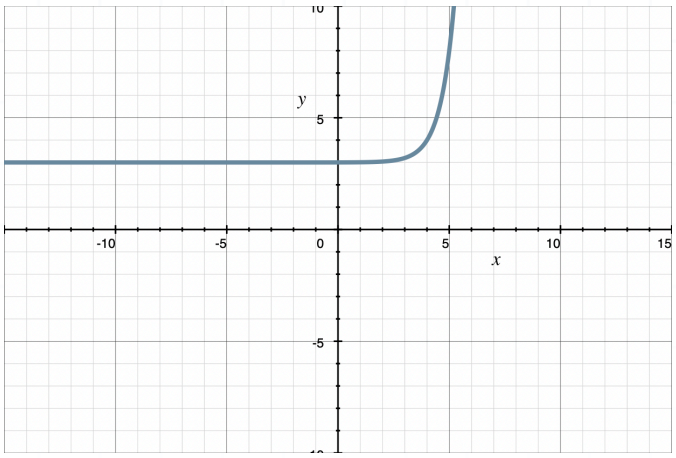
**Topic**: Graphing transformations of exponential functions

**Question**: Sketch the graph of the exponential function.

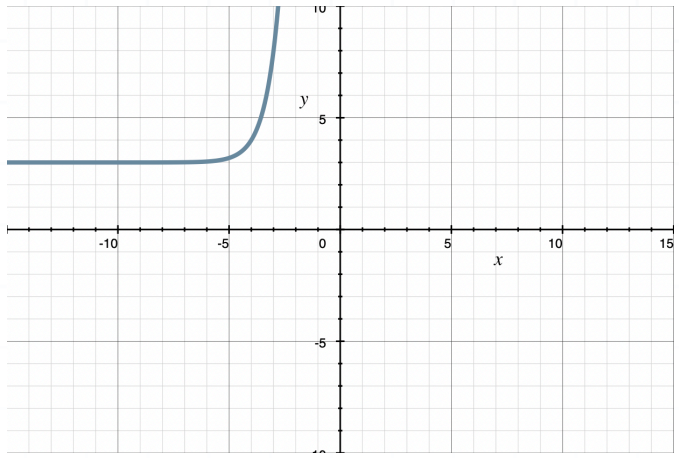
$$y = 5^{x-4} + 3$$

**Answer choices**:

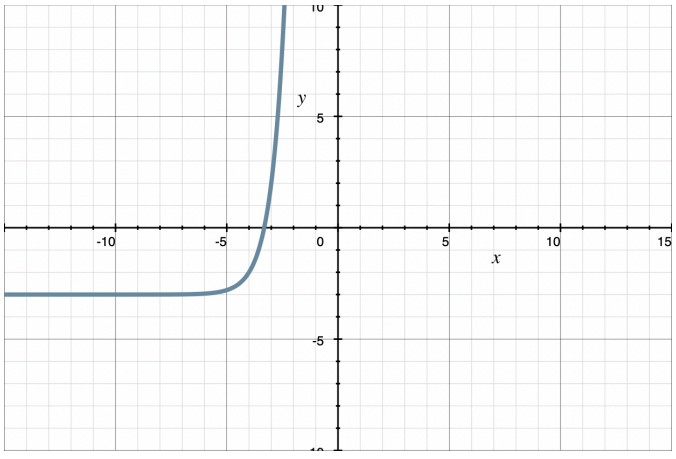
A



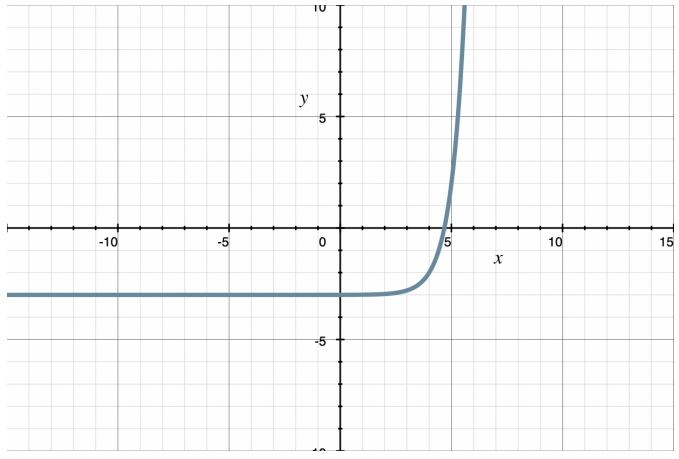

B




C




D



**Solution**: A

The exponential equation is given in the form $f(x) = b^{x+c} + d$, with $b = 5$, $c = -4$ and $d = 3$. Because $d = 3$, the horizontal asymptote is $y = 3$.

