INTEGRATED ALGEBRA MIDTERM REVIEW 2016 - 17

Name_____Period_____Date_____

Part 1 – Solve the Equation. Show all steps. Check your answer!

1.) 4(a + 5) = 2a + 12

2.) $\dfrac{3x}{4} - 2 = \dfrac{3x}{2} - 8$

3.) $4(2a - 8) = \dfrac{1}{7}(49a + 70)$

4.) $\dfrac{3n - 2}{5} = \dfrac{7}{10}$

5.) 7 − 3x = x − 4(2 - x)

6.) $\dfrac{3x - 5}{7} - 3 = 7$

INTEGRATED ALGEBRA MIDTERM REVIEW 2016 - 17

<u>The Rules:</u>

- When you solve an equation, the variables adds to zero, and you end with a **<u>true statement</u>**, the solution set will be: _____.

  Example:
  $$3(x+2)=3x+6$$
  $$3x+6=3x+6$$
  $$\underline{\begin{array}{cc} -\ 3x & -\ 3x \end{array}}$$
  $$6=6$$

  Many Solutions!

- When you solve an equation, the variables add to zero and you end with a **<u>false statement</u>**, the solution set will be: _____.

  $$3(x+2)=3x+4$$
  $$3x+6=3x+4$$
  $$\overline{\begin{array}{cc} -\ 3x & -\ 3x \end{array}}$$
  $$6 \neq 4$$

  No Solutions!

Try These:

7.   2x + 5 = 2x − 3

8.   3(x+1) − 5 = 3x − 2

INTEGRATED ALGEBRA MIDTERM REVIEW 2016 - 17

SOLVING INEQUALITITES

Recall, when you solve an inequality, if you multiply or divide by a negative number, you must _____!

SOLVE AND GRAPH THE SOLUTION SET!

9.) -3(x-2) > 12

10.) 2x + 7 > x - 10

11.) $-9c + 3 \geq 21$

12.) $5(2h - 6) - 7(h + 7) > 4h$

SOLVING LITERAL EQUATIONS

Strategy – Highlight the variable you are solving for!

13. Solve $6 = mx + b$ for x

14. Solve $x = \dfrac{4 - k}{6}$ for k

15. Solve $A = P + Prt$ for t.   THINK FACTOR OUT THE GCF!

16. Solve $3x - 4y = 12$ for y

17. Solve $\dfrac{2x + 3b}{9} = \dfrac{x - b}{2}$ for b

INEQUALITIES – REMEMBER THE RULES!

18. Solve $3x - 4y > 12$ for y

19. Solve $2x - 3y > 5y - 8$ for y

Algebraic expressions

20. A plumber charges $13.50 per hour for a plumbing job that requires more than 3 hours to complete. For any job requiring 3 hours or less, there is a flat charge of $40.50. If h represents the number of hours the job requires, which of the following expressions gives the charge, in dollars, for a job requiring more than 3 hours to complete?

   A. $13.5h + 40.5$
   B. $13.5h$
   C. $13.5h - 40.5$
   D. 40.5

21. Translate "5 less than twice the width" into an algebraic expression.

INTEGRATED ALGEBRA MIDTERM REVIEW 2016 - 17

MODELING WITH LINEAR FUNCTIONS A

22.   A candle is 18 in. tall after burning for 3 hours. After 5 hours, it is 16.5 in. tall. Write a linear equation to model the relationship between height h of the candle and time t. Predict how tall the candle will be after burning 8 hours.

a. $h(t) = -0.75t + 20.25;\ 14.25$ inches   c. $h(t) = -0.75t + 15.75;\ 9.75$ inches
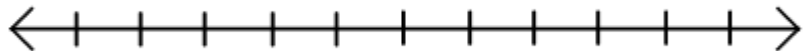b. $h(t) = 0.75t + 15.75;\ 9.75$ inches   d. $h(t) = 0.75t + 20.25;\ 14.25$ inches

