KEY

511 MIDYEAR EXAM -- REVIEW PACKET -- NAME: _____

CHAPTER 1 – Basic Concepts of Algebra

1. Absolute Value means distance from Zero.

2. Use < , >, or = to compare the expressions.

a. $|4-8|$ = $|8-4|$

$|-4|$ = $|4|$

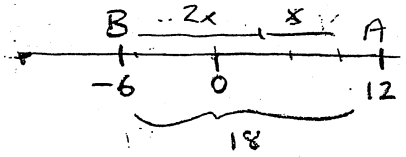
$4 = 4$

b. $6 \cdot (-2) + 4$ > $(-1)(-3)^2$

$-12 + 4$ > $-1 \cdot 9$

$-8 > -9$

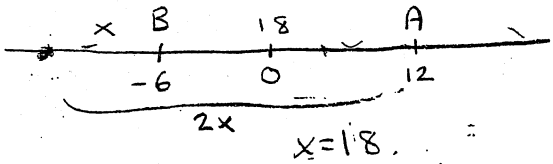
3. On a number line, A has the coordinate 12 and B has the coordinate –6, Identify *two* locations which are exactly two times as far from location A as they are from location B.



$3x = 18$

$x = 6$

point = 6



$x = 18$.

Point = -24

4. Simplify each expression as much as possible.

a. $3 \cdot (-2 + 6 \cdot 5) - 8 \cdot 2$

$3(28) - 16$

$84 - 16 = \boxed{68}$

b. $(2a) \cdot (4a + 10b - c)$

$\boxed{8a^2 + 20ab - 2ac}$

c. $\dfrac{4 + 6 \cdot (-2)}{5 - |-9 + 3|}$

$\dfrac{4-12}{5-6} = \dfrac{-8}{-1} = \boxed{8}$

d. $(x + 8) - (12 - x)$

$x + 8 - 12 + x$

$\boxed{2x - 4}$

5. Evaluate if a= -4 and b = (2/3).

a. $4a + 3b - 2ab$

$4(-4) + 3\left(\frac{2}{3}\right) - 2(-4)\left(\frac{2}{3}\right)$

$-16 + 2 + \frac{16}{3} = -\frac{42}{3} + \frac{16}{3} = \boxed{\frac{-26}{3}}$

b. $a^2 - 6b + 2$

$(-4)^2 - 6\left(\frac{2}{3}\right) + 2$

$16 - 4 + 2 = \boxed{14}$

6. Determine if the following operations are commutative… if not, give a counterexample.

a. addition

yes

b. subtraction

NO

$4 - 7 \neq 7 - 4$

$-3 \qquad 3$

c. multiplication

yes

d. division

NO $\frac{1}{2} \neq \frac{2}{1}$

7. Determine if each set is CLOSED under Addition and Multiplication… if not, give a counterexample.

a. { 5, 10, 15, 20, … }

yes for both

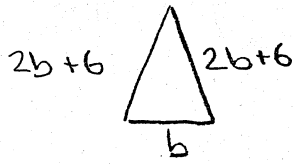
b. { 0, .5, 1, 1.5, 2, 2.5, 3, … }

yes for addition

NO for multiplication $.5 \times .5 = .25$

Solve each of the following word problems by writing as an equation and then solve for the variables.

8. An isosceles triangle has a base of length "b" and the two legs are each 6 more than twice the base. If the perimeter of the triangle is 72 inches, how long is each leg?



b = base

$2b+6+2b+6+b=72$

$5b+12=72$

$5b=60$

$b=12$

$2b+6=24$

base = 12 in
legs = 30in each

9. Molly is currently "M" years old. Twelve years from now her Uncle Kevin will be exactly twice Molly's age at that time. Right now Uncle Kevin is 44. How old is Molly right now?

	Now	In 12 years
Molly	M	M+12
Kevin	44	2(M+12)

$44+12=2(M+12)$

$56=2M+24$

$32=2M$

M = 16 years old

CHAPTER 2 - Inequalities and Proof

SOLVE for x.

10. $3x+8=-4$

$3x=-12$

$x=-4$

11. $2(3x+5)=4(2x-3)$

$6x+10=8x-12$

$22=2x$

$x=11$

12. $3x+8<-2x+15$

$5x<7$

$x<7/5$

13. $\frac{x-3}{2}\geq x-5$

$x-3\geq 2x-10$

$7\geq x$

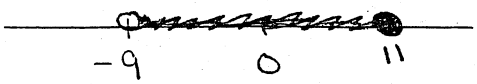
***While using inequalities, when multiplying or dividing by a negative number, you must: Flip the Inequality

SOLVE For x and place on a number line.

