.

b. How many boxes represent offspring that are homozygous for the earwax gene?

c. How many boxes represent offspring that are heterozygous for the earwax gene?

d. Shade in the boxes that represent offspring with dry earwax.



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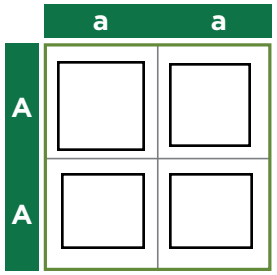
3. People with ACHOO Syndrome sneeze uncontrollably when they are suddenly exposed to bright light. The allele for having ACHOO Syndrome (A) is dominant over the allele for not having ACHOO Syndrome (a).

a. Fill in the Punnett square to the right.

b. How many boxes represent offspring that are homozygous for the ACHOO Syndrome gene?

c. How many boxes represent offspring that are heterozygous for the ACHOO Syndrome gene?

d. Shade in the boxes that represent offspring with ACHOO syndrome.



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4. Kendall has two cats named Pinto and Mandy. Pinto and Mandy both have long hair. The allele for short hair (H) is dominant over the allele for long hair (h). If Pinto and Mandy breed, is it possible that they could produce a kitten with short hair? Explain why or why not. Fill in the Punnett square to the right to help you explain.