Name ____ Date ____________________

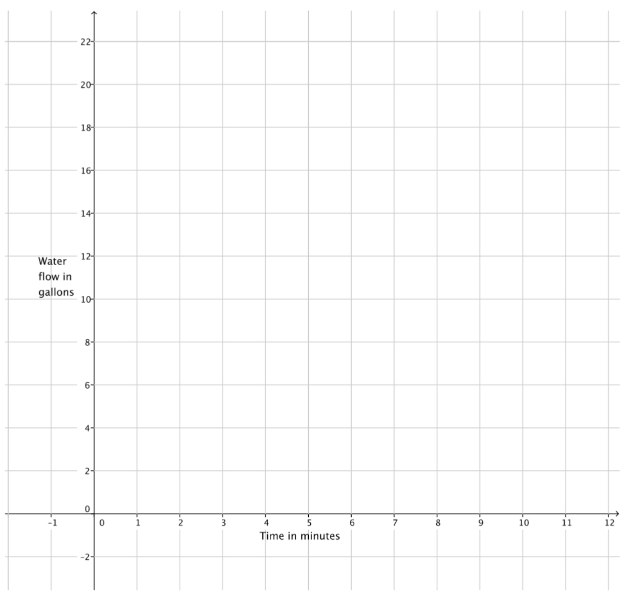
Graphs of Functions and Equations

The amount of water that flows out of a certain hose in gallons is a function of the amount of time in minutes that the faucet is turned on. The amount of water that flows out of the hose in 4 minutes is 11 gallons. Assume water flows at a constant rate.

a. Write an equation in two variables that represents the amount of water, y, in gallons, as a function of the time in minutes, x, the faucet is turned on.

b. Use the equation you wrote in part (a) to determine the amount of water that flows out of a hose in 8 minutes, 4 minutes, and 2 minutes.

c. The input of the function, x, is time in minutes, and the output of the function, y, is the amount of water that flows out of the hose in gallons. Write the inputs and outputs from part (b) as ordered pairs, and plot them as points on the coordinate plane.



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1. The distance that Scott walks is a function of the time he spends walking. Scott can walk $\frac{1}{2}$ mile every 8 minutes. Assume he walks at a constant rate.

   a. Predict the shape of the graph of the function. Explain.

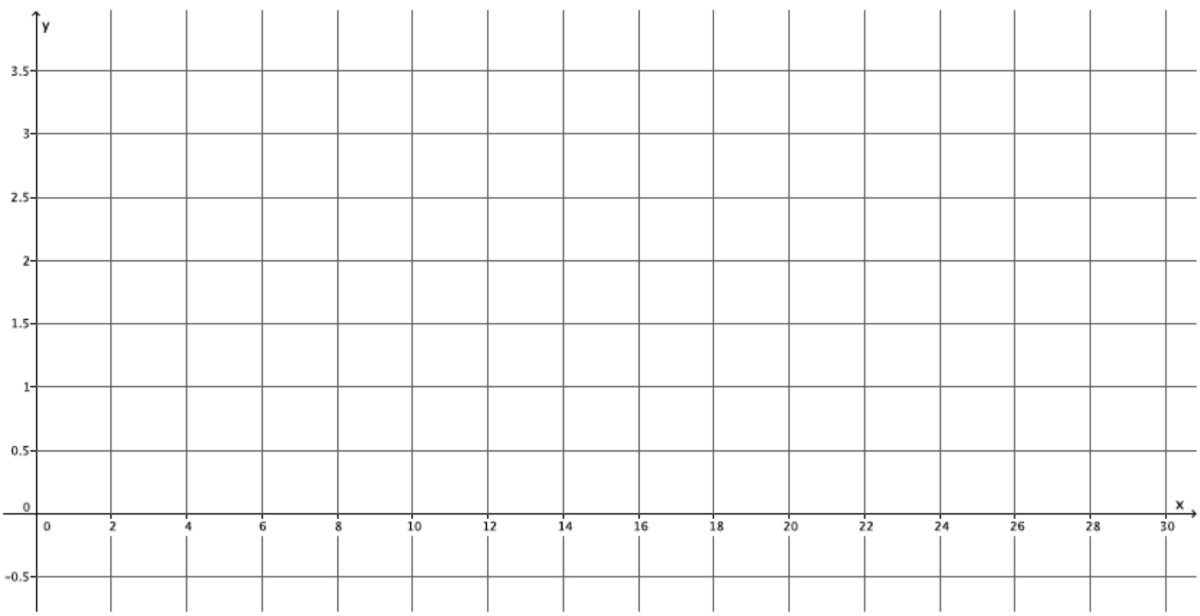
   b. Write an equation to represent the distance that Scott can walk, y, in x minutes.

