Name: _____

Practice Test

Multiple Choice

Identify the choice that best completes the statement or answers the question.

____ 1. How would you graph the solution set for the linear inequality $y + 5x \leq 2$?
   a. Draw a dashed boundary line $y = -5x + 2$, then shade above the line.
   b. Draw a solid boundary line $y = -5x + 2$, then shade above the line.
   c. Draw a solid boundary line $y = -5x + 2$, then shade below the line.
   d. Draw a dashed boundary line $y = -5x + 2$, then shade below the line.

____ 2. Identify the point of intersection for the following system of linear inequalities.
   $\{y - 3x < 12, x + y \geq 0, x \in \mathrm{R}, y \in \mathrm{R}\}$
   a. (3, –3)
   b. (1, –1)
   c. (–1, 1)
   d. (–3, 3)

____ 3. Describe the boundary lines for the following system of linear inequalities.
   $\{y - 3x < 12, x + y \geq 0, x \in \mathrm{R}, y \in \mathrm{R}\}$
   a. Dashed line along $y = 3x + 12$; solid line along $y = -x$
   b. Dashed line along $y = 3x + 12$; dashed line along $y = -x$
   c. Solid line along $y = 3x + 12$; dashed line along $y = -x$
   d. Solid line along $y = 3x + 12$; solid line along $y = -x$

____ 4. A vending machine sells juice and pop.
   • The machine holds, at most, 200 cans of drinks.
   • Sales from the vending machine show that at least 3 cans of juice are sold for each can of pop.
   • Each can of juice sells for $1.50, and each can of pop sells for $1.00.
   Let x represent the number of cans of pop.
   Let y represent the number of cans of juice.
   Which of the following is a constraint of this optimization problem?

   a. $x + y \geq 200$
   b. $x + y \leq 200$
   c. $2x + y \leq 200$
   d. $x + 2y \leq 200$

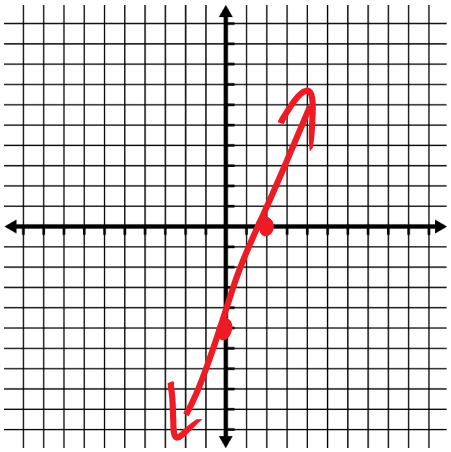
____ 5. Audrey notices the number of people and dogs in a dog park.
   • There are more people than dogs.
   • There are at least 12 dogs.
   • There are no more than 40 people and dogs, in total.
   Let d represent the number of dogs and let p represent the number of people.
   Which inequality represents a restriction of d and p based on the given information?
   a. $d - p \leq 40$
   b. $d - p \geq 12$
   c. $d < p$
   d. $2d \geq p$

Answers 1) c 2) d 3) a 4) b 5) c

Written section

1) Graph the following equation by finding the intercepts *(2 marks)*

$5x - 2y = 10$

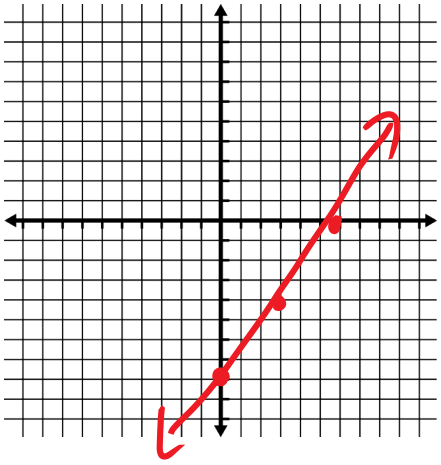


$y=0$ X-intercept = 2

$x=0$ Y-intercept = -5

2) Graphing the following equation by finding the y-intercept and the slope *(2 marks)*