14. $-15<(2x+3)\leq 25$

$-18<2x<22$

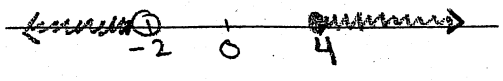
$-9<x<11$



15. $3x+7<1$ or $x\geq 4$.

$3x<-6$

$x<-2$ or $x\geq 4$



***Remember that absolute value statements are really the combination of two simpler statements.

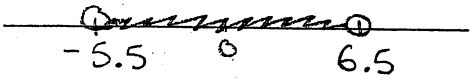
16. $|4x-2|<24$

$-24 < 4x-2 < 24$

$-22 < 4x < 26$

$-\frac{11}{2} < x < \frac{13}{2}$

$-5.5 < x < 6.5$



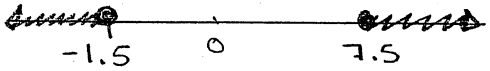
17. $4|-2x+6| \geq 36$

$|-2x+6| \geq 9$

$-2x+6 \geq 9$ or $-2x+6 \leq -9$

$-2x \geq 3$ $\quad -2x \leq -15$

$x \leq -1.5$ or $x \geq 7.5$



CHAPTER 3 - Linear Equations and Functions

Determine the missing value in each solution:

18. $y = 4x - 8$

(2, 0) (0, -8)

19. $3x - 6y = 18$

(6, 0) (0, -3)

Determine the slope of the line containing the given points:

Remember: $\frac{y_1 - y_2}{x_1 - x_2}$

20. (2, 4) and (-1, -8)

$\frac{4+8}{2+1} = \frac{12}{3} = 4$

21. (9, 8) and (-3, 8)

$\frac{8-8}{9+3} = \frac{0}{12} = 0$

22. (12, -3) and (12, 2)

$\frac{-3-2}{12-12} = \frac{-5}{0}$

Undefined

(or no slope)

Determine the slope of the lines given the equations:

23. $5x - 3y = 15$

$-3y = -5x + 15$

OR $y = \frac{5}{3}x - 5$

$-\frac{A}{B}$

$\frac{5}{3}$

Slope = $\frac{5}{3}$

24. $x = 9$

Undefined

25. $y = .75x - 8$

Slope = .75

26. Given the equation $y = \frac{-1}{3}x + 10$, determine the equation of a line that is …

Parallel to the given line.

$y = -\frac{1}{3}x + (\text{anything})$

Perpendicular to the given line.

$y = 3x + (\text{anything})$

27. Provide an equation for the line with a slope of 3 which passes through the location (-2, 7).

$y - 7 = 3(x + 2)$

OR $y = 3x + 13$

28. Having just received a new aquarium, you go to a pet store to buy some fish to put in the tank. During your first trip to the store, you buy 8 gold fish and 3 tropical fish. The cost was $5.75. Even after putting these fish into your aquarium, it still doesn't look full enough, so you return to the store. This time you purchase 12 gold fish and 5 tropical fish for $9.25. What is the cost of each gold fish and each tropical fish?

VARIABLES:

g = price per goldfish

t = price per tropical fish

SYSTEM OF EQUATIONS:

$5(8g + 3t = 5.75)$

$-3(12g + 5t = 9.25)$

$40g + 15t = 28.75$

$-36g - 15t = -27.75$

$4g = 1$

$g = .25$

$8(\frac{1}{4}) + 3t = 5.75$

$3t = 3.75$

$t = 1.25$

SOLUTION:

goldfish cost $.25 each

tropical fish cost $1.25 each

Solve the system of equations:

