

PUNNET SQUARES

The *Punnet Square* is a diagram that is used to predict the chances of an offspring inheriting certain genes. Reginald C. Punnett devised the diagram, hence the name *Punnett Square*. The square is a summary of every possible combination of genes that can be inherited for a given trait.

Remember that each parent passes along one set of genes, but how do your cells know which genes to use to make you? Some genes are *dominant* while others are *recessive*. A dominant gene dominates, or covers up, a recessive trait. So, it's the trait that's dominant (stronger) that will always show.

There's a geeky name given to the letters you write in a Punnet Square. In science, we call them *alleles*. For every trait you have, you have 2 alleles (one from your mother and one from your father). Together, the 2 alleles are called a gene.

Look at the following examples of completed Punnet Squares. Then, complete the ones that follow.

1)

	b	b
B	Bb	Bb
B	Bb	Bb

2)

	B	b
B	BB	Bb
B	BB	Bb

3)

	B	b
B	BB	Bb
b	Bb	bb

4)

	Y	Y
Y		
y		

5)

	Y	y
Y		
y		

6)

	Y	Y
Y		
Y		

7)

	X	x
X		
x		

8)

	X	X
x		
x		

9)

	x	x
X		
x		

In a punnet square, a capital letter always represents a dominant allele, while a lowercase letter always represents a recessive allele. If there is one dominant allele (B) and one recessive allele (b), the dominant allele (B) for that offspring will show.

In the above examples, let's pretend that each stand for the following:

B = brown hair, b = blonde hair

Y = brown eyes, y = blue eyes

X = detaches earlobes, x = attached earlobes

For each example above, tell the trait that each offspring would have. In other words, which trait would show?

1) Offspring 1 _____

Offspring 2 _____

Offspring 3 _____

Offspring 4 _____

2) Offspring 1 _____

Offspring 2 _____

Offspring 3 _____

Offspring 4 _____

3) Offspring 1 _____

Offspring 2 _____

Offspring 3 _____

Offspring 4 _____

4) Offspring 1 _____

Offspring 2 _____

Offspring 3 _____

Offspring 4 _____

5) Offspring 1 _____

Offspring 2 _____

Offspring 3 _____

Offspring 4 _____

6) Offspring 1 _____

Offspring 2 _____

Offspring 3 _____

Offspring 4 _____

7) Offspring 1 _____

Offspring 2 _____

Offspring 3 _____

Offspring 4 _____

8) Offspring 1 _____

Offspring 2 _____

Offspring 3 _____

Offspring 4 _____

9) Offspring 1 _____

Offspring 2 _____

Offspring 3 _____

Offspring 4 _____

Using a Punnett square, we can predict the probability of having an offspring with a given trait. For example, in Punnett Square 1 all 4 possible offspring have brown hair. So, the probability of that set of parents to have a child with brown hair is 4 out of 4 (or 100%). Punnett Square 2 is the same. All four possible offspring have brown hair. However, Punnett Square 3 is different. Three out of the 4 possible offspring have brown hair. So, the probability of the parents in Punnett Square 3 having a child with brown hair is 3 out of 4 (or 75%).

Fill in the following probabilities. The first 3 are done for you.

1) What's the probability of Punnett Square 1 having a child with brown hair?
ANSWER: 4 out of 4 (or 100%)

2) What's the probability of Punnett Square 2 having a child with brown hair?
ANSWER: 4 out of 4 (or 100%)

3) What's the probability of Punnett Square 3 having a child with brown hair?
ANSWER: 3 out of 4 (or 75%)

4) What's the probability of Punnett Square 4 having a child with brown eyes?

5) What's the probability of Punnett Square 5 having a child with brown eyes?

6) What's the probability of Punnett Square 6 having a child with brown eyes?

7) What's the probability of Punnett Square 7 having a child with attached earlobes?

8) What's the probability of Punnett Square 8 having a child with attached earlobes?

9) What's the probability of Punnett Square 9 having a child with attached earlobes?

Below, create your own Punnett Square that would result in the following probabilities:

10) 4 out of 4 probability for brown hair.

11) 3 out of 4 probability for brown hair