

**Algebra 1 Diagnostic Test**

Name: \_\_\_\_\_

Last Course Completed: \_\_\_\_\_

School: \_\_\_\_\_

Directions: Complete all problems on this paper and show as much work as possible. If you don't know how to solve a problem, leave the problem blank.

1. Solve the following equation for  $x$ .

$$3(x + 4) - 2(x - 3) = 13$$

2. Solve the following equation for  $y$ .

$$\frac{1}{2}(y + 4) + \frac{2}{3}y = 16$$

3. The following formula is used to find the surface area of a cone.

$$S = \pi r \ell + \pi r^2$$

**Part A:** Solve for  $\ell$ .

**Part B:** Find  $\ell$  when  $S = 219.8$   
and  $r = 5$ . Use 3.14 for  $\pi$ .

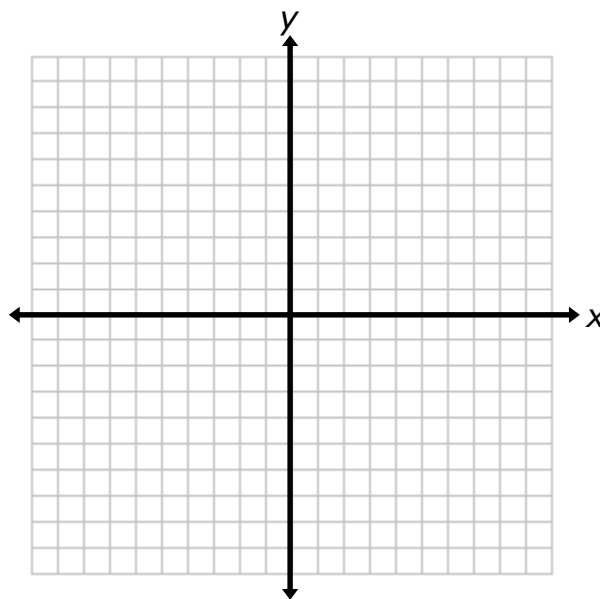
4. Solve the following equation for  $x$ .

$$-2(x + 5) + 1 = 3x - 4(x + 2) + 2$$

5. **Part A:** Graph the following system of equations on the grid. Label each equation.

line  $a$ :  $2x - 2y = 10$

line  $b$ :  $y = -4x + 10$



**Part B:** Identify the solution to the system of equations.

6. Write an equation for a line that passes through the points  $(-3, 4)$  &  $(1, -12)$

7. **Part A:** Lisa is trying to save money. In January, she had \$125 in her savings account and in July she had \$550 in her account. What is the rate of change between January and July?

**Part B:** What does the rate of change mean in this context?

8. Jonathan receives \$10 per week for doing chores around the house. He also mows lawns for his neighbors and earns \$15 per lawn. Write an equation that can be used to determine Jonathan's weekly earnings,  $y$ , based on the number of lawns mowed,  $x$ .

9. Lyla has \$150 to purchase shrubs for her front yard. Small shrubs cost \$20 per shrub and large shrubs cost \$35 per shrub.

**Part A:** Write an equation that can be used to determine the number of small shrubs,  $x$ , and the number of large shrubs,  $y$  that Lyla can purchase.

**Part B:** If Lyla purchases 2 large shrubs, what is the greatest amount of small shrubs that she can purchase? Show how you determined your answer.

10. Given the following equation:

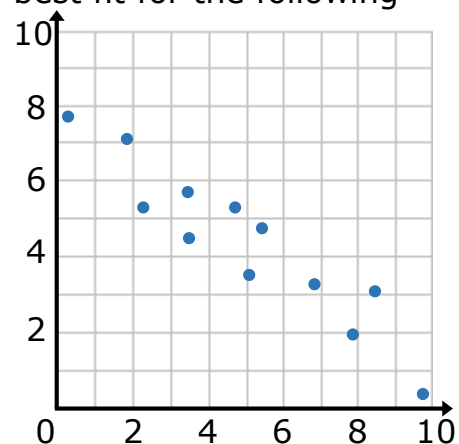
$$y = \frac{3}{4}x + 2$$

**Part A:** Write an equation for a line that is parallel to the line represented by this equation.

**Part B:** Write an equation for a line that is perpendicular to the line represented by this equation.

11. Which answer choice best describes the line of best fit for the following scatter plot.

- A. The line of best fit would be a straight line through  $(0,10)$  and  $(10,0)$ .
- B. The line of best fit would be a straight line through  $(0,8)$  and  $(10,0)$ .
- C. The line of best fit would be a straight line through  $(0,6)$  and  $(8,0)$ .
- D. There is no line of best fit.



12. Solve the following system of equations. Be sure to show your work!

$$\begin{aligned}x &= 2y - 4 \\3x + 5y &= 21\end{aligned}$$

13. Solve the following system of equations. Be sure to show your work!

$$\begin{aligned}2x + 5y &= -4 \\3x - 2y &= -6\end{aligned}$$

14. Liza has \$50 in her savings account and saves \$10 per week. Frank has \$350 in his savings account and spends \$15 per week. In how many weeks will they have the same amount in their savings accounts?

