Algebra G
Unit 6 - Notes

Key

Graphing Exponential Functions

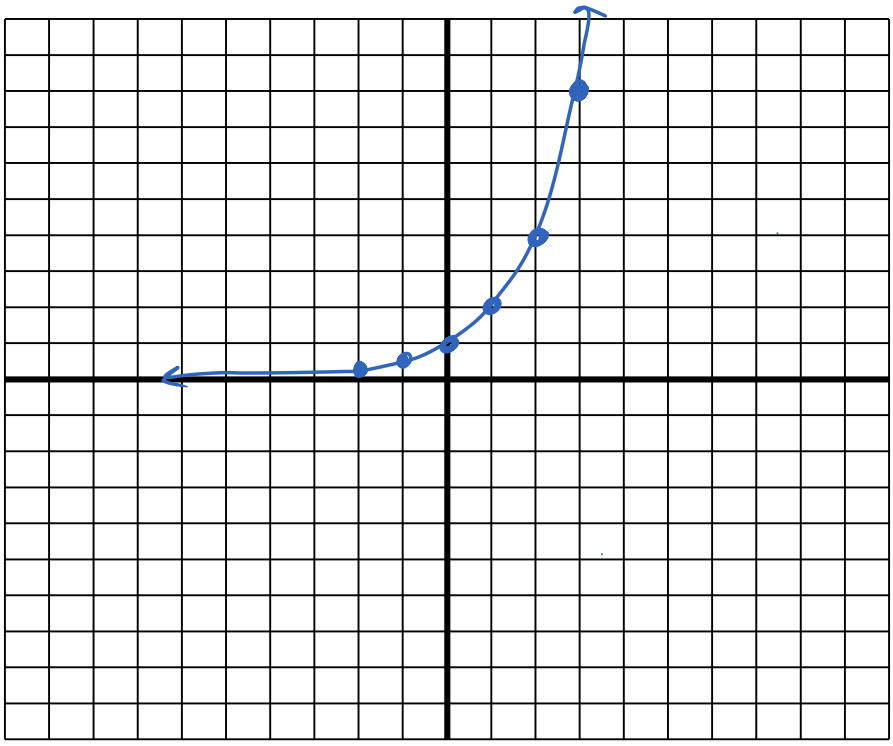
Identify the exponential functions below:

a) $y = 7^x$ b) $y = 9x^2$ c) $y = 4^x$ d) $y = 7 \cdot 2^x$

For the exponential function, $y = 2^x$, make a table of values.

x	-2	-1	0	1	2	3
$y = 2x$	$2^{-2} = \frac{1}{2^2} = \frac{1}{4}$	$2^{-1} = \frac{1}{2^1} = \frac{1}{2}$	$2^0 = 1$	$2^1 = 2$	$2^2 = 4$	$2^3 = 8$

These are y-values on the graph of the function. Let's try to graph using the table of values!



If x got smaller, would the graph ever hit the x-axis? no → fraction keeps getting smaller

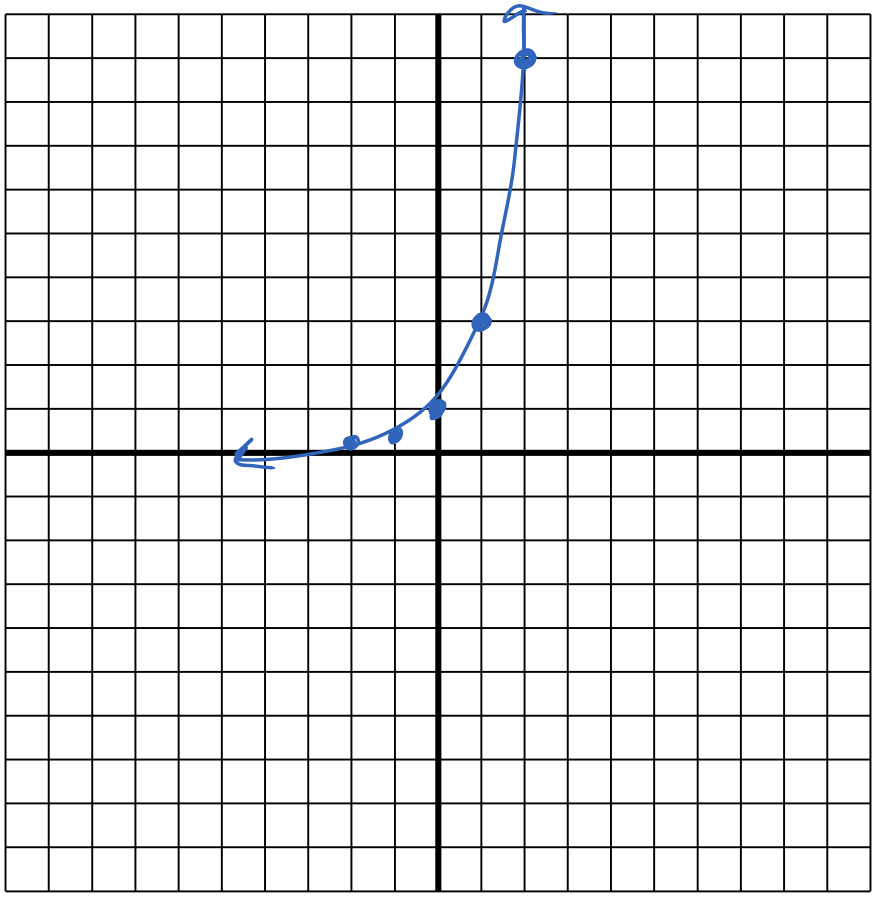
Does the point (0, 3) lie on the graph? How do we check? no, plug it in