Solving Compound Inequalities Involving AND
Solve each inequality and graph the solutions. OPEN CIRCLE: <, > CLOSED CIRCLE – MORE INK!
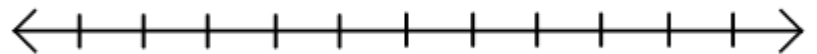
Example 23: $8 < 3x - 1 \le 11$
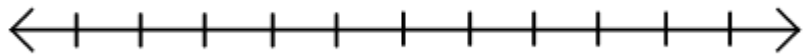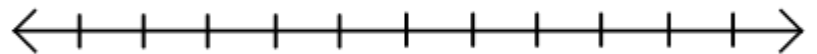

You Try! #24. $-9 < x - 10 < -5$

Solving Compound Inequalities Involving OR
Solve each inequality and graph the solutions.

Example 25: $4x \le 20$ OR $3x > 21$

You Try! #26   - 2x +6 < 12   OR
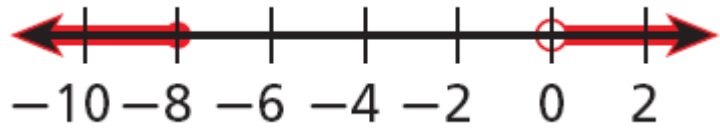$$\frac{-2x+5}{2} > 4$$

INTEGRATED ALGEBRA MIDTERM REVIEW 2016 – 17

Writing a Compound Inequality from a Graph

When writing an inequality from a graph, you must decide:

1) AND or OR
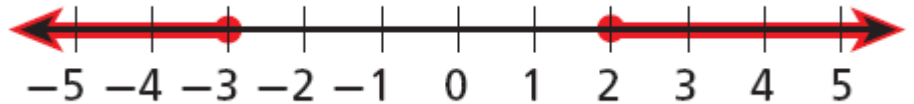
2) open or closed circle(s)

3) what numerical values

Since the arrows are going in opposite directions…OR

Closed circle at (-8) and open circle at (0)

So, x ≤ -8 or x > 0

Example 27: Write the compound inequality shown by the graph.

A._____
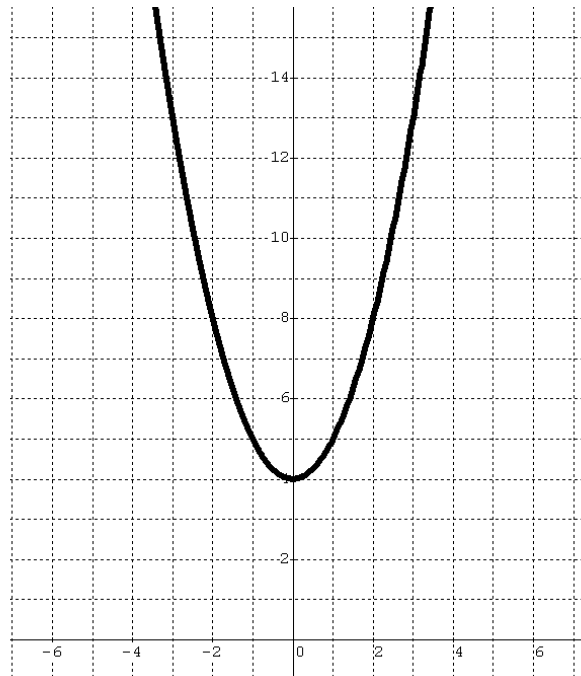

B._____

EVALUATING FUNCTIONS:

28) Given $f(x)$ graphed below, evaluate the following:

a) $f(0)$

b) $f(3)$

c) $f(-2)$

d) Why is $f(x)$ a function?

e) Write the domain and range of $f(x)$.

f) Challenge: Write the equation of $f(x)$.

