Algebra 1
Midterm Exam
REVIEW
February 2014

Name: _____   **Date:** _____

Teacher: _____   **Period:** ____

Your midterm examination will consist of approximately:
- <u>60 multiple-choice questions</u> – these will be completed on the Scantron.
- <u>6 short answer questions</u> – these will be completed in the test booklet. Show your work.

The exam will include material from Chapters 1 (1.2, 1.3), 2, 3, 5 (5.1, 5.2, 5.4, 5.5, 5.6), and 6 (6.1, 6.2, 6.3, 6.5).

NOTE: School policy mandates a penalty for cheating on an exam to be a grade of ZERO for that exam. The term cheating includes "intent to cheat." NO CELL PHONES. All cell phones must be kept out of sight. If a cell phone is seen during an exam, you will receive a grade of ZERO.

All calculators may be checked for inclusion of extraneous material. No papers should be placed in calculators. No information should be written on the front/back of calculators. The program portion of the graphing calculator will be checked. Any information entered there can be considered intent of cheating.

Before the examination, clear your calculator of any formulas, notes or any such items, which could be perceived as "useful" or providing unfair advantage. The best solution is to RESET and clear the memory completely.

The following pages provide a comprehensive review of the materials to be studied for this exam. We will take a few days of class time to review for this exam. Please feel free to stop in on your own time for further assistance. Good Luck!

Mr. Brill, Mrs. Buonomo-Gramata, Ms. Keeble, Ms. Marchegiano, Mr. Peklo, Ms. Simpson, Mr. Waddon, Mrs. Winter

CHAPTER 1:

1. Evaluate:

(a) $\lvert -7 - x \rvert$ when $x = 2$	(b) $3y - 6$ when $y = -8$
(c) $x^2 - y$ when $x = 5$ and $y = -3$	(d) $-4x^2 - 2$ when $x = -3$

2. Simplify each expression:

(a) $3 + 6^2 \div 4 + 2$	(b) $\dfrac{15 - 6 \cdot 2}{8(4^2 - 7)}$
(c) $16 + 3(8 - 3)^2 \div 5 - 1$	(d) $\dfrac{(6+8)(7+3)}{2 + 3 \cdot 2^2}$

3. Insert grouping symbols to produce the given values for each:

$$(a)\ 14 \div 5 + 2 + 8 = 10$$

$$(b)\ 8 + 25 \cdot 2 \div 6 = 11$$

CHAPTER 2

1. State all number systems that apply for each. Choose from the following: N for NATURAL, W for WHOLE, I for INTEGER, Ra for RATIONAL, Irr for IRATIONAL, and R for REAL.

    (a) – 8 _____   (b) $\dfrac{-3}{5}$ _____

    (c) 0 _____   (d) $\sqrt{7}$ _____

    (e) 2.13_____   (f) π _____

    (g) $2.\overline{313}$ _____   (h) $-2\sqrt{63}$ _____

2. Find the opposite of each number:

    (a) 13_____   (b) – 18.2 _____   (c) $|{-}61|$ _____

3. Simplify:

    (a) $|{-}2| + |{-}3.4| - |{-}9| =$_____   (b) $|{-}12 + 15| =$ _____

    (c) $|{-}21| - 2|16| =$ _____   (d) $-|{-}6| + |4| =$ _____

4. Find the reciprocal of each:

    (a) $\dfrac{2}{5}$ _____   (b) $-\dfrac{5}{8}$ _____   (c) -57 _____

5. Rewrite each using the distributive property:

     (a) $2(3x + 6y) = $ _____

     (b) $-3(5x - 7y) = $ _____

     (c) $-5(2x^2 - 3x + 10) = $ _____

6. Operations with signed numbers. Perform the indicated operation:

(a) $4 - 3[4 - 2(6 - 3)]$	(b) $-((-3)^3 - 35)$

7. Combining like terms. Simplify:

a. $2x + 5 + 4x + 3 =$	b. $(6z - 3) + (4z - 5) =$
c. $6x - (4 - 3x) =$	d. $-5x - 3x^2 + 9x + 2 - 11x^2 =$
e. $(7m + 6n) - (5m - 8n) =$	f. $6(3x^3 + 2x^2) - (-3x^2 + 4x^3 - 9) =$
g. $8x - 2y + 5 - 3y - 7x + 10 =$	

