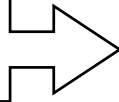


Synthetic Division

Name ANSWERS



Remember the mantra
for Synthetic Division:



“Bring down ... multiply and add ...
multiply and add ... multiply and add ...”

Example:

$$x+4 \overline{)x^3+7x^2+17x+20} \quad \Rightarrow \quad \begin{array}{r|rrrr} -4 & 1 & 7 & 17 & 20 \\ & & -4 & -12 & -20 \\ \hline & 1 & 3 & 5 & 0 \end{array} \quad \Rightarrow \quad \text{Answer: } x^2 + 3x + 5$$

1 3 5 0 ← remainder

Solve the following problems using synthetic division.

1. $(x^2 - 11x + 28) \div (x - 4)$

$$\begin{array}{r|rrr} 4 & 1 & -11 & 28 \\ & & 4 & -28 \\ \hline & 1 & -7 & 0 \end{array}$$

Ans: $x - 7$

2. $(m^2 - 2m - 39) \div (m + 5)$

$$\begin{array}{r|rrr} -5 & 1 & -2 & -39 \\ & & -5 & 35 \\ \hline & 1 & -7 & 4 \end{array}$$

Ans: $x - 7 + \frac{4}{x+5}$

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

$$\begin{array}{r|rrrr} 1 & 2 & 3 & -4 & 1 \\ & & 2 & 5 & 1 \\ \hline & 2 & 5 & 1 & 2 \end{array}$$

Ans: $2x^2 + 5x + 1 + \frac{2}{x-1}$

4. $2x^4 - x^3 + 2x^2 - 3x + 7) \div \left(x - \frac{1}{2}\right)$

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

Ans: $2x^3 + 0x^2 + 2x - 2 + \frac{6}{x - \frac{1}{2}}$

5. $\frac{a^4 + 16}{a + 4}$

$$\begin{array}{r|rrrrr} -4 & 1 & 0 & 0 & 0 & 16 \\ & & -4 & 16 & -64 & 256 \\ \hline & 1 & -4 & 16 & -64 & 272 \end{array}$$

Ans: $a^3 - 4a^2 + 16a - 64 + \frac{272}{a+4}$

6. $\frac{x^4 - 16}{x - 2}$

$$\begin{array}{r|rrrrr} 2 & 1 & 0 & 0 & 0 & -16 \\ & & 2 & 4 & 8 & 16 \\ \hline & 1 & 2 & 4 & 8 & 0 \end{array}$$

Ans: $x^3 + 2x^2 + 4x + 8$

7. Determine if $(x - 3)$ is a factor

of $9x^3 - 9x + 3$.

$$\begin{array}{r|rrrr} 3 & 9 & 0 & -9 & 3 \\ & & 27 & 81 & 216 \\ \hline & 9 & 27 & 81 & 219 \end{array}$$

There is a remainder, so it is not a factor.

8. Determine if $\left(x + \frac{3}{4}\right)$ is a factor

of $(8x^3 - 6x^2 - 5x + 3)$.

$$\begin{array}{r|rrrr} -\frac{3}{4} & 8 & -6 & -5 & 3 \\ & & -6 & 9 & -3 \\ \hline & 8 & -12 & 4 & 0 \end{array}$$

There is no remainder, so it is a factor.