



Graphing Exponential Functions

Graphing & Transforming Exponential Functions

Exponential growth describes quantities that increase over time. This increase in quantity is a fixed amount and can be modelled. In addition, exponential functions always approach asymptotes.

Exponential formula

$$f(x) = ab^{x-h} + k$$

$f(x)$ = output as a function of x

a = initial amount (y-intercept), $a \neq 0$

b = rate of growth, $b \neq 0$

x = variable

If $b > 1$, it is an exponential growth function

If $b < 1$, it is an exponential decay function

Exponential function $f(x) = 2^x$
Basic exponential function (no transformations)

Reflected function (x) $f(x) = -2^x$
Reflection of the basic growth function in the x -axis into a decay function (negative b).

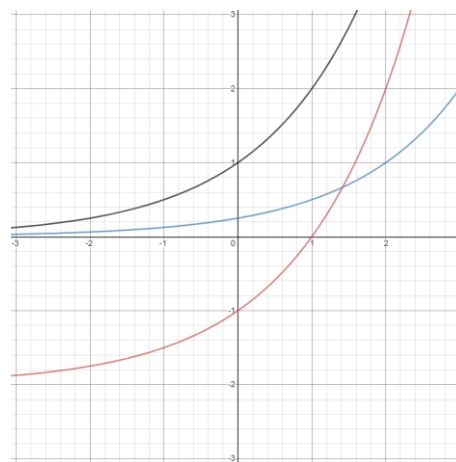
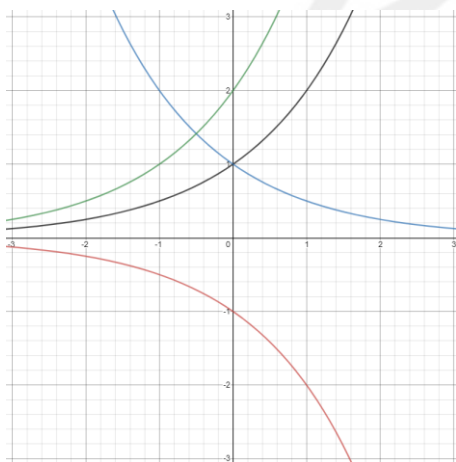
Reflected function (y) $f(x) = 2^{-x}$
Reflection of the basic growth function in the y -axis. Negative x -values = negative growth.

Initial y-value $f(x) = 2 \times 2^x$
The initial amount or y -intercept is 2.
 y -values from the basic growth function ($y = 2^x$) are all multiplied by this factor.

Shift in y -axis (k) $f(x) = 2^x - 2$
Function is shifted vertically down 2 units

Shift in x -axis (h) $f(x) = 2^{x-2}$
Function is shifted horizontally across 2 units.

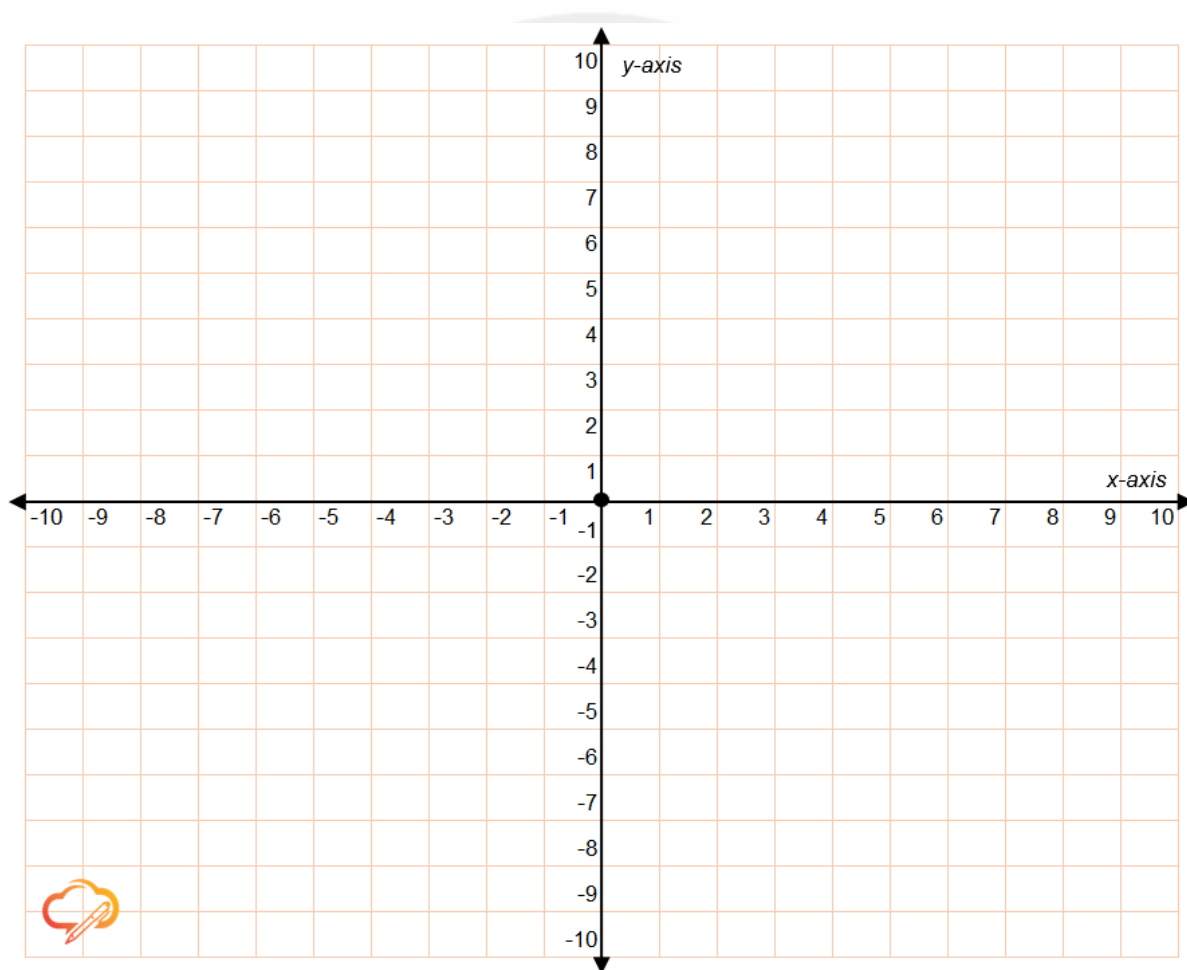
Please note $f(x) = ab^{x-h} + k$
where h is negative





Instructions: Sketch and label each exponential function below.

1	$y = 2^x$	2	$y = 3 \times 2^x$	3	$y = 2^{x-3} - 5$
4	$y = 2^{-x} - 1$	5	$y = 2^x + 4$	6	$y = 5 \times 2^x$
7	$y = -2^{-x}$	8	$y = -6 \times 2^x$	9	$y = 2^{x+1} + 2$





Instructions: Sketch and label each exponential function below.

1	$y = 2^x$	2	$y = 7 \times 2^x$	3	$y = 2 \times 2^x + 2$
4	$y = -2^x + 2$	5	$y = -4 \times 2^x$	6	$y = -2^{x-4} - 5$
7	$y = 2^{x+3} - 1$	8	$y = -3 \times 2^x - 1$	9	$y = 5 \times -2^x + 1$