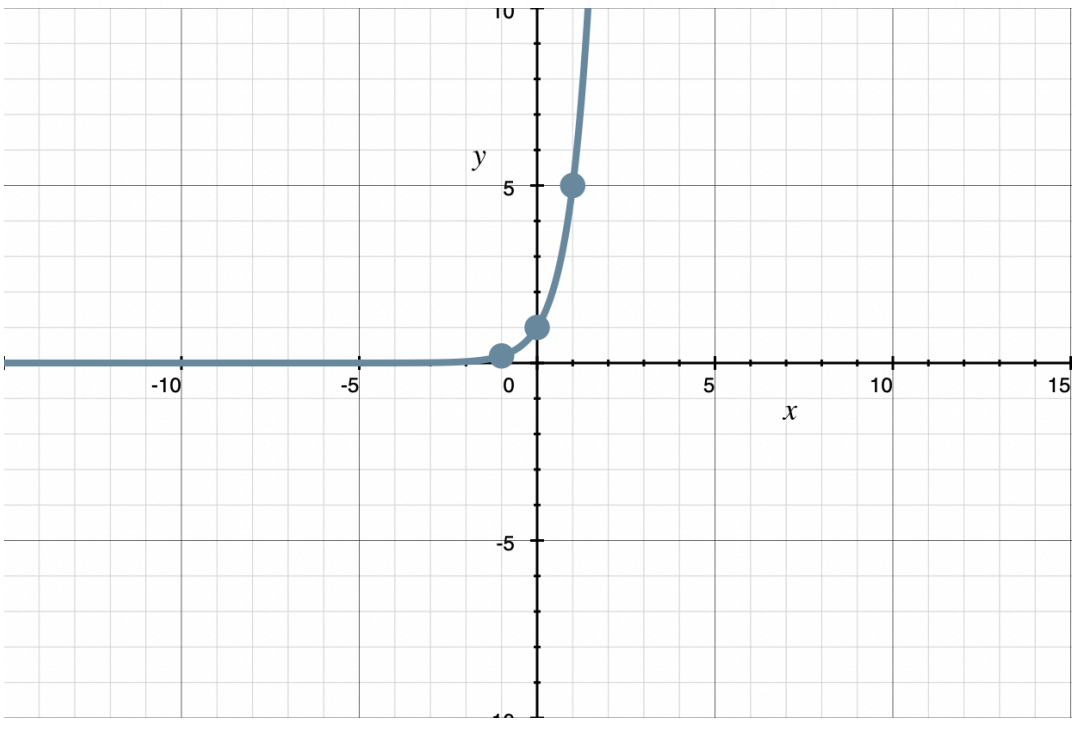
First we need to graph $y = 5^x$. We'll plug in a few values of $x$ for which $y$ will be easy to calculate.