8. Multiplying & Dividing Expressions. Simplify:

a. $-4x(5y) =$	b. $-7x \cdot -3 =$	c. $8\left(\dfrac{x}{3}\right) =$
d. $-36x \div 6x =$	e. $\dfrac{-15x+10}{5} =$	f. $\dfrac{6-12x}{6} =$

CHAPTER 3

1. SOLVE EACH EQUATION:

a. $-6 = 7c + 5$	b. $y - \frac{1}{2} = \frac{3}{5}$	c. $-3x = 16 + 7x$
d. $-7 = 5 - (7 - 4x)$	e. $\frac{x}{-30} = -2.3$	f. $6x + 12 = -18$
g. $20 = 6 - 7r$	h. $\frac{y}{8} - 6 = 2$	i. $-4(2x - 3) = 12 - 9x$

j. $5(x + 3) = 7x + 10 - 2x + 5$

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

l. $12y - 4(y - 5) = -4$

2. LITERAL EQUATIONS: SOLVE FOR THE INDICATED VARIABLE

(A) a + x = b; solve for a	(B) A = lw; solve for l	(C) 2L + 2w = P; solve for w

<u>CHAPTER 5</u>

(1) What is the slope of a line that passes through the origin and the point (-2, 1)?

    a. $-\dfrac{1}{2}$ b. 2   c. $\dfrac{1}{2}$ d. –2

(2) The slope of the line containing an x- intercept of 2 and a y- intercept of -7

    a. $\dfrac{2}{7}$ b. $\dfrac{7}{2}$ c. $-\dfrac{2}{7}$ d. -5

(3) The slope of the vertical line x = 8 is:
    a. undefined   b. 0   c. 1   d. 8

(4) The slope of the horizontal line y = 8 is:
    a. undefined   b. 0   c. 1   d. 8

(5) The slope of the equation $3x - 4y = 8$ is:

    a. 3   b. –4   c. $\dfrac{3}{4}$ d. $-\dfrac{3}{4}$ e. 8

(6) Determine the x-coordinate of the ordered pair $(x, -5)$ if it lies on the line $2x - y = -3$:

    a. 4   b. -16   c. -4   d. -2

(7) What are the slope and y-intercept of the equation: $2x + 4y = 4$?

    a. slope: $\dfrac{1}{2}$; y-int. 4   b. slope: 2; y-int. 4   c. slope: $-\dfrac{1}{2}$; y-int. 1   d. slope: $\dfrac{1}{2}$; y-int. -1

(8) What is the slope of a line perpendicular to $x - 3y = 4$?

    a. –3   b. 3   c. $\dfrac{1}{3}$ d. $-\dfrac{1}{3}$

(9) What is the slope of a line parallel to the line through (2, 3) and (-3, 4)

    a. 5   b. 7   c. $-\dfrac{1}{5}$ d. –5

(10) An equation of a line that has slope of 0 and contains the point (0, -2) is
    a. x = 2   b. x = -2   c. y = -2   d. y = x – 2

(11) Which line is perpendicular to $y = -1$ through the point $(3, -5)$?
    a. $x = 3$ b. $x = -5$ c. $y = 3$ d. $y = -5$

(12) An equation for the line that contains (2, 4) and has an undefined slope is
    a. y = 2x + 4   b. x = 2   c. y = 2   d. y = 0

(13) Which point is on the graph of the equation $y - 2 = -\frac{1}{2}(x - 5)$?

    a. $(-5, -2)$ b. (5,2)   c. $(-\frac{1}{2}, 2)$ d. (2,5)

(14) Write in standard form $y = \frac{1}{3}x - 2$:
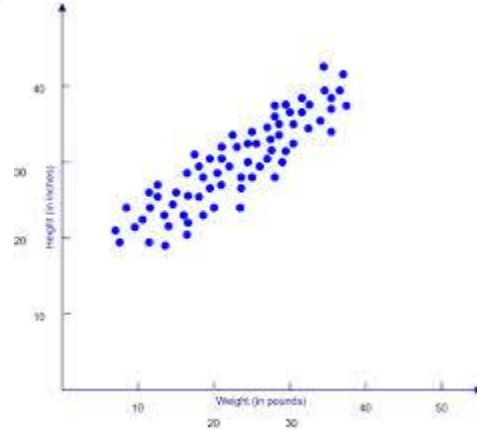
     a. $3y = x - 6$ b. $x - 3y = 6$ c. $-\frac{1}{3}x + y = -2$ d. $x + 3y = -6$

(15) The following graph represents what type of correlation?

     a. Strong Negative
   b. Strong Positive
     c. Weak Negative
     d. Weak Positive

(16) Write the equation $8x + 4y = 24$ in slope–intercept form.

