

# Notes

Name key !!  
 Period \_\_\_\_\_

## Dividing Polynomials Using Synthetic Division

Use synthetic division to divide the polynomial by the linear factor.

1.  $(3x^2 + 7x + 2) \div (x + 2)$

$$\begin{array}{r|rrr} -2 & 3 & 7 & 2 \\ & \downarrow & -6 & -2 \\ \hline & 3 & 1 & 0 \end{array}$$

← remainder

$3x + 1$

2.  $(2x^2 + 7x - 15) \div (x + 5)$

$$\begin{array}{r|rrr} -5 & 2 & 7 & -15 \\ & \downarrow & -10 & +15 \\ \hline & 2 & -3 & 0 \end{array}$$

← remainder

$2x - 3$

3.  $(7x^2 - 3x + 5) \div (x + 1)$

$$\begin{array}{r|rrr} -1 & 7 & -3 & 5 \\ & \downarrow & -7 & 10 \\ \hline & 7 & -10 & 15 \end{array}$$

$7x - 10 + \frac{15}{x+1}$

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

$$\begin{array}{r|rrr} 2 & 4 & 1 & 1 \\ & \downarrow & 8 & 18 \\ \hline & 4 & 9 & 19 \end{array}$$

$4x + 9 + \frac{19}{x-2}$

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

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

$$\begin{array}{r|rrrrr} -2 & -1 & -2 & 3 & 4 & -4 \\ & \downarrow & 2 & 0 & -6 & 4 \\ \hline & -1 & 0 & 3 & -2 & 0 \end{array}$$

$-x^3 + 0x^2 + 3x - 2$

$-x^3 + 3x - 2$

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

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

$x^2 + 4x + 4$

$$7. (x^4 + 1) \div (x + 1)$$

$$\begin{array}{r} -1 \overline{) 1 \ 0 \ 0 \ 0 \ 1} \\ \underline{\downarrow -1 \ 1 \ -1 \ 1} \\ 1 \ -1 \ 1 \ -1 \ 2 \end{array}$$

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

$$8. (x^4 + 9) \div (x + 3)$$

$$\begin{array}{r} -3 \overline{) 1 \ 0 \ 0 \ 0 \ 9} \\ \underline{\downarrow -3 \ 9 \ 27 \ 81} \\ 1 \ -3 \ 9 \ -27 \ 90 \end{array}$$

$$\boxed{x^3 - 3x^2 + 9x - 27 + \frac{90}{x+3}}$$

$$9. (x^4 - 16) \div (x + 2)$$

$$\begin{array}{r} -2 \overline{) 1 \ 0 \ 0 \ 0 \ -16} \\ \underline{\downarrow -2 \ 4 \ -8 \ 16} \\ 1 \ -2 \ 4 \ -8 \ 0 \end{array}$$

$$\boxed{x^3 - 2x^2 + 4x - 8}$$

$$10. \frac{x^6 + 4x^5 - 2x^3 + 7}{x + 1}$$

$$\begin{array}{r} -1 \overline{) 1 \ 4 \ 0 \ -2 \ 0 \ 0 \ 7} \\ \underline{\downarrow -1 \ -3 \ 3 \ -1 \ 1 \ -1} \\ 1 \ 3 \ -3 \ 1 \ -1 \ 1 \ 6 \end{array}$$

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