For $x = 0$: $f(0) = 5^0 = 1$

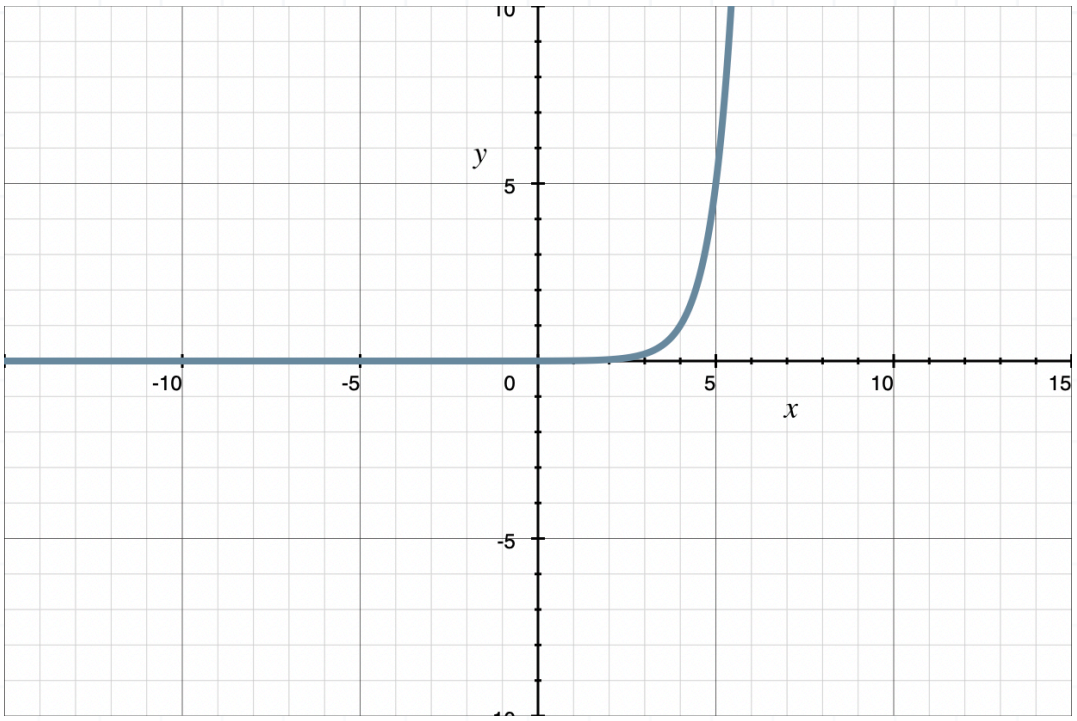
For $x = -1$: $f(-1) = 5^{-1} = 1/5$

For $x = 1$: $f(1) = 5^1 = 5$

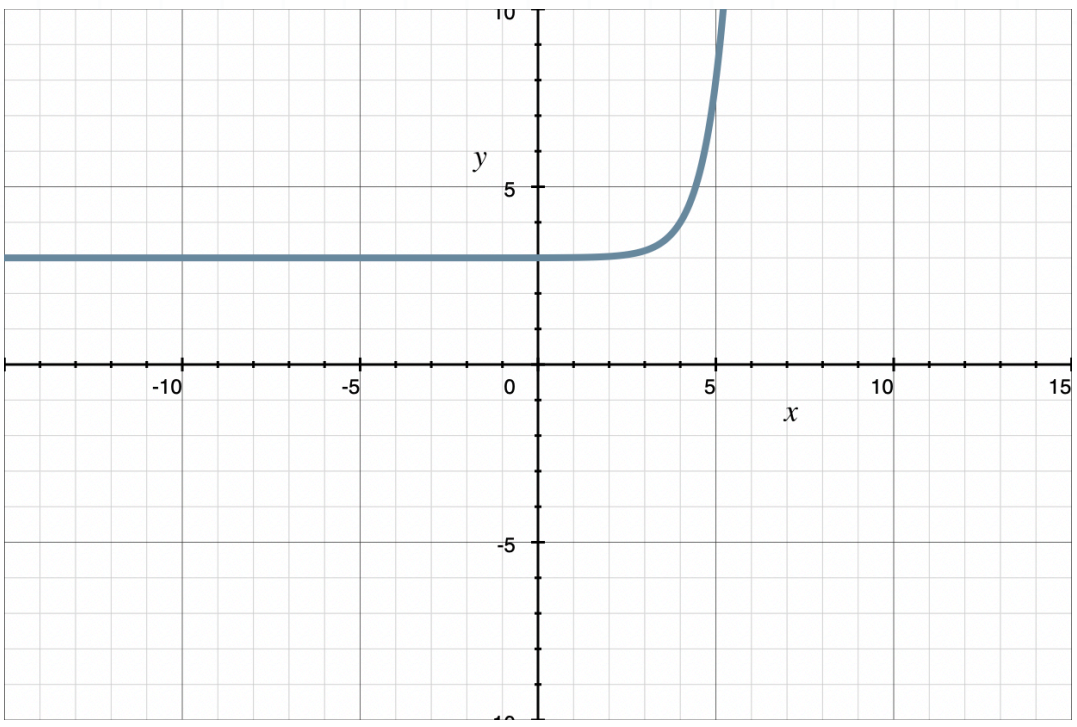
Now we have three points of the graph of $f$: $(0,1)$, $(-1,1/5)$, and $(1,5)$. If we plot them and sketch the curve through those points, we get




To go from $y = 5^x$ to $y = 5^{x-4}$, we move the graph $4$ units to the right.




And to go from $y = 5^{x-4}$ to $y = 5^{x-4} + 3$, we move the graph $3$ units up.



