

1. Solve these inequalities.

a) $3x + 8 < 24$

b) $-6x \geq 24$

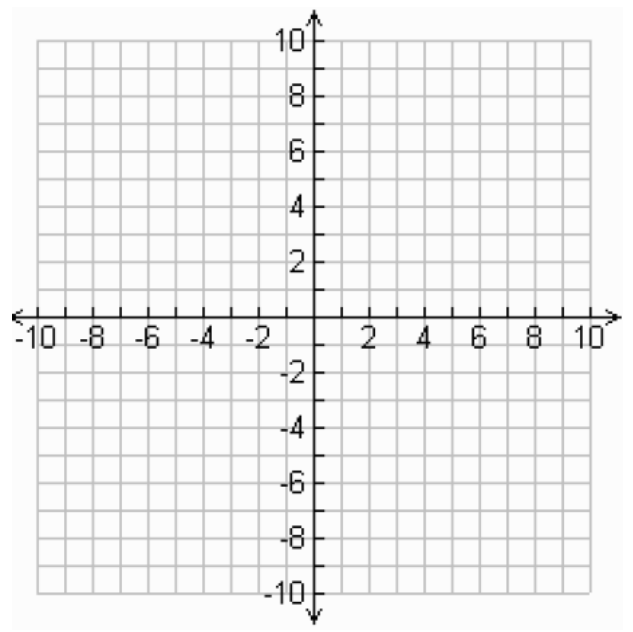
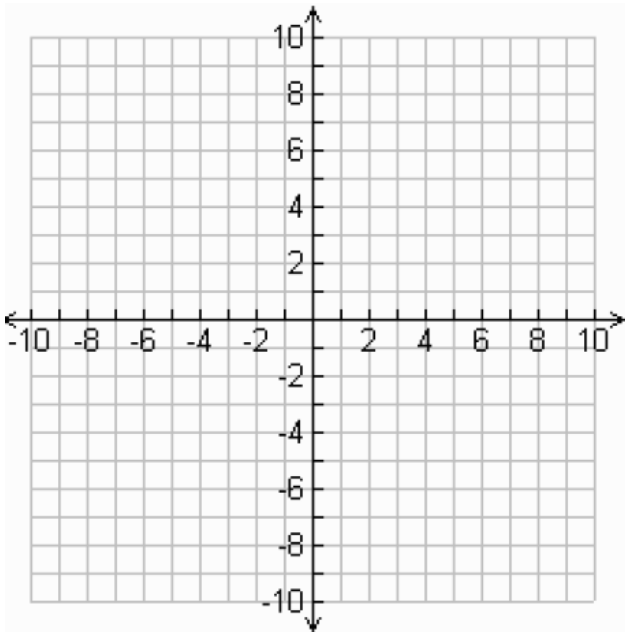
2. Determine the x-intercept and y-intercept for the following:

$6y = 2x + 12$

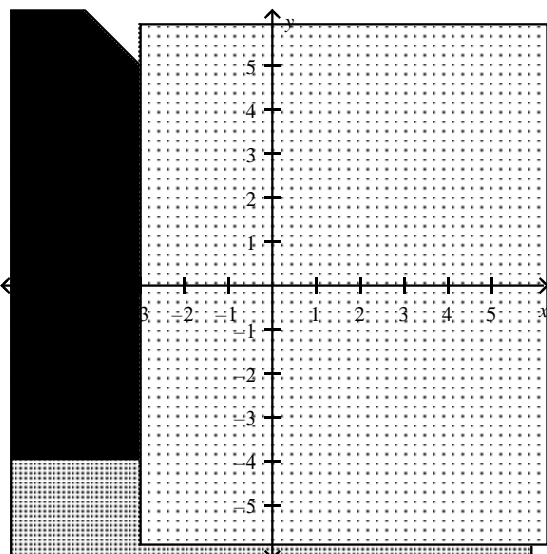
3. Draw the graph for the following inequalities and shade the feasible region.

a) $2x + 4y \geq 16$

b) $y \geq 2x - 1$ and $y < x + 5$



4. What system of linear inequalities is shown here? Write your answer in set notation.



5. A toy company makes two types of stuffed animals, cats and dogs, and it wants to maximize profit. A cat takes 1.5 hours to assemble and 0.5 hours to package. A dog takes 2 hours to assemble and 0.25 hours to package. A maximum of 60 hours is spent on assembly, and a maximum of 20 hours is spent on packaging.

