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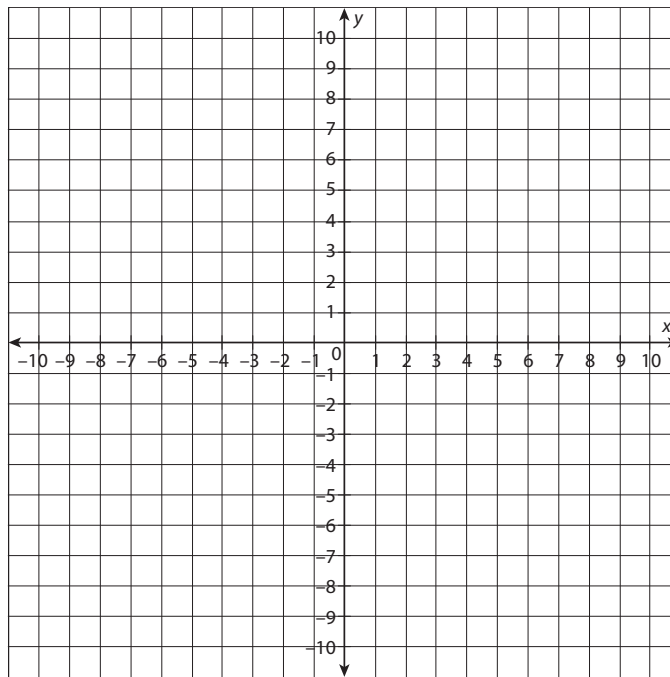
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Station Activities: Comparing Linear, Exponential, and Quadratic Functions

Station 1

Work with your group to answer each question.

1. Graph $y = 3x + 1$.



What is the y -intercept?

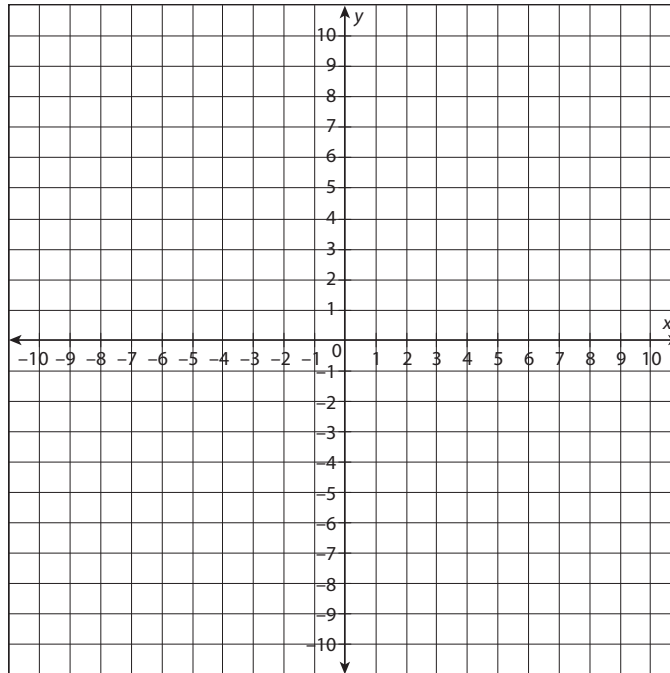
What are the zeros of this function?

