

Lesson 2.4: Polynomial Division (Synthetic Division)

Divisor must be linear,
(In the form $x-a$ or $x+a$)

Review

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

$$\frac{2x^2}{\cancel{x}} = \overset{\text{Top}}{2x}$$

$$\overset{\text{Top}}{2x}(x-3)$$

$$\frac{3x}{\cancel{x}} = \overset{\text{Top}}{3}$$

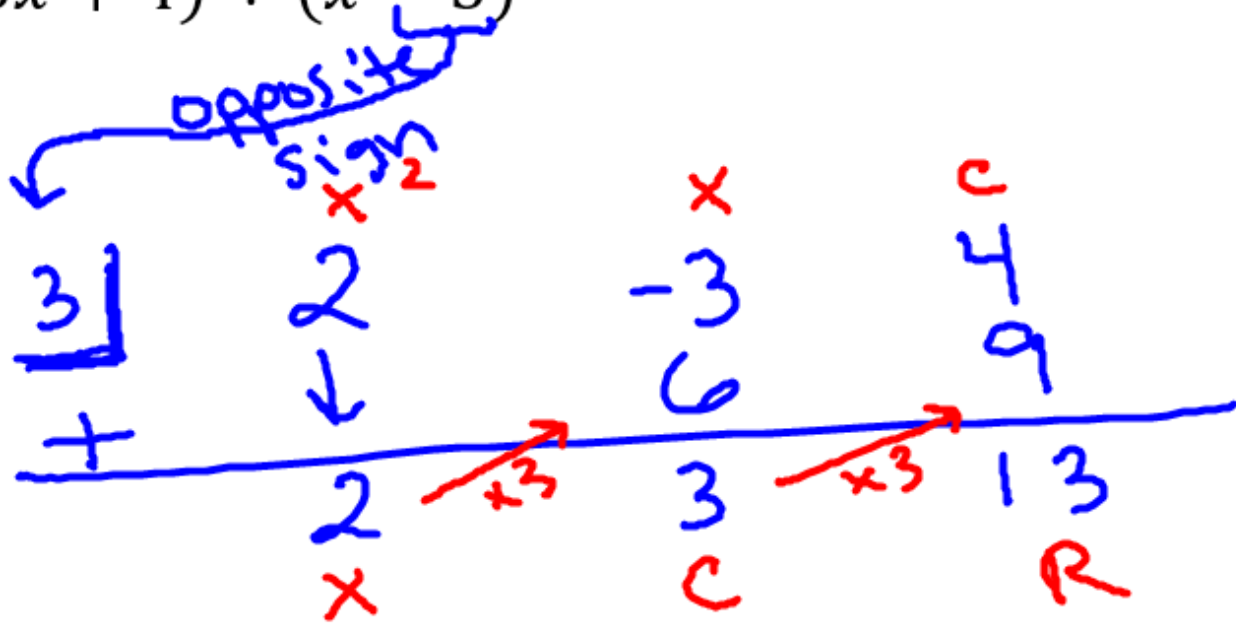
$$\overset{\text{Top}}{3}(x-3)$$

$$\begin{array}{r} 2x + 3 \\ \hline \cancel{x} - 3 \overline{) 2x^2 - 3x + 4} \\ \underline{+ (-2x^2 + 6x)} \\ 3x + 4 \\ \underline{+ (-3x + 9)} \\ 13 \end{array}$$

$$2x + 3 + \frac{13}{x-3}$$

$(2x^2 - 3x + 4) \div (x - 3)$ *Divisor*

$2x + 3 + \frac{13}{x-3}$



$2x + 3 + \frac{13}{x-3}$

$$(x^3 + 5x^2 + 4x + 1) \div (x + 4)$$

Handwritten long division showing the process of dividing $x^3 + 5x^2 + 4x + 1$ by $x + 4$. The divisor $x + 4$ is written on the left. The dividend coefficients $1, 5, 4, 1$ are written above a horizontal line. The quotient coefficients $1, 1, 0$ are written below the line. The remainder 1 is written in a box below the line. Red annotations include a bracket under the divisor, a plus sign, a downward arrow, and a box around the remainder. Blue annotations include arrows pointing from the dividend coefficients to the quotient coefficients.

$$1x^2 + 1x + \frac{1}{x+4}$$

$$(5x^4 - 2x^2 - 1) \div (x + 1)$$

	x^4	x^3	x^2	x	c
-1	5	0	-2	0	-1
+	↓	-5	5	-3	3
+					
	5	-5	3	-3	2
	x^3	x^2	x	c	R

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

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

$$\begin{array}{r} 2 \overline{) \begin{array}{r} 1 \\ + 2 4 - 2 \\ \hline 1 2 - 1 5 \end{array} \\ \begin{array}{r} x^3 \\ x^2 \\ x \\ c \\ R \end{array} \end{array}$$

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