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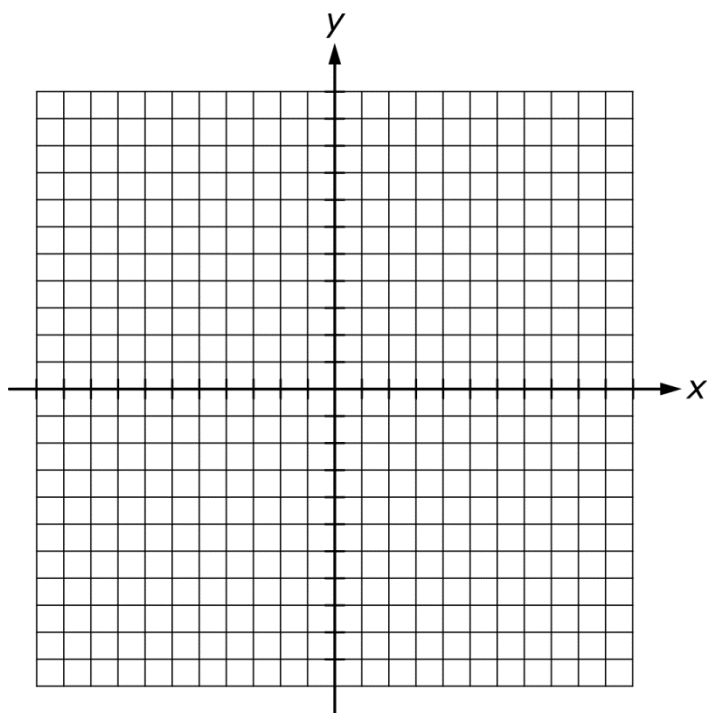
Algebra 1 Unit 2
Benchmark Exam

Scoring – For Teacher Use Only											
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
13	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	
									Total	___ /___	

1. Solve the system of equations below by graphing on the coordinate plane provided.

$$3x + 2y = 8$$
$$x + 2y = 4$$

Solution: _____

2. Solve the system of equations below algebraically.

$$2x + 3y = 6$$
$$-5x + 2y = 4$$

Solution: _____

3. Solve the system of equations below algebraically. Show your work.

$$5y + 3x = -10$$
$$-\frac{5}{3}y = x - \frac{4}{3}$$

Solution: _____

4. Two linear functions have been evaluated for integer *x*-values from −3 to 3. The results are shown in the table below. Based on the table, which of the following could be the coordinates of the point where the graphs of the equations intersect?

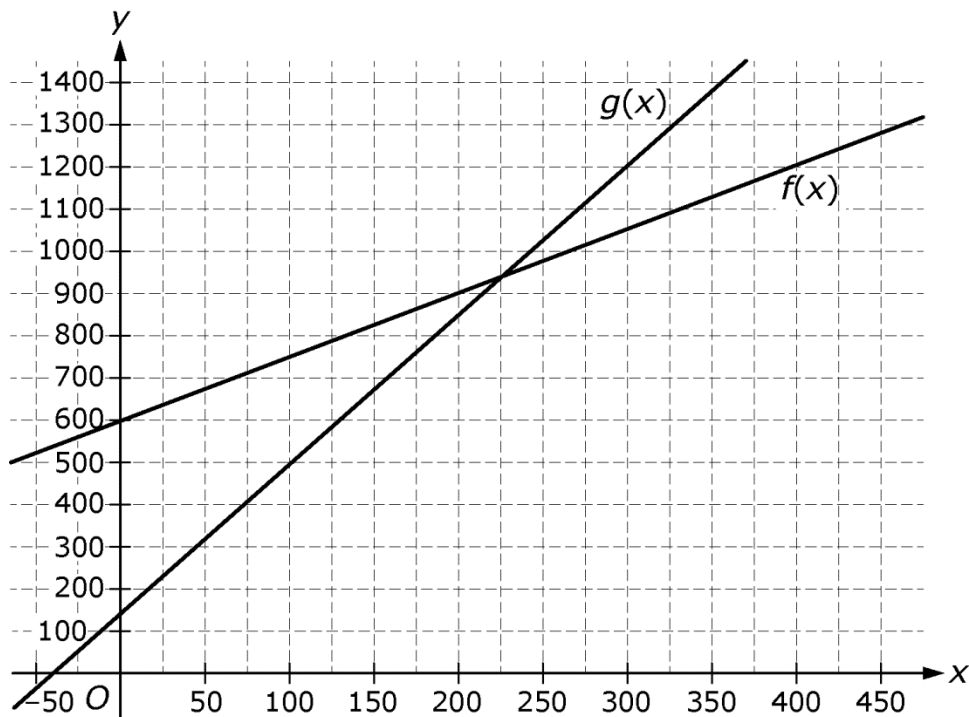| *x*	Function 1	Function 2
−3	4	−5
−2	3	−4
−1	2	−3
0	1	−2
1	0	−1
2	−1	0
3	−2	1

