

Ch 5 - Exponential Expressions &amp; Polynomials

HW #5 - Due Tuesday, 9/15:  
5.1 #63-85 oddHW #6 - Due Wednesday, 9/16:  
5.2 #3-7 odd, 15-25 odd, 35-49 oddHW #7 - Due Tuesday, 9/22:  
5.3 #25-29 odd, 43-51 odd, 61-67 odd, 89-97 odd, 109-117 oddHW #8 - Due Friday, 9/25?  
5.4 #19-25 odd; 27-43 odd; 55-61 odd  
5.5 #21-47 oddHW #9 - Due Tuesday, 9/29?  
5.6 #3-131 odd  
5.7 #35-49 odd, 51-57 odd, 61-75 odd

Test 3 - Tuesday, 9/29?



Review Problems:

1. Write in interval notation:  $\{x|x \leq -5\}$ 

$$(-\infty, -5]$$

2. Solve. Write the solution set in interval notation.

$$6 - 4x > -3 \text{ and } 3x + 2 \leq -1$$

$$-4x > -9 \quad 3x \leq -3$$

$$x < \frac{9}{4} \cap x \leq -1$$

$$(-\infty, -1]$$

3. Simplify.  $(x^5x^{-3})^{-2}(x^{-4}x^3)^4$ 

$$(x^2)^{-2} (x^{-1})^4 = x^{-4} x^{-4} = x^{-8} = \boxed{\frac{1}{x^8}}$$

Multiplying Two Binomials (FOIL Method)

$$(x+3)(x^2-4x) = x(x^2) + x(-4x) + 3(x^2) + 3(-4x)$$

$$= x^3 - 4x^2 + 3x^2 - 12x = \boxed{x^3 - x^2 - 12x}$$

Special Cases:

$$(a+b)(a-b) = a^2 - ab + ab - b^2 = a^2 - b^2$$

$$(a+b)^2 = (a+b)(a+b) = a^2 + ab + ab + b^2 = a^2 + 2ab + b^2$$

$$(a-b)^2 = (a-b)(a-b) = a^2 - ab - ab + b^2 = a^2 - 2ab + b^2$$

$$(a+b)(a-b) = a^2 - b^2$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(a-b)^2 = a^2 - 2ab + b^2$$

Book Problems from section 5.3:

$$26. a^{n+4}(a^{n-2} + 5a^2 - 3) = a^{n+4}(a^{n-2}) + a^{n+4}(5a^2) + a^{n+4}(-3)$$

$$= \boxed{a^{2n+2} + 5a^{n+6} - 3a^{n+4}}$$

$$50. (2a^n - b^n)(3a^n + 2b^n)$$

$$(2a^n)(3a^n) + (2a^n)(2b^n) + (-b^n)(3a^n) + (-b^n)(2b^n)$$

$$= 6a^{2n} + 4a^n b^n - 3a^n b^n - 2b^{2n} = \boxed{6a^{2n} + a^n b^n - 2b^{2n}}$$

$$66. (x^n + y^n)(x^n - 2x^n y^n + 3y^n)$$

$$= x^{2n} - 2x^{2n} y^n + 3x^n y^n + x^n y^n - 2x^n y^{2n} + 3y^{2n}$$

$$= \boxed{x^{2n} - 2x^{2n} y^n + 4x^n y^n - 2x^n y^{2n} + 3y^{2n}}$$

Simplify.

$$108. \frac{(2x+1)^5}{(2x+1)^3} = (2x+1)^2$$

$$\frac{a^m}{a^n} = \frac{a^{m-n}}{1}$$

$$= (2x+1)(2x+1)$$

$$= 4x^2 + 4x + 1$$

$$116. \frac{(a+b)(a-b)}{[x+(y+1)][x-(y+1)]} = \frac{a^2 - b^2}{x^2 - (y+1)^2}$$

$$= \frac{x^2 - (y^2 + 2y + 1)}{x^2 - y^2 - 2y - 1}$$

126. Find  $(3n^4)^3$  if  $5(n-1) = 2(3n-2)$ .

$$(3(-1)^4)^3$$

$$(3(1))^3$$

$$\boxed{27}$$

$$5n - 5 = 6n - 4$$

$$-5 + 4 = 6n - 5n$$

$$-1 = n$$

Orders of Magnitude, Multiplying & Dividing Scientific Notation

Rewrite  $4 \times 10^4$  in decimal notation.  $40000$

Express this quotient in scientific notation:  $\frac{5.900 \times 10^{11}}{1.0 \times 10^5} = 5.9 \times 10^6$

How many times smaller is  $1 \times 10^{-9}$  than  $7 \times 10^{-6}$ ?

$$\frac{7 \times 10^{-6}}{1 \times 10^{-9}} = 7 \times 10^3$$

The length of a water molecule is 0.00000000278 meters. Estimate the length of a water molecule by rewriting it in the form of  $x \times 10^y$  meters, where  $x$  and  $y$  are whole numbers.