(17) Write the equation of a line in slope-intercept form that contains the point (2, -9) and has a slope of –1.

(18) Write the equation of a line in slope-int. form that has an x- intercept of -1 and is parallel to the line $2x + 3y = 6$.

(19) Given the following lines: $2x + y = 3$ and $6x + 3y = 9$. Are they the same line, parallel, perpendicular or intersecting?

(20) Find the slope of the line from the following graph:
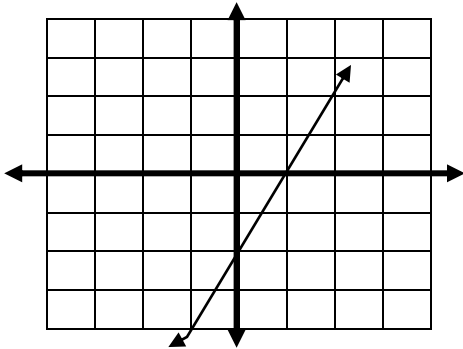
(21) Which of the following equations is perpendicular to $y + 3x = 6$ through the point (3,-4):
     a. $y - 4 = 1/3 (x-3)$ b. $y + 4 = 1/3 (x-3)$ c. $y + 4 = -3 (x-3)$

(22) Rewrite y - 5 = 2(x+4) in SLOPE-INTERCEPT FORM.

(23) Write an equation in POINT-SLOPE FORM for the line that passes through (5,1) and (-4,-2).

(24) Find a point and the slope of the line with equation: $y + 6 = -(x - 3)$

(25) List the domain and range of the following: $\{(1,0),(-3,8),(2.5,-9),(-6,-4)\}$
   Does this relation represent a function? Explain why or why not.

(26) Find the domain and range for the following: {(1, 2), (-10, 4), (-3, -7), (4, 1), (1, -5)}
   Does this relation represent a function? Explain why or why not.

(27) Given $g(x) = -3x + 7$ $h(x) = -2x^2 + 3x - 4$

       a. $g(3) =$ _____   b. $g(-4) =$ _____   c. $g(0) =$ _____

       d. $h(3) =$ _____   e. $h(-4) =$ _____   f. $h(0) =$ _____

CHAPTER 6

1. Solve and graph each of the following inequalities:

(a) $2x + 5 \leq 5 + 2(x - 9)$	(b) $-6x + 3 > 4x + 23$
(c) $-(4 + x) + 5x \leq 2(2x + 9)$	(d) $-2m + 6 \leq 18$
(e) $|x| + 5 \leq 7$	(f) $|2x + 1| > 7$
(g) $-3|x + 3| \geq 27$	(h) $5 + 2\left|\frac{x}{3}\right| \geq 15$

2. Write an inequality describing each graph below:

   (a)

   (b)
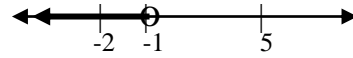
3. Graph each solution.

   (a) $-1 < x < 4$ (b) $x < 3$ or $x > 4$ (c) $0 \leq y < 7.5$ (d) $k < 12$ or $k \geq 3.5$

4. Solve and graph the following compound inequalities.

(a) $-5 \leq x + 2 < 0$	(b) $10y > -2 \; or \; 2 + y \leq -15$
(c) $-4x < 8 \; or -3x \geq 9$	(d) $x + 4 > 2$ and $-2x + 6 \geq 4$

5. Solve the following absolute value equations.

(a) $-7 = \lvert 3x + 1 \rvert + 8$	(b) $6 - 2\lvert 4 - x \rvert = -8$	(c) $-\left\lvert \dfrac{x}{2} \right\rvert + 5 = -2$