a. $(0, 1)$

b. $(0.5, 0.5)$

c. $(1.5, 0)$

d. $(1.5, -0.5)$

5.

$$f(x) = 1.5x + 600$$
$$g(x) = 3.5x + 150$$

The cost to produce x books is modeled by the function $f(x)$ above. The income from selling x books is modeled by the function $g(x)$. The graphs of f and g are shown in the coordinate plane below.

What is the number of books that must be produced and then sold to make the income equal to the cost? Justify your answer.

6.

$$y_1 = 3x - 8$$
$$y_2 = 0.5x + 7$$

For the functions defined above, fill in the table of values and circle the row of the table that indicates the solution to $y_1 = y_2$. Then give the solution to $y_1 = y_2$.
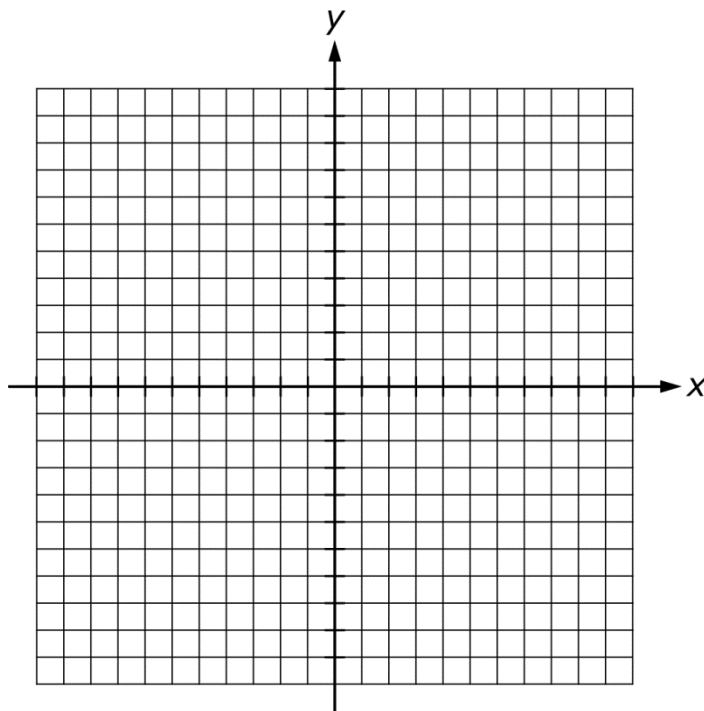
x	y_1	y_2
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Solution: _____

7. Graph the solution to the system of inequalities in the coordinate plane below.

$$3x - 2y > 12$$
$$2x + y \leq 8$$

8. A system contains two linear equations. Describe all possibilities for the solution set for the system, and in each case explain how the number of solutions relates to the graphs of lines.

9. It is recommended that adults consume at least 1,000 mg of calcium every day. One ounce of whole milk contains 30 mg of calcium, and one ounce of cheddar cheese contains 200 mg of calcium. If a person meets the recommendation by consuming x ounces of whole milk and y ounces of cheddar cheese, then $30x + 200y \geq 1,000$.