The company makes a profit of \$5 on the cat and \$6 on the dog.

- Define the variables and state the restrictions for this situation.
- Write the constraints as a system of linear inequalities.
- Write the objective function.

Test Review (Chapter 5) RF1
Foundations of mathematics 11

Name : _____

Period : _____

6. The following model represents an optimization problem. Graph the constraints and determine the values of x and y that will maximize the value of the objective function, R .

Restrictions:

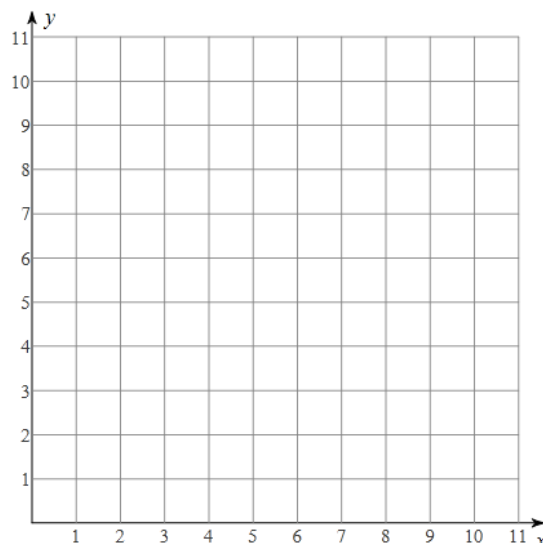
$$x \in W, y \in W$$

Constraints:

$$x \leq 6 \quad x + 2y \leq 10$$

Objective function:

$$R = 12x + 11y$$



7. Bob builds and sells sheds. He uses 10 sheets of plywood and 15 pieces of wood to build a small shed and 15 sheets of plywood and 45 pieces of wood to build a large shed. He has 60 sheets of plywood and 135 pieces of wood.

- If Bob makes a profit of \$390 on a small shed and \$520 on a large shed, which combination of sheds should he build in order to maximize his profit?

x = small sheds

y = large sheds

The constraints and graph are already included for you:

$$10x + 15y \leq 60$$

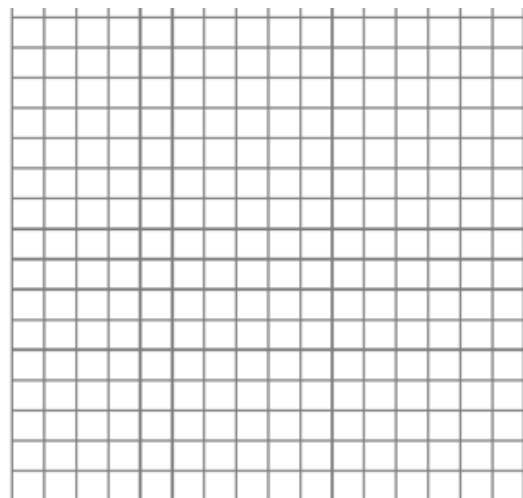
$$x \geq 0$$

$$15x + 45y \leq 135$$

$$y \geq 0$$

a) Draw the graph. Don't forget to label it.

b) List the intersection points of the feasible region.



c) Write the profit equation:

d) What is the maximum profit? _____

e) How many small sheds should Bob build in order to maximize his profit? _____

f) How many large sheds should Bob build in order to maximize his profit? _____

SOLUTIONS:

1. Solve these inequalities.

a) $3x + 8 < 24$

$$\frac{3x}{3} < \frac{16}{3}$$

$$x < \frac{16}{3}$$

b) $-6x \geq 24$

$$\frac{-6x}{-6} \geq \frac{24}{-6}$$

$$x \leq -4$$

2. Determine the x-intercept and y-intercept for the following.

$6y = 2x + 12$

(y=0)
 $6(0) = 2x + 12$
 $x = -6$

(x=0)

