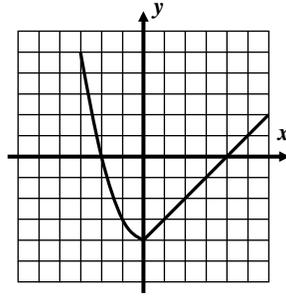




6. For the function  $f(x)$  shown below, which of the following represents the interval over which  $f(x) < 0$ ?

- (1)  $-2 < x < 4$
- (2)  $-2 \leq x \leq 4$
- (3)  $-4 < x < 0$
- (4)  $-4 \leq x \leq 0$



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7. For the piecewise defined function  $f(x) = \begin{cases} 3x - 1 & x < 3 \\ \frac{1}{2}x + 7 & x \geq 3 \end{cases}$ , which of the following is the value of  $f(6)$ ?

- (1) 7
- (2) 10
- (3) 17
- (4) 27

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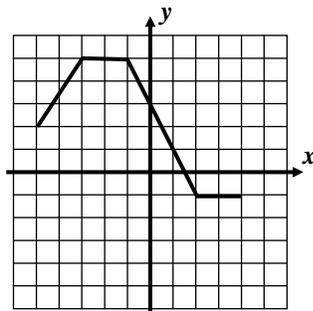
8. If  $f(x) = x^2 - 2x - 11$ , then which of the following values of  $x$  solves  $f(x) = 4$ ?

- (1)  $x = 0$
- (2)  $x = -2$
- (3)  $x = 3$
- (4)  $x = 5$

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9. The function  $f(x)$  is shown graphed below. The function  $g$  is defined by the formula  $g(x) = 3f(x) - 2$  for all values of  $x$  in the domain of  $f$ . Which of the following is the value of  $g(2)$ ?

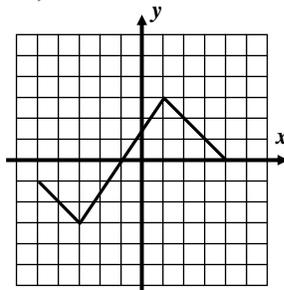
- (1) -5
- (2) -1
- (3) 3
- (4) 4



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10. Given the graph of  $h(x)$  shown below, over which of the following intervals is  $h$  increasing?

- (1)  $-1 < x < 4$
- (2)  $-3 < x < 1$
- (3)  $-3 < x < 3$
- (4)  $1 < x < 4$

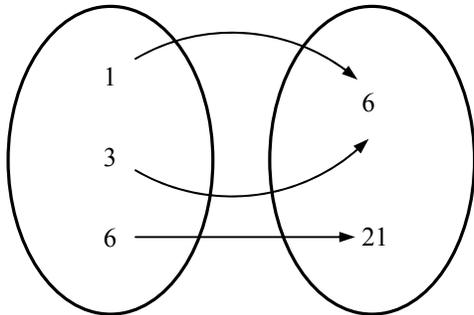


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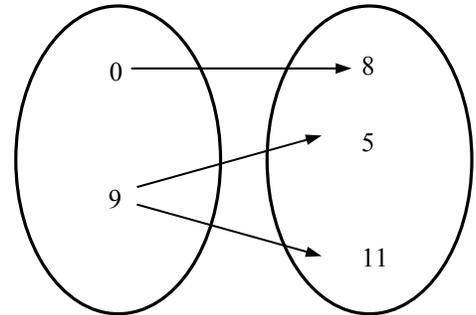


## Free Response Questions

11. The two diagrams below show how elements of a domain get changed into elements of a range. In one case, this represents a function. In the other case, it does not. Explain which is a function and which is not. Fully explain your choices.



**Case #1**

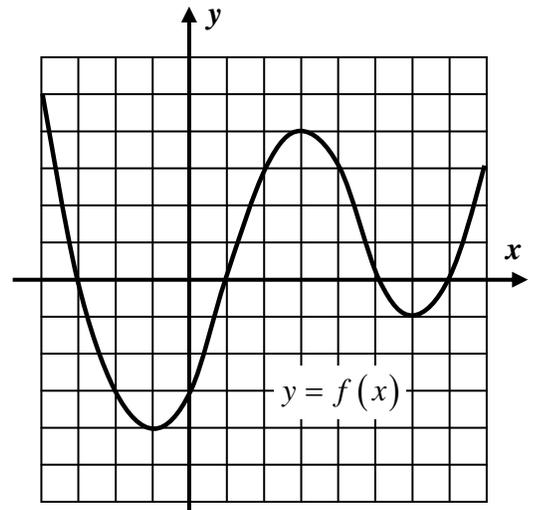


**Case #2**

12. For the function  $y = f(x)$  shown graphed below, answer the following questions.

(a) Find the value of  $f(3) + f(6)$ .

(b) State all intervals over which  $f(x) < 0$ .