INTEGRATED ALGEBRA MIDTERM REVIEW 2016 - 17

g) 29) If $f(x) = 3x - 2$ and $g(x) = \frac{1}{2}x^2$, evaluate the following by REPLACING x with the given input!

a) $f(0) = 3(0) - 2 = $ -2

b) $f(-1)$

c) g(-4)

d) $g(-1)$

PART 2
A. Which equation best describes the relationship between the values of x and y shown in the table?

x	y
-1	-7
0	-5
2	-1
4	3

A. $y = x - 5$
B. $y = 2x - 5$
C. $y = 3x - 7$
D. $y = 4x - 7$

B. A plumber charges $13.50 per hour for a plumbing job that requires more than 3 hours to complete. For any job requiring 3 hours or less, there is a flat charge of $40.50. If h represents the number of hours the job requires, which of the following expressions gives the charge, in dollars, for a job requiring more than 3 hours to complete?

E. $13.5h + 40.5$
F. $13.5h$
G. $13.5h - 40.5$
H. 40.5

WRITING EQUATIONS OF LINES:

Objective: I CAN . . . Write an equation in slope intercept form and graph the line using slope intercept form.

Slope – Intercept Form: ; $m =$; $b =$

Write the equations in slope intercept form. Then identify the slope and the y-intercept.

1. $2x - 3y = 6$

2. $-4x + 7y = -14$

3. $6y + 2 = 3x$

Slope: _____
y-int: _____

Slope: _____
y-int: _____

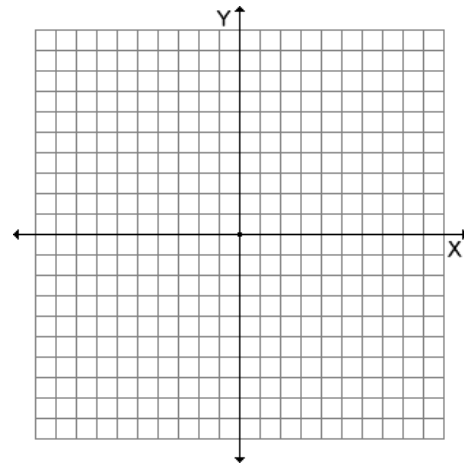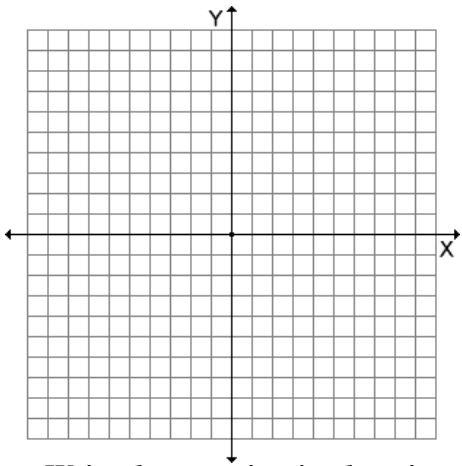*Slope:* _____
y-int: _____

1/7/2016

INTEGRATED ALGEBRA MIDTERM REVIEW 2016 - 17

STEPS TO GRAPH A LINE WHEN IN SLOPE INTERCEPT FORM:

    1. Plot the **y-intercept** on the y-axis.

    2. From the y-intercept, use the slope $= \dfrac{rise}{run}$ to plot other points.

    3. **Graph** the line through the points.

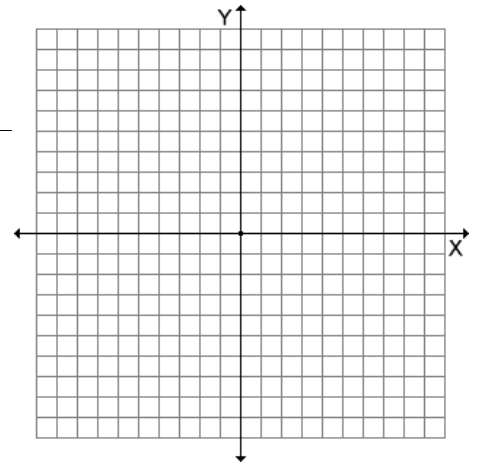*Identify the slope and y-intercept of the equation, then graph the line.*