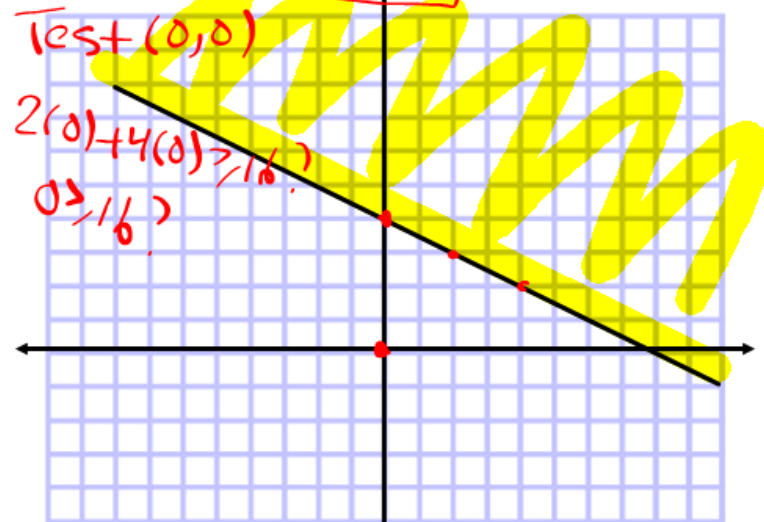
$6y = 2(0) + 12$
 $6y = 12$
 $y = 2$

3. a)

$$2x + 4y \geq 16$$

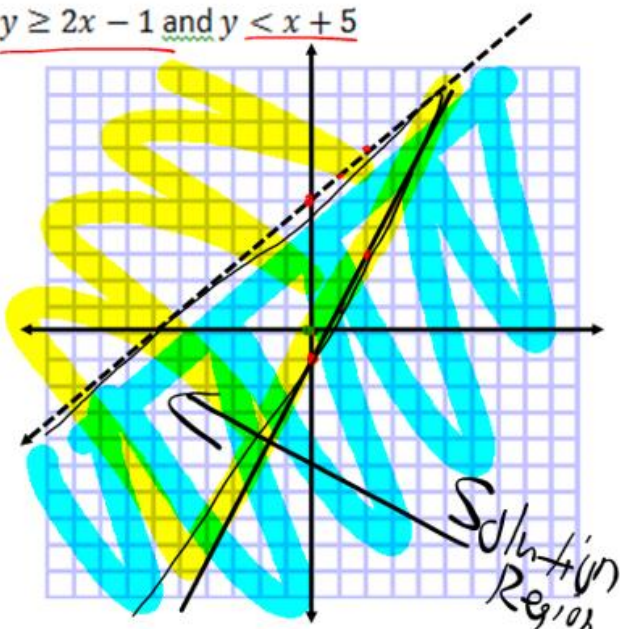
$$\frac{4y}{4} \geq \frac{-2x + 16}{4}$$

$$y \geq -\frac{1}{2}x + 4$$



b)