Part A Graph $30x + 200y \geq 1,000$ in the first quadrant of the coordinate plane.
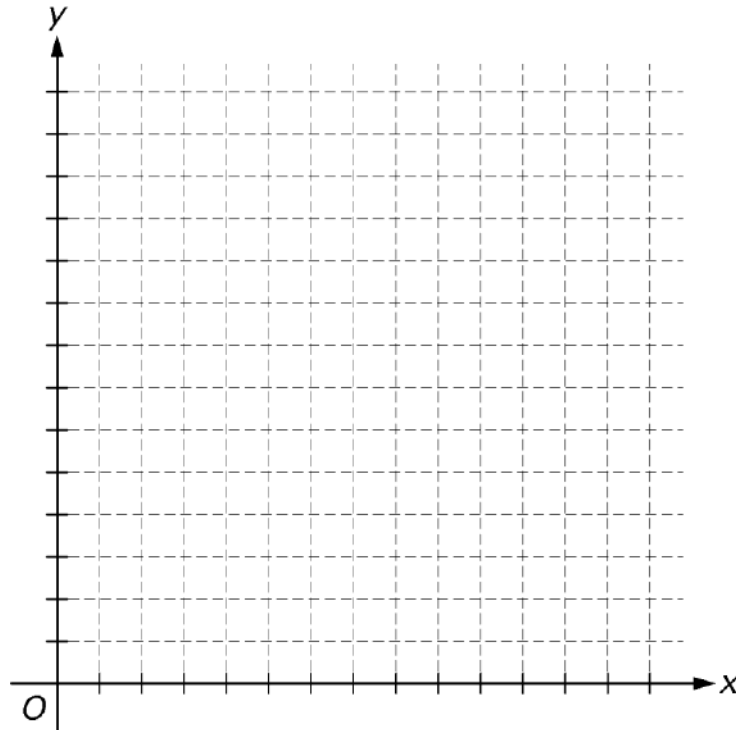
Part B Give three different amounts of milk and cheese that a person could consume to meet the recommendation.

10. Consider the system given below.

$$y = \frac{2}{3}x + 3$$
$$y = \frac{5}{2}x + \frac{7}{2}$$

Which of the following is true about the solution set of the system?

a. The solution is a point in the coordinate plane.

b. The solution is all the points on the line $y = \frac{2}{3}x + 3$.

c. The solution is a point on the x-axis.

d. The solution is the region in the coordinate plane above $y = \frac{5}{2}x + \frac{7}{2}$.

11. The Chang family is on their way home from a cross-country road trip. During the trip, the function $D(t) = 2,280 - 60t$ can be used to model their distance, in miles, from home after t hours of driving.

Part A Find $D(15)$ and interpret the meaning in the context of the problem.

Part B If $D(t) = 1,200$, find the value of t and interpret its meaning in the context of the problem.

12. The function $F(v)$ represents the amount, in dollars, raised at a fundraiser for a charity by v volunteers. Use function notation to write a representation of each of the following.

Part A The amount, in dollars, raised by 12 volunteers.

Part B The amount, in dollars, raised by m volunteers is $2,500.

Part C The amount, in dollars, raised by v volunteers is at least $3,000.

Part D 90 percent of the amount, in dollars, raised by 30 volunteers.

13. In New Jersey, the 2009 tuition cost at public universities for each student who lives in state was $17,547. In-state students paid 70% of the tuition amount, and the rest was paid by the state.

Part A Use function notation to express the total amount of tuition paid by the state for all in-state students as a function of the number of in-state students. Explain how any variables used are defined in the context of the problem. Show your work.

Part B In 2009, there were 69,543 in-state students enrolled at public universities in New Jersey. Use your function from Part A to find the total amount of tuition paid, in dollars, by the state for the 69,543 in-state students. Show your work.

14. In the following, assume x is the independent variable and y is the dependent variable.

Part A Use the definition of function to explain why the relation shown in the table below is a function.

x	y
0	0
2	3
3	2
4	10
5	−10
6	2

Part B Write the domain of the function.

Part C Write the range of the function.

15.   2, 6, 18, 54, 162,…

The first five terms of a geometric sequence are given above. Write a recursive function rule for the sequence.