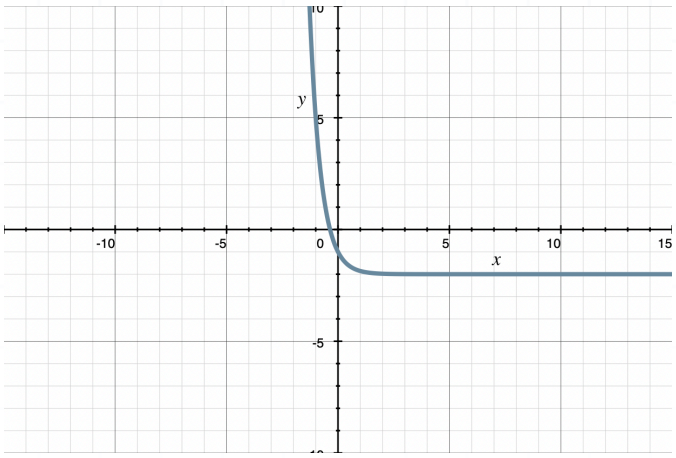
**Topic**: Graphing transformations of exponential functions

**Question**: Sketch the graph of the exponential function.

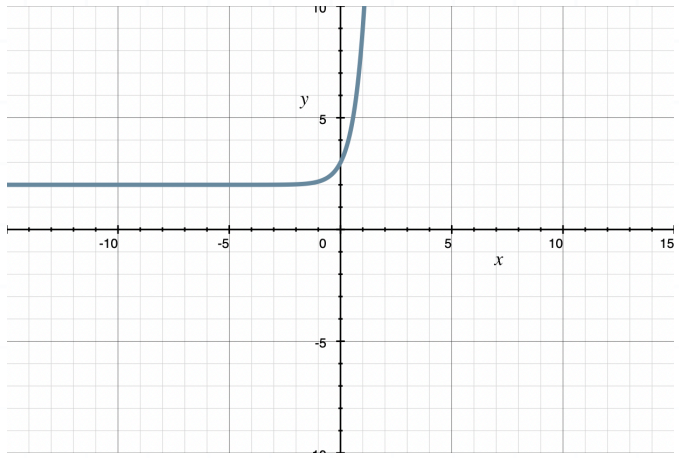
$$y = 7^{-x} + 2$$

**Answer choices**:

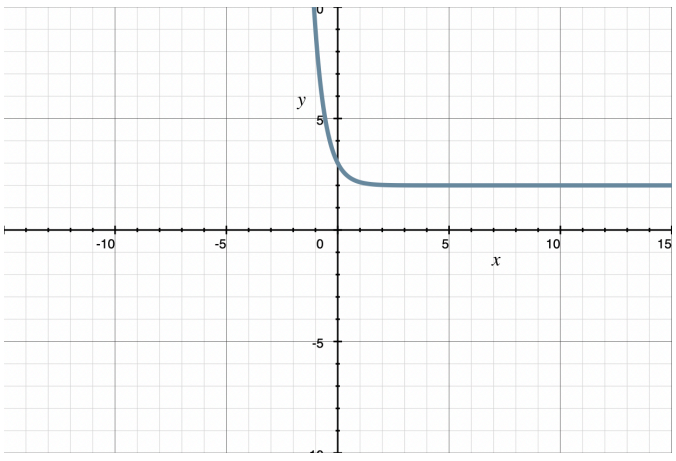
A



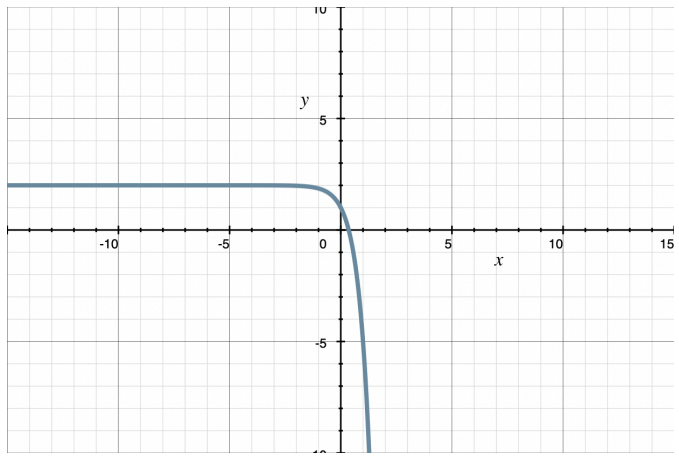

B




C




D



**Solution**: C

The exponential equation is given in the form $f(x) = b^{x+c} + d$, with $b = 7$, $c = 0$ and $d = 2$. Because $d = 2$, the horizontal asymptote is $y = 2$.

