



Guinea Pig Genes:

Piggy Punnet
Squares

Essential Question

- How are patterns of inheritance studied?

By the end of this lesson, you should be able to explain how patterns of heredity can be predicted by Punnett squares.



Vocab Terms

- Define the following:
 - Ratio
 - Probability
 - Punnett Square







Vocab Terms

- Define the following:
 - Ratio – an expression that compares two quantities
 - Probability – the likelihood of a specific outcome
 - Punnett Square – a graphic used to predict the possible genotypes of offspring in a given cross

In guinea pigs, the dominant **B** allele is responsible for **black fur**, while the recessive **b** allele is responsible for **brown fur**. Record the Punnett square in your notebook. Use the Punnett square to find the probability of this cross resulting in **offspring with brown fur**.



Parent 2's alleles

		Parent 1's alleles	
		B	b
Parent 2's alleles	b	Bb 	bb 
	b	Bb 	bb 

Identify





What do you know? Parent genotypes are Bb and bb. Possible offspring genotypes are Bb and bb.

What do you want to find out?

Probability of the cross resulting in offspring with brown fur.



Parent 2's alleles

		Parent 1's alleles	
		B	b
Parent 2's alleles	b	Bb 	bb 
	b	Bb 	bb 

Plan





Count the total number of offspring allele combinations: 4

Count the number of allele combinations that will result in offspring with brown fur:

2



Parent 2's alleles

		Parent 1 alleles	
		B	b
Parent 2's alleles	b	Bb 	bb 
	b	Bb 	bb 

Solve





Write the probability of the offspring with brown fur as a ratio: 2:4

Convert to percentage: 50%

Answer:
50% chance of offspring with brown fur



Parent 2's alleles

		Parent 1 alleles	
		B	b
Parent 2's alleles	b	Bb 	bb 
	b	Bb 	bb 

This Punnett square shows a cross between two **Bb** guinea pigs. What is the probability of the cross resulting in **offspring with black fur**?