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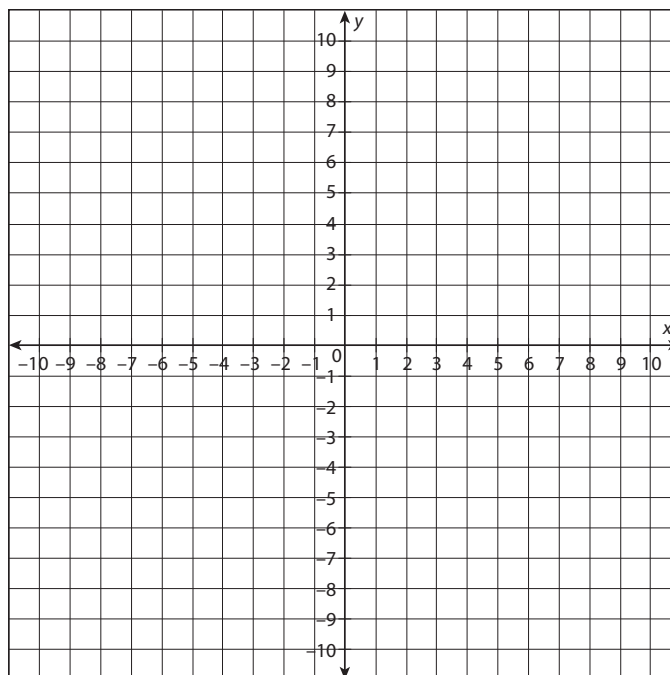
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2. Graph $y = 2^x - 2$.



Does this function have an x -intercept? If so, what is it?

3. Graph $x^2 + 1$.



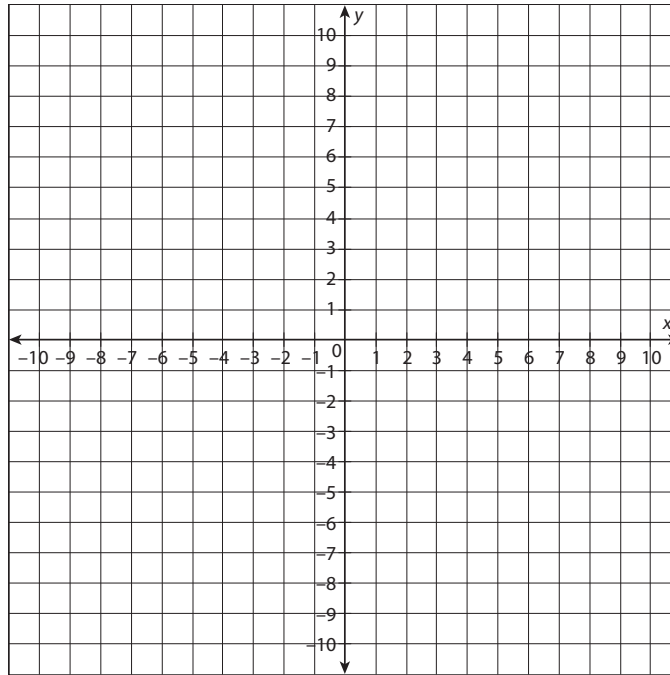
Does this function have an x -intercept? If so, what is it?

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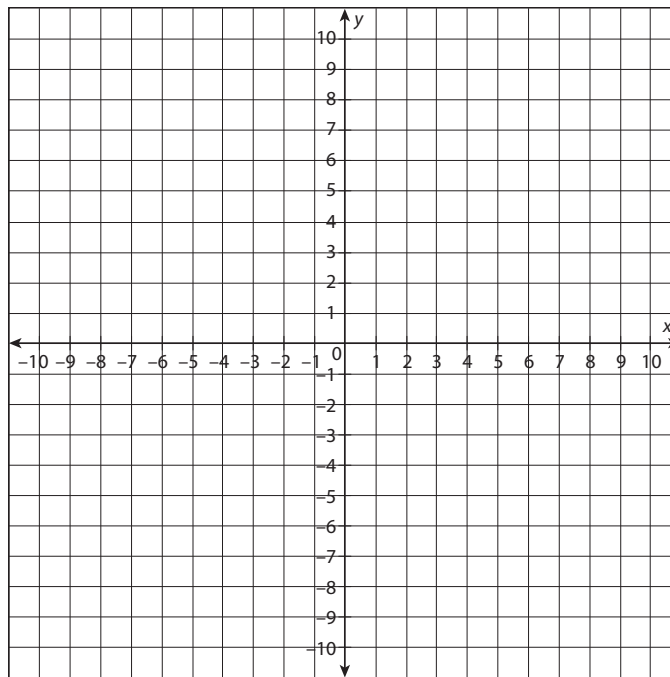
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4. A function passes through the points $(0, 5)$ and $(5, 0)$, and has a constant slope of -1 . What kind of function is this? Sketch a graph of the function.



