Name _____

Math 3 Honors Unit 1: Functions and Their Inverses

Monday	Tuesday	Wednesday	Thursday	Friday
		January 23 ● Solve systems of equations HW: worksheet 1.1	**January 24** ● Solve systems of inequalities HW: worksheet 1.2	**January 25** ● Absolute value HW: worksheet 1.3
January 28 ● QUIZ!! ● Inverses HW: worksheet 1.4	**January 29** ● Inverses ● Function operations HW: worksheet 1.5	**January 30** ● Compositions of functions HW: worksheet 1.6	**January 31** ● Review HW: finish review	**February 1** ● TEST!!

1.1 - Systems of Equations

Solve the following systems algebraically.

1. $-10x - 15y = 25$
   $x - 5y = -9$

2. $y = \frac{1}{3}x + 3$
   $y = 2x - 2$

3. $25x - 9y = 3$
   $8x - 3y = 1$

4. $x^2 + 4y^2 = 36$
   $x^2 + y^2 = 12$

5. Henry is one more than two times as old as Enrique. In 14 years, the sum of their ages will be 62. How old is Enrique?

6. The senior classes at RHS and WFHS planned separate trips to New York City. The senior class at RHS rented and filled 1 van and 6 buses with 372 students. WFHS rented and filled 4 vans and 12 buses with 780 students. Each van and each bus carried the same number of students. How many students can a van carry? How many students can a bus carry?

Solve using graphing calculator. Sketch the graph and record the solution.

7. $f(x) = -|x + 3| + 6$
   $f(x) = |x - 4| + 4$
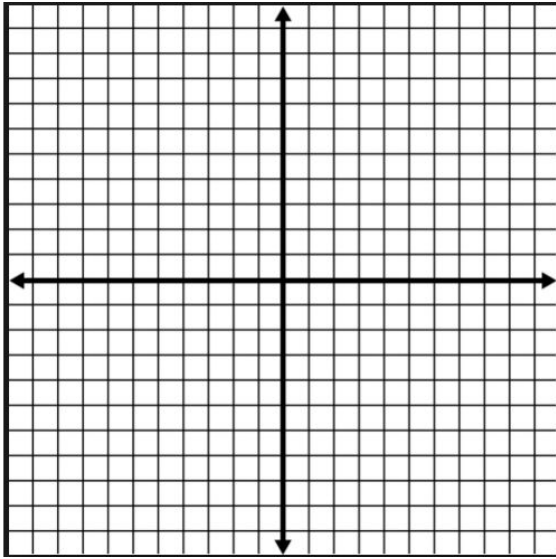
8. $3y + 12 = 2x$
   $-2y = (x - 5)^2 - 4$
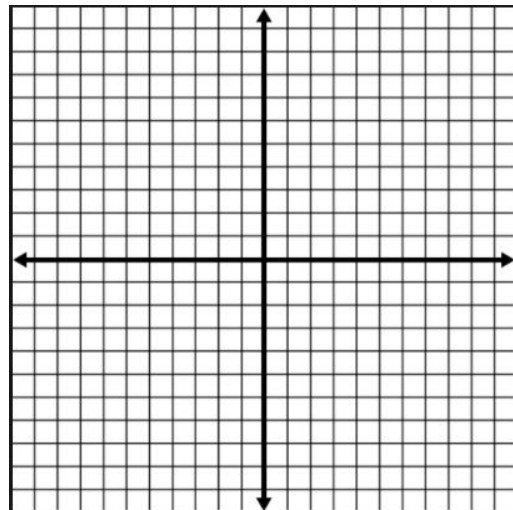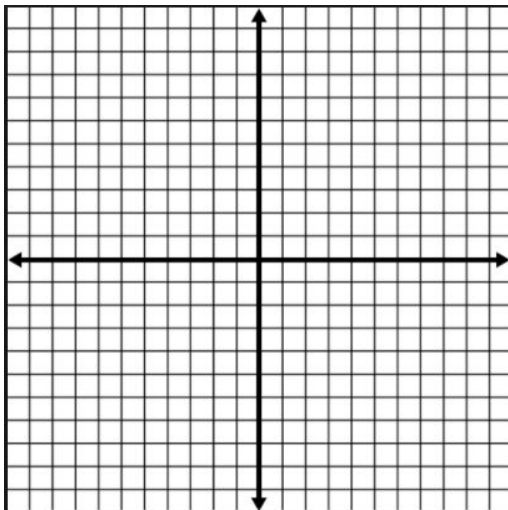
1.2 - Systems of Inequalities
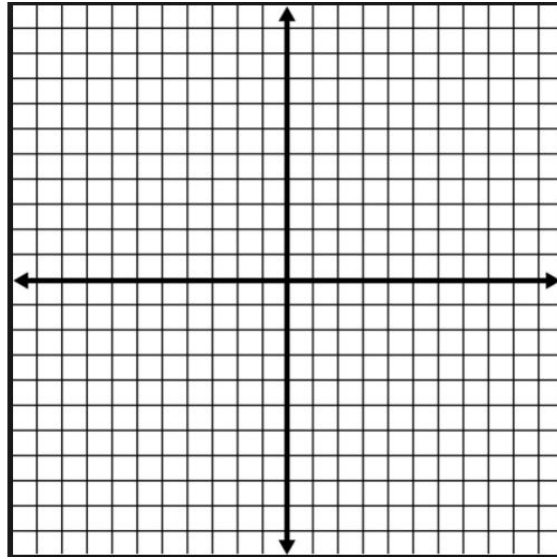
Solve by graphing.
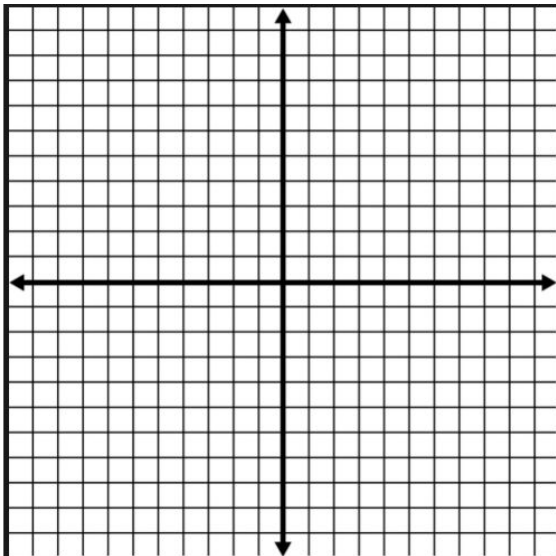
1. $y + 6 \leq 3x$
   $4x > y + 2$

