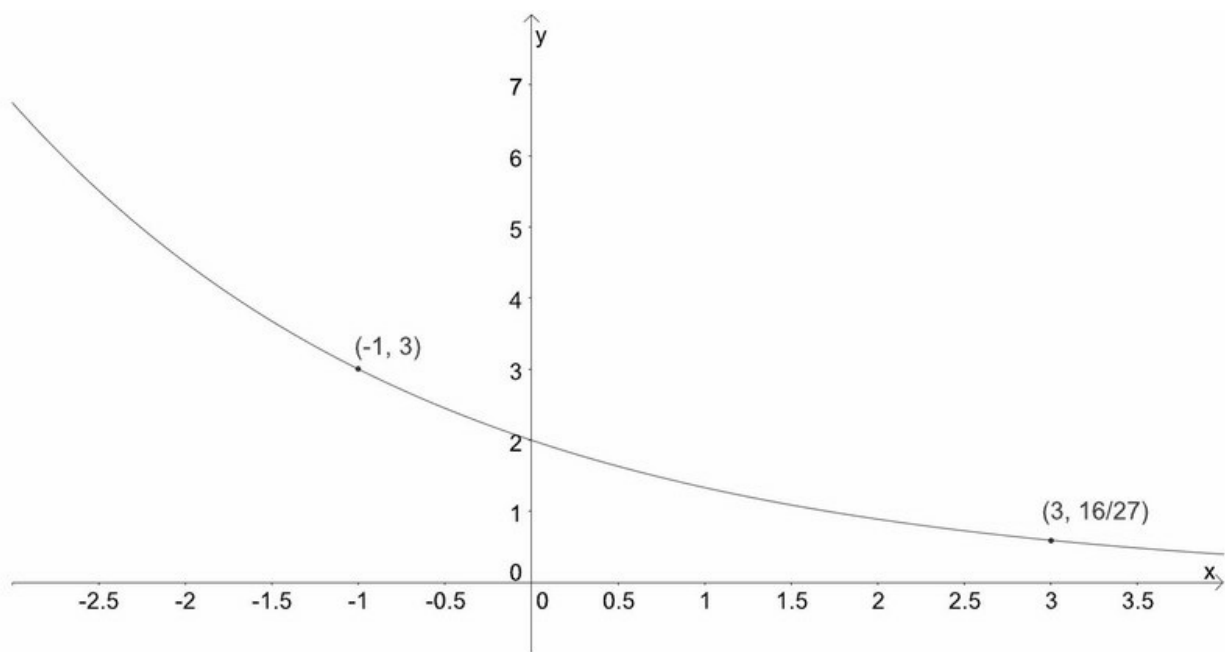


F-LE Two Points Determine an Exponential Function II

Alignments to Content Standards: F-LE.A.2

Task

The graph of a function of the form $f(x) = ab^x$ is shown below. Find the values of a and b .



IM Commentary

An easier version of this problem is given in Two Points Determine an Exponential

Function, I

[Edit this solution](#)

Solution

The value of the function decreases from 3 to $\frac{16}{27}$ by multiplying 3 four times by b

$$3 \times b \times b \times b \times b = \frac{16}{27}$$

Writing this as $3b^4 = \frac{16}{27}$, we divide by 3 to get $b^4 = \frac{16}{81}$, so $b = \pm\frac{2}{3}$. Since the base b must be positive, we conclude that $b = \frac{2}{3}$.

Now, since $(-1, 3)$ is on the graph of f , we know $f(-1) = 3$, so substituting this input-output pair into the equation yields

$$3 = a\left(\frac{2}{3}\right)^{-1},$$

which quickly leads to $a = 2$. We conclude that $f(x) = 2\left(\frac{2}{3}\right)^x$



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