

Topics Covered: Systems of Equations & Inequalities, Solving Absolute Value Equations & Inequalities, Finding Inverses, Function Operations and Compositions

System of Equations

1.  $y+x=-8$   
 $2x+2y=6$

No Solution

2.  $y+4x=4$   
 $y+x^2+2x=4$

$(0,4)$   
 $(2,-4)$

3.  $y=|x-3|$   
 $5y+2x=27$

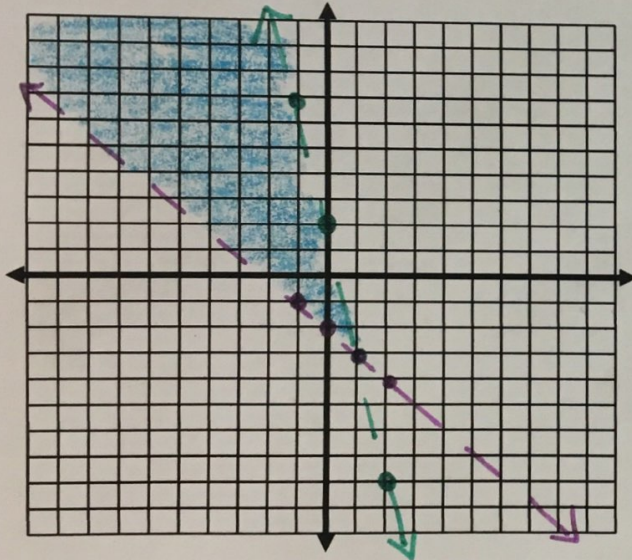
$(-4,7)$   
 $(6,3)$

4.  $y-4x=-6$   
 $2y-8x=-12$

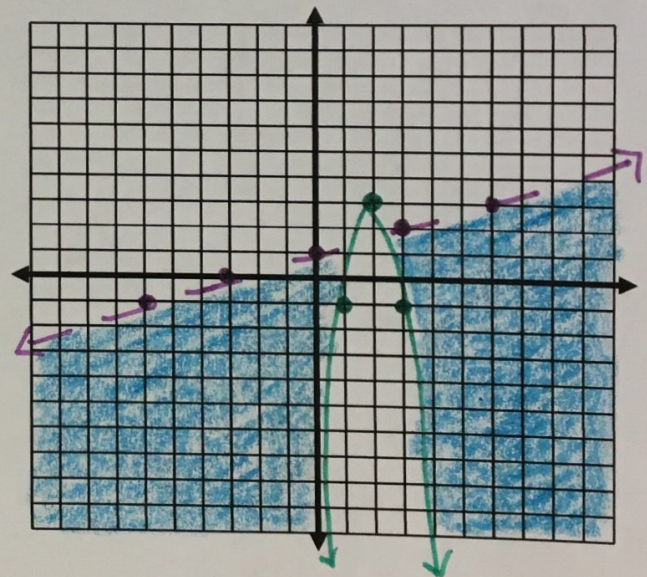
IMS

Systems of Inequalities

8.  $-y < x+2$  ●  
 $y < -5x+2$  ●



9.  $y < \frac{1}{3}x+1$  ●  
 $y \geq -4(x-2)^2+3$  ●



Applications of Systems

5. A coffee merchant has two types of coffee beans, one selling for \$9 per pound and the other selling for \$15 per pound. The beans are to be mixed to provide 100 pounds of a mixture selling for \$13.50 per pound. How much of each type of coffee bean should be used to form 100 pounds of the mixture?

$x = \text{bean 1}$   
 $y = \text{bean 2}$

$x+y=100$   
 $9x+15y=1350$

$\begin{cases} x=25 \text{ pounds} \\ y=75 \text{ pounds} \end{cases}$

6. Two car rental agencies have the following rate structures for a subcompact car. Urent charges \$50 per day plus \$.15 per mile. Painz charges \$45 per day plus \$.20 per mile. If you rent a car for 1 day, for what number of miles will the two companies have the same total charge?

$C = \text{Cost } \$$   
 $m = \text{miles}$

$C = 0.15m + 50$   
 $C = 0.20m + 45$

100 miles

7. Fuel x costs \$2 per gallon and fuel y costs \$3 per gallon. You have at most \$18 to spend on fuel. Write to represent this situation. [Note: you do NOT need to solve this.]

$$2x \leq 18$$

$$3y \leq 18$$

### Absolute Value Equations and Inequalities

23.  $|2 + 3x| = 4$

$$x = \frac{2}{3} \text{ or } x = -2$$

24.  $|4x - 2| + 6 \leq +20$

$$-3 \leq x \leq 4$$

25.  $-9|m + 1| - 6 < 93$

$$m > 10 \text{ or } m < -12$$

26.  $|-3 + 6x| + 10 = 31$

$$x = 4 \text{ or } x = -3$$

### Function Combinations and Compositions

Given that  $f(x) = 2x - 5$  and  $g(x) = x^2 - 3x + 6$  find the following:

27.  $(f + g)(x)$

$$x^2 - x + 1$$

29.  $(f \cdot g)(-2)$

$$-144$$

31.  $f(g(x))$

$$2x^2 - 6x + 7$$

28.  $(g - f)(x)$

$$x^2 - 5x + 11$$

30.  $g(f(x))$

$$4x^2 - 26x + 46$$

32.  $(f \circ g)(3)$

$$7$$

### Finding Inverses

3.  $\{(-5, 6), (0, -1), (7, 4)\}$

$$f^{-1}(x) = \{(6, -5), (-1, 0), (4, 7)\}$$

34.  $f(x) = 5x^3 - 7$

D:  $(-\infty, \infty)$  R:  $(-\infty, \infty)$

$$f^{-1}(x) = \sqrt[3]{\frac{x+7}{5}}$$

D of  $f^{-1}(x)$ :  $(-\infty, \infty)$

R of  $f^{-1}(x)$ :  $(-\infty, \infty)$

Function? yes/no

35.  $f(x) = (3x - 11)^2$

D:  $(-\infty, \infty)$  R:  $(0, \infty)$

$$f^{-1}(x) = \frac{-11 \pm \sqrt{x}}{3}$$

D of  $f^{-1}(x)$ :  $(0, \infty)$

R of  $f^{-1}(x)$ :  $(-\infty, \infty)$

Function? yes/no