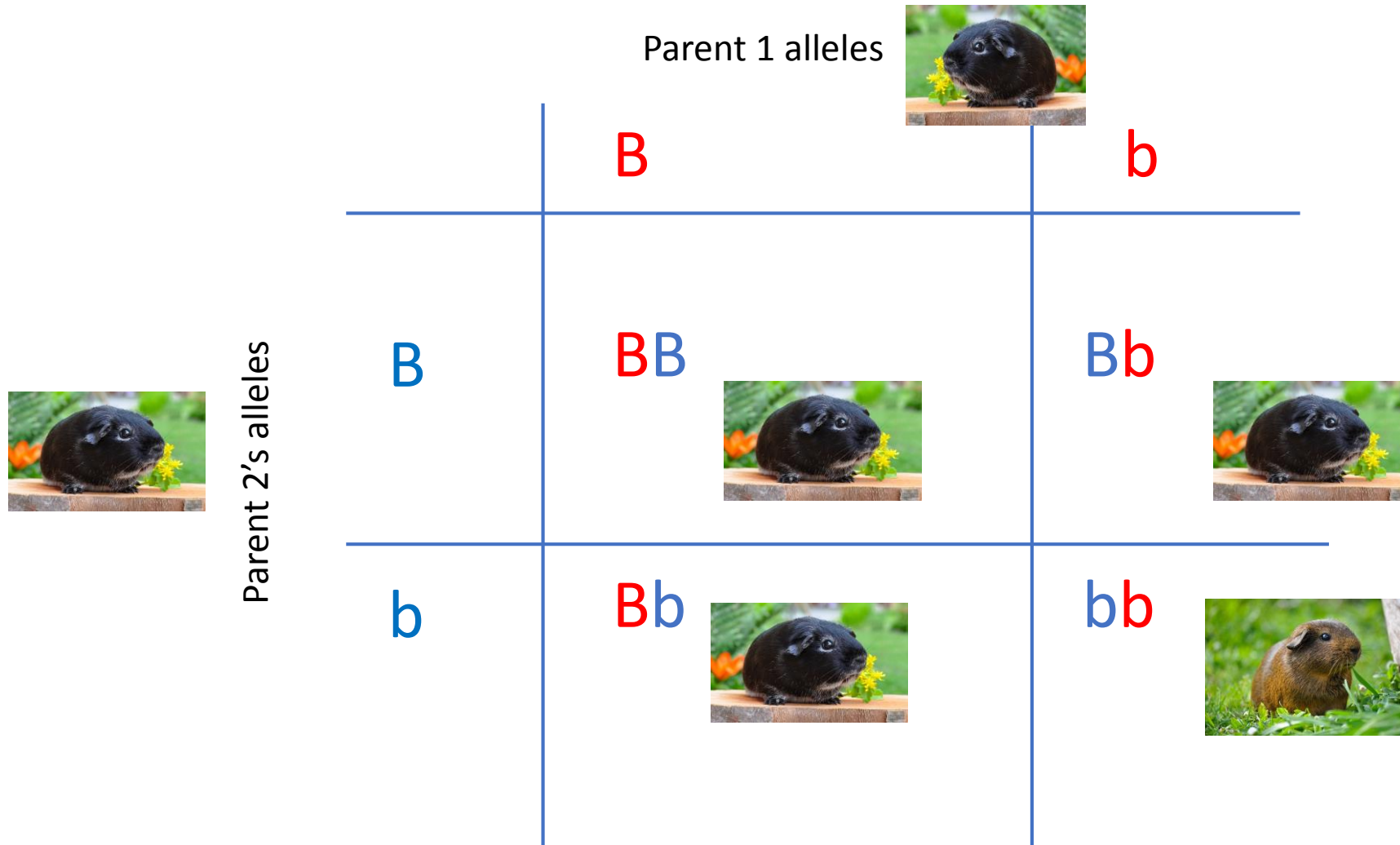


Parent 2's alleles

		Parent 1 alleles	
		B	b
Parent 2's alleles	B	BB	Bb
	b	Bb	bb

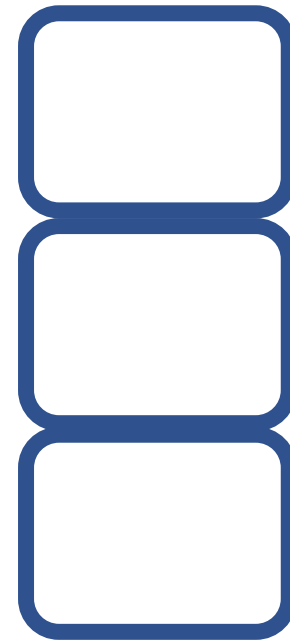
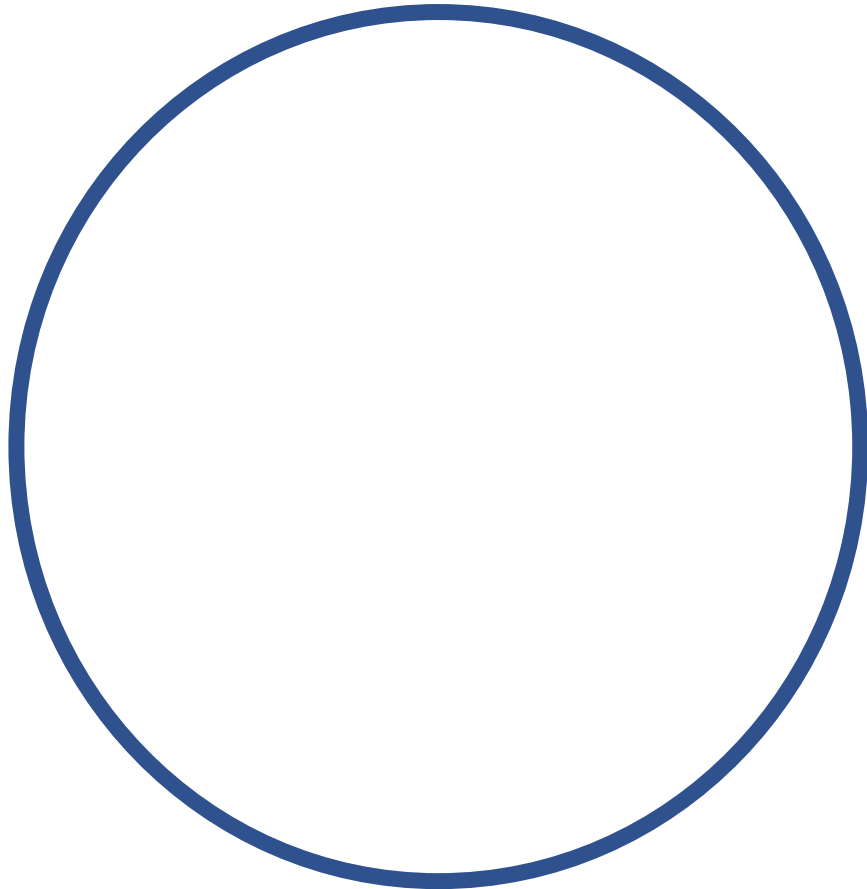


Who wants to share their answer?