29. $\begin{cases} y = x + 3 \\ 3x - 2y = -2 \end{cases}$

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

$3x - 2x - 6 = -2$

$x = 4$

$y = 7$

30. $\begin{cases} 6x + 5y = 2 \\ -3(2x + 3y = 6) \end{cases}$

$6x + 5y = 2$

$-6x - 9y = -18$

$-4y = -16$

$y = 4$

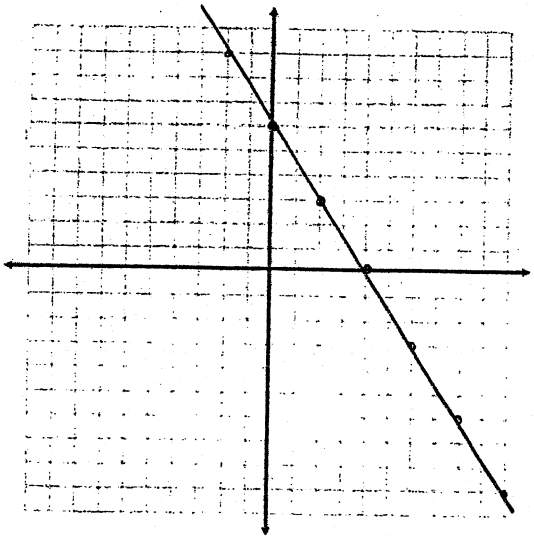
$6x + 20 = 2$

$6x = 18$

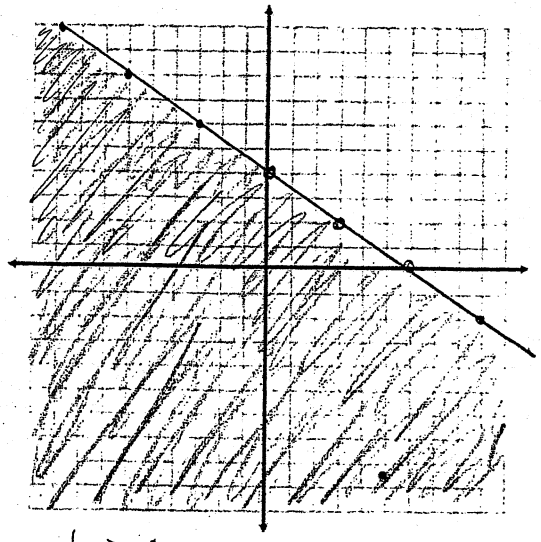
$x = -3$

Graph the following on a coordinate plane:

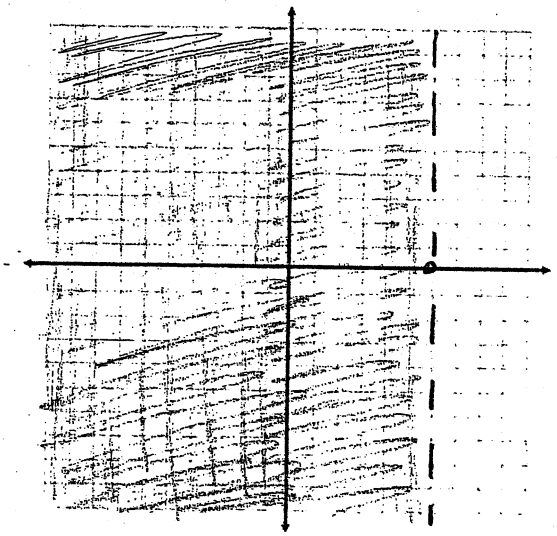
31. $3x+2y=12$



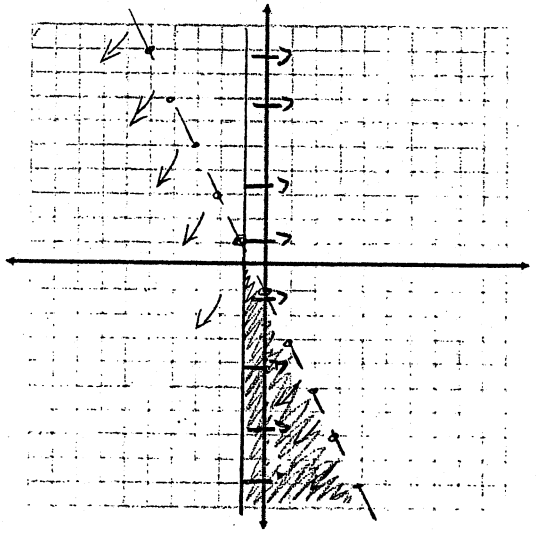
32. $y \le \frac{-2}{3}x+4$



33. $x<6$



34. $\begin{cases} x \ge -1 \\ y < -2x+1 \end{cases}$



CHAPTER 4 – PRODUCTS and FACTORS of POLYNOMIALS

This is a POLYNOMIAL: $4x^7-6x^3+x^2+18x+2$

35. Determine the DEGREE of the polynomial. 7

36. List the COEFFICIENTS of the polynomial. 4, 0, 0, 0, -6, 1, 18, 2

Which is the leading coefficient? 4 (or 4, -6, 1, 18, 2)

