

# Synthetic Division



**Divide:** \*Can only use synthetic div. when the divisor is linear \*



$$(x^3 + 3x^2 + 3x + 2) \div (x + 2)$$

$$x + 2 = 0$$

$$x = -2$$

① Set divisor equal to zero & solve for x

② Write the ans for x in the partial box

-2		1	3	3	2
		↓			
			-2	-2	-2
		1	1	1	0

③ (Standard form & has all of the terms)

List the coefficients and the constant in order horizontally.

④ Bring down the 1<sup>st</sup> coefficient under the line

⑤ Multiply the # in the partial box times the # under the line. Write the ans in the next column above the line

⑥ Add the column & write the ans. below the line

⑦ Repeat steps 5 & 6 until we are at the end.

⑧ write the answer:

Begin with the variable that has a degree of 1 less than the orig. problem

$$1x^2 + 1x + 1$$

$x^2 + x + 1$

↑ remainder

**Divide:**

$$(x^2 - 10x - 24) \div (x + 2) \quad x + 2 = 0$$



$$\begin{array}{r}
 \text{X-12} \\
 \text{X+2} \overline{) x^2 - 10x - 24} \\
 \underline{x^2 + 2x} \phantom{-24} \\
 -12x - 24 \\
 \underline{-12x - 24} \\
 0
 \end{array}$$

$$\begin{array}{r}
 -2 \overline{) 1 \quad -10 \quad -24} \\
 \underline{1 \quad -2 \quad 24} \\
 1 \quad -12 \quad 0 \\
 \hline
 \boxed{x - 12}
 \end{array}$$

Divide:

$$(1x^5 - 3x^2 - 20) \div (x - 2) = 0$$



$$\begin{array}{r}
 \underline{2} \overline{) \quad 1 \quad 0 \quad 0 \quad -3 \quad 0 \quad -20} \\
 \quad \downarrow \quad 2 \quad 4 \quad 8 \quad 10 \quad 20 \\
 \hline
 \quad 1 \quad 2 \quad 4 \quad 5 \quad 10 \quad \underline{0} \\
 \hline
 \boxed{x^4 + 2x^3 + 4x^2 + 5x + 10}
 \end{array}$$

Quartic 5 term polynomial

**Divide:**

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

$$\begin{array}{r|rrrr} -3 & 1 & 3 & -7 & -21 \\ & \downarrow & -3 & 0 & 21 \\ \hline & 1 & 0 & -7 & 0 \end{array}$$

$$1x^2 + 0x - 7$$

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

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$$10x^3 + x^2 - 14x - 7 \div \underline{\underline{x+1}}$$

$$\begin{array}{r|rrrr} -1 & 10 & 1 & -14 & -7 \\ & \downarrow & -10 & 9 & 5 \\ \hline & 10 & -9 & -5 & -2 \end{array}$$

$$10x^2 - 9x - 5 + \frac{-2}{x+1}$$

