 Name Key

Dividing Polynomials Using Synthetic Division

Divide.

1) $(r^3 + 6r^2 - 21r - 18) \div (r - 3)$

$$\begin{array}{r|rrrr} 3 & 1 & 6 & -21 & -18 \\ & \downarrow & 3 & 27 & 18 \\ \hline & 1 & 9 & 6 & 0 \end{array}$$

$= r^2 + 9r + 6$

2) $(x^3 - 11x^2 + 22x + 40) \div (x - 5)$

$$\begin{array}{r|rrrr} 5 & 1 & -11 & 22 & 40 \\ & \downarrow & 5 & -30 & -40 \\ \hline & 1 & -6 & -8 & 0 \end{array}$$

$= x^2 - 6x - 8$

3) $(9x^3 - 19x^2 - 28x + 12) \div (x - 3)$

$$\begin{array}{r|rrrr} 3 & 9 & -19 & -28 & 12 \\ & \downarrow & 27 & 24 & -12 \\ \hline & 9 & 8 & -4 & 0 \end{array}$$

$= 9x^2 + 8x - 4$

4) $(m^3 - 13m^2 + 24m + 18) \div (m - 3)$

$$\begin{array}{r|rrrr} 3 & 1 & -13 & 24 & 18 \\ & \downarrow & 3 & -30 & -18 \\ \hline & 1 & -10 & -6 & 0 \end{array}$$

$= m^2 - 10m - 6$

5) $(x^3 + 15x^2 + 45x - 25) \div (x + 5)$

$$\begin{array}{r|rrrr} -5 & 1 & 15 & 45 & -25 \\ & \downarrow & -5 & -50 & 25 \\ \hline & 1 & 10 & -5 & 0 \end{array}$$

$= x^2 + 10x - 5$

6) $(a^3 + 5a^2 + 14a + 16) \div (a + 2)$

$$\begin{array}{r|rrrr} -2 & 1 & 5 & 14 & 16 \\ & \downarrow & -2 & -6 & -16 \\ \hline & 1 & 3 & 8 & 0 \end{array}$$

$= a^2 + 3a + 8$

7) $(2x^3 + 9x^2 + 2x - 21) \div (x + 3)$

$$\begin{array}{r|cccc} -3 & 2 & 9 & 2 & -21 \\ & \downarrow & -6 & -9 & 21 \\ \hline & 2 & 3 & -7 & 0 \end{array}$$

$= 2x^2 + 3x - 7$

8) $(10r^3 - 22r^2 - 17r - 21) \div (r - 3)$

$$\begin{array}{r|cccc} 3 & 10 & -22 & -17 & -21 \\ & \downarrow & 30 & 24 & 21 \\ \hline & 10 & 8 & 7 & 0 \end{array}$$

$= 10r^2 + 8r + 7$

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

$$\begin{array}{r|cccc} -1 & 1 & 6 & 4 & -2 \\ & \downarrow & -1 & -5 & 1 \\ \hline & 1 & 5 & -1 & -1 \end{array}$$

$= n^2 + 5n - 1, R: -1$

10) $(7m^3 + 16m^2 - 7m + 27) \div (m + 3)$

$$\begin{array}{r|cccc} -3 & 7 & 16 & -7 & 27 \\ & \downarrow & -21 & 15 & -24 \\ \hline & 7 & -5 & 8 & 3 \end{array}$$

$= 7m^2 - 5m + 8, R: 3$

11) $(5x^3 - 2x^2 + 5x - 16) \div (x - 1)$

$$\begin{array}{r|cccc} 1 & 5 & -2 & 5 & -16 \\ & \downarrow & 5 & 3 & 8 \\ \hline & 5 & 3 & 8 & -8 \end{array}$$

$= 5x^2 + 3x + 8, R: -8$

12) $(r^3 - 5r^2 - 3r + 26) \div (r - 4)$

$$\begin{array}{r|cccc} 4 & 1 & -5 & -3 & 26 \\ & \downarrow & 4 & -4 & -28 \\ \hline & 1 & -1 & -7 & -2 \end{array}$$

$= r^2 - r - 7, R: -2$

13) $(b^3 + 2b^2 - 15b + 49) \div (b + 6)$

$$\begin{array}{r|cccc} -6 & 1 & 2 & -15 & 49 \\ & \downarrow & -6 & 24 & -54 \\ \hline & 1 & -4 & 9 & -5 \end{array}$$

$= b^2 - 4b + 9, R: -5$

14) $(n^3 + 13n^2 + 40n + 26) \div (n + 9)$

$$\begin{array}{r|cccc} -9 & 1 & 13 & 40 & 26 \\ & \downarrow & -9 & -36 & -36 \\ \hline & 1 & 4 & 4 & -10 \end{array}$$

$= n^2 + 4n + 4, R: -10$