

## Lesson 8.2: Transformations of Logarithmic Functions

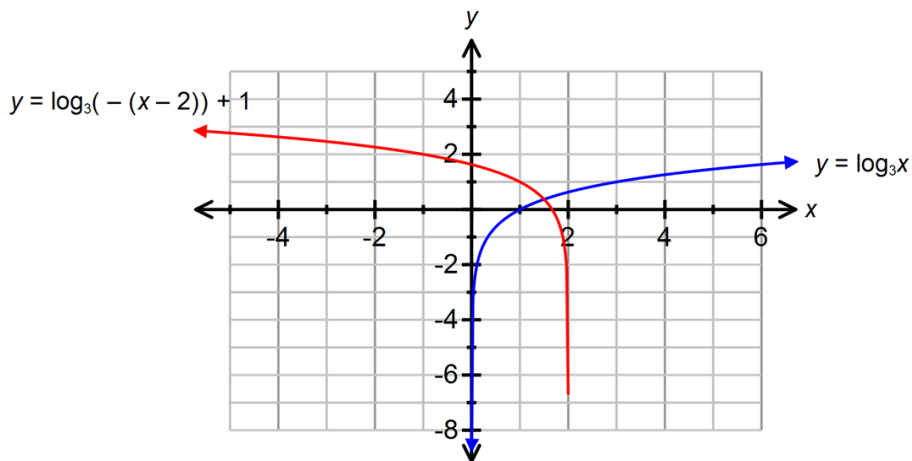
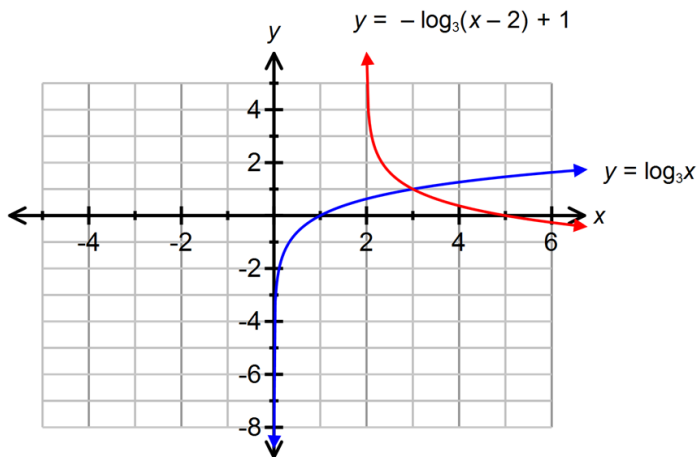
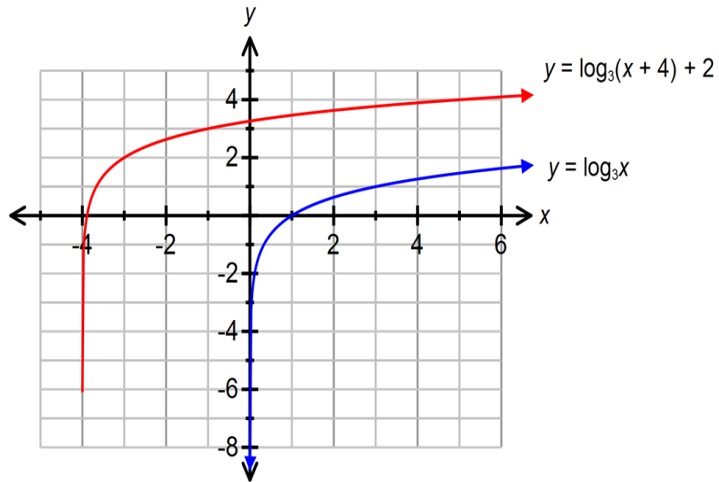
↳ The graph of the logarithmic function  $y = a \log_c (b(x-h)) + k$  can be obtained by transforming the graph of  $y = \log_c x$ .

Parameter	Transformation
$a$	$(x, y) \rightarrow (x, ay)$
$b$	$(x, y) \rightarrow \left(\frac{x}{b}, y\right)$
$h$	$(x, y) \rightarrow (x + h, y)$
$k$	$(x, y) \rightarrow (x, y + k)$

→

## Transformations of Logarithmic Functions

↳ Horizontal translation determines the vertical asymptote which also defines the domain.