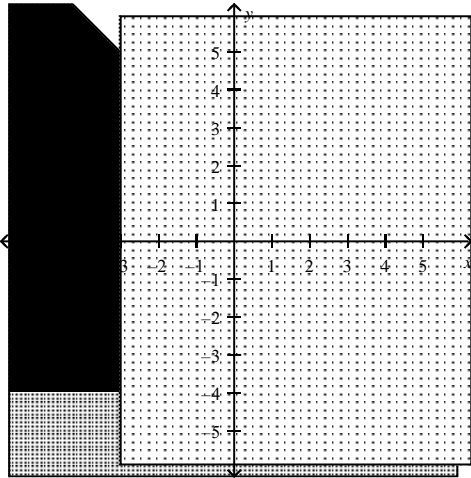
$y \geq 2x - 1$ and $y < x + 5$



Test pt (0,0)
 $0 \geq 2(0) - 1$
 $0 \geq -1$
 yes

Test pt (0,0)
 $0 < 0 + 5$
 $0 < 5$ yes

4. What system of linear inequalities is shown here? Write your answer in set notation.



4. $\{(x, y) \mid x + y \leq 2, x > -3, x \in \mathbf{R}, y \in \mathbf{R}\}$

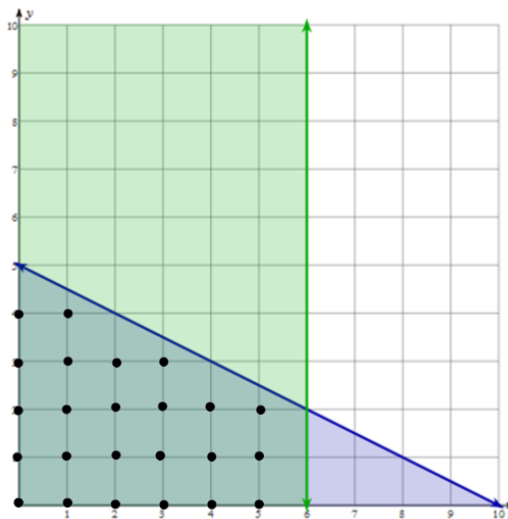
5. a. Let x = the number of stuffed cats, $x \in W$
 Let y = the number of stuffed dogs, $y \in W$

b. *assembly* : $1.5x + 2y \leq 60$
packaging : $0.5x + 0.25y \leq 20$

c. $P = 5x + 6y$

6. $x \leq 6$

$2y + x \leq 10$
 $y \leq -\frac{1}{2}x + 5$



Points	$R = 12x + 11y$
(0,0)	\$0
(0,5)	\$55
(6,2)	\$94
(6,0)	\$72

Therefore, the max value of R is \$94 when $x = 6$ and $y = 2$.

7. a) $10x + 15y \leq 60, x \geq 0$ $15x + 45y \leq 135, y \geq 0$

$$\frac{15y}{15} \leq \frac{-10x + 60}{15}$$

$$\frac{45y}{45} \leq \frac{-15x + 135}{45}$$

$y \leq -\frac{2}{3}x + 4, x \geq 0$

$y \leq -\frac{1}{3}x + 3, y \geq 0$

b) (6, 0) → 6 small sheds
 0 large sheds

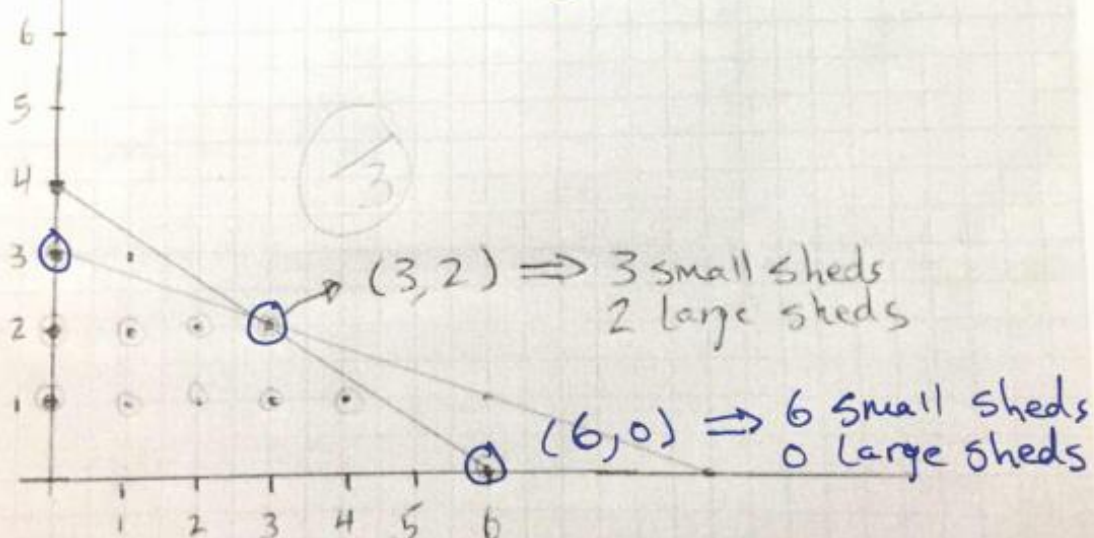
c) $P = 390x + 520y$

d) ~~\$2270~~ \$2340 $P = 390(6) + 520(0)$

e) 6 $P = \$2340$

f) 0

large sheds



small sheds