   c. Use the equation you wrote in part (b) to determine how many miles Scott can walk in 24 minutes.

   d. Use the equation you wrote in part (b) to determine how many miles Scott can walk in 12 minutes.

   e. Use the equation you wrote in part (b) to determine how many miles Scott can walk in 16 minutes.

   f. Write your inputs and corresponding outputs as ordered pairs, and then plot them on a coordinate plane.



   g. What shape does the graph of the points appear to take? Does it match your prediction?

   h. If the function that represents Scott's walking is continuous, connect the points to make a line, and then write the equation that represents the graph of the function. What do you notice?

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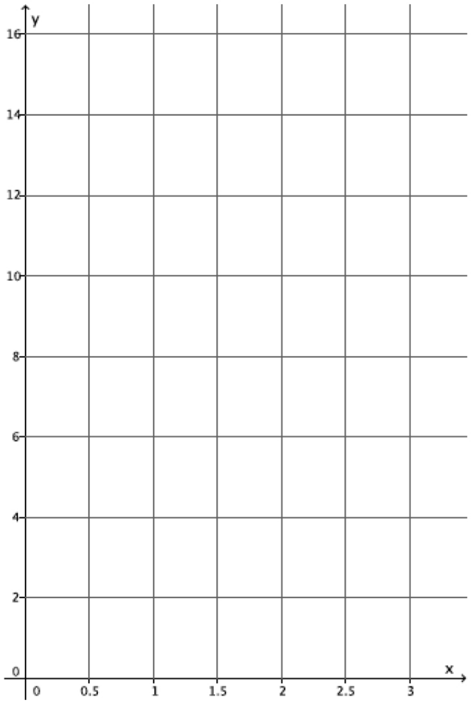
2. Graph the equation $y = x^3$ for positive values of x. Organize your work using the table below, and then answer the questions that follow.

x	y
0	
0.5	
1	
1.5	
2	
2.5	



a. Plot the ordered pairs on the coordinate plane.

b. What shape does the graph of the points appear to take?

c. Is this the graph of a linear function? Explain.

d. A volume function has the rule so that it assigns to each input, the length of one side of a cube, s, and to the output, the volume of the cube, V. The rule for this function is $V = s^3$. What do you think the graph of this function will look like? Explain.

e. Use the function in part (d) to determine the volume with side length of 3. Write the input and output as an ordered pair. Does this point appear to belong to the graph of $y = x^3$?

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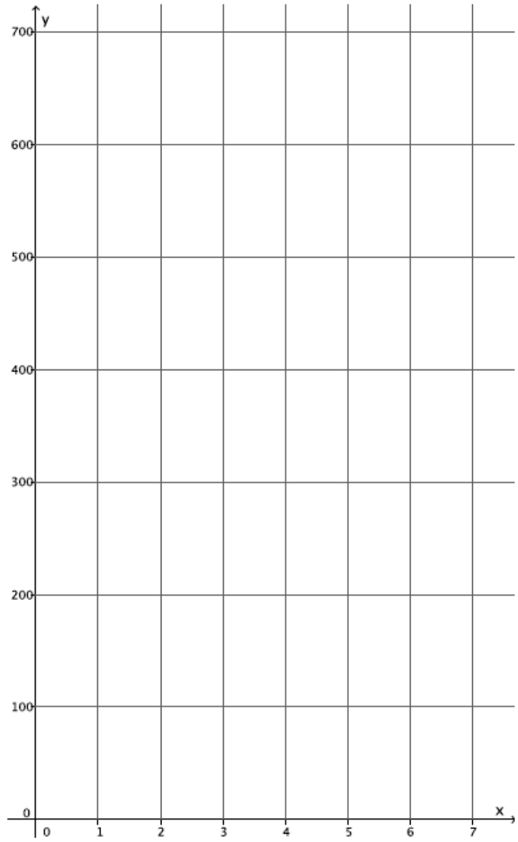
3. Sketch the graph of the equation $y = 180(x - 2)$ for whole numbers. Organize your work using the table below, and then answer the questions that follow.