4. $y = 3x + 7$ *Slope:* _____

    y-int: _____

5. $y = -\dfrac{2}{3}x - 5$ *Slope:* _____
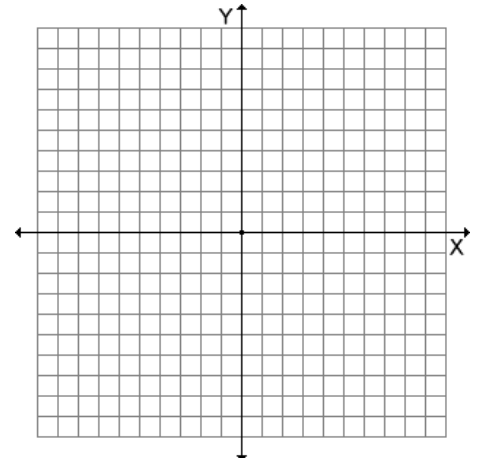
    y-int: _____

a.   **Write the equation in slope intercept form.**
b.   **Identify the slope and y-intercept.**
c.   **Graph the line.**

6. $x + y = 5$ *Slope:* _____ *y-int:* _____

7. $3x - 5y = 10$ *Slope:* _____ *y-int:* _____

INTEGRATED ALGEBRA MIDTERM REVIEW 2016 - 17

Writing an equation given the SLOPE and a POINT:
1.   Write **y = mx + b**
2.   Substitute in the slope (**m**) and the point (**x, y**)
3.   Solve for the y-intercept (**b**)
4.   Substitute only the slope (**m**) and the y-intercept (**b**) into slope-int form: **y = mx +b**

Write an equation of a line given the slope and a point:
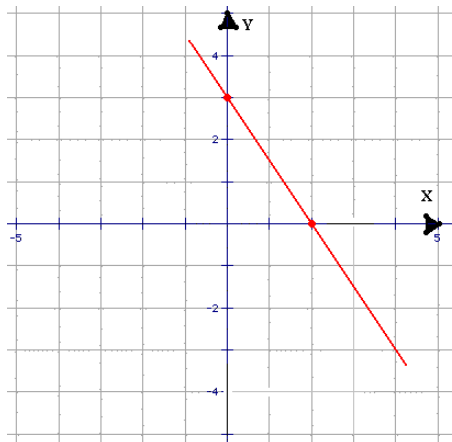
8. $(2,2), m = -5$ **9.** $(8,1), m = 3$

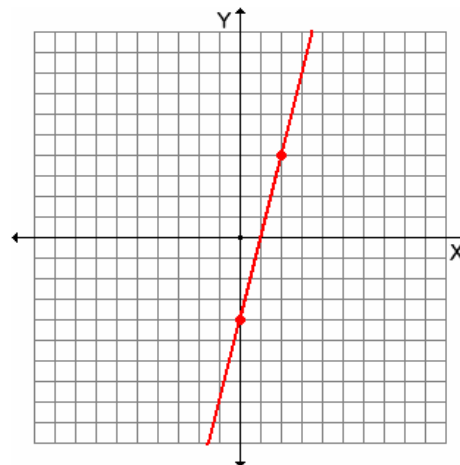**Writing an equation from a GRAPH given the y-intercept:**

1. **y-intercept (b) :** Where does the line cross the y-axis?

2. **Slope (m) :** Use **m =** $\dfrac{rise}{run}$

3. Substitute only **(m)** and **(b)** into slope-intercept form: **y = mx + b**

10.

11.

INTEGRATED ALGEBRA MIDTERM REVIEW 2016 - 17

Writing an Equation Given 2 Points
OBJECTIVE: I CAN . . . Write an equation in slope intercept form given two points on the line.

Steps to writing the equation given TWO POINTS: (x_1, y_1) *and* (x_2, y_2)

1. Find the slope: $m = \dfrac{y_1 - y_2}{x_1 - x_2}$

2. Substitute the slope (***m***) and one point **(x, y)** into slope-intercept form: **y = mx + b**
3. Solve for the y-intercept **(b)**

4. Substitute only the slope (***m***) and the y-intercept **(b)** into slope-intercept form: **y = mx + b**

Write the equation of the line given the two points.