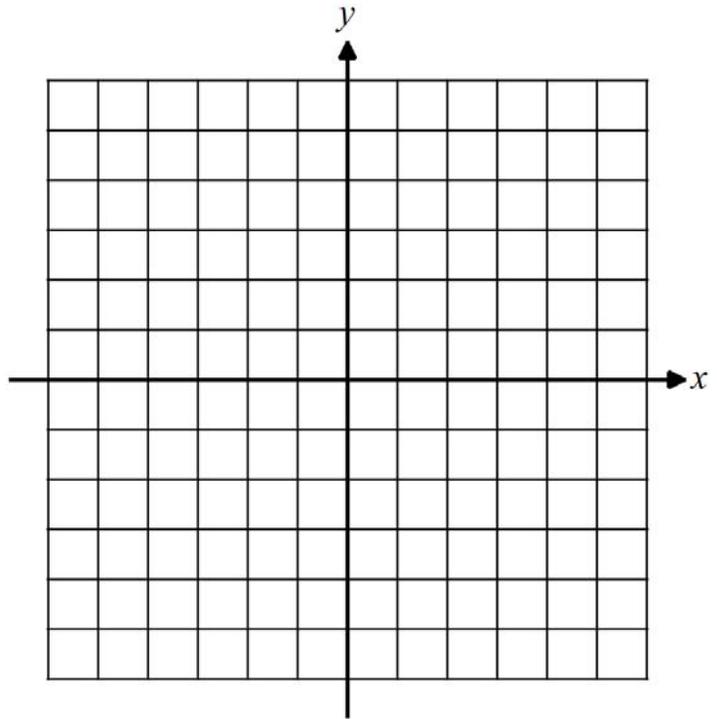
(c) Solve the equation  $f(x) = 0$  for all value(s) of  $x$ . Circle the points on your graph that you use to find your solutions.

(d) Give an interval over which  $f(x)$  is *only* decreasing.



13. Given the piecewise function  $f(x) = \begin{cases} 3x+11 & -5 \leq x \leq -2 \\ -\frac{1}{2}x+5 & -2 < x \leq 4 \end{cases}$ .

- (a) Graph this function on the grid to the right.  
Show your table of values.



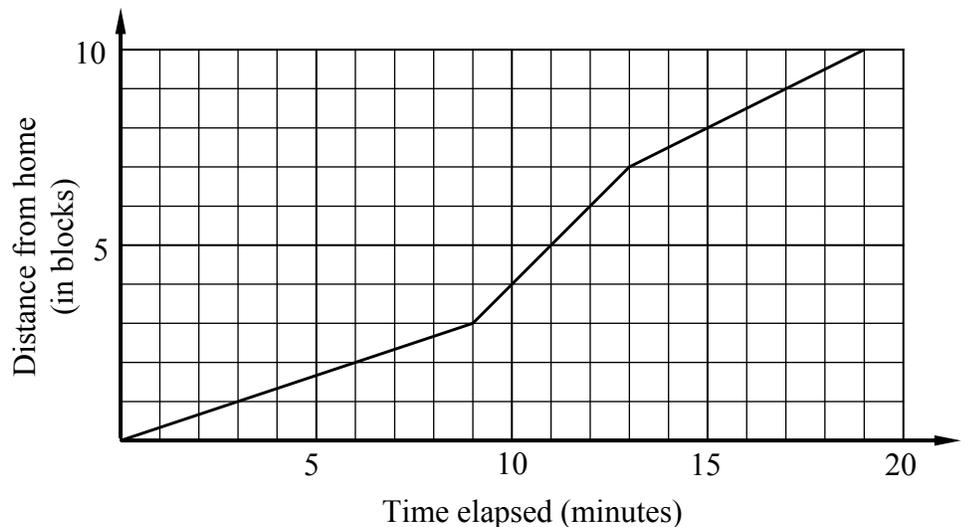
- (b) State the range of this function.

14. Michael is walking from home to a subway stop that is 10 blocks away. Calculate Michael's average rate of change, in blocks per minute, for each of the following intervals:

0 to 9 minutes

9 to 13 minutes

13 to 19 minutes



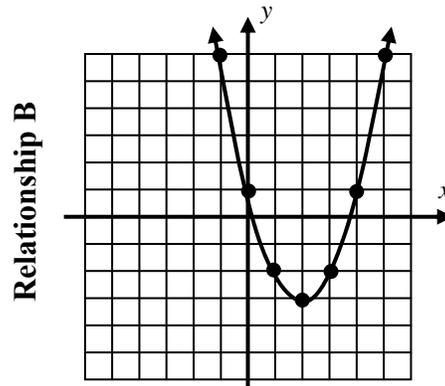
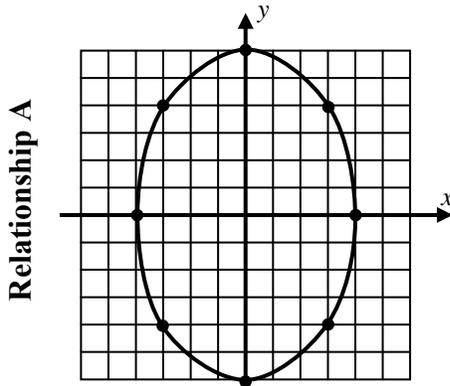
During which interval is Michael moving the slowest?



15. The classic test for whether the graph of a relationship represents a function is known as the **vertical line test**. It states:

**Vertical Line Test:** If a vertical line drawn on the graph of a relationship intersects that graph more than once, it does not represent the graph of a function.

Using this test, which relationship below is a function and which is not. Label.



Explain, using these graphs and a value of  $x = 3$ , why this test works.

16. The table below is partially filled out for the function  $f(x) = x^2 - 3x - 4$ .

$x$	-3	-2	-1	0	1	2	3	4	5
$f(x)$	14			-4		-6			6

(a) Fill out the remaining portions of the table.

(b) State the zeroes of the function.

(c) What is the maximum value of  $f$  on this interval?