x	y
3	
4	
5	
6	



a. Plot the ordered pairs on the coordinate plane.

b. What shape does the graph of the points appear to take?

c. Is this graph a graph of a function? How do you know?

d. Is this a linear equation? Explain.

e. The sum of interior angles of a polygon has the rule so that it assigns each input, the number of sides, n, of the polygon, and to the output, S, the sum of the interior angles of the polygon. The rule for this function is $S = 180(n - 2)$. What do you think the graph of this function will look like? Explain.

f. Is this function continuous or discrete? Explain.

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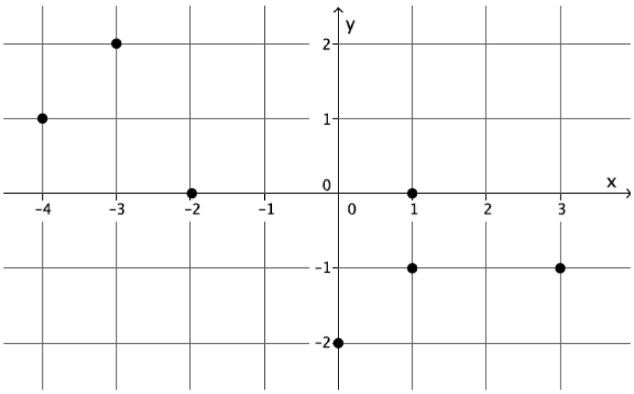
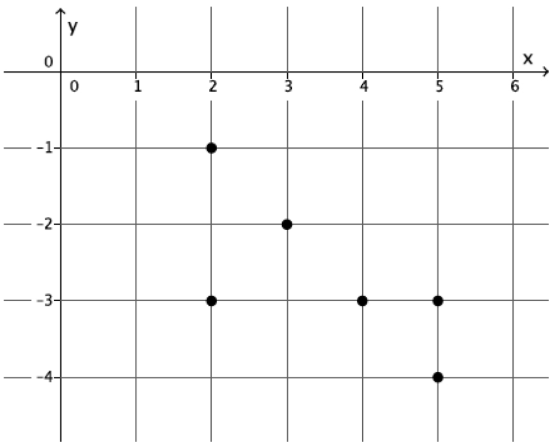
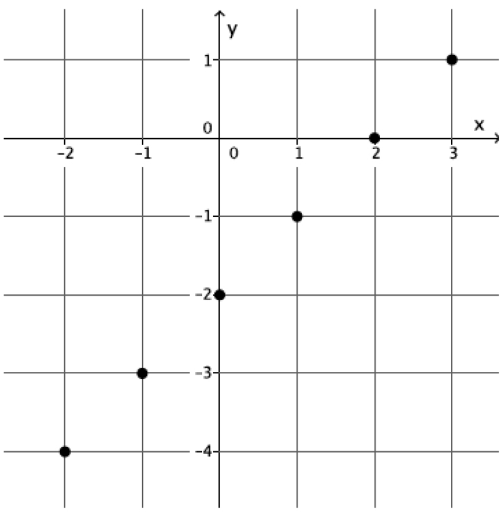
4. Examine the graph below. Could the graph represent the graph of a function? Explain why or why not.



5. Examine the graph below. Could the graph represent the graph of a function? Explain why or why not.



6. Examine the graph below. Could the graph represent the graph of a function? Explain why or why not.



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The amount of water that flows out of a certain hose in gallons is a function of the amount of time in minutes that the faucet is turned on. The amount of water that flows out of the hose in 4 minutes is 11 gallons. Assume water flows at a constant rate.

a. Write an equation in two variables that represents the amount of water, y, in gallons, as a function of the time in minutes, x, the faucet is turned on.

$$\frac{11}{4} = \frac{y}{x}$$
$$y = \frac{11}{4}x$$

b. Use the equation you wrote in part (a) to determine the amount of water that flows out of a hose in 8 minutes, 4 minutes, and 2 minutes.