12. (-5, 7)   and   (2, -7)

13. (2, 0)   and   (-2, 6)

Parallel and Perpendicular Lines
OBJECTIVE: I CAN . . . Identify, graph, and write equations of parallel and perpendicular lines.
Parallel Lines:
*   The slope (***m***) of parallel lines are the _____

Perpendicular Lines:
*   The slope (***m***) of perpendicular lines are _____

Determine if the lines are parallel, perpendicular, or neither.

1.
$y = -2x - 4$
$2x + y = 5$

2.
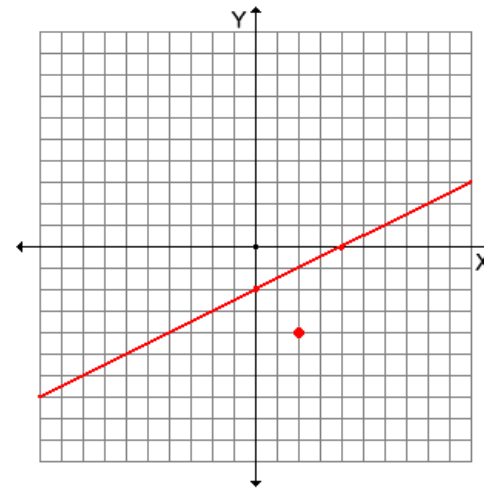$y = \dfrac{1}{2}x + 10$
$4x + 2y = 7$

INTEGRATED ALGEBRA MIDTERM REVIEW 2016 - 17

Write the equation of a line that is <u>perpendicular</u> to the given line and passes through the given point.

1. $y = 2x + 10 \quad (-2, 3)$ 2. $y = -\dfrac{1}{5}x + 10 \quad (4, -3)$ 3.

A **horizontal line** will be an equation in the form: _____   Recall Slope (**m**) =

_____
A **vertical line** will be an equation in the form: _____   Recall Slope (**m**) =

_____
Mnemonic Device to Help Remember: **HOY   VUX**

APPLICATIONS Write a linear model to represent the scenario given.

1. Write linear equations using the given information.

a. The table below represents a linear equation. Write a formula for *f(x)*.

x	f(x)
5	4
7	1
9	-2
11	-5

INTEGRATED ALGEBRA MIDTERM REVIEW 2016 - 17

     2. A school booster club is having a raffle for a graphing calculator that they purchased for $80. Their profit or loss is a linear function in which the profit or loss depends upon the number of tickets sold. The booster club figures that if they sell 10 tickets, they will lose $60. If they sell 30 tickets, they will lose $20.

     3. Biologists have found that the number of chirps some types of crickets make per minute depends upon the temperature. This relationship can be represented by a linear function. When the temperature is 60°F, crickets chirp 92 times per minute. If it is 75°F, they will chirp 152 times per minute.

4. A car is driving down from the top of a Colorado mountain. The elevation at the top of the mountain is 13,500 feet. Every minute of driving, the car's elevation decreases by 150 feet.

Let $x =$ the time in minutes that the car has been driving down the mountain,
$E(x) =$ the car's elevation in feet.

  a. Write a function formula equation for $E(x)$.

  b. Evaluate $E(5)$, and explain the meaning of the answer in terms of the car.

   c. *Find the answer by setting up and solving an equation:* There is a scenic overlook at elevation 12,300 feet. How much time will it take the car to reach the scenic overlook?

   d. *Find the answer by setting up and solving an inequality:* The top of the mountain is too cold for trees to grow, but below 11,700 feet there are trees. When will the car be on the part of the mountain that has trees?

   e. *Find the answer by setting up and solving an inequality:* The part of the mountain between 9,000 feet and 12,000 feet is in the subalpine climate zone. When will the car be in the subalpine climate zone?