2. $x + y > 2$
   $2x < y + 1$
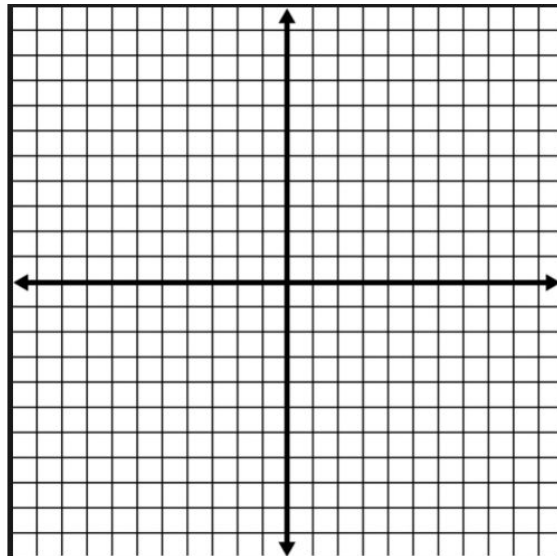
3. $x - 2y < 6$
   $2y + 3x \leq 10$

4. $x^2 + 3 > y$
   $y < 2x + 1$

5. Jonah is going to the store to buy candles. Small candles cost $3.50 and large candles cost $5.00. He needs to buy at least 20 candles, and he cannot spend more than $80. Write a system of linear inequalities that represent the situation.

6. During a family trip, you share the driving with your dad. At most, you are allowed to drive for three hours. While driving, your maximum speed is 55 miles per hour. Write a system of inequalities describing the possible numbers of hours *t* and distance *d* you may have to drive. Is it possible for you to have driven 160 miles?