5. A function passes through the points $(-1, 0)$ and $(0, 1)$. Its right end approaches infinity, while its left end approaches -1 . What kind of function is this? Sketch a graph of the function.

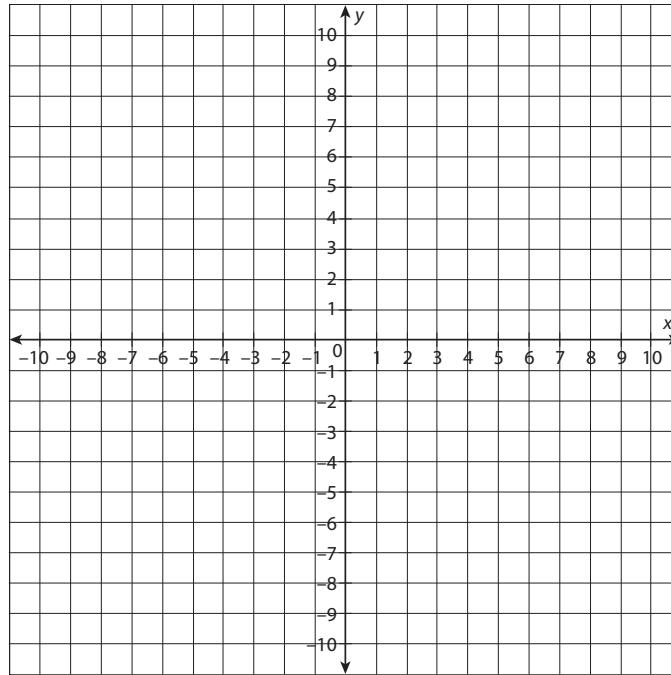


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6. A function passes through the points $(-3, 0)$ and $(5, 0)$. It attains a maximum value at $(1, 4)$. What kind of function is this? Sketch a graph of the function.



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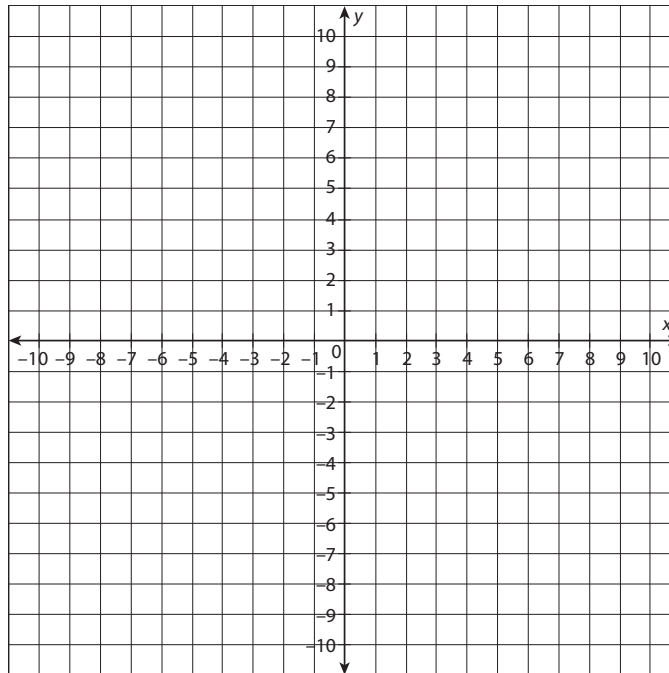
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Station 2

Work with your group to graph each function and evaluate the function at the given value.