16.   The first term in a sequence is –18, and each term after the first is 4 times
the preceding term.

Part A Which of the following recursive functions defines the sequence
described above?

a.
$$f(1) = -18$$
$$f(n) = 4f(n-1), \; n > 1$$

b.
$$f(1) = -18$$
$$f(n) = 4 + f(n-1), \; n > 1$$

c.
$$f(1) = -18$$
$$f(n) = 4f(n+1), \; n > 1$$

d.
$$f(1) = -18$$
$$f(n) = 4 + f(n+1), \; n > 1$$

Part B Which of the following explicit functions defines the sequence
described above, where n is a positive integer?

a. $f(n) = (-18 \cdot 4)^n$

b. $f(n) = (-18 \cdot 4)^{n-1}$
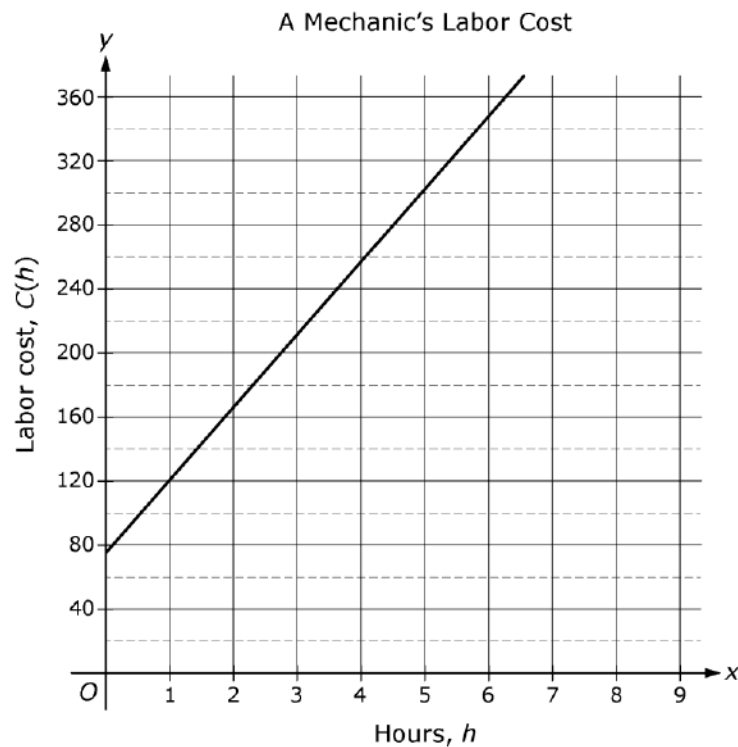
c. $f(n) = -18(4)^n$

d. $f(n) = -18(4)^{n-1}$

17.
$$a_n = -9\left(-\frac{1}{3}\right)^n$$

Fill in the blanks to give a recursive function for the sequence defined explicitly above.

$f(1) = $ _____

$f(n) = $ _____ , _____

18.   The graph below describes the labor cost for a mechanic.

A Mechanic's Labor Cost

Which of the following describes the domain of the function?

a.   All real numbers
b.   All real numbers greater than or equal to 0
c.   All whole numbers greater than 1
d.   All whole numbers greater than 75

19. The function $f(t) = 7.2t$ models the average distance, $f(t)$, in kilometers that Bob rides his bike over time, t, in hours.

The function $g(t) = 5.9t$ models the average distance, $g(t)$, in kilometers that Alice walks over time, t, in hours.
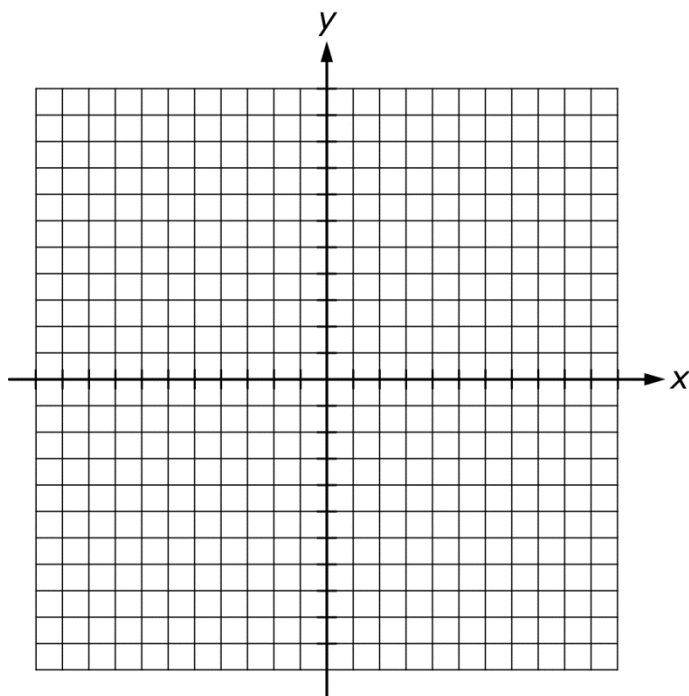
Part A What are the domains of the two functions?