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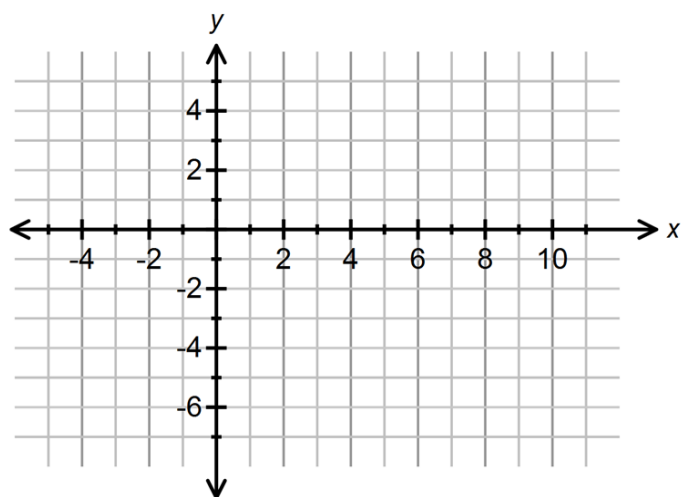
### Example 1

Use transformations to sketch the graph of  $y = 2\log_3(3(x-1)) - 6$

Mapping Rule:  $(x, y) \rightarrow$

$y = 3^x$	$y = \log_3 x$	$y = 2\log_3(3(x-1)) - 6$

←

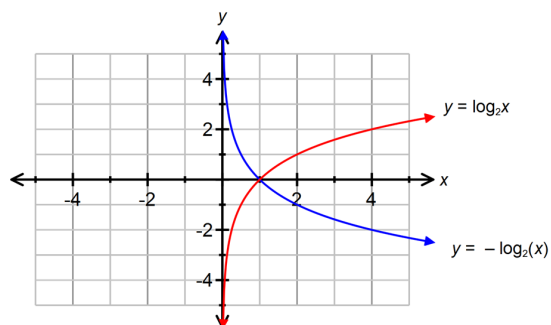


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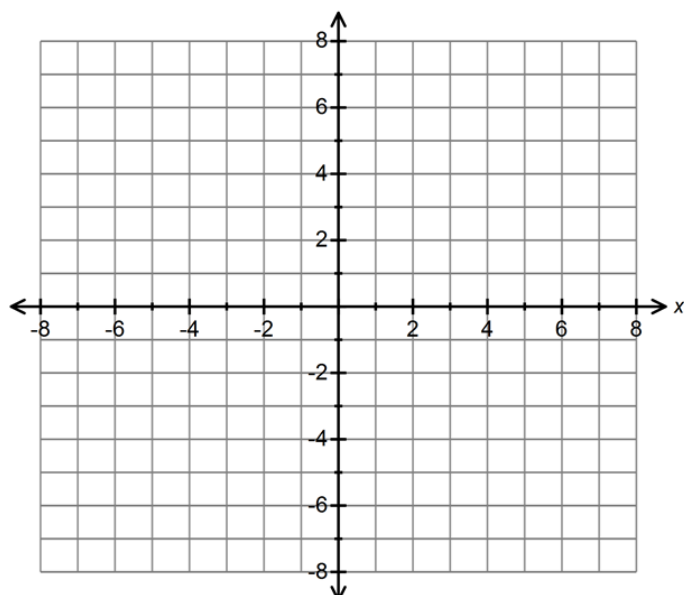
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### Example 2

Use transformations to sketch the graph of  $y = -\log_2(2x + 6)$



Mapping Rule:  $(x, y) \rightarrow$

y:

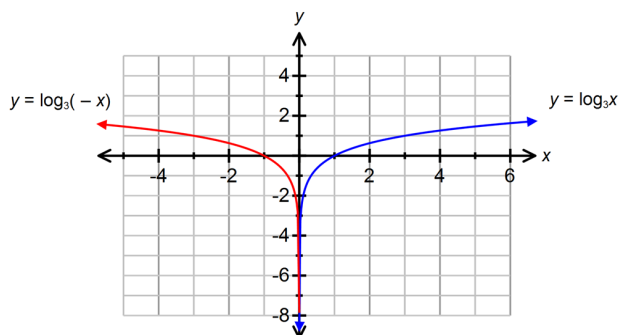
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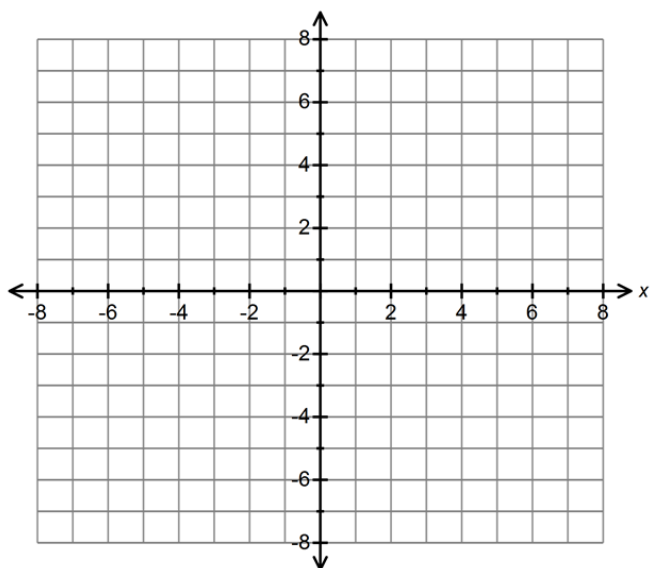
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### Example 3

Use transformations to sketch the graph of  $y = 2 \log_3(-x + 1)$



Mapping Rule:  $(x, y) \rightarrow$

$y$

$\rightarrow$