1.3 - Absolute Value

Solve for the variable.

1. $|-2b| = 6$

2. $|-6x| - 10 = -64$

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

4. $6 - 3|4r - 9| = 3$

Solve each inequality.

5. $|7x| \geq 56$

6. $-2|4x - 3| \geq 6$

7. $5 + |2v - 4| > 29$

8. $-3\left|\frac{1}{2}x + 2\right| + 6 < -20$

Solve each compound inequality.

9. $5v - 6 < -36 \ or \ 9 + 2v > 15$

10. $68 < 5 - 9n \leq 77$
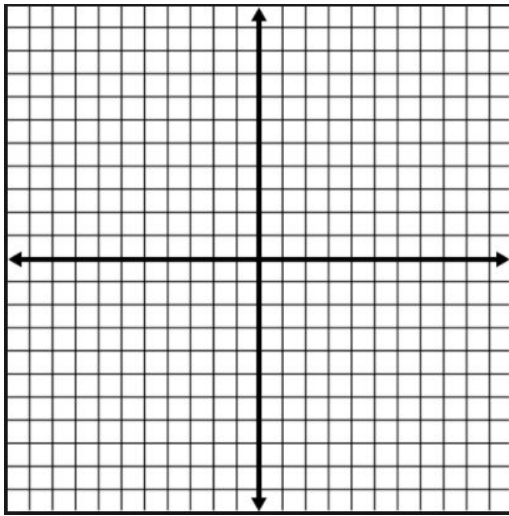
1.4 - Graphing Inverses

Find the domain and range of the given function. Then, find the inverse of the function and state its domain and range. Finally, graph the function and its inverse to determine if the inverse is a function.

1. $h(x) = -2x + 5$

Domain: _____   Range: _____

$f^{-1}(x) =$ _____   Function/Not Function

Domain: _____   Range: _____

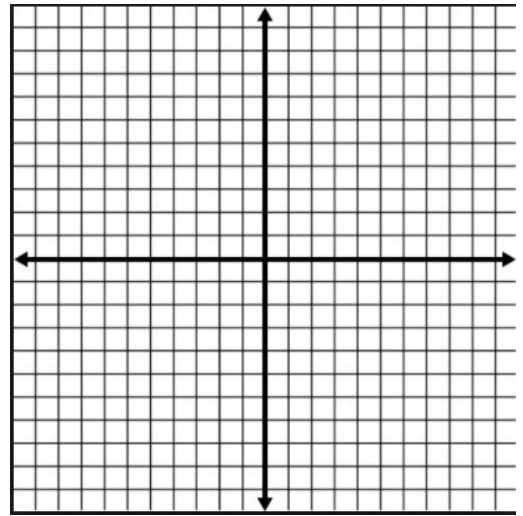2. $f(x) = -\sqrt[5]{x} - 3$

Domain: _____   Range: _____

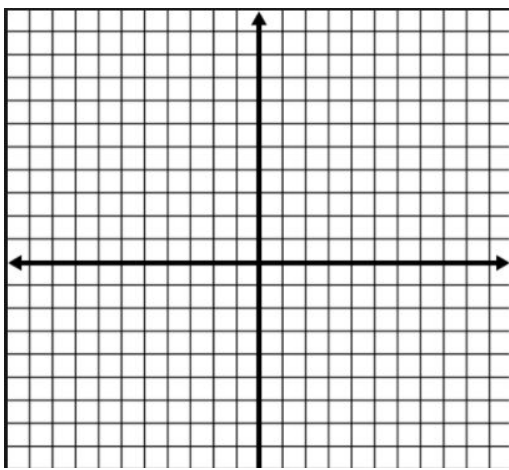$f^{-1}(x) =$ _____   Function/Not Function

