

Warm-Up:

Simplify.

1)  $(-4x^2 + 5x - 12) - (-6x^2 + 4x - 9)$

$$-4x^2 + 5x - 12 + 6x^2 - 4x + 9$$

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

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

$$x^3 - x^2 + 3x - 7x^2 + 7x - 21$$

$$x^3 - 8x^2 + 10x - 21$$

3) Divide without a calculator.

$\overline{27}$   
13) 351  
26  
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91  
91  
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0

### Section 6-3: Dividing Polynomials

Examples:

Divide.

1)  $(\frac{8x^2}{4x} + \frac{4x}{4x} + \frac{12}{4x}) \div 4x$

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

2)  $\frac{6x^3 + 2x^2 + 8x}{2x}$

$$\frac{6x^3}{2x} + \frac{2x^2}{2x} + \frac{8x}{2x}$$

$$3x^2 + x + 4$$

Examples:

Divide.

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

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

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

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

$$\begin{array}{r} x^3 + x + 1 \\ x+1 \overline{) x^4+x^3+x^2+2x+1} \\ \underline{-(x^4+x^3)} \phantom{+x^2+2x+1} \\ x^2+2x \phantom{+1} \\ \underline{-(x^2+x)} \phantom{+1} \\ x+1 \\ \underline{-(x+1)} \\ 0 \end{array}$$

$$x^3 + x + 1$$

Examples:

5) Which expression is equal to  $(a^2 - 5a + 3)(2 - a)^{-1}$ ?

~~A)  $a + 3$~~

~~B)  $-a + 3 + \frac{3}{2 - a}$~~

~~C)  $-a - 3 + \frac{3}{2 - a}$~~

**D)  $-a + 3 - \frac{3}{2 - a}$**

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

$$-a + 3$$

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

$$\begin{array}{r} -3a+3 \\ \underline{-(-3a+6)} \\ -3 \end{array}$$

$$-a + 3 + \frac{-3}{-a+2}$$

$$-a + 3 + \frac{-3}{2-a}$$

$$-a + 3 - \frac{3}{2-a}$$

**Synthetic division** is a different process used to divide a polynomial by a first degree binomial.

The variable can not have a coefficient to use synthetic division.

Synthetic division uses addition, and not subtraction.

Examples:

Divide.

6)  $(x^3 - 4x^2 + 6x - 4) \div (x - 2)$

$$\begin{array}{r|rrrr} 2 & 1 & -4 & 6 & -4 \\ & \downarrow & \nearrow 2 & \nearrow -4 & \nearrow 4 \\ \hline & 1 & -2 & 2 & 0 \end{array}$$

$x^2 \quad -2x \quad 2 \quad \# \quad 0$

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

7)  $(4y^4 - 5y^2 + 2y + 4) \div (y - 1)$

$$\begin{array}{r|rrrrr} 1 & 4 & 0 & -5 & 2 & 4 \\ & \downarrow & \nearrow 4 & \nearrow -4 & \nearrow 1 & \nearrow 1 \\ \hline & 4 & 4 & -1 & 1 & 5 \end{array}$$

$y^3 \quad y^2 \quad y \quad \#$

$$4y^3 + 4y^2 - y + 1 + \frac{5}{y-1}$$

Examples:

Pick any number.

Multiply that number by nine.

From that product, subtract your original number.

To that difference, add 16.

From that total, divide your number by the sum of your original number and two.

Your total should be 8.

Why?

$$\frac{9x - x + 16}{x + 2}$$
$$\frac{8x + 16}{x + 2} = \frac{8(x + 2)}{x + 2} = 8$$

Homework: pg. 329 - 330 #14-30 even, 34, 38-40 all, 46, 47

Section 6-3 Vocab