

Mar. 19, 2018

Sect. 6-7a

Polynomial Division

Monomial

Long

Monomial

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

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

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

$$\frac{3x \cancel{x} \cancel{x}}{\cancel{x}} - \frac{7x \cancel{x}}{\cancel{x}} + \frac{2\cancel{x}}{\cancel{x}}$$

$$3x^2 - 7x + 2$$

$$\frac{5a^6 + 6a^4 - 7a^3}{a^2}$$

$$\frac{5\cancel{a}a\cancel{a}a\cancel{a}a}{\cancel{a}a}$$

$$5a^4 + 6a^2 - 7a$$

# Long Division

A handwritten long division problem showing 432 divided by 3. The quotient is 144 and the remainder is 0. The numbers 144 and 0 are crossed out with green vertical lines. Red arrows and text identify the parts: 'Divisor' points to the 3, 'Dividend' points to the 432, and 'Quotient' points to the 144.

$$\begin{array}{r} 144 \\ 3 \overline{) 432} \\ \underline{-3} \phantom{0} \\ 13 \phantom{0} \\ \underline{-12} \phantom{0} \\ 12 \\ \underline{-12} \\ 0 \end{array}$$

Annotations:  
- **Divisor**: 3  
- **Dividend**: 432  
- **Quotient**: 144  
- **Remainder**: 0

$$(x^2 + 5x + 6) \div (x + 2) = x + 3$$

$$\frac{\cancel{x}x}{\cancel{x}} = x$$

$$\frac{3\cancel{x}}{\cancel{x}} = 3$$

$$\begin{array}{r}
 \phantom{x+2} \overline{) x^2 + 5x + 6} \\
 \underline{-(x^2 + 2x)} \phantom{+ 6} \\
 \phantom{x+2} 3x + 6 \\
 \underline{-(3x + 6)} \\
 \phantom{x+2} 0
 \end{array}$$

$$(3x^3 - 7x^2 + 9x - 14) \div (x - 2)$$

$$\begin{array}{r}
 3x^2 + 1x + 7 \\
 \hline
 x \cdot 2 \big) 3x^3 - 7x^2 + 9x - 14 \\
 \underline{3x^3 - 6x^2} \phantom{+ 9x - 14} \\
 -1x^2 + 9x \phantom{- 14} \\
 \underline{-(-1x^2 + 2x)} \phantom{- 14} \\
 7x - 14 \\
 \underline{-(7x - 14)} \\
 0
 \end{array}$$

$\frac{3x^3}{x} = 3x^2$   
 $\frac{-1x^2}{x} = -1x$   
 $\frac{7x}{x} = 7$

$$(x^2 - x - 6) \div (x + 2)$$

$$\begin{array}{r}
 \cancel{x} \cancel{x} = x \\
 \cancel{x} \\
 \hline
 -3x \\
 \hline
 x = -3
 \end{array}$$

$$\begin{array}{r}
 x + 2 \overline{) x^2 - x - 6} \\
 \underline{-(x^2 + 2x)} \phantom{-6} \\
 -3x - 6 \\
 \underline{-(-3x - 6)} \\
 0
 \end{array}$$



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

$$\begin{array}{r}
 \phantom{x+3} \overline{) 2x^3 + 2x^2 + 0x - 7} \\
 \underline{2x^2 + 6x^2} \phantom{+ 0x - 7} \\
 -4x^2 + 0x \phantom{- 7} \\
 \underline{-(-4x^2 - 12x)} \phantom{- 7} \\
 12x - 7 \\
 \underline{-(12x + 36)} \\
 -43
 \end{array}
 + \frac{-43}{x+3}$$

$\frac{2x^2}{x} = 2x^2$   
 $\frac{-4x^2}{x} = -4x$   
 $\frac{12x}{x} = 12$

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

$$3x^3 + 6x^2 + 14x + 28 + \frac{55}{x-2}$$

$$\begin{array}{r}
 x-2 \overline{) 3x^4 + 0x^3 + 2x^2 + 0x - 1} \\
 \underline{-(3x^4 - 6x^3)} \phantom{+ 2x^2 + 0x - 1} \\
 6x^3 + 2x^2 \phantom{+ 0x - 1} \\
 \underline{-(6x^3 - 12x^2)} \phantom{+ 0x - 1} \\
 14x^2 + 0x \phantom{- 1} \\
 \underline{-(14x^2 - 28x)} \phantom{- 1} \\
 28x - 1 \\
 \underline{-(28x - 56)} \\
 55
 \end{array}$$

$$\begin{array}{l}
 \frac{3x \cdot x}{x} = 3x^3 \\
 \frac{6x \cdot x}{x} = 6x^2 \\
 \frac{14x \cdot x}{x} = 14x \\
 \frac{28x}{x} = 28
 \end{array}$$

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

$$\begin{array}{r}
 x^2 - 1 \overline{) x^3 + 2x^2 - 3x + 1} \\
 \underline{-(x^3 \phantom{- 2x^2} - 1x)} \phantom{+ 1} \\
 2x^2 - 2x + 1 \\
 \underline{-(2x^2 \phantom{- 2x} - 2)} \\
 -2x + 3
 \end{array}$$

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

$\frac{\cancel{x} \cancel{x} \cancel{x}}{\cancel{x} \cancel{x}} = x$

$\frac{\cancel{2} \cancel{x} \cancel{x}}{\cancel{x} \cancel{x}} = 2$