Domain: _____   Range: _____

3. $f(x) = 2(x-4)^2 - 5$

Domain: _____   Range: _____

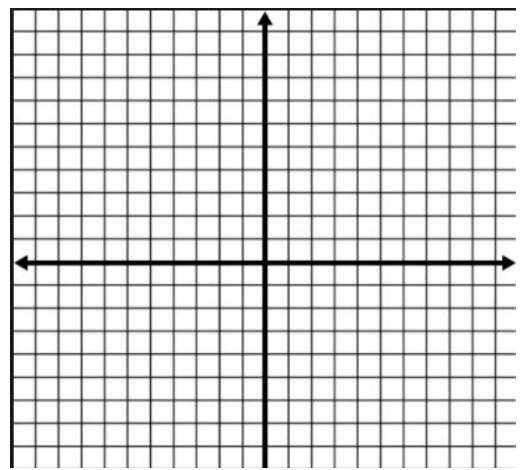$f^{-1}(x) =$ _____   Function/Not Function

Domain: _____   Range: _____

4. $g(x) = \frac{-3x-10}{5}$

Domain: _____   Range: _____
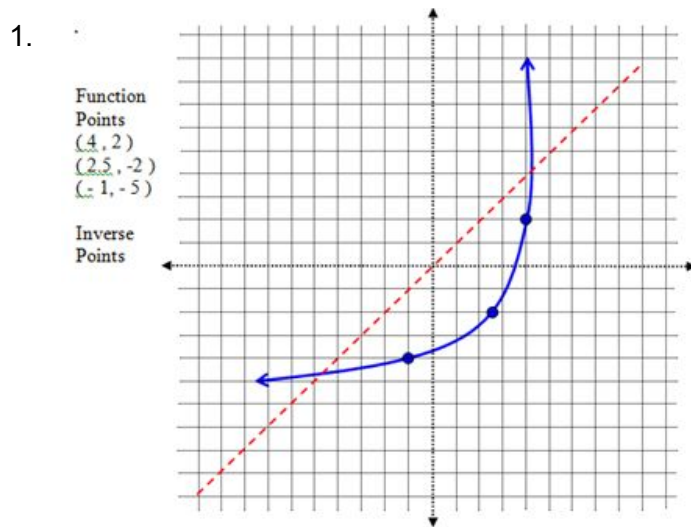
$f^{-1}(x) =$ _____   Function/Not Function

Domain: _____   Range: _____

1.5 - Finding Inverses

Graph the inverse of the function shown below. Then, list the inverse coordinates of the given points.

1.

Function
Points
(4, 2)
(2.5, -2)
(-1, -5)

Inverse
Points

Determine the inverse of each function.

2. $f = \{(1, -2), (-2, 1), (0, 7)\}$

3. $f = \{(-6, 3), (8, 2), (3, 3)\}$

4. $f(x) = 15x - 1$

5. $y = \sqrt{x - 3} + 2$

6. $g(x) = (x - 2)^2 + 5$

7. $y = 4\sqrt[3]{x} - \frac{1}{2}$

8. $h(x) = \frac{7x + 5}{4}$

1.6 - Compositions and Operations of Functions

Given $f(x) = x^2 - 1$, $g(x) = 2x - 3$, *and* $h(x) = 1 - 4x$, *find the following:*

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

2. $(h \cdot g)(x)$

3. $(g - h)(x)$

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

Given $f(x) = 3x + 3$, $g(x) = 6x - 5$, *and* $h(x) = x^2 + 14$, *find the following:*

5. $f(g(-3))$

6. $(f \circ h)(7)$

7. $g(h(24))$

8. $(h \circ f)(9)$

9. $g(f(0))$

10. $(h \circ g)(-4)$

Given $f(x) = 9 - x$, $g(x) = x^2 + 3$, *and* $h(x) = x - 2$, *find the following:*

11. $(g \circ f)(x)$

12. $f(g(x))$

13. $(h \circ f)(x)$

14. $f(h(x))$

15. $(h \circ g)(x)$

16. $(g \circ g)(x)$

17. A toy manufacturer has a new product to sell. The number of units to be sold, x, is a function of the price p: $n(p) = 30 - 25p$. The revenue r earned is a function of the number of units sold x: $r(x) = 1000 - \frac{1}{4}x^2$ Find the function for revenue r in terms of price, p.

Prove the two functions are inverses.

18. $f(x) = 4x + 3$

$g(x) = \frac{1}{4}x - \frac{3}{4}$

19. $h(x) = 2\sqrt[3]{x - 2} + 3$

$k(x) = \frac{(x-3)^3}{8} + 2$