

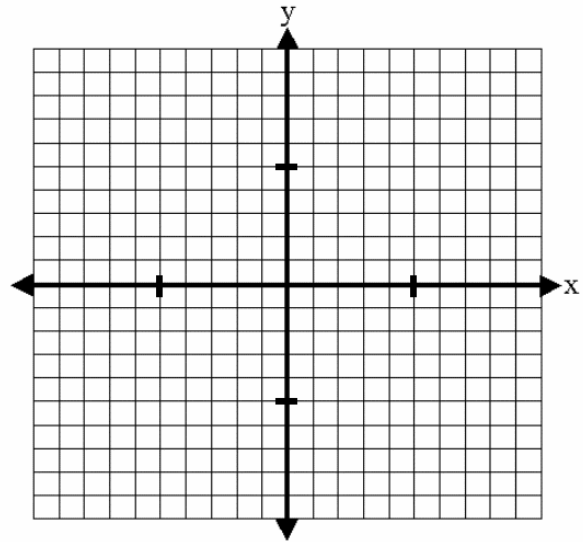
Factor Completely

1. $24x^2 + 6x - 9$

2. $54s^3 + 16t^3$

3. Given $g(x) = \frac{1}{2}x^2 - 3x + \frac{9}{2}$, find the following characteristics then graph the function:

- a. vertex
- b. axis of symmetry
- c. y-intercept
- d. x-intercept(s)



4. Solve for x and y by substitution or elimination:

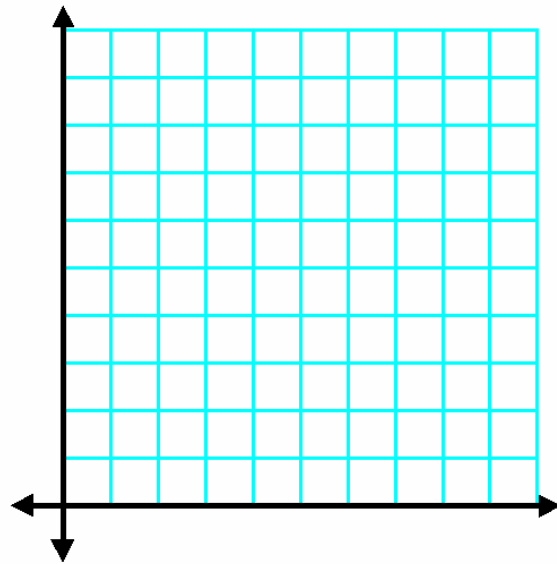
$$2y - 6x = 5$$

$$2y + 2x = 7$$

5. Find the inverse of the function $f(x) = -3x^2 + 42$.

6. The Woodell Carpentry Shop makes bookcases and cabinets. Each bookcase requires 15 hours of woodworking and 9 hours of finishing. The cabinets require 10 hours of woodworking and 4.5 of finishing. The profit is \$60 on each bookcase and \$40 on each cabinet. There are 70 hours available each week for woodworking and 36 hours available for finishing. How many of each item should be produced in order to maximize profit?

Remember to define your variables, list your constraints, graph the constraints, identify the vertices of the feasible region, state the objective function, and use the vertices to find the maximum profit.



7. Solve for x and y by substitution or elimination:

$$3y - 5 = 8x$$

$$x = \frac{3}{4}y - 2$$

8. a) Find both compositions:

$$f(x) = x + 5$$

$$g(x) = 2x^2 + 4x - 12$$

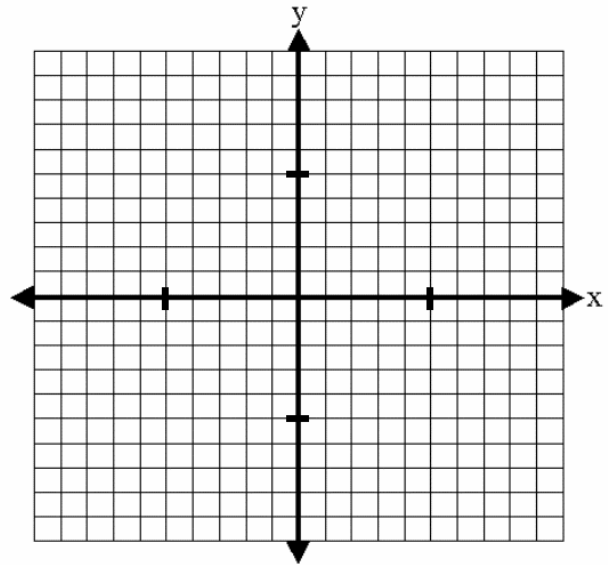
$$f(g(x)) =$$

$$g(f(x)) =$$

b) Are f and g inverses? Explain.