Does the point (4, 16) line on the graph? How do we check? yes

$2^4 = 16$

For the exponential function, $y = 3^x$ make a table of values. Then graph.

x	$y = 3^x$
-2	$3^{-2} = \frac{1}{3^2} = \frac{1}{9}$
-1	$3^{-1} = \frac{1}{3}$
0	$3^0 = 1$
1	$3^1 = 3$
2	$3^2 = 9$
3	$3^3 = 27$

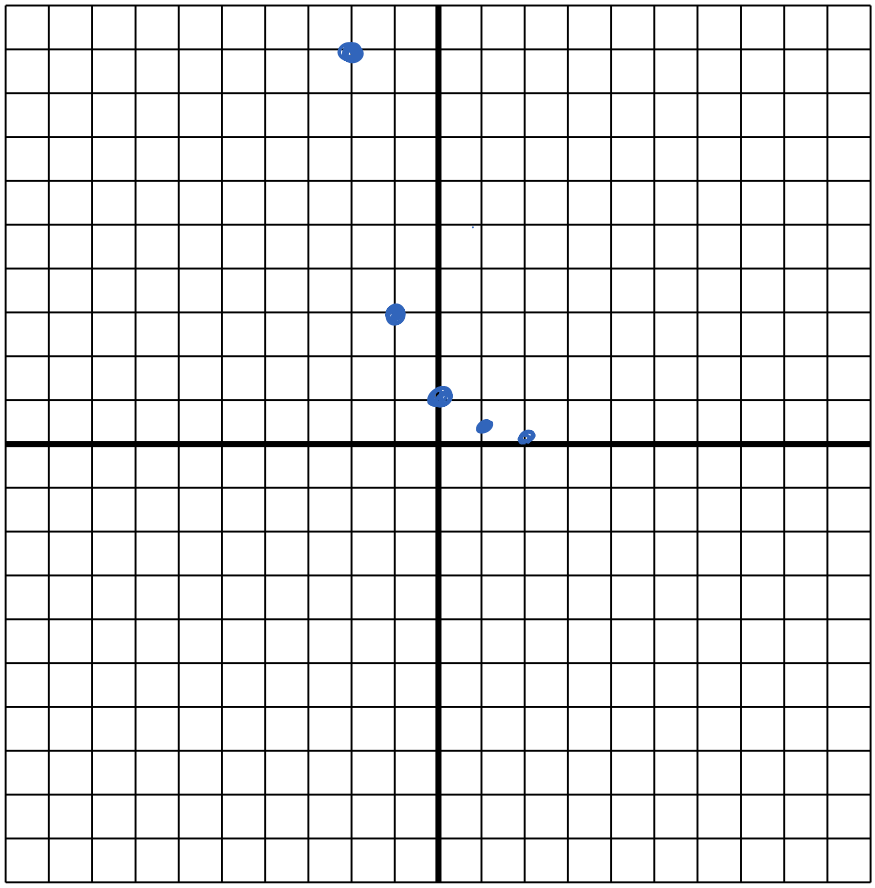


Does the point (0, 1) lie on the graph? How do we check? yes, $3^0 = 1$

★ How does the graph of $y = 3^x$ compare to the graph of $y = 2^x$? ★

For the exponential function, $y = \left(\frac{1}{3}\right)^x$ make a table of values. Then graph.