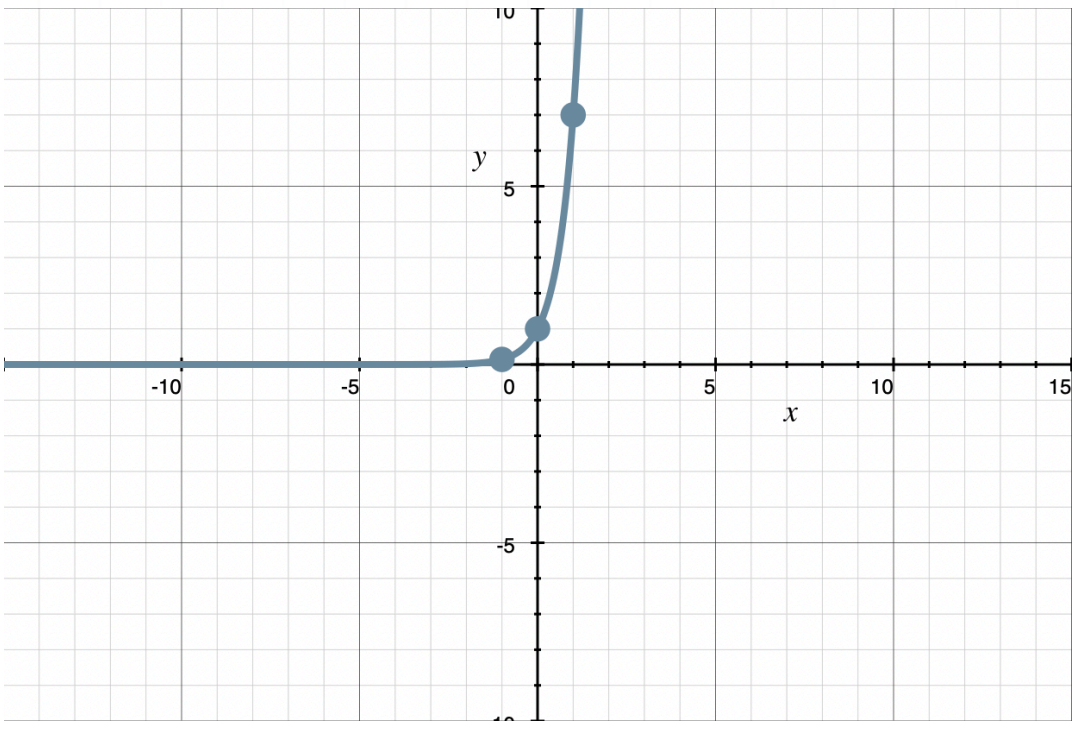
First we need to graph $y = 7^x$. We'll plug in a few values of $x$ for which $y$ will be easy to calculate.