$$2.78 \times 10^{-10}$$

5.4 Division of Polynomials

Long Division  $57 \div 2$

$$\begin{array}{r} 28.5 \\ 2 \overline{) 57.0} \\ \underline{-4} \phantom{0} \\ 17 \phantom{0} \\ \underline{-16} \phantom{0} \\ 10 \phantom{0} \\ \underline{-10} \\ 0 \end{array}$$

$$\frac{57}{2} = 28 + \frac{1}{2}$$

$$4. (x^2 - 14x + 24) \div (x - 2) = \boxed{x - 12}$$

$$\begin{array}{r} x-2 \overline{) x^2 - 14x + 24} \\ \underline{-(x^2 - 2x)} \phantom{+ 24} \\ -12x + 24 \\ \underline{-(-12x + 24)} \\ 0 \end{array}$$

$$6. (x^3 + 4x^2 - 8) \div (x + 4) = \boxed{x^2 + \frac{-8}{x+4}}$$

$$\begin{array}{r} x+4 \overline{) x^3 + 4x^2 - 8} \\ \underline{-(x^3 + 4x^2)} \phantom{- 8} \\ -8 \end{array} \leftarrow \text{remainder}$$

$$10. (18x^2 - 3x + 2) \div (3x + 2) = \boxed{6x - 5 + \frac{12}{3x+2}}$$

$$\begin{array}{r} 6x-5 \\ 3x+2 \overline{) 18x^2 - 3x + 2} \\ \underline{-(18x^2 + 12x)} \phantom{+ 2} \\ -15x + 2 \\ \underline{-(-15x - 10)} \\ 12 \end{array}$$

$$\begin{array}{r} 4x^2 - 5 \\ 3x^2 + 1 \overline{) 12x^2 - 11x^2 + 10} \\ \underline{-(12x^2 + 4x^2)} \phantom{+ 10} \\ -15x^2 + 10 \\ \underline{-(-15x^2 - 5)} \\ 15 \end{array}$$

$$14. (12x^4 - 11x^2 + 10) \div (3x^2 + 1)$$

$$= \boxed{4x^2 - 5 + \frac{15}{3x^2+1}}$$

20.  $\frac{x + 3x^4 - x^2 + 5x^3 - 2}{x + 2}$   
 $= 3x^3 - x^2 + x - 1$

$$\begin{array}{r} 3x^3 - x^2 + x - 1 \\ x+2 \overline{) 3x^4 + 5x^3 - x^2 + x - 2} \\ \underline{-(3x^4 + 6x^3)} \phantom{-2} \\ -x^3 - x^2 + x - 2 \\ \underline{-(-x^3 - 2x^2)} \phantom{-2} \\ x^2 + x - 2 \\ \underline{-(x^2 + 2x)} \\ -x - 2 \\ \underline{-(-x - 2)} \\ 0 \end{array}$$

24.  $\frac{2 - 3x^2 + 5x^3}{x^2 + 3}$   
 $= 5x - 3 + \frac{-15x + 11}{x^2 + 3}$

$$\begin{array}{r} 5x - 3 \\ x^2+3 \overline{) 5x^3 - 3x^2 + 2} \\ \underline{-(5x^3 + 15x)} \phantom{+2} \\ -3x^2 - 15x + 2 \\ \underline{-(-3x^2 - 9)} \\ -15x + 11 \end{array}$$

Synthetic Division *only works when dividing by (x ± a)*  
 28.  $(3x^2 + 19x + 20) \div (x + 5) = 3x + 4$

$$\begin{array}{r} -5 \overline{) 3 \quad 19 \quad 20} \\ \phantom{-5 \overline{) }} \downarrow -15 \quad -20 \\ \hline 3 \quad 4 \quad 0 \end{array}$$

linear coeff.      constant      ← remainder

30.  $(4x^2 - 8) \div (x - 2) = 4x + 8 + \frac{8}{x-2}$

$$\begin{array}{r} 2 \overline{) 4 \quad 0 \quad -8} \\ \phantom{2 \overline{) }} \downarrow 8 \quad 16 \\ \hline 4 \quad 8 \quad 8 \end{array}$$

missing x-term

34.  $(3x^2 - 15) \div (x + 3)$

$$\begin{array}{r} -3 \overline{) 3 \quad 0 \quad -15} \\ \underline{-9 \quad 27} \\ 3 \quad -9 \quad 12 \end{array}$$

$$3x - 9 + \frac{12}{x+3}$$

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

$$\begin{array}{r} -1 \overline{) 1 \quad -4 \quad 1 \quad 6} \\ \underline{-1 \quad 5 \quad -6} \\ 1 \quad -5 \quad 6 \quad 0 \end{array}$$

$$= x^2 - 5x + 6$$