$y = \frac{4}{3}x - 8$



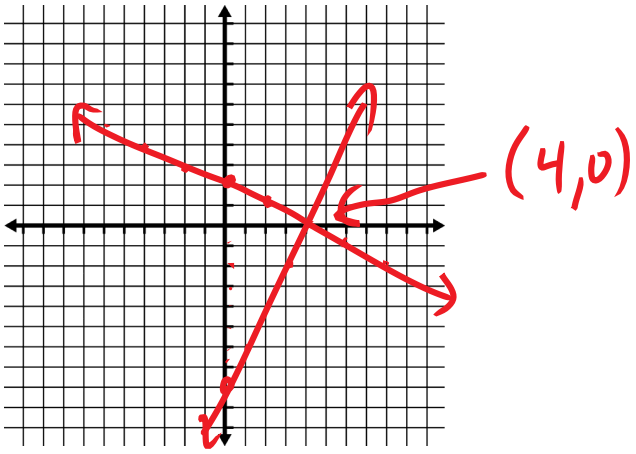
Y-intercept= -8

Slope = 4/3

3) Use a graph to solve the following system of equations: *(3 marks)*

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

$y = 2x - 8$



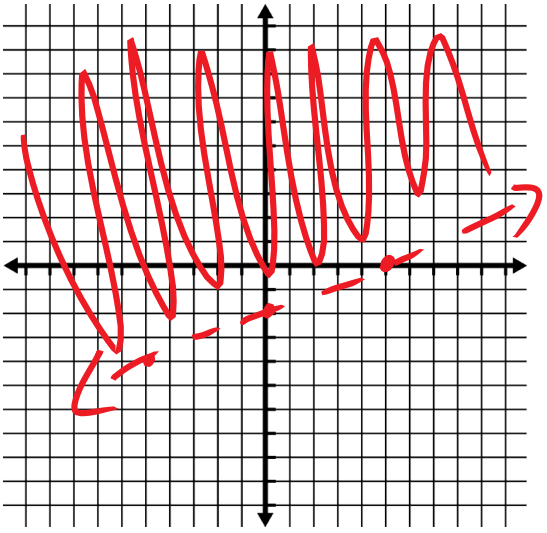
Solution = (4, 0)

4) Graph the following inequality by finding the intercepts and then shading the answer *(2 marks)*

$2x - 5y > 10$

X-intercept = 5

Y-intercept = -2

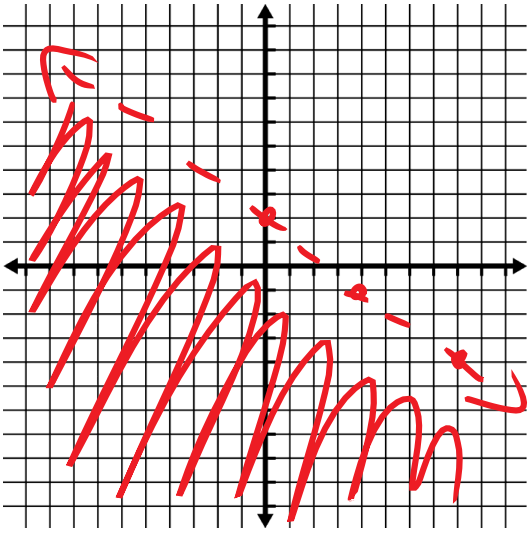


5) Graph the following inequality by finding the y-intercept and the slope and then shading the answer *(2 marks)*

$y < -\frac{3}{4}x + 2$

Y-intercept= 2

Slope = -3/4



Does the point (4,-1) satisfy the inequality? No (on the line)

6) Re-write the following inequality in slope-intercept form: *(2 marks)*

$3x - 2y < 24$

$2y < -3x + 24$

$y > \frac{3}{2}x - 12$

7) Use a graph to solve the following system of inequalities: *(3 marks)*

$\{(x, y) \mid 2x + 3y < 6, y > 2x - 6, x \in I, y \in I\}$

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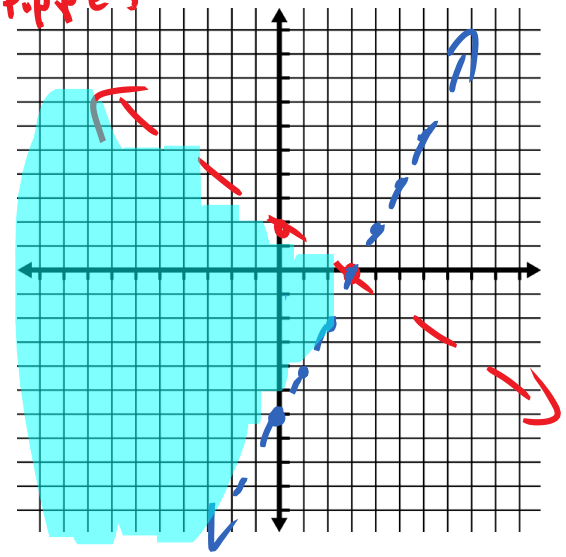
① $2x + 3y < 6$

② $y > 2x - 6$



8) Jan volunteers to fold origami fish and birds for a display.

