

Name: \_\_\_\_\_  
PC: Synthetic Division of Polynomials

Date: \_\_\_\_\_  
Ms. Loughran

Do Now:

1. Use long division to divide:  $(2x^3 - 9x^2 + 10x - 7) \div (x - 3)$

$$\begin{array}{r} 2x^2 - 3x + 1 \\ x-3 \overline{) 2x^3 - 9x^2 + 10x - 7} \\ \underline{-2x^3 + 6x^2} \phantom{-7} \\ -3x^2 + 10x - 7 \\ \underline{+3x^2 + 9x} \phantom{-7} \\ \phantom{-3x^2} x - 7 \\ \underline{-x + 3} \\ \phantom{-3x^2} \phantom{x} -4 \end{array}$$

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

**Model 1:** Use synthetic division to find the quotient and remainder.

$$(2x^3 - 9x^2 + 10x - 7) \div (x - 3)$$

$$\begin{array}{r|rrrr} 3 & 2 & -9 & 10 & -7 \\ & & 6 & -9 & 3 \\ \hline & 2 & -3 & 1 & \boxed{-4} \text{ remainder} \end{array}$$

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

Exercises: Use synthetic division to find the quotient and remainder.

1.  $(x^3 - 2x^2 - 5x + 6) \div (x - 3)$

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

$$x^2 + x - 2$$

3.  $(2x^3 + x^2 - 3x + 7) \div (x + 1)$

$$\begin{array}{r|rrrr} -1 & 2 & 1 & -3 & 7 \\ & & -2 & 1 & 2 \\ \hline & 2 & -1 & -2 & 9 \end{array}$$

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

5.  $(x^4 - 3x^3 + 7x^2 - 2x + 1) \div (x + 2)$

$$\begin{array}{r|rrrrr} -2 & 1 & -3 & 7 & -2 & 1 \\ & & -2 & 10 & -34 & 72 \\ \hline & 1 & -5 & 17 & -36 & 73 \end{array}$$

$$x^3 - 5x^2 + 17x - 36 + \frac{73}{x+2}$$

7.  $(3x^4 + x^3 - 2x + 3) \div (x + 1)$   
*bec we skip the  $x^2$  term*

$$\begin{array}{r|rrrrr} -1 & 3 & 1 & 0 & -2 & 3 \\ & & -3 & 2 & -2 & 4 \\ \hline & 3 & -2 & 2 & -4 & 7 \end{array}$$

$$3x^3 - 2x^2 + 2x - 4 + \frac{7}{x+1}$$

9.  $(x^4 - 16) \div (x - 2)$

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

$$x^3 - 2x^2 + 4x + 8$$

Use long division to find the quotient and remainder

$$(2x^3 - 7x^2 + 8x + 6) \div (2x - 3)$$

$$\begin{array}{r}
 x^2 - 2x + 1 \\
 \hline
 2x-3 \overline{) 2x^3 - 7x^2 + 8x + 6} \\
 \underline{-2x^3 + 3x^2} \phantom{+ 6} \\
 -4x^2 + 8x \phantom{+ 6} \\
 \underline{+4x^2 + 6x} \phantom{+ 6} \\
 2x + 6 \\
 \underline{-2x + 3} \\
 9
 \end{array}$$

$$x^2 - 2x + 1 + \frac{9}{2x-3}$$

**Model 2.** Use synthetic division to find the quotient and remainder.

$$(2x^3 - 7x^2 + 8x + 6) \div (2x - 3)$$

$$\begin{array}{r|rrrr}
 \frac{3}{2} & 2 & -7 & 8 & 6 \\
 & & 3 & -6 & 3 \\
 \hline
 & 2 & -4 & 2 & \textcircled{9} \text{ remainder} \\
 & & & \div 2 & 
 \end{array}$$

$$x^2 - 2x + 1 + \frac{9}{2x-3}$$

Exercises: Use synthetic division to find the quotient and remainder.

11.  $(6x^3 - 5x^2 - 3x + 4) \div (2x - 1)$

$$\begin{array}{r|rrrr} \frac{1}{2} & 6 & -5 & -3 & 4 \\ & & 3 & -1 & -2 \\ \hline & 6 & -2 & -4 & 2 \\ & & & & \div 2 \\ \hline & 3x^2 & -x & -2 & + \frac{2}{2x-1} \end{array}$$

13.  $(6x^3 + 7x^2 + x + 8) \div (2x + 3)$

$$\begin{array}{r|rrrr} \frac{-3}{2} & 6 & 7 & 1 & 8 \\ & & -9 & 3 & -6 \\ \hline & 6 & -2 & 4 & 2 \\ & & & & \div 2 \\ \hline & 3x^2 & -x & + 2 & + \frac{2}{2x+3} \end{array}$$

15.  $(x^2 + 5 + 6x^3 - 12x) \div (3x - 4)$

Put Dividend in Standard form

$$6x^3 + x^2 - 12x + 5$$

$$\begin{array}{r|rrrr} \frac{4}{3} & 6 & 1 & -12 & 5 \\ & & 8 & 12 & 0 \\ \hline & 6 & 9 & 0 & 5 \leftarrow \text{remainder} \\ & & & & \div 3 \\ \hline & 2x^2 & + 3x & + \frac{5}{3x-4} \end{array}$$

17.  $(15x^7 - x^6 + 8x^5 + 21x^4 - 9x^2 - 8x + 4) \div (5x - 2)$

$$\begin{array}{r|rrrrrrrr} \frac{2}{5} & 15 & -1 & 8 & 21 & 0 & -9 & -8 & 4 \\ & & 6 & 2 & 4 & 10 & 4 & -2 & -4 \\ \hline & 15 & 5 & 10 & 25 & 10 & -5 & -10 & 0 \\ & & & & & & & & \div 5 \\ \hline & 3x^6 & + x^5 & + 2x^4 & + 5x^3 & + 2x^2 & - x & - 2 \end{array}$$

## Homework 11-28

$$\textcircled{2} \quad n+5 + \frac{1}{n-6}$$

$$\textcircled{12} \quad p+7 + \frac{10}{2p-7}$$

$$\textcircled{4} \quad k-6 + \frac{4}{k-1}$$

$$\textcircled{14} \quad p^2-5p-5 + \frac{1}{p-5}$$

$$\textcircled{6} \quad a+5 - \frac{3}{a-5}$$

$$\textcircled{16} \quad x^2-6x-2 + \frac{4}{x-7}$$

$$\textcircled{8} \quad x-1 + \frac{9}{x+6}$$

$$\textcircled{18} \quad k^2-4k+4 + \frac{8}{k-1}$$

$$\textcircled{10} \quad 6x-6 + \frac{9}{7x+7}$$

$$\textcircled{20} \quad 10k^2+10k+1 - \frac{3}{5k-4}$$

$$\textcircled{18} \quad (-5k^2+k^3+8k+4) \div (-1+k)$$

$$\begin{array}{r}
 k^2 - 4k + 4 \\
 k-1 \overline{) k^3 - 5k^2 + 8k + 4} \\
 \underline{-k^3 + k^2} \phantom{+ 4} \\
 -4k^2 + 8k \phantom{+ 4} \\
 \underline{+4k^2 + 4k} \phantom{+ 4} \\
 4k + 4 \\
 \underline{-4k + 4} \\
 8
 \end{array}$$