SAMPLE MULTIPLE CHOICE QUESTIONS

1. Solve: $-4x - 6 - 3x = 5$.   A. $\dfrac{-11}{7}$ B. -3 C. $1\dfrac{6}{11}$ D. 3

2. Solve: $8(2x - 1) - 5x = 24 + 11x$ A. all reals   B no solution($\varnothing$)   C. $x = 0$ D. $x = -5$

3. Which equation is a translation of "3 times a number decreased by 6 equals 18"?

     A. $3x \div 6 = 18$ B. $3x - 6 = 18$ C. $6 - 3x = 18$ D. $3x + 6 = 18$

4. Use the formula I = Prt and solve for r.   A. $r = \dfrac{Pt}{I}$ B. $r = I - Pt$ C. $r = \dfrac{I}{Pt}$ D. $r = Ipt$

5. Which inverse operation can be used to solve the equation $4 = y - 8$?

       A. Add 8 to each side.   B. Subtract 8 from each side.   C. multiply both sides by 8.

       D. Divide each side by 8.

6. Evaluate: $-6 - (-12) + 8$ A. 26   B. 2   C. –2   D. 14

7. Evaluate $5 + x - 3$ if $x = -2$ A. 6   B.-6   C. 0   D. 1

8. Simplify: $-2(2x + 6y) + 4(5x - 3y)$ A. 16x + 3y   B. 16x   C. 16x + 24y   D. 16x – 24y

9. Simplify: $\dfrac{24x - 8}{4}$ A. $24x - 2$ B. $6x - 8$ C. $6x - 2$ D. $6x + 2$

10. Evaluate: $\left(-\dfrac{1}{2} \right)(-12x)(-y)$ A. $-24xy$ B. $24xy$ C. $6xy$ D. $-6xy$

11. Solve the inequality: $2 - x < -5$ A. $x < 7$ B. $x > 7$ C. $x < -7$ D. $x > -7$

12. Solve : $2x - 5 > 3 \; or \; 2 - 3x > 5$

A. $x < -1$ or $x > 4$ B. $x < 5$ or $x > 3$ C. $x > 4$ or $x > -1$ D. $-1 < x < 4$

13. What compound sentence is graphed below?
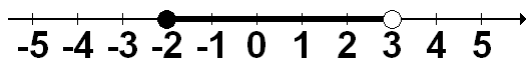
A. $-2 < y < 3$ B. $-2 < y \leq 3$ C. $y \geq -2$ or $y < 3$ D. $-2 \leq y < 3$

14. $|x - 3| = -4$

A. $x = -1$ or $x = -7$ B. $\emptyset$ C. $x = 1$ or $x = 7$ D. $\mathbb{R}$

15. $|2x| - 4 = 6$

A. $x = 3$ or $x = 10$ B. $x = 1$ or $x = -1$ C. $x = 5$ or $x = -5$ D. $\emptyset$

GRAPHING AND MATCHING

Match the graph to its equation:

I.
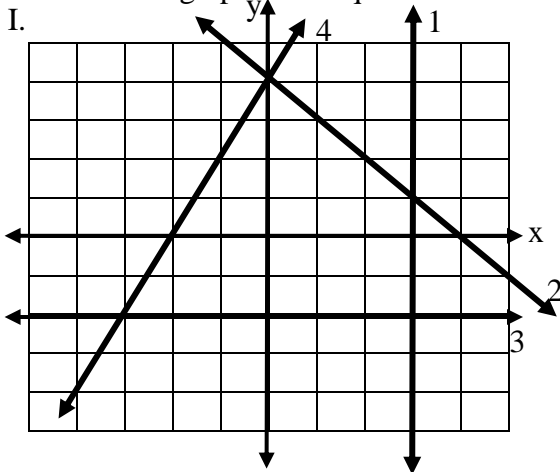
A. $x = 3$
B. $x = -2$
C. $y = 3$
D. $y = -2$
E. $y = -x + 4$
F. $y = x + 4$
G. $y = -2x + 4$
H. $y = 2x + 4$
I. $y = -2x - 4$
J. $y = 2x - 4$

FREE RESPONSE QUESTIONS

DIRECTIONS: FOR EACH OF THE FOLLOWING SHOW ALL WORK AND ALL STEPS IN ARRIVING AT AN ANSWER

1. Solve for x: $4 - 2(3x - 4) - 2x = -(x - 6) - (4x + 3)$

2. Solve and graph: $3m - (-6) < 24 \ or - 5m + 2 \leq 12$

3. Solve the following $|5x - 1| = 4$. Check for extraneous solutions.

4. A plumber charges a flat rate of $120 and $42 per hour for his work.

A) Write an equation to represent the cost c, based on hours of work, h.