Graph

In the previous example, what is the ratio of each of the possible genotypes? Show your results by creating a pie chart



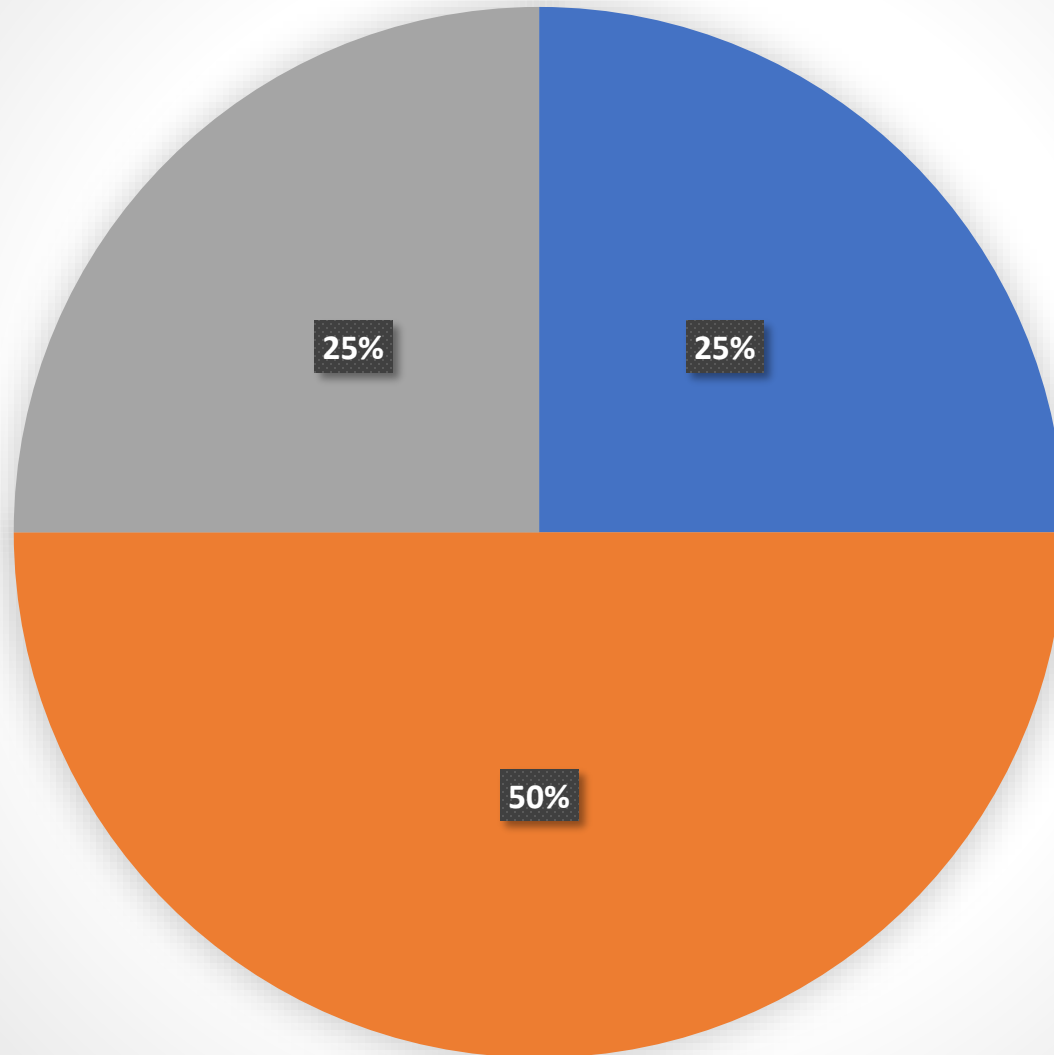
BB

Bb

bb

Sample Graph

Possible Genotypes of Offspring



■ BB

■ Bb

■ bb



Create your own Punnett Square!
Decide what your guinea pig parents alleles are and then trade with your shoulder partner to find the probability of the offspring's phenotype.



Working backwards!



- Skinny pigs are guinea pigs with little to no hair.
- Read the following statements with your table / shoulder partner to figure out the parent's genotypes
- Use **H** for hair and **h** for no hair



Skiny Pig X Skiny Pig

When you breed two Skiny Pigs together, 100% of their babies will all be Skiny Pigs and hairless.

What are the parent genotypes?

Both parents would be: hh, hh



Skinny Pig X Skinny Pig Gene Carrier

There is a 50-75% or about half chance that the babies bred by a Skinny Pig and a haired Skinny pig gene carrier, will have hairless Skinny pig babies. The rest of the babies will just be skinny pig gene carriers.

Skinny Pig Gene Carrier X Skinny Pig Gene Carrier

There is only a 25% chance that 1 or so hairless skinny babies will be born in these litters.

What are the parent genotypes?

Skinny pig – hh

Skinny pig gene carrier - Hh





Skinny Pig X Regular haired breed guinea pig (not a gene carrier of skinny)

None of them will be a hairless skinny pig. There is a chance that most of the babies will be haired Skinny Pig gene carriers which can then be bred back to the Skinny Pig.

What are the parent genotypes?

Skinny pig – hh

Regular haired breed guinea pig (not a gene carrier of skinny) - HH