15. Solve the following inequality.

$$-3(2a - 6) < 12$$

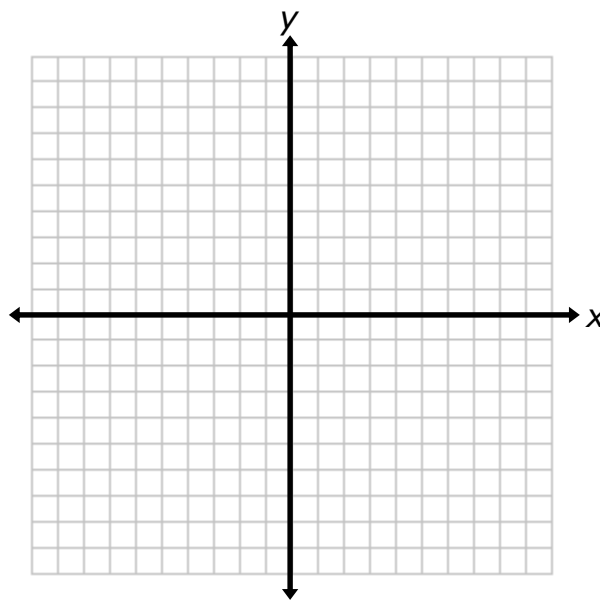
16. Vera has at most \$30 to buy gas and get a car wash. Gas costs \$2.30 per gallon and a car wash costs \$8.00.

**Part A:** Write an inequality that can be used to determine the number of gallons of gas,  $x$ , Vera can purchase.

**Part B:** Solve the inequality to identify how many gallons of gas Vera can purchase.

17. **Part A:** Graph the following system of inequalities on the grid.

$$\begin{aligned}y &\geq -3x + 8 \\ 2x + 3y &< 12\end{aligned}$$

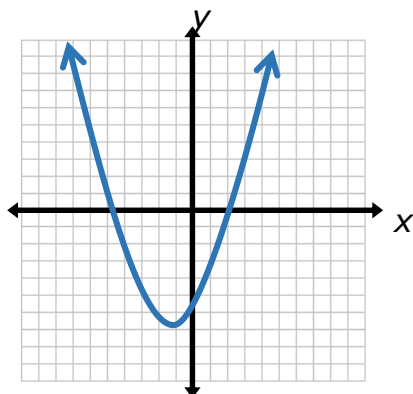


**Part B:** Identify two solutions.

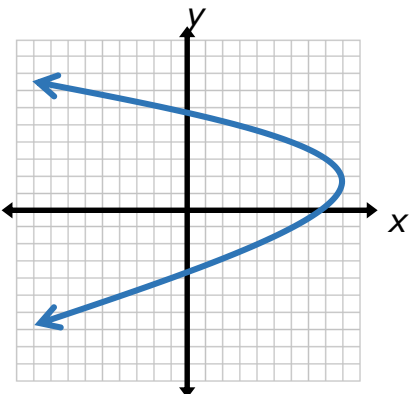
18. Three relations are shown.

**Part A:** Identify which relations are functions.

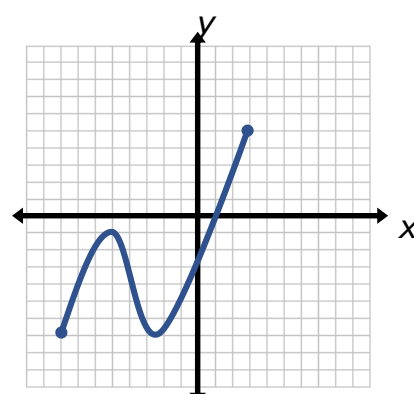
**Part B:** For the relations that are a function, identify the domain and range.



Function? Yes, No  
Domain:  
Range:



Function? Yes, No  
Domain:  
Range:



Function? Yes, No  
Domain:  
Range:

19. Determine whether the following function is linear or exponential. Explain your reasoning.

$x$	-2	-1	0	1	2	3
$f(x)$	3	9	27	81	243	729



20. Three functions are shown.

$$f(x) = -2x + 9$$

$$g(x) = 3^x$$

$$h(x) = 2x^2 + 3x - 4$$

**Part A:** Evaluate  $g(4)$ .

**Part B:** Evaluate  $h(-1)$ .

21. Simplify. All exponents must be positive.

**Part A:**  $4a^3(2a^5)$

**Part B:**  $(2a^4)^3 + 2(2a^2)^2$

**Part C:**  $\frac{3a^4b^5c^2}{4a^2b^2c}$

**Part D:**  $2a^{-1}b^3c^{-4}$

22. Simplify each expression.

**Part A:**  $(3x^3 + 2x^2 + 3x - 5) + (2x^3 - 4x + 2)$

**Part B:**  $(5x^2 - 4x + 6) - (2x^2 + 3x - 2)$

**Part C:**  $3x^2(4x^2 + 2x - 2)$

**Part D:**  $(3x + 5)(2x - 1)$

23. A rectangle has sides with length  $(x^2 + 5x + 2)$  and  $(4x - 2)$ .

**Part A:** Write a simplified expression that represents the perimeter of the rectangle.

**Part B:** Write a simplified expression that represents the area of the rectangle.

24. Factor each of the polynomials completely.

**Part A:**  $x^2 + x - 56$

**Part B:**  $6x^2 + 10x - 4$

**Part C:**  $2x^3y^2 + 3x^2y^5 + 2xy$

25. A right triangle has a side with length 15 inches and a hypotenuse with length 25 inches. Find the length of the second leg. Round to the nearest hundredth if needed.

26. Find the zeros for the following function:

$$F(x) = x^2 - 9x - 36$$

27. Find the values of  $y$  for the following equation:

$$2y^2 + 2y - 10 = 2$$

28. A ball is shot from a canon into the air with an upward velocity of 45 ft/sec. The following function gives the height,  $h$ , of the ball at any time,  $t$ .

$$h(t) = -16t^2 + 45t + 1.5$$

**Part A:** Find the maximum height obtained by the ball.

**Part B:** How long did it take for the ball to reach the ground?

29. Graph the following function on the grid. Explain how you graphed the function.

$$f(x) = x^2 - 8x + 12$$

