

1-3: Simplify each expression.

1.  $\frac{18a^3 + 30a^2}{3a}$   
 $\frac{18a^3}{3a} + \frac{30a^2}{3a}$   
 $6a^2 + 10a$

2.  $\frac{24mn^6 - 40m^2n^3}{4m^2n^3}$   
 $\frac{24mn^6}{4m^2n^3} - \frac{40m^2n^3}{4m^2n^3}$   
 $\frac{6n^3}{m} - 10$

3.  $\frac{60a^2b^3 - 48b^4 + 84a^5b^2}{12ab^2}$   
 $\frac{60a^2b^3}{12ab^2} - \frac{48b^4}{12ab^2} + \frac{84a^5b^2}{12ab^2}$   
 $5ab - \frac{4b^2}{a} + 7a^4$

4-9: Divide each using LONG DIVISION.

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

$$\begin{array}{r} 2x + 1 \\ x - 3 \overline{) 2x^2 - 5x - 3} \\ \underline{-(2x^2 - 6x)} \phantom{- 3} \\ x - 3 \\ \underline{-(x - 3)} \\ 0 \end{array}$$
  
 $2x + 1$

5.  $(12m^4 + 20m^3 - 24m^2 + 20m + 35) \div (3m + 5)$   

$$\begin{array}{r} 4m^3 - 8m + 20 \\ 3m + 5 \overline{) 12m^4 + 20m^3 - 24m^2 + 20m + 35} \\ \underline{-(12m^4 + 20m^3)} \phantom{- 24m^2 + 20m + 35} \\ 0m^3 - 24m^2 + 20m + 35 \\ \underline{-(0m^3 + 15m^2 + 15m + 15)} \\ -24m^2 + 20m + 20 \\ \underline{-(-24m^2 - 40m)} \\ 60m + 35 \\ \underline{-(60m + 100)} \\ -65 \end{array}$$
  
 $4m^3 - 8m + 20 - \frac{65}{3m + 5}$

6.  $(4p^3 + 9p - 6) \div (2p - 1)$   

$$\begin{array}{r} 2p^2 + p + 5 \\ 2p - 1 \overline{) 4p^3 + 0p^2 + 9p - 6} \\ \underline{-(4p^3 - 2p^2)} \phantom{- 6} \\ 2p^2 + 9p - 6 \\ \underline{-(2p^2 - p)} \phantom{- 6} \\ 10p - 6 \\ \underline{-(10p - 5)} \\ -1 \end{array}$$
  
 $2p^2 + p + 5 - \frac{1}{2p - 1}$

7.  $(t^3 - 6t^2 + 1) \div (t + 2)$   

$$\begin{array}{r} t^2 - 8t + 16 \\ t + 2 \overline{) t^3 - 6t^2 + 0t + 1} \\ \underline{-(t^3 + 2t^2)} \phantom{+ 0t + 1} \\ -8t^2 + 0t + 1 \\ \underline{-(-8t^2 - 16t)} \phantom{+ 1} \\ 16t + 1 \\ \underline{-(16t^2 + 32)} \\ -31 \end{array}$$
  
 $t^2 - 8t + 16 - \frac{31}{t + 2}$

8.  $\frac{2x^3 + 250}{x + 5}$   

$$\begin{array}{r} 2x^2 - 10x + 50 \\ x + 5 \overline{) 2x^3 + 0x^2 + 0x + 250} \\ \underline{-(2x^3 + 10x^2)} \phantom{+ 0x + 250} \\ 70x^2 + 0x + 250 \\ \underline{-(70x^2 + 350x)} \phantom{+ 250} \\ 50x + 250 \\ \underline{-(50x + 250)} \\ 0 \end{array}$$
  
 $2x^2 - 10x + 50$

9.  $\frac{6x^3 - 5x^2 + 3x - 4}{2x - 1}$   

$$\begin{array}{r} 3x^2 - x + 1 \\ 2x - 1 \overline{) 6x^3 - 5x^2 + 3x - 4} \\ \underline{-(6x^3 - 3x^2)} \phantom{+ 3x - 4} \\ -2x^2 + 3x - 4 \\ \underline{-(-2x^2 + x)} \phantom{- 4} \\ 2x - 4 \\ \underline{-(2x - 1)} \\ -3 \end{array}$$
  
 $3x^2 - x + 1 - \frac{3}{2x - 1}$

10-15: Divide each using SYNTHETIC DIVISION.

10.  $\frac{2x^3 - x^2 - 19x + 15}{x - 3}$

$$\begin{array}{r|rrrr} 3 & 2 & -1 & -19 & 15 \\ & \downarrow & 6 & 15 & -12 \\ \hline & 2 & 5 & -4 & 3 \end{array}$$

$$2x^2 + 5x - 4 + \frac{3}{x-3}$$

11.  $(y^3 - y^2 - 6) \div (y + 2)$

$$\begin{array}{r|rrrr} -2 & 1 & -1 & 0 & -6 \\ & \downarrow & -2 & 6 & -12 \\ \hline & 1 & -3 & 6 & -18 \end{array}$$

$$y^2 - 3y + 6 - \frac{18}{y+2}$$

12.  $(2x^3 - 5x^2 + 5x - 2) \div (x - 1)$

$$\begin{array}{r|rrrr} 1 & 2 & -5 & 5 & -2 \\ & \downarrow & 2 & -3 & 2 \\ \hline & 2 & -3 & 2 & 0 \end{array}$$

$$2x^2 - 3x + 2$$

13.  $(n^2 + 7n + 10) \cdot (n + 5)^{-1}$

$$\begin{array}{r|rrr} -5 & 1 & 7 & 10 \\ & \downarrow & -5 & -10 \\ \hline & 1 & 2 & 0 \end{array}$$

$$n + 2$$

14.  $\frac{x^3 - 27}{x - 3}$

$$\begin{array}{r|rrrr} 3 & 1 & 0 & 0 & -27 \\ & \downarrow & 3 & 9 & 27 \\ \hline & 1 & 3 & 9 & 0 \end{array}$$

$$x^2 + 3x + 9$$

15.  $(4p^3 - 3p^2 + 2p) \div (p - 1)$

$$\begin{array}{r|rrrr} 1 & 4 & -3 & 2 & 0 \\ & \downarrow & 4 & 1 & 3 \\ \hline & 4 & 1 & 3 & 3 \end{array}$$

$$4p^2 + p + 3 + \frac{3}{p-1}$$

16. GEOMETRY: The area of a rectangle is  $x^3 + 8x^2 + 13x - 12$  square units. The width of the rectangle is  $x + 4$  units. What is the length of the rectangle?  $A = l \cdot w$

$$l \cdot w = A$$

$$l(x+4) = (x^3 + 8x^2 + 13x - 12)$$

$$l = \frac{(x^3 + 8x^2 + 13x - 12)}{(x+4)}$$

$$\begin{array}{r|rrrr} -4 & 1 & 8 & 13 & -12 \\ & \downarrow & -4 & -16 & 12 \\ \hline & 1 & 4 & -3 & 0 \end{array}$$

$$x^2 + 4x - 3$$