$$y = \frac{11}{4}(8)$$
$$y = 22$$

In 8 minutes, 22 gallons of water flow out of the hose.

$$y = \frac{11}{4}(4)$$
$$y = 11$$

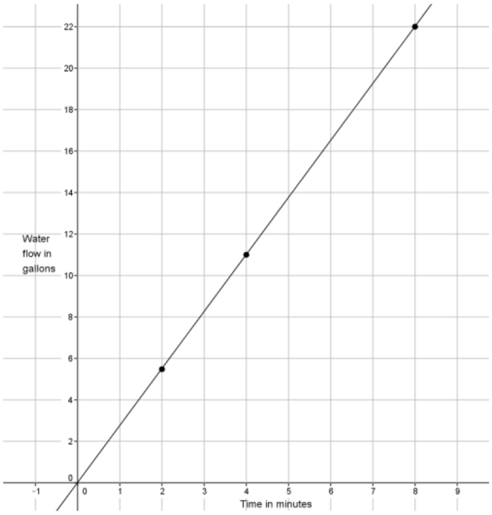
In 4 minutes, 11 gallons of water flow out of the hose.

$$y = \frac{11}{4}(2)$$
$$y = 5.5$$

In 2 minutes, 5.5 gallons of water flow out of the hose.

c. The input of the function, x, is time in minutes, and the output of the function, y, is the amount of water that flows out of the hose in gallons. Write the inputs and outputs from part (b) as ordered pairs, and plot them as points on the coordinate plane.

$(8, 22), (4, 11), (2, 5.5)$



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1. **The distance that Scott walks is a function of the time he spends walking. Scott can walk $\frac{1}{2}$ mile every 8 minutes. Assume he walks at a constant rate.**

   a. **Predict the shape of the graph of the function. Explain.**

   The graph of the function will likely be a line because a linear equation can describe Scott's motion, and I know that the graph of the function will be the same as the graph of the equation.

   b. **Write an equation to represent the distance that Scott can walk, y, in x minutes.**

$$\frac{0.5}{8} = \frac{y}{x}$$
$$y = \frac{0.5}{8}x$$
$$y = \frac{1}{16}x$$

   c. **Use the equation you wrote in part (b) to determine how many miles Scott can walk in 24 minutes.**

$$y = \frac{1}{16}(24)$$
$$y = 1.5$$

   Scott can walk 1.5 miles in 24 minutes.

   d. **Use the equation you wrote in part (b) to determine how many miles Scott can walk in 12 minutes.**

$$y = \frac{1}{16}(12)$$
$$y = \frac{3}{4}$$

   Scott can walk 0.75 miles in 12 minutes.

   e. **Use the equation you wrote in part (b) to determine how many miles Scott can walk in 16 minutes.**

$$y = \frac{1}{16}(16)$$
$$y = 1$$

   Scott can walk 1 mile in 16 minutes.

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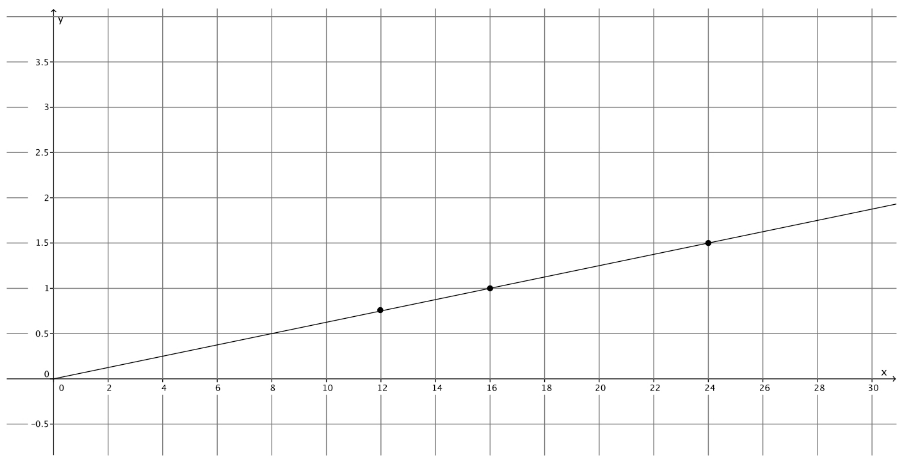
f. **Write your inputs and corresponding outputs as ordered pairs, and then plot them on a coordinate plane.**

