

## Additional Examples

## Lesson 9-4

1 EXAMPLE

a. Find  $(y + 11)^2$ .

$$\begin{aligned}(y + 11)^2 &= y^2 + 2y(11) + 11^2 \\ &= y^2 + 22y + 121\end{aligned}$$

Square the binomial.

Simplify.

$$(y + 11)(y + 11)$$

$$y^2 + 11y + 11y + 121$$

b. Find  $(3w - 6)^2$ .

$$\begin{aligned}(3w - 6)^2 &= (3w)^2 - 2(3w)(6) + 6^2 \\ &= 9w^2 - 36w + 36\end{aligned}$$

Square the binomial.

Simplify.

\*Same "Outside" + "Inside"

MULTIPLYING SPECIAL  
CASES (FOIL)

## 2 EXAMPLE

Among guinea pigs, the black fur gene (B) is dominant and the white fur gene (W) is recessive. This means that a guinea pig with at least one dominant gene (BB or BW) will have black fur. A guinea pig with two recessive genes (WW) will have white fur.

The Punnett square below models the possible combinations of color genes that parents who carry both genes can pass on to their offspring. Since WW is  $\frac{1}{4}$  of the outcomes, the probability that a guinea pig has white fur is  $\frac{1}{4}$ .

	B	W
B	BB	BW
W	BW	WW

You can model the probabilities found in the Punnett square with the expression  $(\frac{1}{2}B + \frac{1}{2}W)^2$ . Show that this product gives the same result as the Punnett square.

$$\begin{aligned}
 \left(\frac{1}{2}B + \frac{1}{2}W\right)^2 &= \left(\frac{1}{2}B\right)^2 + 2\left(\frac{1}{2}B\right)\left(\frac{1}{2}W\right) + \left(\frac{1}{2}W\right)^2 && \text{Square the binomial.} \\
 &= \frac{1}{4}B^2 + \frac{1}{2}BW + \frac{1}{4}W^2 && \text{Simplify.}
 \end{aligned}$$

The expressions  $\frac{1}{4}B^2$  and  $\frac{1}{4}W^2$  indicate the probability that offspring will have either two dominant genes or two recessive genes is  $\frac{1}{4}$ . The expression  $\frac{1}{2}BW$  indicates that there is  $\frac{1}{2}$  chance that the offspring will inherit both genes. These are the same probabilities shown in the Punnett square.

**3 EXAMPLE** a. Find  $81^2$  using mental math.

$$\begin{aligned} 81^2 &= (80 + 1)^2 \\ &= 80^2 + 2(80 \cdot 1) + 1^2 \\ &= 6400 + 160 + 1 = 6561 \end{aligned}$$

Square the binomial.

Simplify.

b. Find  $59^2$  using mental math.

$$\begin{aligned} 59^2 &= (60 - 1)^2 \\ &= 60^2 - 2(60 \cdot 1) + 1^2 \\ &= 3600 - 120 + 1 = 3481 \end{aligned}$$

Square the binomial.

Simplify.

**4 EXAMPLE** Find  $(p^4 - 8)(p^4 + 8)$ .

$$\begin{aligned} (p^4 - 8)(p^4 + 8) &= (p^4)^2 - (8)^2 \\ &= p^8 - 64 \end{aligned}$$

Find the difference of squares.

Simplify.

*Opposite Signs*

*Just do "First" & "Last"*

**5 EXAMPLE** Find  $43 \cdot 37$ .

$$\begin{aligned} 43 \cdot 37 &= (40 + 3)(40 - 3) \\ &= 40^2 - 3^2 \\ &= 1600 - 9 = 1591 \end{aligned}$$

Express each factor using 40 and 3.

Find the difference of squares.

Simplify.

*FOIL*

$$p^8 + 8p^4 - 8p^4 - 64$$

$$p^8 - 64$$

*"Outside" & "inside" Cancel out!*