SYSTEMS OF EQUATIONS:

1. Solve the linear system:

$$-2y - x = -3$$
$$-7x + 3y = -21$$

2. Solve the systems:

a.
$$2x + y = 9$$
$$-3x + y = -1$$

b.
$$4x + 3y = -1$$
$$5x + 4y = 1$$

C.
$$3x - 4y = -5$$
$$5x - 2y = -6$$

d.
$$y = -2x + 4$$
$$-4x - 2y = -8$$

INTEGRATED ALGEBRA MIDTERM REVIEW 2016 - 17

Write a system of equations to represent each problem!

3. A ballet company says that 540 tickets have been sold for its upcoming performance. Tickets for the Orchestra seats are $56. Tickets for the Balcony seats are $38. The company has sold $24,120 in tickets. How many Orchestra and Balcony seats were sold?

4. Two angles are complementary. The larger angle is 3 degrees less than twice the measure of the smaller angle. Find the measure of each angle.

5. The calorie-nutrient information for an apple and an avocado is given in the table. How many of each should be eaten to get exactly 1250 calories and 90 grams of carbohydrates?

	One Apple	One Avacado
Calories	100	350
Carbohydrates (grams)	24	14

6.	A hotel has 150 rooms. Those with kitchen facilities rent for $100 per night and those without kitchen facilities rent for $80 per night. On a night when the hotel was completely occupied, revenues were $13,000. How many of each type of room does the hotel have?

7. Joanne makes a mixture of dried fruits by mixing dried apples costing $6.00/kg with dried apricots costing $8.00/kg. How many kilograms of each are needed to make 20 kg of a mixture worth $7.20/kg?

8. **Michael has 34 coins in nickels and dimes. The total value of the coins is $2.45. If Michael has *d* dimes and *n* nickels, which system of equations can be used to find the number of each coin?**

(A)
$$\begin{cases} d + n = 15 \\ 5d + 10n = 245 \end{cases}$$

(B)
$$\begin{cases} d + n = 15 \\ 10d + 5n = 245 \end{cases}$$

(C)
$$\begin{cases} d + n = 34 \\ 5d + 10n = 245 \end{cases}$$

(D)
$$\begin{cases} d + n = 34 \\ 10d + 5n = 245 \end{cases}$$

Linear INEQUALITIES in 2 Variables:
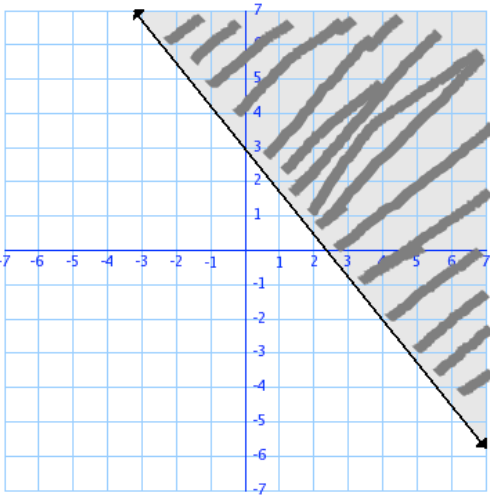
Fill in the blank with the word *dashed* or *solid*.

1. If the inequality has a < or > , then your graph will have a _____ line.

2. If the inequality has a ≤ or ≥, then your graph will have a _____ line.

Fill in the blank with the word *up* or *down*.