37. How many TERMS are there in this polynomial? 5

Which is the constant term? 2

*** exponent rules: $x^3 \cdot x^7 = x^{10}$ $\quad (x^3)^5 = x^{15}$ $\quad (2x^3y)^4 = 2^4 x^{12} y^4$

SIMPLIFY completely:

38. $(3xy^3)^2 \cdot (4x^5y^8)^3$

$9x^2y^6 \cdot 64x^{15}y^{24}$

$576x^{17}y^{30}$

39. $(x-6)^2$

$(x-6)(x-6)$

$x^2 - 12x + 36$

40. $(4x^2-5y)\cdot(4x^2+5y)$

41. $(x+4)^3$

$(x+4)(x+4)(x+4)$

$(x^2+8x+16)(x+4)$

$x^3+4x^2+8x^2+32x+16x+64$

$x^3+12x^2+48x+64$

42. $(x-2)\cdot(x^2+5)$

$x^3+5x-2x^2-10$

or

$x^3-2x^2+5x-10$

43. $y^5 \cdot y^{2m-1} \cdot y^{2m+1} \cdot y^{2m}$

$y^{5+2m-1+2m+1+2m}$

y^{5+6m} (or y^{6m+5})

*** 1) find a common factor for all terms
2) quadratic factoring / difference of squares
3) quadratic factoring with a lead coefficient other than 1

FACTOR completely:

44. $100x^3+50x^4-20x^2y-10x^3y^4$

$10x^2(10x+5x^2-2y-xy^4)$

45. x^2-5x+6

$(x-3)(x-2)$

46. $16x^2 - 1$

$(4x-1)(4x+1)$

47. $32x^2 - 50$

$2(16x^2-25)$

$2(4x-5)(4x+5)$

48. $10x^2 + 13x - 3$

$(2x+3)(5x-1)$

49. $x^4 - 16$

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

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

Solve for x:

50. $x^3 - 4x^2 - 21x = 0$

$x(x^2-4x-21)=0$

$x(x-7)(x+3)=0$

$x=0$, $x=7$, or $x=-3$

Solve for x:

51. $3(x^2+1) = x+5$

$3x^2+3-x-5=0$

$3x^2-x-2=0$

$(3x+2)(x-1)=0$

$x=-2/3$ or $x=1$

CHAPTER 5 –Rational Expressions

Simplify. Express your answers without the use of negative exponents.

52. $\dfrac{a^2bc^4}{ab^3c^2}$

$\dfrac{ac^2}{b^2}$

53. $\dfrac{(xyz^2)^2}{x^4y^2x}$

$\dfrac{x^2y^2z^4}{x^4y^2x}$

$\dfrac{z^4}{x^3}$

54. $\dfrac{(-2x)^3}{3y^5} \cdot \dfrac{3y^2}{(2x^2)^2}$

$\dfrac{-8x^3 \cdot 3y^2}{3y^5 \cdot 4x^4}$

$\dfrac{-2}{xy^3}$

55. $(5x^{-1}y^2z^{-2})^{-2}$

$\dfrac{1}{25} \cdot \dfrac{x^2}{y^4} \cdot z^4$

$\dfrac{x^2z^4}{25y^4}$

56. $\left(\dfrac{u^2}{v}\right)^{-3}$

$\left(\dfrac{v}{u^2}\right)^3 = \dfrac{v^3}{u^6}$

57. $\dfrac{(pq^{-2})^{-1}}{(p^{-1}q^2)}$

$\dfrac{1}{pq^{-2} \cdot p^{-1}q^2} = \dfrac{pq^2}{pq^2}$

1

58. 3^0

1

59. $\dfrac{a^{-2}}{4b^4} \cdot \dfrac{a^3}{2b^{-1}}$

$\dfrac{ba^3}{4b^4 \cdot 2a^2}$

$\dfrac{a}{8b^3}$

60. $(3x^2yz^6)^0$

1

ONE LAST TOPIC – CHAPTER 3 – Functions

61. Assume $f(x) = 3x - 5$, $g(x) = 7 - x$, and $h(x) = x^2 + 2$.

a) f(0)= −5

b) g(3)= 4

c) h(-6)= 38

d) f(g(5))= f(2) 1

e) g(f(5))= g(10) −3

f) h(h(h(1)))= h(h(3)) h(11) 123