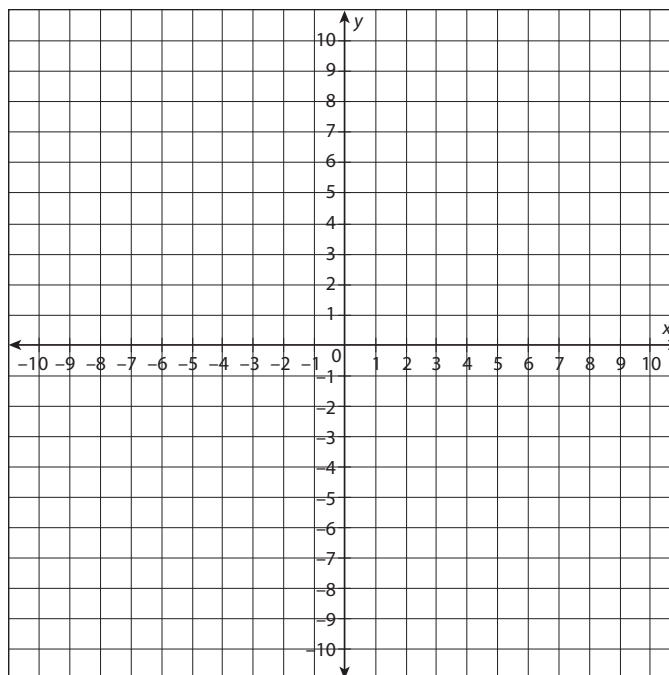
1. $f(x) = 0.25x + 3$

$f(8) =$



2. $f(x) = 2^{-x} - 1$

$f(-2) =$



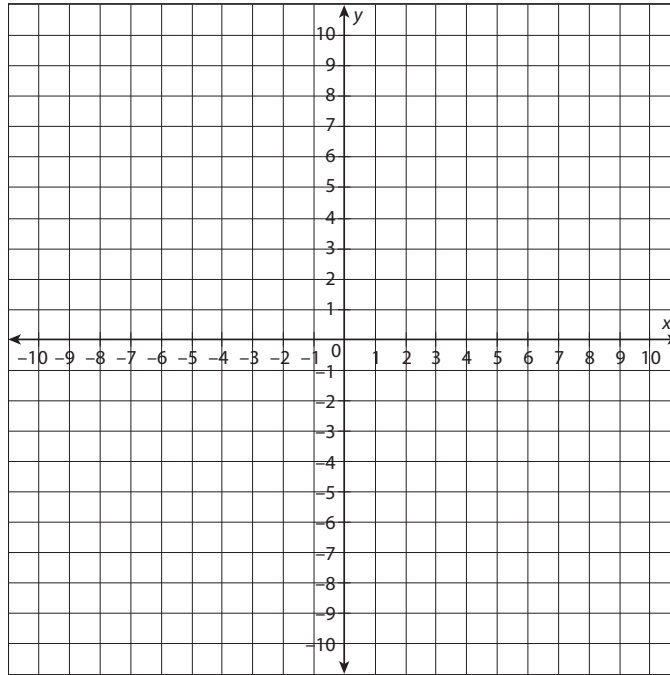
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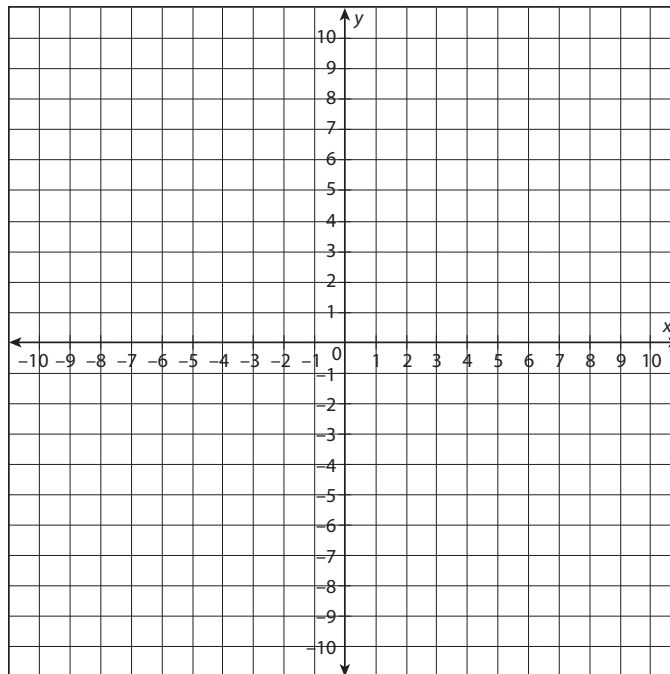
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3. $f(x) = x^2 - x - 2$

