

Illustrative Mathematics

F-LE Two Points Determine an Exponential Function I

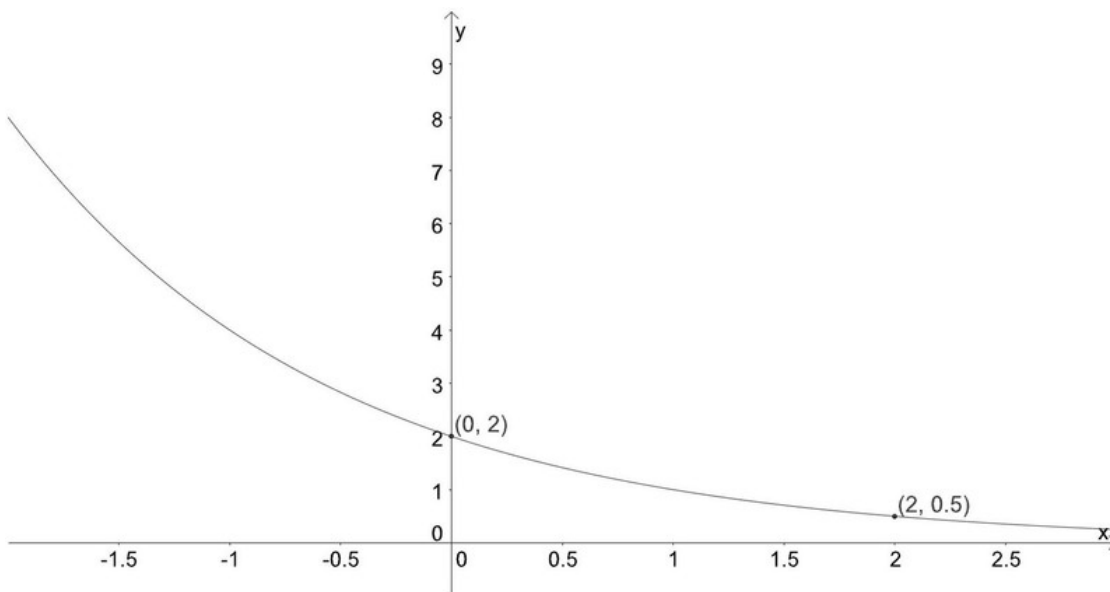
Alignments to Content Standards

- [Alignment: F-LE.A.2](#)

Tags

- *This task is not yet tagged.*

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



Commentary

A more sophisticated version of this problem is F.LE Two Points Determine an Exponential Function 2.

Solutions

Solution: Two Points Determine an Exponential Function I, first solution

The point $(0, 2)$ is on the graph, so the equation should be satisfied by $x = 0$ and $y = 2$. This gives $2 = ab^0$. Because $b^0 = 1$ we get $2 = a$.

Now setting $a = 2$ and substituting $x = 2, y = \frac{1}{2}$ we get

$$\frac{1}{2} = 2b^2 \text{ so } \frac{1}{4} = b^2 \text{ so } \pm \frac{1}{2} = b$$

The base b must be positive so $f(x) = 2\left(\frac{1}{2}\right)^x$.

Solution: Two Points Determine an Exponential Function I, second solution

The value of the function decreases from 2 to $\frac{1}{2}$ by multiplying 2 twice by b .

$$2 \times b \times b = \frac{1}{2} \quad 2b^2 = \frac{1}{2} \quad b^2 = \frac{1}{4} \quad b = \pm \frac{1}{2}$$

The base, b , must be positive so $b = \frac{1}{2}$.

Substituting the point $(0, 2)$ yields

$$2 = a\left(\frac{1}{2}\right)^0 \text{ so } 2 = a \cdot 1 \text{ and } 2 = a.$$

So $f(x) = 2\left(\frac{1}{2}\right)^x$.



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