

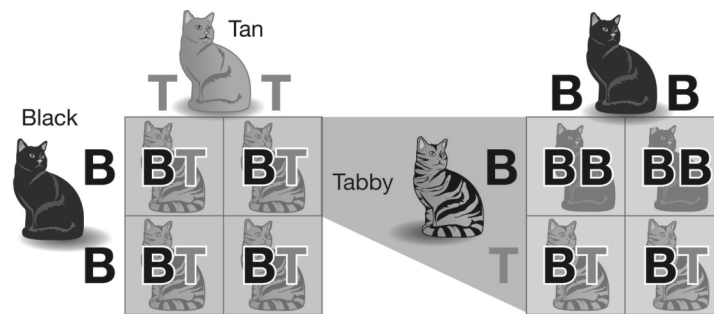
# Incomplete Dominance and Codominance



When Mendel studied pea plants, he happened to select traits that were determined by two alleles where one allele was completely dominant over the other allele. For instance, for flower color in peas, purple flowers are dominant and white flowers are recessive. But some patterns of inheritance are different than the ones Mendel discovered. In this skill sheet, you will get some practice with two other patterns of inheritance called incomplete dominance and codominance.

When a red snapdragon is crossed with a white snapdragon, the next generation will have all pink flowers! Because red and white blend, this is an example of a pattern of inheritance called incomplete dominance (see example below). In *incomplete dominance*, the phenotypes of the two alleles blend—just like mixing paints.

In *codominance*, an organism that has both alleles of a gene displays both phenotypes at the same time. For example, a cross between a black cat and a tan cat results in a tabby cat.



## EXAMPLES

1. A cross between red-flowered snapdragons and white-flowered snapdragons produces offspring with pink flowers. Let R = red flowers and W = white flowers.

a. What is the genotype of a plant with a phenotype of red flowers?

**Answer:** RR

b. What is the phenotype of a plant with a genotype of RW?

**Answer:** pink flowers

2. Suppose a pink-flowered plant is crossed with a pink-flowered plant. The punnett square to the right shows the possible genotypes of the offspring. Use the punnett square to answer the questions below it.

a. What are the possible genotypes and phenotypes of the offspring?

**Answer:** RR = red flowers; RW = pink flowers; WW = white flowers

b. What ratio of the offspring will have pink flowers?

**Answer:** 1:2

c. What percent of the offspring will have red flowers?

**Answer:**  $1/4 = 25\%$

	R	W
R	RR	RW
W	RW	WW

**PRACTICE**


1. A tabby cat is crossed with a tan cat. Use punnett square A to answer the questions below.
  - a. What is the pattern of inheritance in this example?
  - b. What are the genotypes and phenotypes of the parents?
  - c. List the possible genotypes and phenotypes of the offspring.
  - d. What ratio of the offspring will have tabby fur? Tan fur? Black fur?
  - e. What are the chances, in percent, that the parents will have a kitten with black fur?
  - f. Suppose two cats with tan fur have kittens. What are the possible genotypes and phenotypes of their offspring?
  
2. There are three possible genotypes and phenotypes for wing color in a species of moth:  
 RR = red wings; RY = orange wings; YY = yellow wings.  
 Use punnett square B to answer the following questions:
  - a. What is the pattern of inheritance in this example?
  - b. What are the genotypes and phenotypes of the parents?
  - c. What percent of the offspring will have red wings? Orange wings? Yellow wings?
  - d. Moths lay lots of eggs! Suppose the parents produce 1,200 offspring. Predict how many of those offspring will have orange wings.
  - e. Suppose out of the 1,200 offspring, 950 have orange wings. Is this possible? Why or why not?
  - f. Challenge: Suppose two moths, each with orange wings, produce offspring. Make a punnett square of the cross. List the possible genotypes and phenotypes of the offspring and their ratios.
  
3. In a fictional species of mice, one gene determines fur color. Let B = black fur and W = white fur. Use punnett square C to answer the following questions.
  - a. True or false: The offspring would have a variety of phenotypes.
  - b. Suppose the alleles in the examples show incomplete dominance. What would you expect the offspring to look like? Explain your answer.
  - c. Suppose the alleles in the example show codominance. What would you expect the offspring to look like? Explain your answer.

	B	T
T	BT	TT
T	BT	TT

Punnett square A

	R	Y
R	RR	RY
R	RR	RY

Punnett square B

	B	B
W	BW	BW
W	BW	BW

Punnett square C