$f(5) =$



4. Graph $y = 4x - 3$. Are there any x -intercepts? If so, list them.

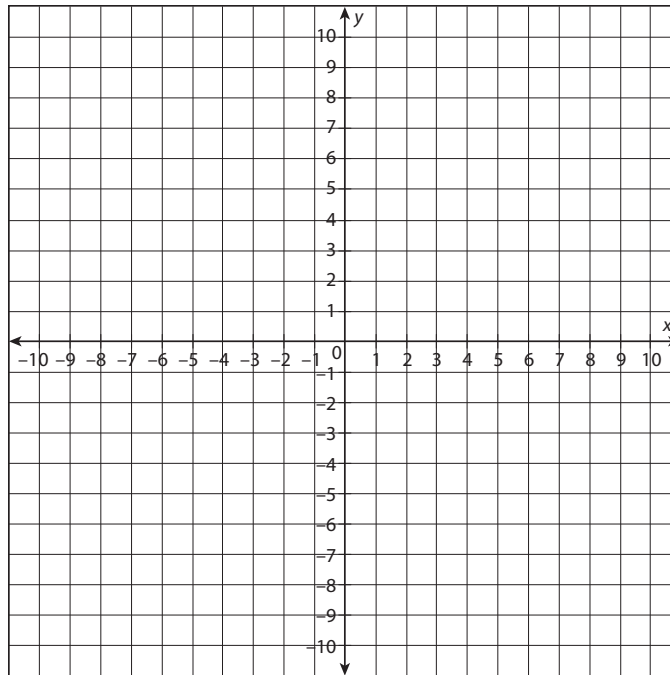


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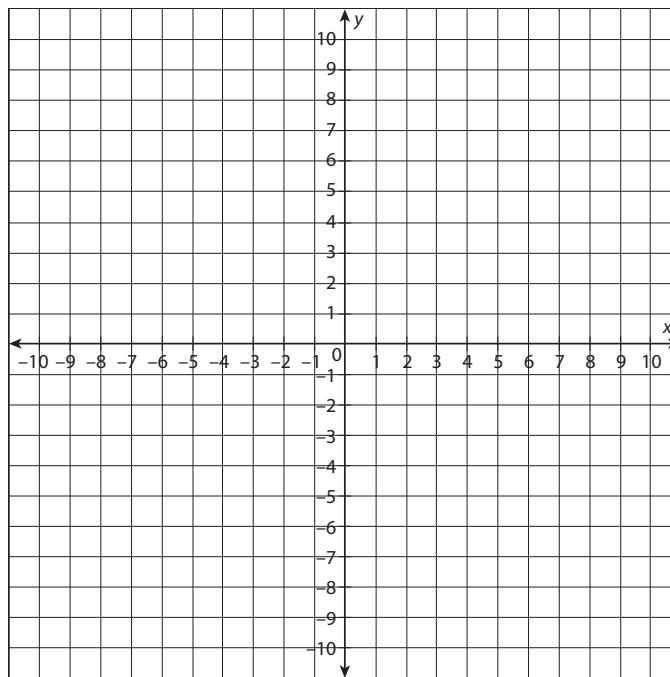
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5. Graph $y = \frac{1}{2} \left(\frac{1}{2} \right)^x$. Are there any x -intercepts? If so, list them.



6. Graph $y = 0.5x^2$. Are there any x -intercepts? If so, list them.



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7. Will a linear function always have an x -intercept? Explain.