$(24, 1.5)$, $(12, 0.75)$, $(16, 1)$



g. **What shape does the graph of the points appear to take? Does it match your prediction?**

The points appear to be in a line. Yes, as I predicted, the graph of the function is a line.

h. **If the function that represents Scott's walking is continuous, connect the points to make a line, and then write the equation that represents the graph of the function. What do you notice?**

The graph of the function is the same as the graph of the equation $y = \frac{1}{16}x$.

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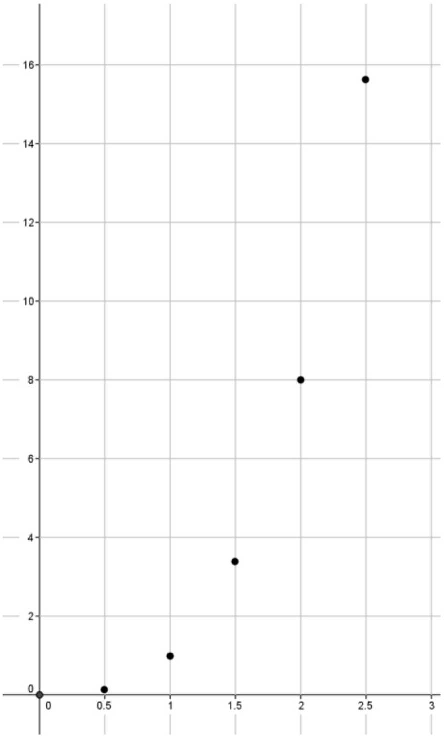
2. Graph the equation $y = x^3$ for positive values of x. Organize your work using the table below, and then answer the questions that follow.

x	y
0	0
0.5	0.125
1	1
1.5	3.375
2	8
2.5	15.625

a. Plot the ordered pairs on the coordinate plane.



b. What shape does the graph of the points appear to take?

It appears to take the shape of a curve.

c. Is this the graph of a linear function? Explain.

No, this is not the graph of a linear function. The equation $y = x^3$ is not a linear equation because the exponent of x is greater than 1.

d. A volume function has the rule so that it assigns to each input, the length of one side of a cube, s, and to the output, the volume of the cube, V. The rule for this function is $V = s^3$. What do you think the graph of this function will look like? Explain.

I think the graph of this function will look like the graph of the equation $y = x^3$. The inputs and outputs would match the solutions to the equation exactly. For the equation, the y-value is the cube of the x-value. For the function, the output is the cube of the input.

e. Use the function in part (d) to determine the volume with side length of 3. Write the input and output as an ordered pair. Does this point appear to belong to the graph of $y = x^3$?

$$V = (3)^3$$
$$V = 27$$

$(3, 27)$ *The point looks like it would belong to the graph of $y = x^3$; it looks like it would be on the curve that the shape of the graph is taking.*

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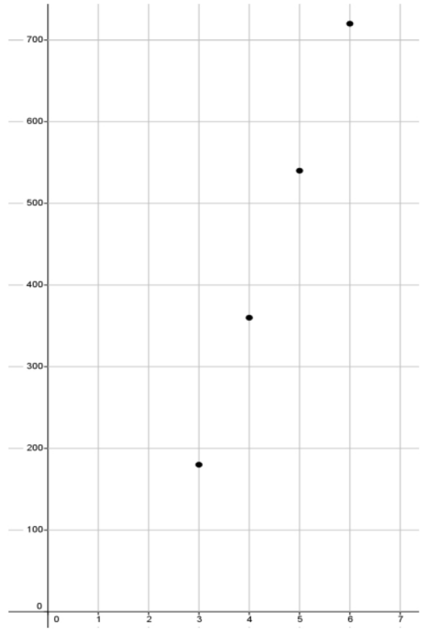
3. Sketch the graph of the equation $y = 180(x - 2)$ for whole numbers. Organize your work using the table below, and then answer the questions that follow.

x	y
3	180
4	360
5	540
6	720

a. Plot the ordered pairs on the coordinate plane.



b. What shape does the graph of the points appear to take?