For $x = 0$: $f(0) = 7^0 = 1$

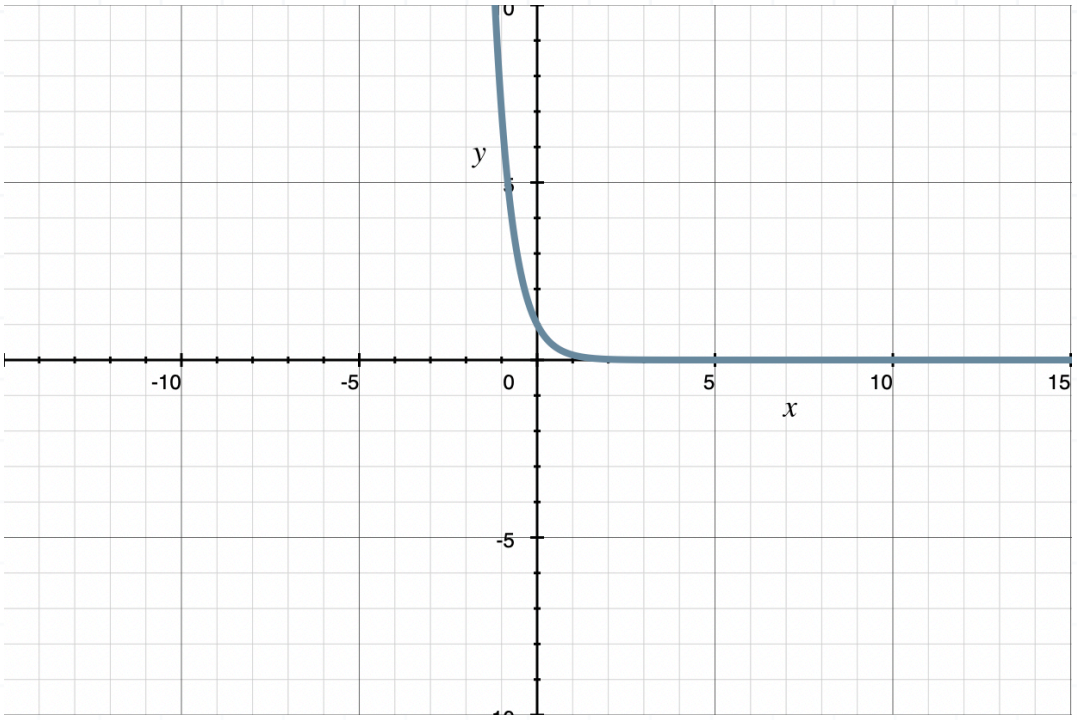
For $x = -1$: $f(-1) = 7^{-1} = 1/7$

For $x = 1$: $f(1) = 7^1 = 7$

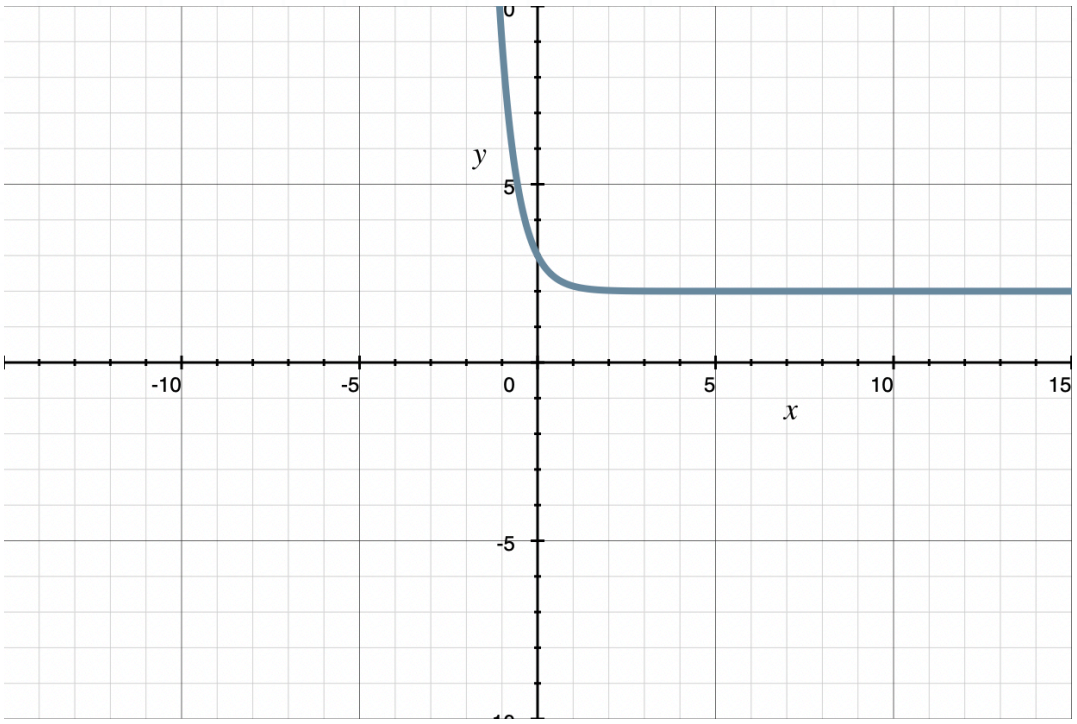
Now we have three points of the graph of $f$: $(0,1)$, $(-1,1/7)$, and $(1,7)$. If we plot them and sketch the curve through those points, we get




To go from $y = 7^x$ to $y = 7^{-x}$, we reflect the graph across the $y$-axis.




And to go from $y = 7^{-x}$ to $y = 7^{-x} + 2$, we move the graph $2$ units up.



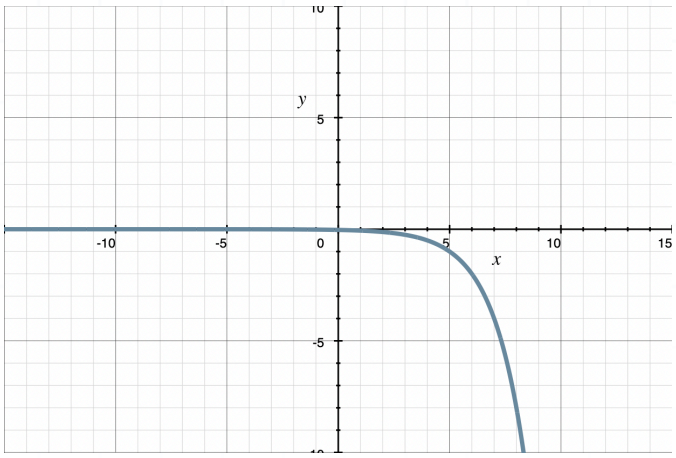
**Topic**: Graphing transformations of exponential functions