8. For an exponential function to have an x -intercept, what must be true of the equation?

9. Is it possible to tell how many x -intercepts a quadratic equation will have? Explain.

Station 3

Work with your group to set up and then solve each equation. Keep in mind the following:

- The formula for compound interest is $A = P\left(1 + \frac{r}{n}\right)^{nt}$, where A is the final total (principal plus interest), P is the initial amount (principal), r is the interest expressed as a decimal, t is the amount of time in years, and n is the number of times the interest compounds per year.
 - The formula for the height above the ground of a falling object is $h(t) = a_0t^2 + v_0t + h_0$, where h_0 is the object's initial height, v_0 is the object's initial vertical velocity, a_0 is the object's initial vertical acceleration, and t is time in seconds. *Note:* The acceleration due to gravity is approximately -9.8 m/s^2 .
1. An account with an initial balance of \$2,500 has an interest rate of 2.9% that compounds annually over 5 years. What is the balance at the end of the year 5?
 2. Sarah makes cloth flowers. She buys \$300 in materials, and she sells 12 flowers for \$5.00. What is her profit if she sells 1,200 cloth flowers?
 3. An object is dropped from a height of 24.5 meters. The acceleration due to gravity is 9.8 meters per second per second. When will the object hit the ground?

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4. A swallow swoops down over the ground from a branch 21 feet high. The swallow reaches a minimum height of 1 foot when it is 25 feet horizontally from its starting point. If it continues on this path, how far from its starting point will the swallow be when it returns to its initial height? Explain how you found your answer.

5. If you have \$2,000 to invest for 8 years, which account has the better yield: an account that compounds quarterly at 3.2%, or an account that compounds monthly at 3%?

6. A show cost \$1,500 to produce. Tickets are sold for \$12 apiece. How many tickets do the organizers need to sell in order to break even?

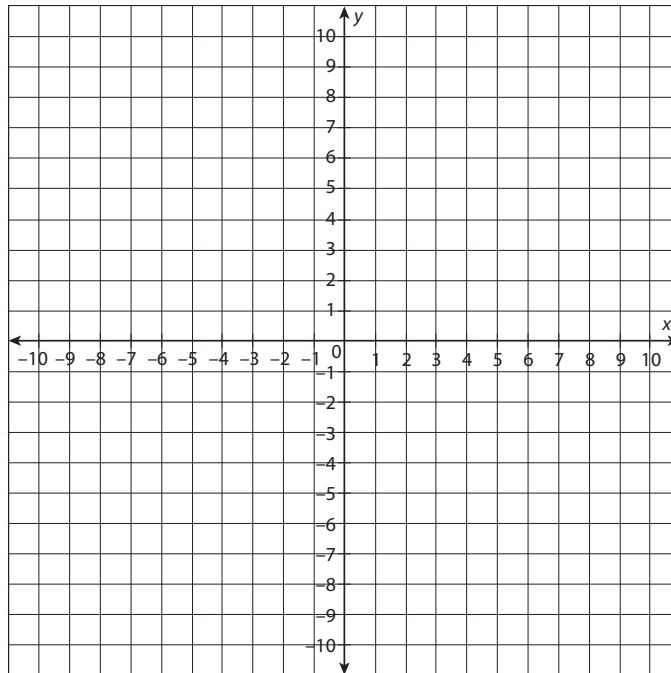
Station 4

You will work with a series of functions at this station. Use the given function for the problems that follow.

$$f(x) = \frac{1}{3}x - 2$$

1. Create a table of values and a graph for the function. Identify the x - and y -intercepts.

x	$f(x)$



x -intercept(s):

y -intercept:

2. Looking at the equation, what is a defining characteristic of a linear function?
3. Looking at the table of values, what is a defining characteristic of a linear function's table of values?
4. Looking at the graph, what is a defining characteristic of a linear function's graph?