x	$y = \left(\frac{1}{3}\right)^x$
-2	$y = \left(\frac{1}{3}\right)^{-2} = \frac{1^{-2}}{3^{-2}} \frac{3^2}{1^2}$ $3^2 = 9$
-1	$\left(\frac{1}{3}\right)^{-1} = \frac{1^{-1}}{3^{-1}} = \frac{3}{1} = 3$
0	$\left(\frac{1}{3}\right)^0 = 1$
1	$\left(\frac{1}{3}\right)^1 = \frac{1}{3}$
2	$\left(\frac{1}{3}\right)^2 = \frac{1}{9}$
3	$\left(\frac{1}{3}\right)^3 = \frac{1}{27}$



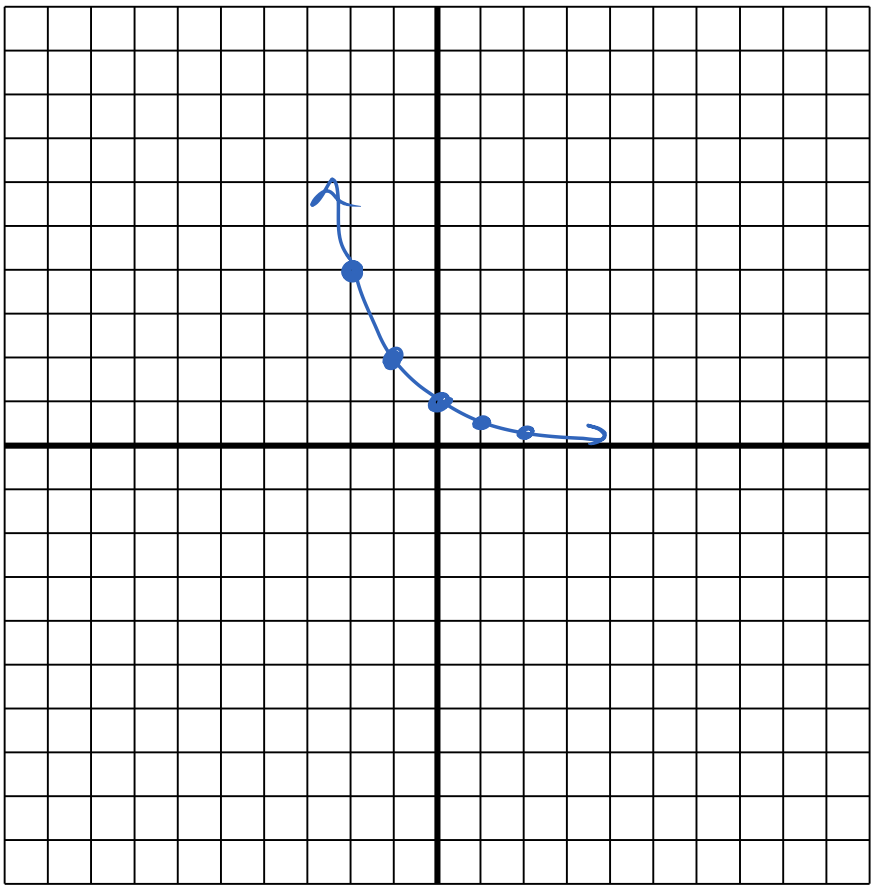
What is different about this graph than the other two? Why is this?

If x got larger, would the graph ever hit the x-axis?

★ show example → if time allows ★

For the exponential function, $y = 2^{-x}$ make a table of values. Then graph.

x	$y = 2^{-x} = \left(\frac{1}{2}\right)^x$
-2	$y = 2^{-x} = 2^{-(-2)} = 4$ or $\left(\frac{1}{2}\right)^{-2} = 2^2 = 4$
-1	$\left(\frac{1}{2}\right)^{-1} = 2^1 = 2$
0	$2^0 = 1$
1	$2^{-1} = \frac{1}{2}$
2	$2^{-2} = \frac{1}{4}$
3	$2^{-3} = \frac{1}{8}$



What is different about this graph than the others? Why is this?

$y = 2^{-x}$ is same as the graph of $y = \left(\frac{1}{2}\right)^x$