9. Graph

$$f(x) = \begin{cases} 3x + 11, & x \in [-7, -3) \\ (x + 1)^2 - 4, & x \in [-3, 2) \\ 6, & x \in (3, 9) \end{cases}$$



10. Write the equation of the line passing through $(4, -5)$ that is parallel to the line $y = -\frac{1}{3}x + 8$.

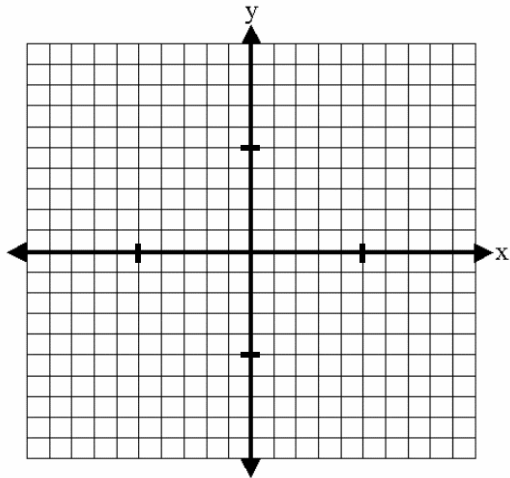
11. Write the equation of the line passing through $(4, -5)$ that is perpendicular to the line $y = -\frac{1}{3}x + 8$.

12. Find the inverse of the function $f(x) = \sqrt{\frac{1}{2}x - \frac{1}{4}} + 3$.

13. Find the inverse and graph both functions. Then explain how the graph shows that these are inverses.

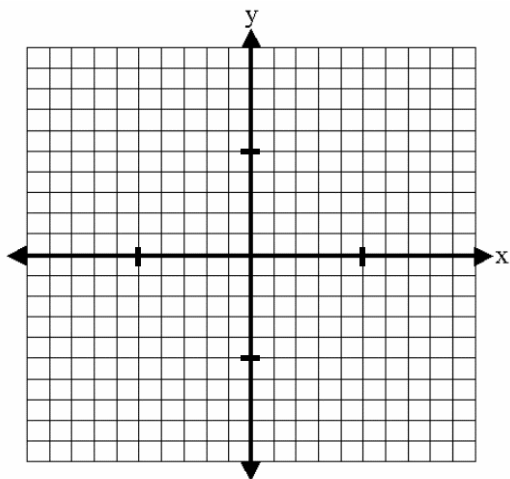
$$f(x) = 5x - 10$$

$$f^{-1}(x) =$$



14. Graph

$$f(x) = \begin{cases} -x+1, & x \in [-2, 5] \\ -2|x-8|+8, & x \in [6, 10] \\ (x+6)^2, & x \in (-\infty, -3) \end{cases}$$



15. Factor completely.

a) $2r^5s^3 - 128r^2$

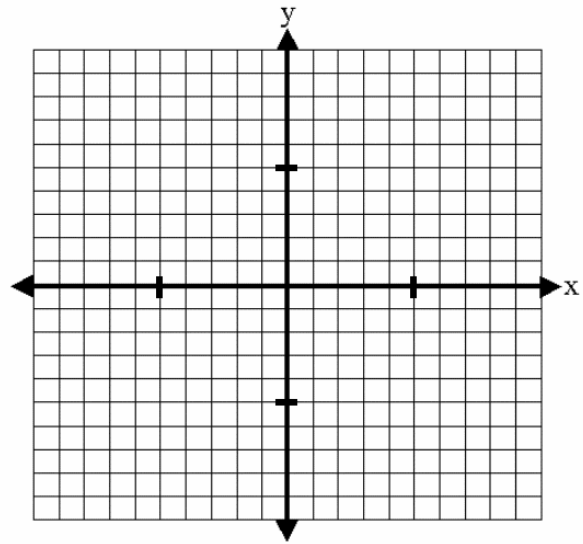
b) $16x^2 + 24xy + 36y^2$

c) $81h - h^5$

d) $6x + 2xy - 9y - 3y^2$

16. Given $g(x) = 3x^2 - 6x - 4$, find the following characteristics then graph the function:

- a. vertex
- b. axis of symmetry
- c. y-intercept
- d. x-intercept(s)



17. Write the piecewise function for the graph. Be sure to include the domain.

$$f(x) = \left\{ \begin{array}{l} \\ \\ \\ \end{array} \right.$$