**Question**: Sketch the graph of the exponential function.

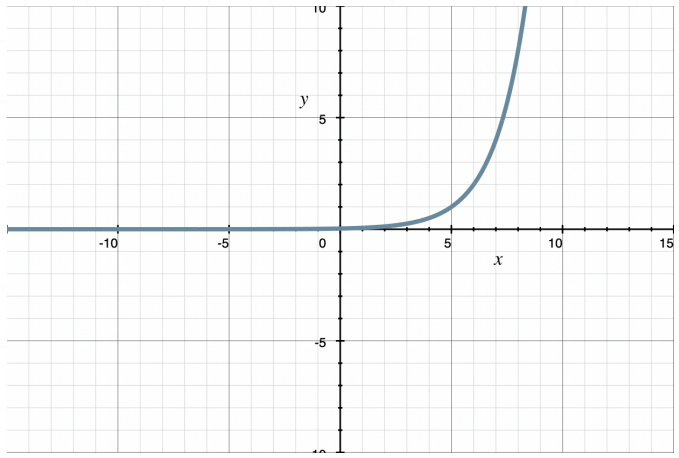
$$y = -2^{x+5}$$

**Answer choices**:

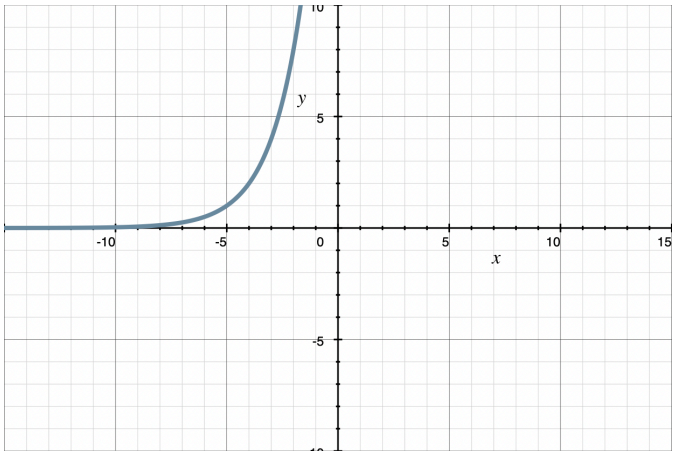
A



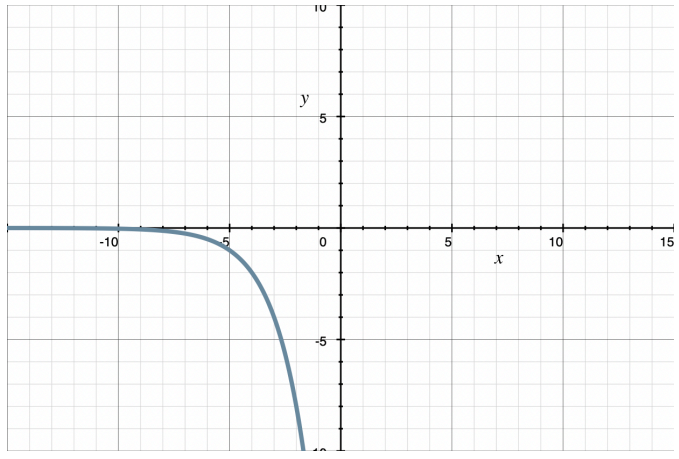

B




C




D



**Solution**: D

The exponential equation is given in the form $f(x) = b^{x+c} + d$, with $b = 2$, $c = 5$ and $d = 0$. Because $d = 0$, the horizontal asymptote is $y = 0$.

