In these sections, students generalize what they have learned about geometric sequences to investigate exponential functions. Students study exponential functions of the form $y = ab^x$. Students look at multiple representations of exponential functions, including graphs, tables, equations, and context. They learn how to move from one representation to another. Students learn that the value of a is the "starting value" of the function—a is the y-intercept or the value of the function at $x = 0$. b is the growth (multiplier). If $b > 1$ then the function increases; if b is a fraction between 0 and 1 (that is, $0 < b < 1$), then the function decreases (decays). In this course, values of $b < 0$ are not considered.

Example 3

Write an equation that represents the function in this table.

Week	Weight of Bacterial Culture (g)
1	756.00
2	793.80
3	833.49

The exponential function will have the form $y = ab^x$, where y is the weight of the bacterial culture, and x is the number of weeks. The multiplier, b, for the weight of the bacterial culture is 1.05 (because $793.80 \div 756 = 1.05$ and $833.49 \div 793.80 = 1.05$, etc.). The starting point, a is not given because we are not given the weight at Week 0. However, since the growth is 1.05 every week, we know that (1.05) • (weight at Week 0) = 756.00g. The weight at Week 0 is 720g, thus $a = 720$. We can now write the equation:

$$y = 720 \cdot 1.05^x,$$

where y is the weight of the bacterial culture (g), and x is the time (weeks).

3. Based on each table below, find the equation of the exponential function $y = ab^x$.

a.

x	$f(x)$
0	1600
1	2000
2	2500
3	3125

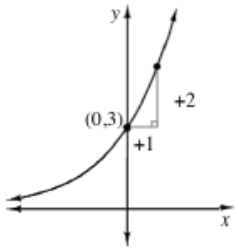
b.

x	y
1	40
2	32
3	25.6

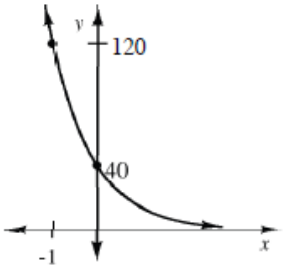
4. The new Bamo Super Ball has a rebound ratio of 0.97. If you dropped the ball from a height of 125 feet, how high will it bounce on the tenth bounce?

5. Based on each graph below, find the equation of the exponential function $y = ab^x$.

a.



b.



3. a. $y = 1600(1.25)^x$ b. $y = 50(0.8)^x$

4. About 92.18 feet.

5. a. $y = 3(\frac{5}{3})^x$ b. $y = 40(\frac{1}{3})^x$