

# Dividing Polynomials (Pages 650–655)

In the previous lesson, you learned that some divisions can be performed using factoring. You can also divide polynomials using long division.

## EXAMPLES

**A** Find  $(3x^2 - 7x - 6) \div (3x + 2)$ .

*Step 1: Divide the first term of the dividend,  $3x^2$ , by the first term of the divisor,  $3x$ .*

$$\begin{array}{r} x \\ 3x + 2 \overline{) 3x^2 - 7x - 6} \\ \underline{(-) 3x^2 + 2x} \phantom{- 6} \\ -9x - 6 \phantom{- 6} \end{array} \quad \begin{array}{l} 3x^2 \div 3x = x \\ \text{Multiply } x \text{ and } 3x + 2. \\ \text{Subtract.} \end{array}$$

*Step 2: Divide the first term of the partial dividend,  $-9x$ , by the first term of the divisor,  $3x$ .*

$$\begin{array}{r} x - 3 \\ 3x + 2 \overline{) 3x^2 - 7x - 6} \\ \underline{(-) 3x^2 + 2x} \phantom{- 6} \\ -9x - 6 \\ \underline{(-) -9x - 6} \\ 0 \end{array} \quad \begin{array}{l} \text{Bring down } -6; \\ -9x \div 3x = -3 \\ \text{Multiply } -3 \text{ and } 3x + 2. \\ \text{Subtract.} \end{array}$$

So,  $(3x^2 - 7x - 6) \div (3x + 2) = x - 3$ .

**B** Find  $(t^2 - 5t + 10) \div (t + 3)$ .

$$\begin{array}{r} t \\ t + 3 \overline{) t^2 - 5t + 10} \\ \underline{(-) t^2 + 3t} \phantom{+ 10} \\ -8t \phantom{+ 10} \end{array} \quad \begin{array}{l} t^2 \div t = t \\ \text{Multiply } t \text{ and } t + 3. \\ \text{Subtract.} \end{array}$$

$$\begin{array}{r} t - 8 \\ t + 3 \overline{) t^2 - 5t + 10} \\ \underline{(-) t^2 + 3t} \phantom{+ 10} \\ -8t + 10 \\ \underline{(-) -8t - 24} \\ 34 \end{array} \quad \begin{array}{l} \text{Bring down } 10; \\ -8t \div t = -8 \\ \text{Multiply } -8 \text{ and } t + 3. \\ \text{Subtract.} \end{array}$$

The quotient is  $t - 8$  with remainder 34 or  $t - 8 + \frac{34}{t + 3}$ .

## Try These Together

1. Find  $(x^2 + 4x - 8) \div (x + 2)$ .

2. Find  $(y^2 + 7y + 10) \div (y + 2)$ .

*HINT: Begin by dividing the first term of the dividend by the first term of the divisor.*

## PRACTICE

Find each quotient.

3.  $(k^2 - 12k + 27) \div (k - 3)$

4.  $(x^2 + 7x + 10) \div (x + 2)$

5.  $(x^2 - 5x + 6) \div (x - 3)$

6.  $(a^2 - 3a - 4) \div (a + 1)$

7.  $(2y^2 + 10y + 8) \div (y + 4)$

8.  $(x^2 + 8x + 14) \div (x + 1)$

9.  $(2b^2 - 5b + 8) \div (b - 2)$

10.  $(2x^2 + 9x + 3) \div (x + 3)$

11.  $(t^2 - 10t + 16) \div (t - 8)$

12.  $(2n^2 + 7n + 3) \div (n + 3)$

13.  $(2x^2 + 13x + 6) \div (2x + 1)$

14.  $(6x^2 + x - 15) \div (2x - 3)$

15.  $\frac{y^3 - 4y^2 + 2y + 8}{y + 1}$

16.  $\frac{x^3 + x - 2}{x - 1}$



**17. Standardized Test Practice** Find  $(3x^2 + 6x + 9) \div (x + 3)$ .

**A**  $3x - 3$

**B**  $3x + 2$

**C**  $3x + 2 + \frac{9}{x + 3}$

**D**  $3x - 3 + \frac{18}{x + 3}$

Answers: 1.  $x + 3$  2.  $\frac{x + 2}{12}$  3.  $k - 3$  4.  $x + 5$  5.  $x + 5$  6.  $a - 4$  7.  $2y + 2$  8.  $x + 7 + \frac{x}{7}$  9.  $2b - 1 + \frac{b}{2}$  10.  $2x + 3 - \frac{3}{6}$  11.  $t - 2$  12.  $2n + 1$  13.  $x + 6$  14.  $3x + 5$  15.  $y^2 - 5y + 7 + \frac{y + 1}{1}$  16.  $x^2 + x + 2$  17. D