

Key

## 4.3 Notetaking with Vocabulary (continued)

## Extra Practice

In Exercises 1–4, divide using polynomial long division.

1.  $(x^2 + 6x + 12) \div (x - 3)$

$$\begin{array}{r} x+9 \\ x-3 \overline{) x^2 + 6x + 12} \\ \underline{-x^2 - 3x} \phantom{+ 12} \\ 9x + 12 \phantom{+ 12} \\ \underline{-9x - 27} \\ 39 \end{array}$$

$R=39$

3.  $(4x^3 + 13x^2 + 27x + 6) \div (4x + 1)$

$$\begin{array}{r} x^2 + 3x + 6 \\ 4x+1 \overline{) 4x^3 + 13x^2 + 27x + 6} \\ \underline{-4x^3 + x^2} \phantom{+ 27x + 6} \\ 12x^2 + 27x \phantom{+ 6} \\ \underline{-12x^2 + 3x} \\ 24x + 6 \\ \underline{-24x - 6} \\ 0 \end{array}$$

$R=0$

In Exercises 5–8, divide using synthetic division.

5.  $(x^2 - 10x + 2) \div (x - 2)$

$$\begin{array}{r|rrr} 2 & 1 & -10 & 2 \\ & & 2 & -16 \\ \hline & 1 & -8 & -14 \end{array}$$

7.  $(2x^3 - 54) \div (x + 3)$

$$\begin{array}{r|rrrr} -3 & 2 & 0 & 0 & -54 \\ & & -6 & 18 & -54 \\ \hline & 2 & -6 & 18 & -108 \end{array}$$

2.  $(x^3 - 4x^2) \div (x^2 - 16)$

$$\begin{array}{r} x-4=R \\ x^2-16 \overline{) x^3 - 4x^2 + 0} \\ \underline{-x^3 - 16x} \\ -4x^2 + 16x \\ \underline{-4x^2 + 64} \\ 16x - 64 = R \end{array}$$

4.  $(x^4 + 2x^3 + 5x^2 + 3x) \div (x^2 - x)$

$$\begin{array}{r} x^2 + 3x + 8 \\ x^2-x \overline{) x^4 + 2x^3 + 5x^2 + 3x} \\ \underline{-x^4 + x^3} \phantom{+ 5x^2 + 3x} \\ 3x^3 + 5x^2 \phantom{+ 3x} \\ \underline{-3x^3 + 3x^2} \\ 8x^2 + 3x \\ \underline{-8x^2 + 8x} \\ 11x = R \end{array}$$

6.  $(x^3 + 4x^2 + 6x + 4) \div (x + 2)$

$$\begin{array}{r|rrrr} -2 & 1 & 4 & 6 & 4 \\ & & -2 & -4 & -4 \\ \hline & 1 & 2 & 2 & 0 \end{array}$$

8.  $(2x^4 - 11x^3 + 11x^2 + 4x + 4) \div (x - 4)$

$$\begin{array}{r|rrrrr} 4 & 2 & -11 & 11 & 4 & 4 \\ & & 8 & -12 & -4 & 0 \\ \hline & 2 & -3 & -1 & 0 & 4 \\ \hline & 2x^3 - 3x^2 - x + \frac{4}{x-4} \end{array}$$

## 4.3 Notetaking with Vocabulary (continued)

$$\frac{f(x)}{d(x)} = q(x) + \frac{r(x)}{d(x)}$$

In Exercises 9–12, match the equivalent expressions. Justify your answers.

9.  $(x^2 - x - 8) \div (x - 4)$

$$\begin{array}{r} 4 \overline{) 1 \quad -1 \quad -8} \\ \underline{1 \quad 3 \quad 12} \\ \phantom{1 \quad 3 \quad 12} \phantom{1} \phantom{1} \phantom{1} \end{array}$$

A.  $x + 3 + \frac{4}{x - 4}$

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

$$\begin{array}{r} 4 \overline{) 1 \quad -1 \quad 8} \\ \underline{1 \quad 3 \quad 12} \\ \phantom{1 \quad 3 \quad 12} \phantom{1} \phantom{1} \phantom{1} \end{array}$$

B.  $x + 5 + \frac{12}{x - 4}$

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

$$\begin{array}{r} 4 \overline{) 1 \quad 1 \quad -8} \\ \underline{1 \quad 5 \quad 12} \\ \phantom{1 \quad 5 \quad 12} \phantom{1} \phantom{1} \phantom{1} \end{array}$$

C.  $x + 5 + \frac{28}{x - 4}$

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

$$\begin{array}{r} 4 \overline{) 1 \quad 1 \quad 8} \\ \underline{1 \quad 5 \quad 20} \\ \phantom{1 \quad 5 \quad 20} \phantom{1} \phantom{1} \phantom{1} \end{array}$$

D.  $x + 3 + \frac{20}{x - 4}$

In Exercises 13–16, use synthetic division to evaluate the function for the indicated value of  $x$ .

13.  $f(x) = -3x^3 + 4x^2 - 17x - 6; x = 2$

14.  $f(x) = -x^4 + x^2 + 4; x = -1$

$$\begin{array}{r} 2 \overline{) -3 \quad 4 \quad -17 \quad -6} \\ \underline{-6 \quad -4 \quad -42} \\ -3 \quad -2 \quad -21 \quad -48 \end{array}$$

$$\begin{array}{r} -1 \overline{) -1 \quad 0 \quad 1 \quad 0 \quad 4} \\ \underline{-1 \quad 1 \quad -1 \quad 0} \\ -1 \quad 1 \quad 0 \quad 0 \quad 4 \end{array}$$

15.  $f(x) = x^3 - 10x^2 + 31x - 30; x = -5$

16.  $f(x) = x^3 + 8x + 27; x = 3$

$$\begin{array}{r} -5 \overline{) 1 \quad -10 \quad 31 \quad -30} \\ \underline{-5 \quad 75 \quad -530} \\ 1 \quad -15 \quad 106 \quad -560 \end{array}$$

$$\begin{array}{r} 3 \overline{) 1 \quad 0 \quad 8 \quad 27} \\ \underline{3 \quad 9 \quad 51} \\ 1 \quad 3 \quad 17 \quad 78 \end{array}$$

17. What is the value of  $k$  such that  $(-x^4 + 5x^2 + kx - 8) \div (x - 4)$  has a remainder of 0?