

2.6 Form Follows Function

A Practice Understanding Task

In our work so far, we have worked with linear and exponential equations in many forms. Some of the forms of equations and their names are:



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| Linear Functions | |
|---|---|
| Equation | Name |
| $y = \frac{1}{2}x + 1$ | Slope Intercept Form $y = mx + b$, where m is the slope and b is the y-intercept |
| $y = \frac{1}{2}(x - 4) + 3$ | Point Slope Form $y = m(x - x_1) + y_1$, where m is the slope and (x_1, y_1) the coordinates of a point on the line |
| $f(0) = 1, f(n) = f(n - 1) + \frac{1}{2}$ | Recursion Formula $f(n) = f(n - 1) + D$, Given an initial value $f(a)$ D = constant difference in consecutive terms (used only for discrete functions) |

| Exponential Functions | |
|-------------------------------|--|
| Equation | Name |
| $y = 10(3)^x$ | Explicit Form $y = a(b)^x$ |
| $f(0) = 10, f(n + 1) = 3f(n)$ | Recursion Formula $f(n + 1) = Rf(n)$ Given an initial value $f(a)$ R = constant ratio between consecutive terms (used only for discrete functions) |

Knowing a number of different forms for writing and graphing equations is like having a mathematical toolbox. You can select the tool you need for the job, or in this case, the form of the equation that makes the job easier. Any master builder will tell you that the more tools you have the better. In this task, we'll work with our mathematical tools to be sure that we know how to use them all efficiently. As you model the situations in the following problems, think about the important information in the problem and the conclusions that can be drawn from it. Is the function linear or exponential? Does the problem give you the slope, a point, a ratio, a y-intercept? Is the function discrete or continuous? This information helps you to identify the best tools and get to work!

1. In his job selling vacuums, Joe makes \$500 each month plus \$20 for each vacuum he sells. Write the equation that describes Joe's monthly income I as a function of the n , the number of vacuums sold.

Name the form of the equation you wrote and why you chose to use that form.

This function is: linear exponential neither (choose one)

This function is: continuous discrete neither (choose one)

2. Write the equation of the line with a slope of -1 through the point $(-2, 5)$

Name the form of the equation you wrote and why you chose to use that form.

This function is: linear exponential neither (choose one)

This function is: continuous discrete neither (choose one)

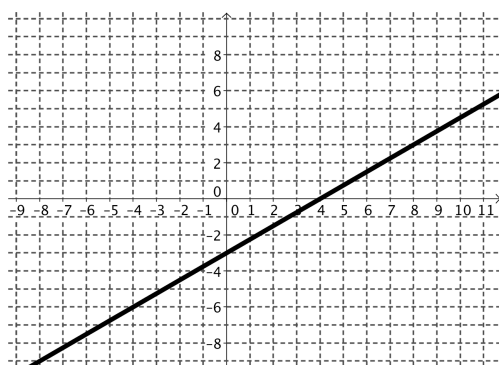
3. Write the equation of the geometric sequence with a constant ratio of 5 and a first term of -3.

Name the form of the equation you wrote and why you chose to use that form.

This function is: linear exponential neither (choose one)

This function is: continuous discrete neither (choose one)

3. Write the equation of the function graphed below:



Name the form of the equation you wrote and why you chose to use that form.

This function is: linear exponential neither (choose one)

This function is: continuous discrete neither (choose one)

4. The population of the resort town of Java Hot Springs in 2003 was estimated to be 35,000 people with an annual rate of increase of about 2.4%. Write the equation that models the number of people in Java Hot Springs, with t = the number of years from 2003?

Name the form of the equation you wrote and why you chose to use that form.

This function is: linear exponential neither (choose one)

This function is: continuous discrete neither (choose one)

5. Yessica's science fair project involved growing some seeds to see what fertilizer made the seeds grow fastest. One idea she had was to use an energy drink to fertilize the plant. (She thought that if they make people perky, they might have the same effect on plants.) This is the data that shows the growth of the seed each week of the project.

| | | | | | |
|-------------|-----|-----|-----|-----|-----|
| Week | 1 | 2 | 3 | 4 | 5 |
| Height (cm) | 1.7 | 2.9 | 4.1 | 5.3 | 6.5 |

Write the equation that models the growth of the plant over time.

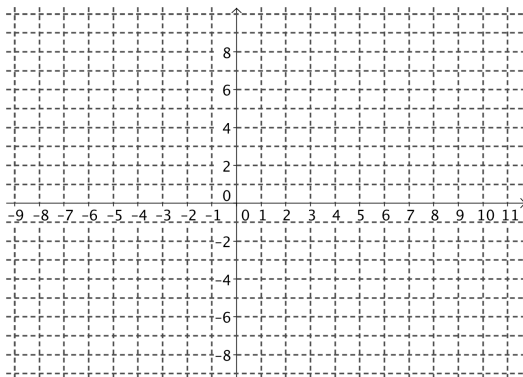
Name the form of the equation you wrote and why you chose to use that form.

This function is: linear exponential neither (choose one)

This function is: continuous discrete neither (choose one)

An equation gives us information that we can use to graph the function. Pick out the important information given in each of the following equations and use the information to graph the function.

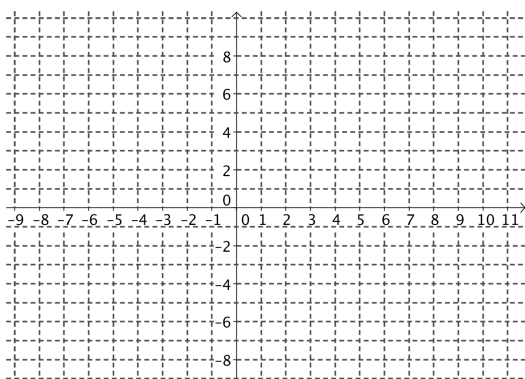
6. $y = \frac{1}{2}x - 5$



What do you know from the equation that helps you to graph the function?

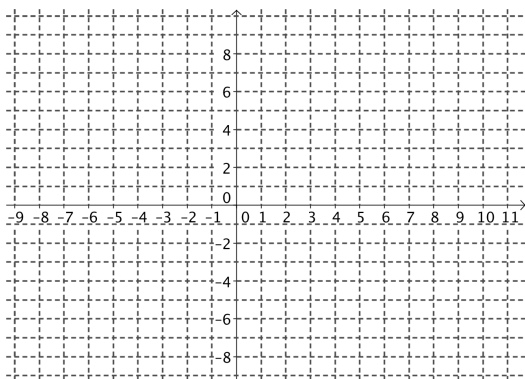
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7. $y = 2^n$



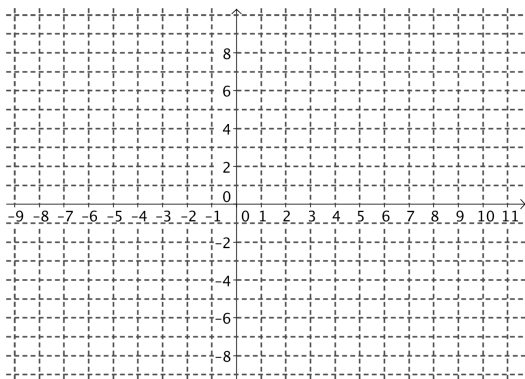
What do you know from the equation that helps you to graph the function?

8. $y = -2(x + 6) + 8$



What do you know from the equation that helps you to graph the function?

9. $f(1) = -5, f(n) = f(n - 1) + 1$



What do you know from the equation that helps you to graph the function?