Part B Graph the two functions on the coordinate plane below.
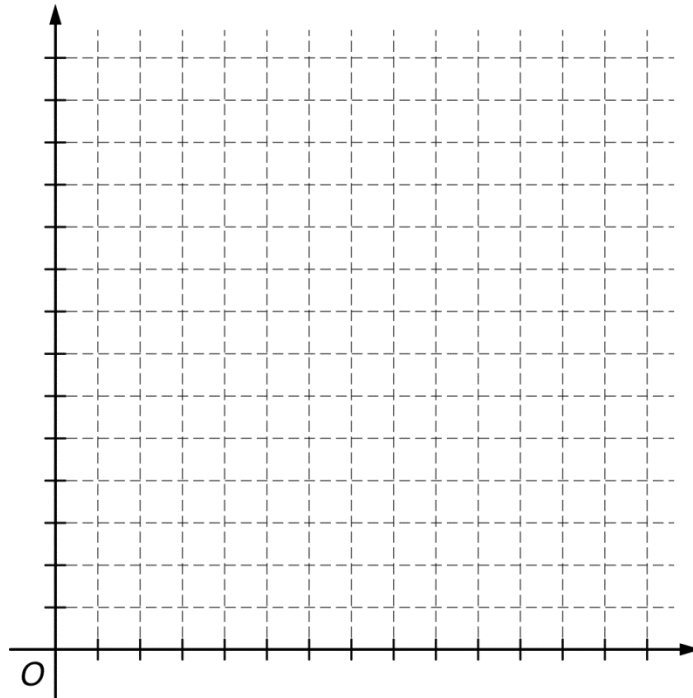
Part C Compare the rate of change of $f(t)$ to the rate of change of $g(t)$. What does this tell you about Alice's and Bob's speeds?

Part D Is there a time where Bob's and Alice's distances are the same? Explain.

20. Graph the function $f(x) = -2.5x + 50$ on the coordinate plane below.

Part A What is the *y*-intercept as an ordered pair?

Part B What is the *x*-intercept as an ordered pair?
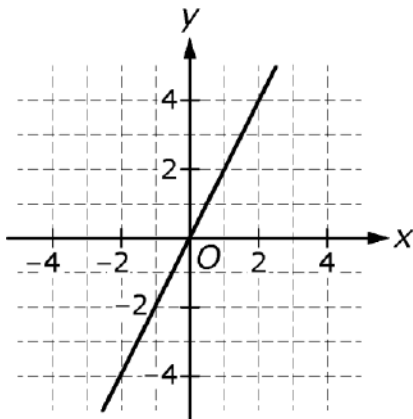
Part C What is the slope of the function?

Part D Describe the domain of the function.

21. Given the linear function $-8x + 4y = 12,$ circle all of the following that are equivalent representations. Explain using the properties of linear functions.
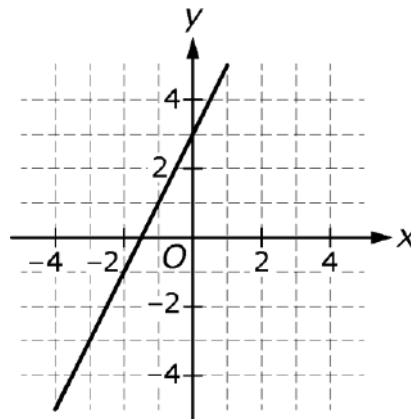
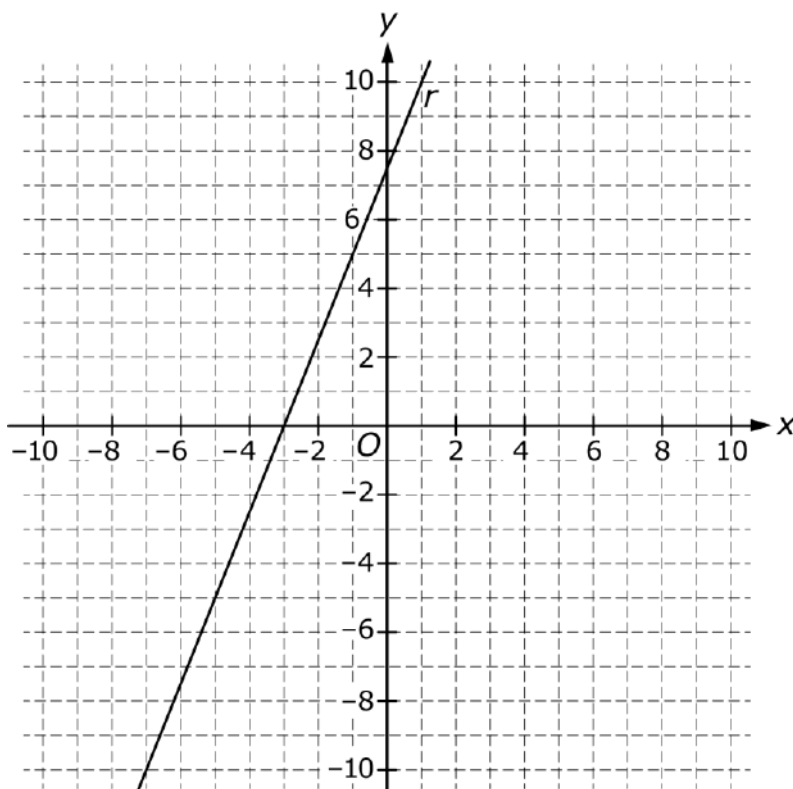a. $y = 2x + 3$