3. If the inequality has a y > or y ≥, then you will shade _____

4. If the inequality has a y < or y ≤, then you will shade _____

5.)
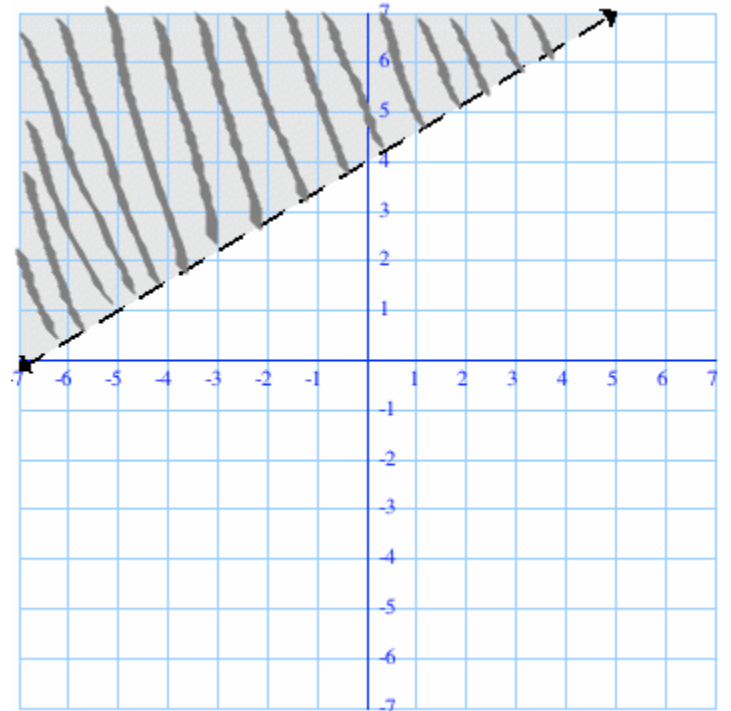
State the inequality that represents this graph.

A.) $y \le \dfrac{5}{4}x+3$ C.) $y \le \dfrac{-5}{4}x+3$

B.) $y \le \dfrac{5}{4}x-3$ D.) $y \le \dfrac{-5}{4}x-3$

6.)

State the inequality that represents this graph.

7: Use the system of linear inequalities $\begin{array}{l} 2x - y \ge 4 \\ y < 2x - 6 \end{array}$. Is the given point a solution?

   a) $(0,0)$ b) $(7,5)$ c) $(0,-6)$

8.)   Graph this system.

A.

$$\begin{cases} y \geq -x + 7 \\ 2x - y > 4 \end{cases}$$

B. $$\begin{array}{l} x + y < 3 \\ 2x - y \geq 5 \end{array}$$

C. $$\begin{array}{l} 3x + y \leq 5 \\ y \geq 2x - 2 \end{array}$$
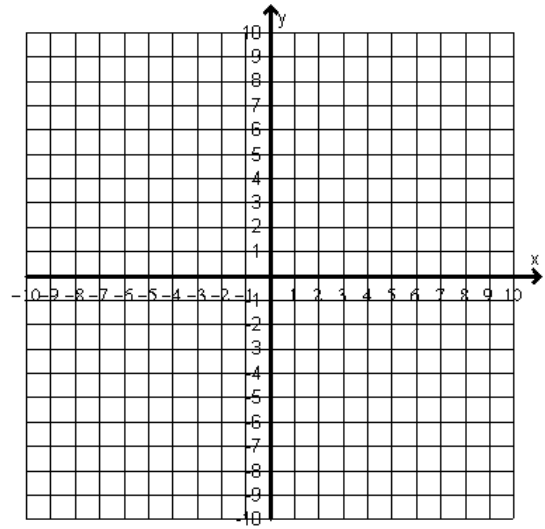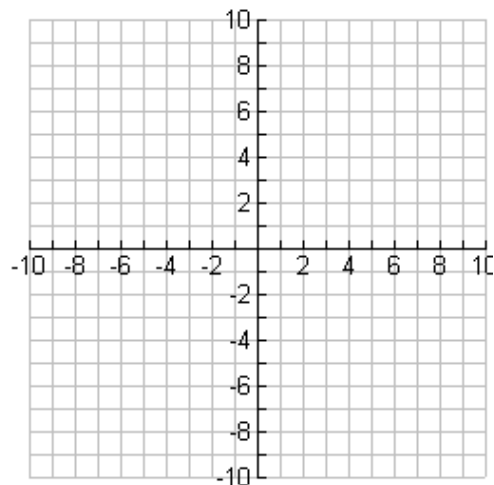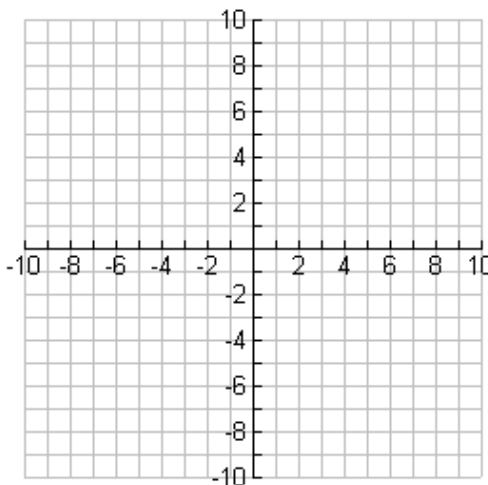
9. A contractor needs at least 500 bricks and 10 bags of sand. Bricks weigh 2 lb each and sand weighs 50 lb per bag. The maximum weight that can be delivered is 3000 lb. Write a system of inequalities that represents the situation.