It appears to take the shape of a line.

c. Is this graph a graph of a function? How do you know?

It appears to be a function because each input has exactly one output.

d. Is this a linear equation? Explain.

Yes, $y = 180(x - 2)$ is a linear equation because the exponent of x is 1.

e. The sum of interior angles of a polygon has the rule so that it assigns each input, the number of sides, n, of the polygon, and to the output, S, the sum of the interior angles of the polygon. The rule for this function is $S = 180(n - 2)$. What do you think the graph of this function will look like? Explain.

I think the graph of this function will look like the graph of the equation $y = 180(x - 2)$. The inputs and outputs would match the solutions to the equation exactly.

f. Is this function continuous or discrete? Explain.

The function $S = 180(n - 2)$ is discrete. The inputs are the number of sides, which are integers. The input, n, must be greater than 2 since three sides is the smallest number of sides for a polygon.

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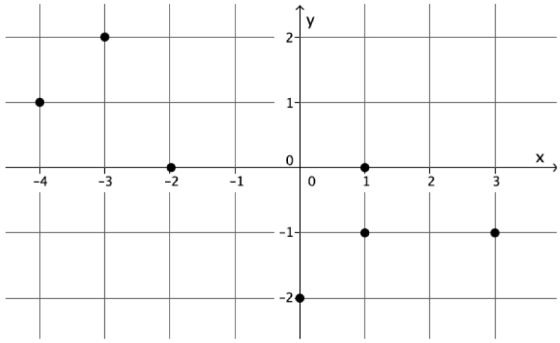
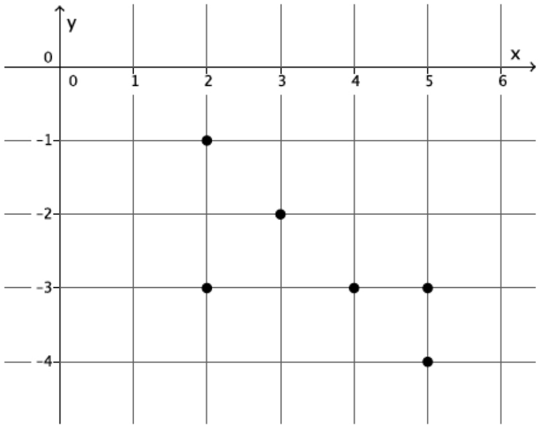
4. **Examine the graph below. Could the graph represent the graph of a function? Explain why or why not.**



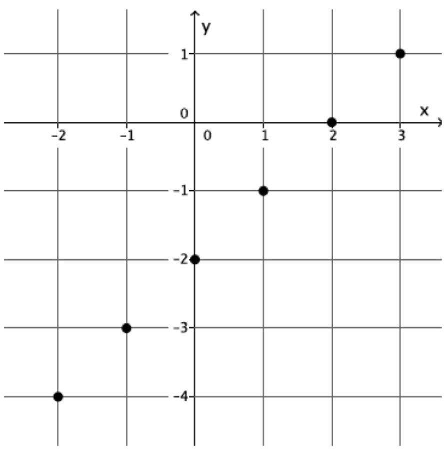
This is not a function. The ordered pairs $(1, 0)$ and $(1, -1)$ show that for the input of 1 there are two different outputs, both 0 and -1. For that reason, this cannot be the graph of a function because it does not fit the definition of a function.

5. **Examine the graph below. Could the graph represent the graph of a function? Explain why or why not.**



This is not a function. The ordered pairs $(2, -1)$ and $(2, -3)$ show that for the input of 2 there are two different outputs, both -1 and -3. Further, the ordered pairs $(5, -3)$ and $(5, -4)$ show that for the input of 5 there are two different outputs, both -3 and -4. For these reasons, this cannot be the graph of a function because it does not fit the definition of a function.

6. **Examine the graph below. Could the graph represent the graph of a function? Explain why or why not.**



This is the graph of a function. The ordered pairs $(-2, -4)$, $(-1, -3)$, $(0, -2)$, $(1, -1)$, $(2, 0)$, and $(3, 1)$ represent inputs and their unique outputs. By definition, this is a function.

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