

Dividing Polynomials With Synthetic Division

Divide each of the following polynomials using synthetic division

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

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

$(x-1)$

2. $\frac{x^2+7x+5}{x+1}$

$$\begin{array}{r|rrr} -1 & 1 & 7 & 5 \\ & & -1 & -6 \\ \hline & 1 & 6 & -1 \end{array}$$

$(x+6-\frac{1}{x+1})$

3. $\frac{x^2-10x-21}{x+2}$

$$\begin{array}{r|rrr} -2 & 1 & -10 & -21 \\ & & -2 & 24 \\ \hline & 1 & -12 & 3 \end{array}$$

$(x-12+\frac{3}{x+2})$

4. $\frac{-x^2-8x+33}{x+10}$

$$\begin{array}{r|rrr} -10 & -1 & -8 & 33 \\ & & 10 & -20 \\ \hline & -1 & 2 & 13 \end{array}$$

$(-x+2+\frac{13}{x+10})$

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

$$\begin{array}{r|rrr} 3 & 1 & 1 & -4 \\ & & 3 & 12 \\ \hline & 1 & 4 & 8 \end{array}$$

$(x+4+\frac{8}{x-3})$

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

$$\begin{array}{r|rrr} -1 & -3 & 10 & -6 \\ & & 3 & -13 \\ \hline & -3 & 13 & -19 \end{array}$$

$(-3x+13-\frac{19}{x+1})$

7. $\frac{5x^4+17x^3+10x^2-5}{x+3}$

$$\begin{array}{r|rrrrr} -3 & 5 & 17 & 10 & 0 & -5 \\ & & -15 & -6 & -12 & 36 \\ \hline & 5 & 2 & 4 & -12 & 31 \end{array}$$

$(5x^3+2x^2+4x-12+\frac{31}{x+3})$

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

$$\begin{array}{r|rrrrr} 2 & 2 & -3 & -4 & 0 & -5 \\ & & 4 & 2 & -4 & -8 \\ \hline & 2 & 1 & -2 & -4 & -13 \end{array}$$

$(2x^3+x^2-2x-4-\frac{13}{x-2})$

Put 0 as a placeholder!

$$9. \frac{2x^3 - x - 2}{x - 2} \quad 2x^2 + 4x + 7 + \frac{12}{x-2}$$

$$\begin{array}{r|rrrr} 2 & 2 & 0 & -1 & -2 \\ & & 4 & 8 & 14 \\ \hline & 2 & 4 & 7 & 12 \end{array}$$

$$10. \frac{2x^3 - 3x^2 - 2x + 5}{x - 3}$$

$$2x^2 + 3x + 7 + \frac{26}{x-3}$$

$$\begin{array}{r|rrrr} 3 & 2 & -3 & -2 & 5 \\ & & 6 & 9 & 21 \\ \hline & 2 & 3 & 7 & 26 \end{array}$$

$$11. \frac{x^3 + 5x^2 - 1}{x + 2}$$

$$\begin{array}{r|rrrr} -2 & 1 & 5 & 0 & -1 \\ & & -2 & -6 & 12 \\ \hline & 1 & 3 & -6 & 11 \end{array}$$

$$x^2 + 3x - 6 + \frac{11}{x+2}$$

$$12. \frac{x^4 - 32x^2 + 21x - 12}{x + 6}$$

$$\begin{array}{r|rrrrr} -6 & 1 & 0 & -32 & 21 & -12 \\ & & -6 & 36 & -24 & 18 \\ \hline & 1 & -6 & 4 & -3 & 6 \end{array}$$

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

$$13. \frac{2x^3 + 5x^2 - 31x - 84}{x + 3}$$

$$\begin{array}{r|rrrr} -3 & 2 & 5 & -31 & -84 \\ & & -6 & 3 & 84 \\ \hline & 2 & -1 & -28 & 0 \end{array}$$

$$2x^2 - x - 28$$

$$14. \frac{4x^3 + 12x^2 - 5}{x + 5}$$

$$\begin{array}{r|rrrr} -5 & 4 & 12 & 0 & -5 \\ & & -20 & 40 & -200 \\ \hline & 4 & -8 & 40 & -205 \end{array}$$

$$4x^2 - 8x + 40 - \frac{205}{x+5}$$

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

$$\begin{array}{r|rrrr} -3 & 2 & 0 & -10 & 3 \\ & & -6 & 18 & -24 \\ \hline & 2 & -6 & 8 & -21 \end{array}$$

$$2x^2 - 6x + 8 - \frac{21}{x+3}$$

$$16. \frac{5x^3 - 60}{x - 2}$$

$$\begin{array}{r|rrrr} 2 & 5 & 0 & 0 & -60 \\ & & 10 & 20 & 40 \\ \hline & 5 & 10 & 20 & -20 \end{array}$$

$$5x^2 + 10x + 20 - \frac{20}{x-2}$$