10. The area of a parking lot is 600 square meters. A car requires 6 square meters and a bus requires 30 square meters of space. The lot can handle a maximum of 60 vehicles. Let b represent the number of buses and c represent the number of cars.

A. Write the constraints given the info above:

B. The diagram below represents the feasible region based on the constraints of the number of vehicles that can be parked in the lot.
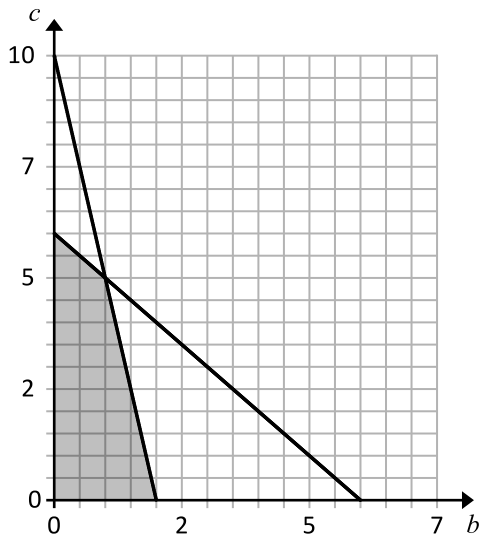
C. To park in the lot, a bus costs $8 and a car costs $3. Write the objective function.

D. Identify the vertices.

E. How many of each type of vehicle can be parked in the lot to maximize the amount of money collected?

A. 0 buses and 60 cars

B. 10 buses and 50 cars

C. 20 buses and 0 cars

D. 30 buses and 30 cars

11. Which ordered pair is in the solution set for the system of inequalities shown below?

$$2x - y < 3$$
$$x + 2y > -1$$

A. $(-2, -1)$

B. $(0, 1)$

C. $(1,-2)$

D. $(6,1)$

POLYNOMIAL OPERATIONS

SIMPLIFY:

1.) $(-18x^2 + 4x - 16) - (15x^2 + 4x - 13)$

2.) $3x^2(4x^3 - 5x + 10)$

3). $\dfrac{-18x^3 + 21x^2 + 3x}{-3x}$

4.) $(4x + 2)(5x - 1)$

5.) $(4x^2 - 3x + 2)(2x + 5)$

6.) $(2x - 5)^2$

7. $(9x - 5)(9x + 5)$

FACTOR:

1. Factor out the GCF: $24a^2b + 18abc$

2. Factor:

INTEGRATED ALGEBRA MIDTERM REVIEW 2016 - 17

A. $x^2 - x - 56$

B. $a^2 - 13a + 14$

C. $25w^2 - 60w + 36$

D. $36m^2 - 64$

E) $3m^2 - m - 30$

F) $8m^2 - 5m - 3$

G) $7x^2 + x - 8$

H) $9m^2 - 1$