- She has 8 squares of grey paper for the fish and 12 squares of blue paper for the birds.
- It takes her 4 min to fold an origami fish and 3 min to fold an origami bird.
- There must be two fish for every bird.

Define variables, write a system of inequalities, and identify restrictions for this scenario *(2 marks)*

f: fish b: birds

$f \leq 8$ $b \leq 12$ $f \geq 2b$

$f, b \in W$

9) A system of linear inequalities has vertices at (–3, –7), (2, –3), (5, –7), and (0, –12).
Which point represent the maximum value of the objective function $W = 2y – 0.5x – 8$? *(2 marks)*

Label the corners of the solution space (the feasible region) and calculate the value of the objective function at each point:

Corner	$2y - 0.5x - 8$
(-3, -7)	$2(-7) - 0.5(-3) - 8 = -20.5$
(2, -3)	$2(-3) - 0.5(2) - 8 = -15$ MAX
(5, -7)	$2(-7) - 0.5(5) - 8 = -24.5$
(0, -12)	$2(-12) - 0.5(0) - 8 = -32$

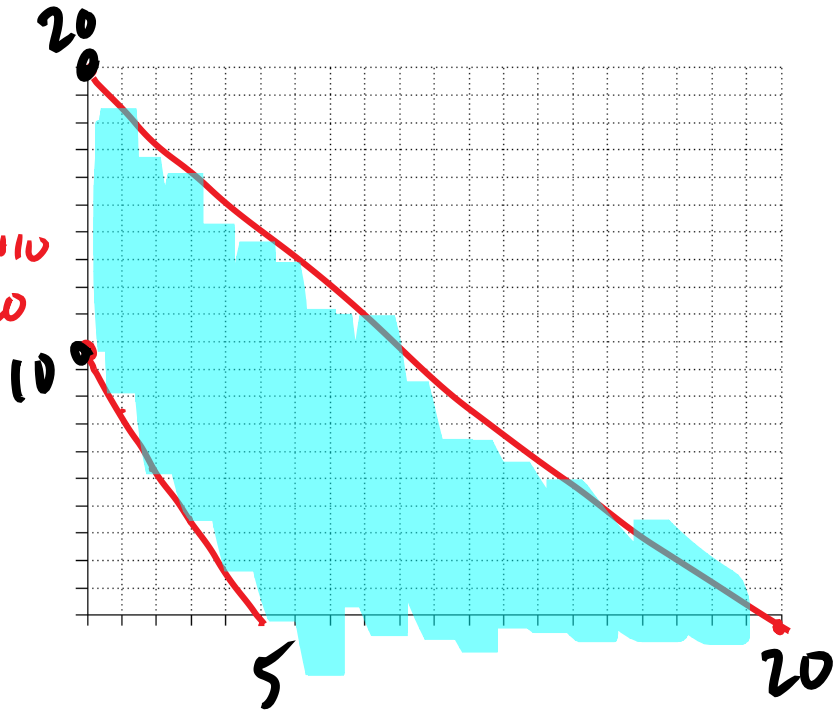
Which point will generate the maximum value? (2, -3)

10. The following model represents an optimization problem. Determine the maximum solution. *(3 marks)*

Restrictions:
$x \in R$
$y \in R$

Constraints:
$x \geq 0$
$y \geq 0$
$2x + y \geq 10$
$x + y \leq 20$

Objective function:
$Q = 2y – 10x$



$y \geq -2x + 10$
$y \leq -x + 20$

(0, 10) : $2(10) - 10(0) = 20$
(0, 20) : $2(20) - 10(0) = 40$ MAX
(5, 0) : $2(0) - 10(5) = -50$
(20, 0) : $2(0) - 10(20) = -200$