B) How much will it cost if the plumber works for 9 hours?

C) If the total cost is $435, how many hours did the plumber work?

ANSWERS

Chapter 1

1. (a) 9　(b) −30　(c) 28　(d) −38	2. (a) 14　(b) $\dfrac{1}{24}$ = .041$\overline{6}$　(c) 30　　(d) 10

3. (a) $14 \div (5+2) + 8 = 10$　(b) $(8+25) \bullet 2 \div 6 = 11$

Chapter 2

1. (a) I, Ra, R.　　(b) Ra, R　　(c) W, I, Ra, R.　　(d) Irr, R　(e) Ra, R.　(f) Irr, R. (g) Ra, R. (h) Irr, R.

2. (a) −13　(b) 18.2　(c) −61	3. (a) −3.6　　(b) 3　(c) − 11　　(d) −2

4. (a) $\dfrac{5}{2}$　　(b) $\dfrac{-8}{5}$　　(c) $-\dfrac{1}{57}$	5. (a) $6x + 12y$,　(b) $-15x + 21y$ 　　(c) $-10x^2 + 15x - 50$

6. (a) 10　(b) 62

7. (a) $6x + 8$　(b) $10z - 8$　(c) $9x - 4$　(d) $-14x^2 + 4x + 2$　(e) $2m + 14n$ (f) $14x^3 + 15x^2 + 9$　　　(g) $x - 5y + 15$

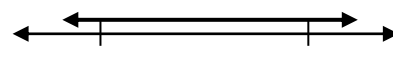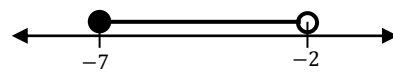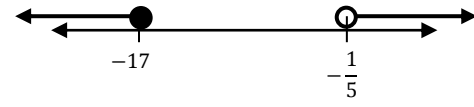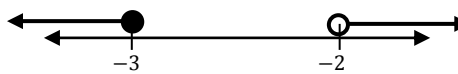| 8. (a) $-20xy$　　(b) $21x$　(c) $\dfrac{8x}{3}$ or $\dfrac{8}{3}x$　(d) −6　　(e) $-3x + 2$　(f) $1 - 2x$ |
|---|

Chapter 3
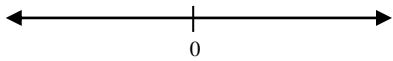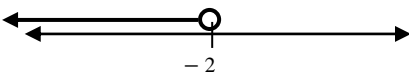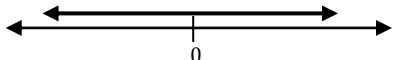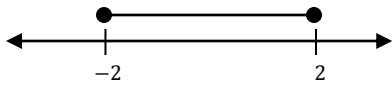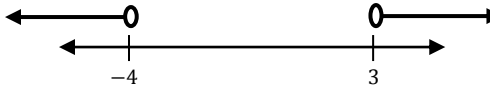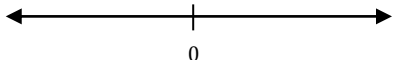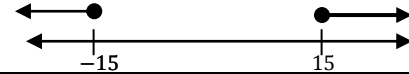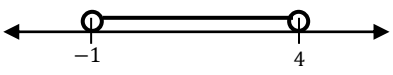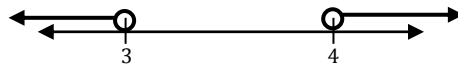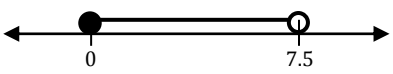
1. (a) $c = -\dfrac{11}{7}$　(b) $y = \dfrac{11}{10}$ (c) $x = -\dfrac{8}{5}$　(d) $x = -\dfrac{5}{4}$　(e) $x = 69$　(f) $x = -5$ (g) $r = -2$　(h) $y = 64$　(i) $x = 0$　(j) all reals　(k) $\varnothing$　(l) $y = -3$
2. (a) $a = b - x$　(b) $l = \dfrac{A}{w}$　(c) $w = \dfrac{P-2L}{2}$

