Honors Pre-Calculus

3.3 - 3.4 Logarithmic Functions

Name Answer Key

Date____________Period______

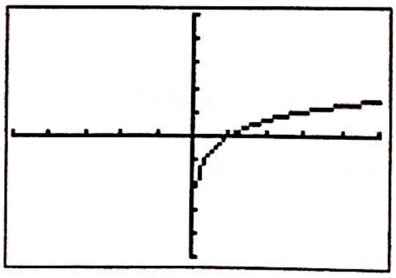
EXPLORATION 2 **Discovering Relationships and Nonrelationships**

Of the eight relationships suggested here, four are *true* and four are *false* (using values of x within the domains of both sides of the equations). Thinking about the properties of logarithms, make a prediction about the truth of each statement. Then test each with some specific numerical values for x. Finally, compare the graphs of the two sides of the equation.

1. $\ln(x+2) = \ln x + \ln 2$ False
2. $\log_3(7x) = 7\log_3 x$ False
3. $\log_2(5x) = \log_2 5 + \log_2 x$ True
4. $\ln\frac{x}{5} = \ln x - \ln 5$ True
5. $\log\frac{x}{4} = \frac{\log x}{\log 4}$ False
6. $\log_4 x^3 = 3\log_4 x$ True
7. $\log_5 x^2 = (\log_5 x)(\log_5 x)$ False
8. $\log|4x| = \log 4 + \log|x|$ True

Which four are true, and which four are false?

e the graph of $g(x) = \log_3 x$ to match the given function with its graph.



$g(x) = \log_3 x$

1.) $f(x) = \log_3 x + 2$ F

2.) $f(x) = \log_3(x-1)$ A

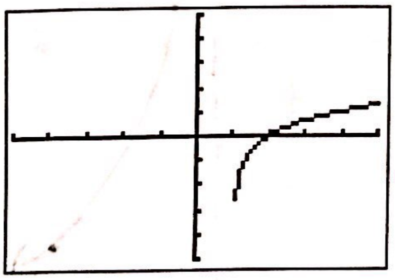
3.) $f(x) = -\log_3 x$ B

4.) $f(x) = \log_3(1-x)$ E

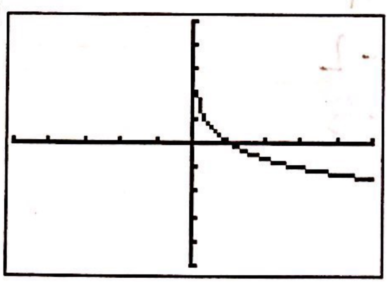
5.) $f(x) = -\log_3(x+2)$ D

6.) $f(x) = -\log_3(-x)$ C

A.)



B.)



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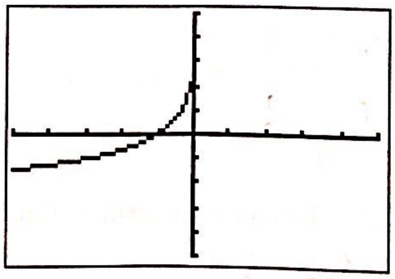
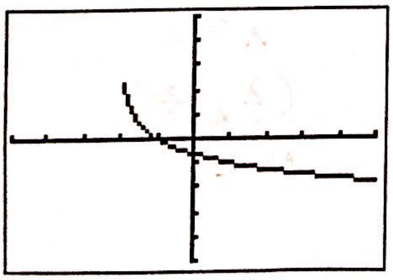
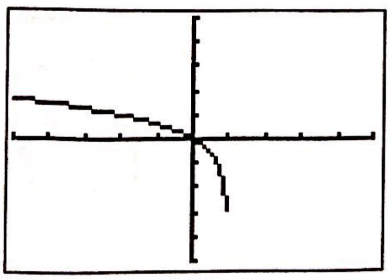


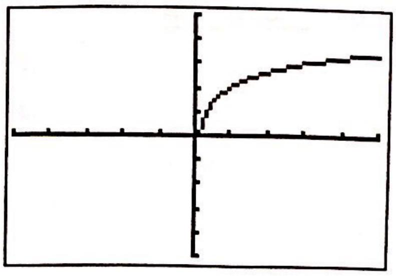
D.)



E.)



F.)