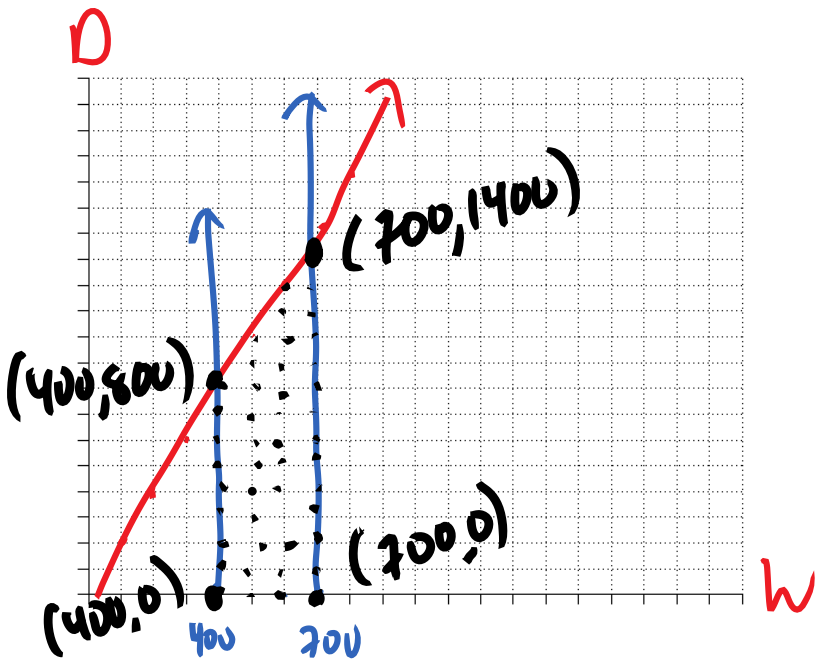
11. A publisher makes western and detective novels. Western novels sell for $10 and detective novels for $8. The publishers noticed that each month they always sell between 400 and 700 western novels and that the number of detective novels sold is never more than double the number of western novels sold. Graph the possible solutions and label corners.
What are the maximum and minimum profits for a month? Show all work. *(6 marks)*

w = western d = detective

$w, d \in W$

$400 \leq w \leq 700$

$d \leq 2w$



12. Brock and Claire have weekend jobs at a marina, applying anti-fouling paint to the bottom of boats.
    - Brock can work no more than 10 h per weekend.
    - Claire is available no more than 15 h per weekend.
    - The marina will hire both of them for 20 h or less per weekend.
    - Brock paints one boat in 2 h, but Claire needs 3 h to paint one boat.

    The marina wants to maximize the number of boats that are painted each weekend. Show all work. *(6 marks)*

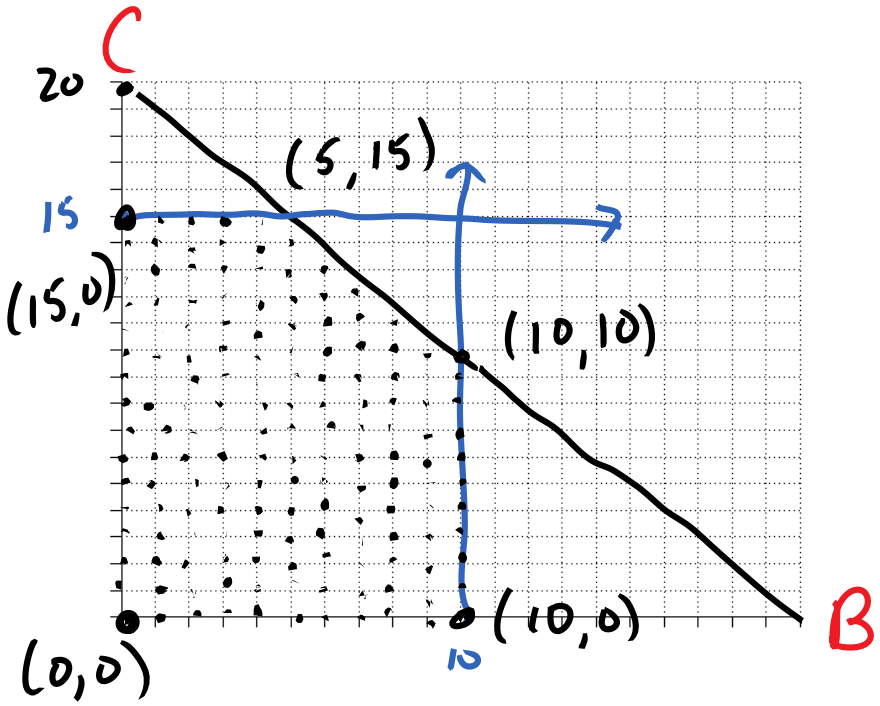
b: Brock C: Claire

$b, c \in W$

$b \leq 10$

$c \leq 15$

$b + c \leq 20$



Objective Function

$\text{Boats} = \frac{1}{2}b + \frac{1}{3}c$

(0,0): 0 boats

(15,0): $\frac{1}{2}(15)$: 7 boats

(5,15): $\frac{1}{2}(5) + \frac{1}{3}(15)$ = 7 boats

(10,10): $\frac{1}{2}(10) + \frac{1}{3}(10)$ = 8 boats MAX

(10,0): $\frac{1}{2}(10)$ = 5 boats