Chapter 5

1. a	2. b	3. a	4. b	5. c
6. c	7. c	8. a	9. c	10. c
11. a	12. b	13. b	14. b	15. b

16. $y = -2x + 6$

17. $y = -x - 7$	18. $y = -\frac{2}{3}x - \frac{2}{3}$	19. Same line	20. $m = 2$

21. b   22. $y = 2x + 13$ 23. y– 1 = 1/3(x − 5) or y + 2 = 1/3(x + 4)   24. (3,-6) m=-1

25. Domain: $\{-6,-3,1,2.5\}$ Range: $\{-9,-4,0,8\}$ It is a function.

26. Domain: $\{-10,-3,1,4\}$ Range: $\{-7,-5,1,2,4\}$ It is not a function.
1 repeats in the domain

27. a. –2, b. 19, c. 7, d. –13, e. –48, f. –4

Chapter 6

1. (a) Ø	(b) $x < -2$
(c) R	(d) $m \geq -6$
(e) $-2 \leq x \leq 2$	(f) $x > 3 \ or \ x < -4$
(g) Ø	(h) $x \geq 15 \ or \ x \leq -15$
2. (a) $x \geq -2$	(b) $x < -1$
3. (a)	(b)
(c)	(d) All Reals
4. (a) $-7 \leq x < 2$	(b) $y > -\frac{1}{5}$ or $y \leq -17$
(c) $x > -2$ or $x \leq -3$	

(d) $x > -2$ and $x \le 1$
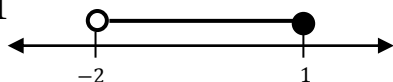
5.
(a) $\emptyset$
(b) $\{-3,11\}$
(c) $\{-14,14\}$

MULT. CHOICE				**GRAPHING & MATCHING:**
1. A	2. B	3. B	4. C	I. $1 - A.$ $2 - E.$ $3 - D.$ $4 - H.$
5. A	6. D	7. C	8. D	
9. C	10. D	11. B	12. A	
13. D	14. B	15. C		

FREE RESPONSE ANSWERS

1. Solve for x: $4 - 2(3x - 4) - 2x = -(x - 6) - (4x + 3)$

$$4 - 6x + 8 - 2x = -x + 6 - 4x - 3$$
$$-8x + 12 = -5x + 3$$
$$+8x \qquad\qquad + 8x$$
$$\overline{\qquad\qquad\qquad\qquad}$$
$$12 = 3x + 3$$
$$-3 \qquad\quad - 3$$
$$\overline{\qquad\qquad\qquad}$$
$$\frac{9}{3} = \frac{3x}{3}$$
$$3 = x$$

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2. Solve and graph: $3m - (-6) < 24 \; or \; -5m + 2 \le 12$

$$3m + 6 < 24 \qquad\quad OR \qquad -5m + 2 \le 12$$
$$-6 \quad\; - 6 \qquad\qquad\qquad\qquad\quad -2 \quad\; - 2$$
$$\overline{\qquad\qquad\qquad}\qquad\qquad\qquad\qquad\overline{\qquad\qquad\qquad}$$
$$\frac{3m}{3} < \frac{18}{3} \qquad\qquad\qquad\qquad \frac{-5m}{-5} \le \frac{10}{-5}$$
$$m < 6 \; OR \; m \ge -2$$

ALL REAL NUMBERS

3. Solve. $|5x - 1| = 4$

$$5x - 1 = 4$$
$$5x = 5$$
$$x = 1$$

$$5x - 1 = -4$$
$$5x = -3$$
$$x = -\frac{3}{5}$$

Both Solutions Work

4.   A) Write an equation to represent the cost, c based on hours of work, h.

$$C = 120 + 34h$$

B) How much will it cost if the plumber works for 9 hours?

$498

C) If the total cost is $435, how many hours did the plumber work?

7.5 hours