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For #7- 8 Find the domain, x-intercept, and vertical asymptote of the logarithmic function and sketch its gr...

7.) $f(x)=2\log_3(3-x)-1$

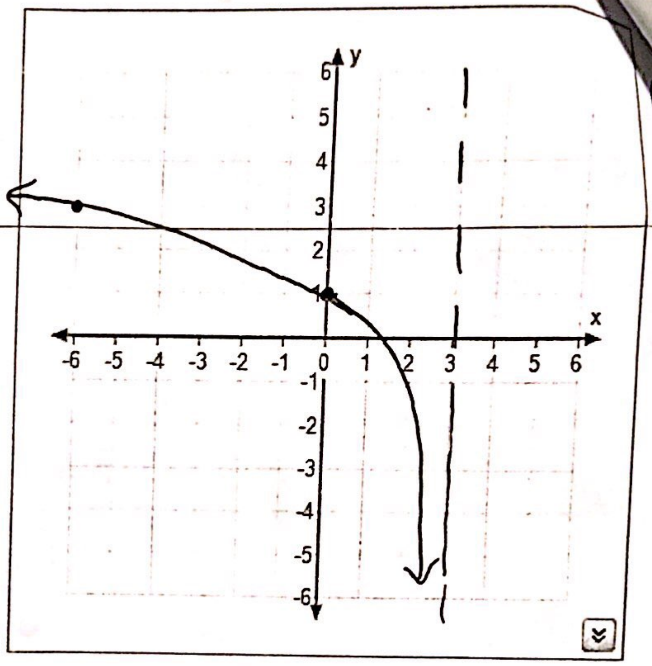
Stretch (×2) y
R_Y (−x)
Right 3 +3 x
down 1 −1 y

Flipped Method

x	y
$3^0 = 1$	0
$3^1 = 3$	1
$3^2 = 9$	2

→

x	y
2	−1
0	1
−6	3



Rewrite in Exponential Form Method

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

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

$\frac{y+1}{2} = \log_3(3-x)$

$3^{\frac{1}{2}(y+1)} = 3-x$

$3^{\frac{1}{2}(y+1)} - 3 = -x$

$\frac{3^{\frac{1}{2}(y+1)} - 3}{-1} = x$

Vertical Asymptote	$x=3$
Domain	$(-\infty, 3)$
~~y~~-int	$(0,1)$

8.) $f(x)=-3\log_2(x-2)+1$

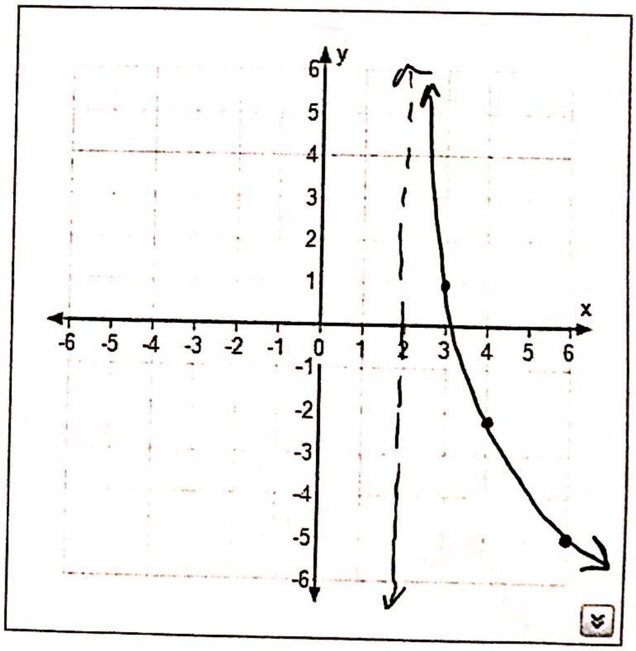
Stretch $y \cdot 3$
R_x −y
Right 2 x+2
up 1 y+1

Flipped Method

x	y
$2^0 = 1$	0
$2^1 = 2$	1
$2^2 = 4$	2

→

x	y
3	1
4	−2
6	−5



Rewrite in Exponential Form Method

$2^{-1/3(y-1)} + 2 = x$

Vertical Asymptote	$x=2$
Domain	$(2, \infty)$
~~y~~-int	None

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