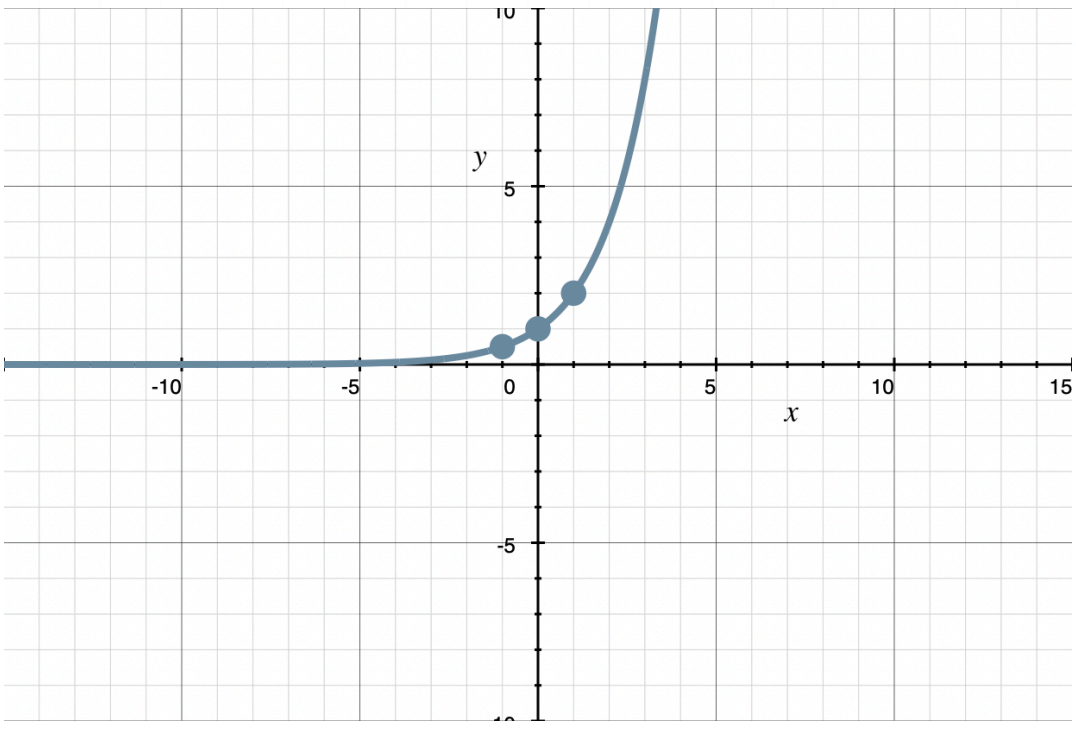
First we need to graph $y = 2^x$. We'll plug in a few values of $x$ for which $y$ will be easy to calculate.

For $x = 0$: $f(0) = 2^0 = 1$

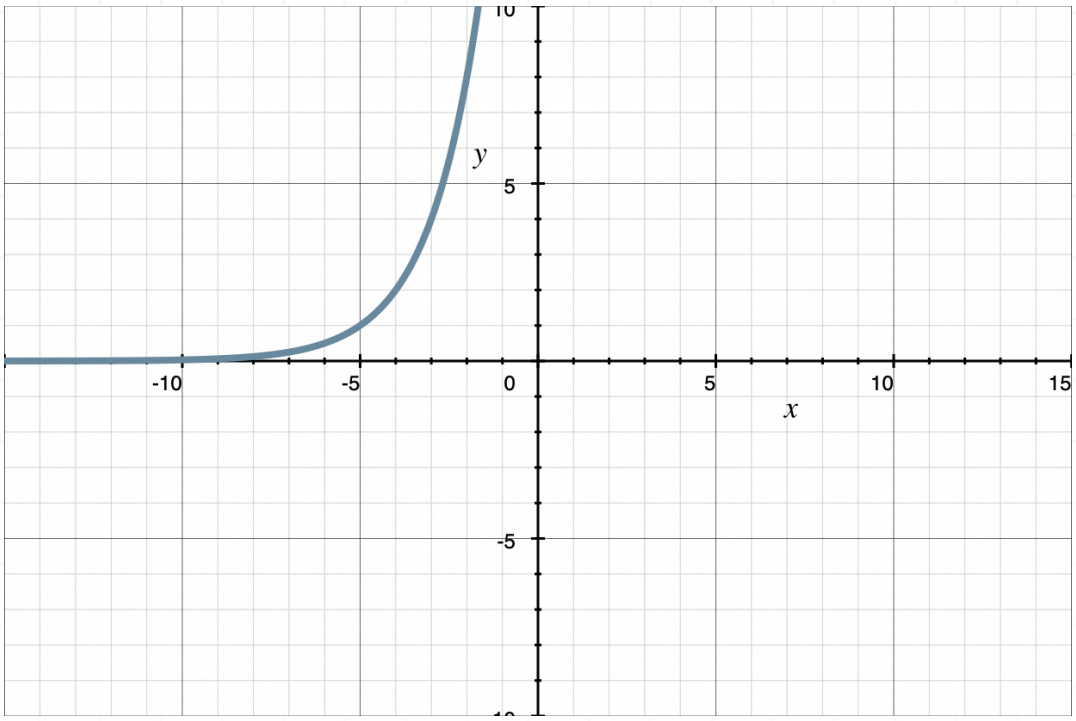
For $x = -1$: $f(-1) = 2^{-1} = 1/2$

For $x = 1$: $f(1) = 2^1 = 2$

Now we have three points of the graph of $f$: $(0,1)$, $(-1,1/2)$, and $(1,2)$. If we plot them and sketch the curve through those points, we get




To go from $y = 2^x$ to $y = 2^{x+5}$, we move the graph $5$ units to the left.




And to go from $y = 2^{x+5}$ to $y = -2^{x+5}$, we reflect the graph across the $x$-axis.