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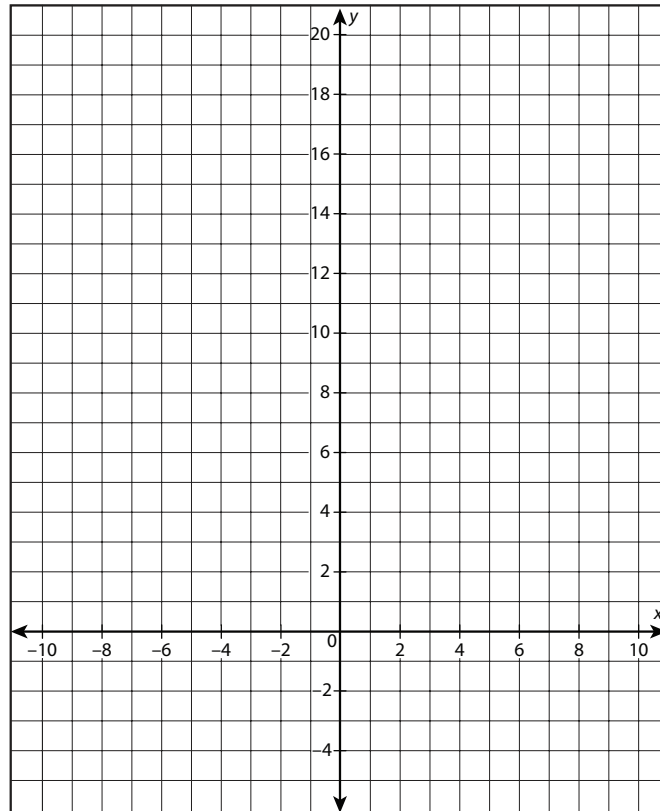
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Use the given function for the problems that follow.

$$g(x) = \left(\frac{1}{2}\right)^x$$

5. Create a table of values and a graph for the function. Identify the x - and y -intercepts.

x	$g(x)$



x -intercept(s):

y -intercept:

6. Looking at the equation, what is a defining characteristic of an exponential function?
7. Looking at the table of values, what is a defining characteristic of an exponential function's table of values?
8. Looking at the graph, what is a defining characteristic of an exponential function's graph?

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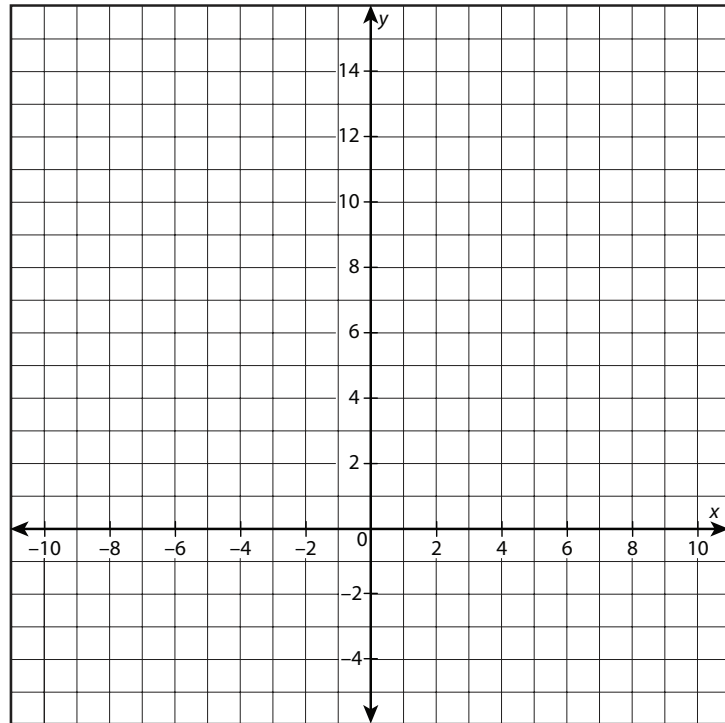
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Use the given function for the problems that follow.

$$h(x) = \frac{1}{10}(x - 5)^2 + 2$$

9. Create a table of values and a graph for the function. Identify the x - and y -intercepts.

x	$h(x)$



x -intercept(s):

y -intercept:

10. Looking at the equation, what is a defining characteristic of a quadratic function?
11. Looking at the table of values, what is a defining characteristic of a quadratic function's table of values?
12. Looking at the graph, what is a defining characteristic of a quadratic function's graph?