

## Dividing Polynomials Using Synthetic Division

Divide.

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

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

$$\boxed{r^2 + 9r + 6}$$

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

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

$$\boxed{x^2 - 6x - 8}$$

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

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

$$\boxed{9x^2 + 8x - 4}$$

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

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

$$\boxed{x^2 - 10x - 6}$$

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

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

$$\boxed{x^2 + 10x - 5}$$

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

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

$$\boxed{x^2 + 3x + 8}$$

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

$$\begin{array}{r} \underline{-3} \mid 2 \quad 9 \quad 2 \quad -21 \\ \quad \downarrow -6 \quad -9 \quad 21 \\ \hline 2 \quad 3 \quad -7 \quad 0 \end{array}$$

$$\boxed{2x^2 + 3x - 7}$$

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

$$\begin{array}{r} \underline{-1} \mid 1 \quad 6 \quad 4 \quad -2 \\ \quad \downarrow -1 \quad -5 \quad -1 \quad +1 \\ \hline 1 \quad 5 \quad -1 \quad 0 \end{array}$$

$$\boxed{n^2 + 5n - 1 - \frac{1}{n+1}}$$

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

$$\begin{array}{r} \underline{1} \mid 5 \quad -2 \quad 5 \quad -16 \\ \quad \downarrow 5 \quad 3 \quad 8 \\ \hline 5 \quad 3 \quad 8 \quad -8 \end{array}$$

$$\boxed{5x^2 + 3x + 8 - \frac{8}{x-1}}$$

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

$$\begin{array}{r} \underline{-6} \mid 1 \quad 2 \quad -15 \quad 49 \\ \quad \downarrow -6 \quad 24 \quad -54 \\ \hline 1 \quad -4 \quad 9 \quad -5 \end{array}$$

$$\boxed{b^2 - 4b + 9 - \frac{5}{b+6}}$$

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

$$\begin{array}{r} \underline{3} \mid 10 \quad -22 \quad -17 \quad -21 \\ \quad \downarrow 30 \quad 24 \quad 21 \\ \hline 10 \quad 8 \quad 7 \quad 0 \end{array}$$
~~$$10r^3 - 22r^2 - 17r - 21$$~~

$$\boxed{10r^2 + 8r + 7}$$

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

$$\begin{array}{r} \underline{-3} \mid 7 \quad 16 \quad -7 \quad 27 \\ \quad \downarrow -21 \quad 15 \quad -24 \\ \hline 7 \quad -5 \quad 8 \quad 3 \end{array}$$

$$\boxed{7m^2 - 5m + 8 + \frac{3}{m+3}}$$

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

$$\begin{array}{r} \underline{4} \mid 1 \quad -5 \quad -3 \quad 26 \\ \quad \downarrow 4 \quad -4 \quad -28 \\ \hline 1 \quad -1 \quad -7 \quad -2 \end{array}$$

$$\boxed{r^2 - r - 7 - \frac{2}{r-4}}$$

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

$$\begin{array}{r} \underline{-9} \mid 1 \quad 13 \quad 40 \quad 26 \\ \quad \downarrow -9 \quad -36 \quad -36 \\ \hline 1 \quad 4 \quad 4 \quad -10 \end{array}$$

$$\boxed{n^2 + 4n + 4 - \frac{10}{n+9}}$$