b. $y = \dfrac{1}{2}x + 3$

c.

d.

e. A line through the following points

x	y
−2	−1
0	3
3	9
5	13

f. A graph through the following points

x	y
−2	2
0	3
4	5
6	9

22.   The graph of the function r is shown in the coordinate plane below.
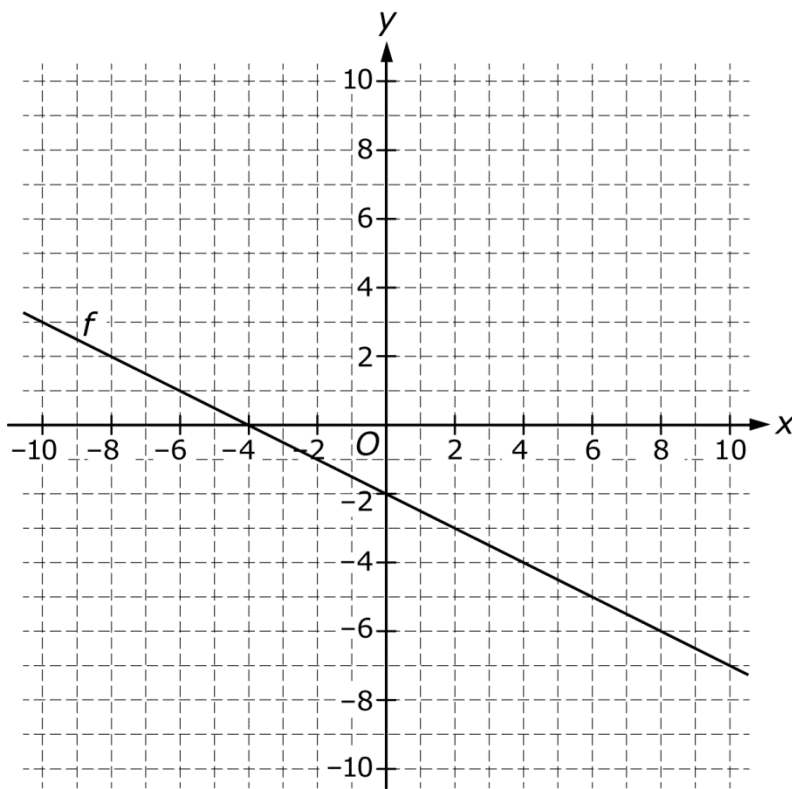

The function s is defined by $s(x) = -\dfrac{2}{5}x - \dfrac{6}{5}$ for all real numbers x.

Part A Describe how the slope of r compares with the slope of s.

Part B Describe how the x-intercept of r compares with the x-intercept of s.

23. The graph of the function *f* is shown in the coordinate plane below.

A table listing some of the values of the linear function *g* is shown below.

x	g(x)
0	9
1	6
2	3
3	0

Which of the two functions has the greater absolute value of the rate of change?

Explain your answer.