

6-1 Skills Practice

Logarithms and Logarithmic Functions

Write each equation in exponential form.

1. $\log_3 243 = 5$

$3^5 = 243$

3. $\log_9 3 = \frac{1}{2}$

$9^{1/2} = 3$

Write each equation in logarithmic form.

5. $2^3 = 8$

$\log_2 8 = 3$

7. $8^{-2} = \frac{1}{64}$

$\log_8 \frac{1}{64} = -2$

2. $\log_4 64 = 3$

$4^3 = 64$

4. $\log_5 \frac{1}{25} = -2$

$5^{-2} = \frac{1}{25}$

6. $3^2 = 9$

$\log_3 9 = 2$

8. $\left(\frac{1}{3}\right)^2 = \frac{1}{9}$

$\log_{1/3} \frac{1}{9} = 2$

Evaluate each expression.

9. $\log_5 25$

2

10. $\log_9 3$

$\frac{1}{2}$

11. $\log_{10} 1000$

3

12. $\log_{125} 5$

$\frac{1}{3}$

13. $\log_8 512$

3

14. $\log_{27} \frac{1}{3}$

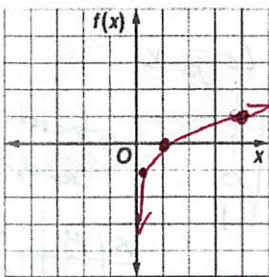
$-\frac{1}{3}$

Graph each function.

15. $f(x) = \log_4 x$

$\log_4 x$

x	y
1/4	-1
1	0
4	1

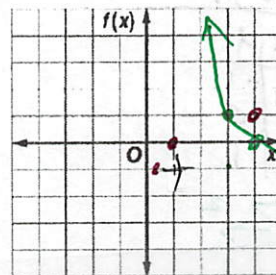


16. $f(x) = -\log_4 (x - 3)$

$\log_4 x$

x	y
1/4	-1
1	0
4	1

flip and on x-axis $\rightarrow 3$

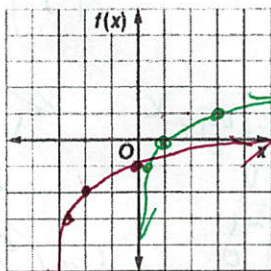


17. ~~f(x)~~ $f(x) = \log_3 (x + 3) - 2$

$y = \log_3 x$

x	y
1/2	-1
1	0
3	1

$\leftarrow 3 \downarrow 2$

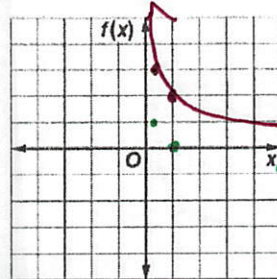


18. $f(x) = -\log_5 x + 2$

$\log_5 x$

x	y
1/5	-1
1	0
5	1

flip x-axis $\uparrow 2$



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$6^3 = 216$

2. $\log_2 64 = 6$

$2^6 = 64$

3. $\log_3 \frac{1}{81} = -4$

$3^{-4} = \frac{1}{81}$

Write each equation in logarithmic form.

4. $5^3 = 125$

$\log_5 125 = 3$

5. $7^0 = 1$

$\log_7 1 = 0$

6. $3^4 = 81$

$\log_3 81 = 4$

Evaluate each expression.

7. $\log_3 81$

4

8. $\log_{10} 0.0001$

-4

9. $\log_2 \frac{1}{16}$

-4

10. $\log_{\frac{1}{3}} 27$

-3

11. $\log_9 1$

0

12. $\log_8 4$

$\frac{2}{3}$

13. $\log_7 \frac{1}{49}$

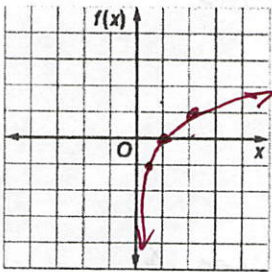
-2

14. $\log_6 6^4$

4

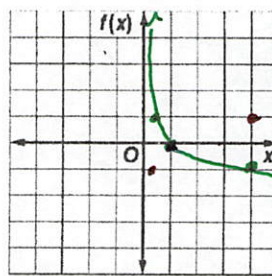
Graph each function.

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16. $f(x) = -\log_4 x$

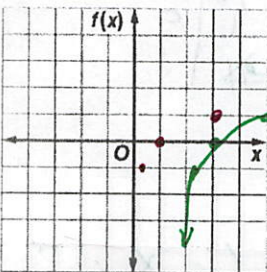


$\log_4 x$

x	y
1/4	-1
1	0
4	1

(-) flips on x-axis

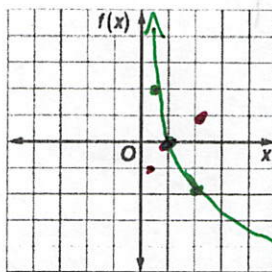
17. $f(x) = \log_3(x - 2)$



$\log_3 x$

x	y
1/3	-1
1	0
3	1

18. $f(x) = -2\log_2 x$



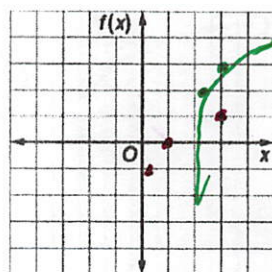
$y = \log_2 x$

x	y
1/2	-1
1	0
2	1

stretch by 2 and flip on x-axis

x	y	-2y
1/2	-1	2
1	0	0
2	1	-2

19. $f(x) = \log_3(x - 2) + 3$

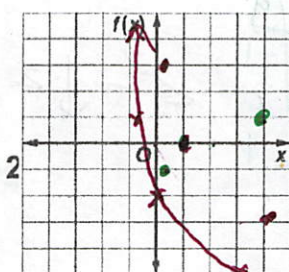


$\log_3 x$

x	y
1/3	-1
1	0
3	1

2 → ↑ 3

20. $f(x) = -3\log_4(x + 1) - 2$



$y = \log_4 x$

x	y
1/4	-1
1	0
4	1

2 ↓ stretch 3 flip x

x	y	-3y
1/4	-1	3
1	0	0
4	1	-3

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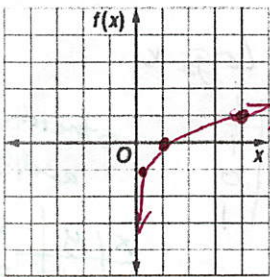
3

14. $\log_{27} \frac{1}{3}$

$-\frac{1}{3}$

Graph each function.

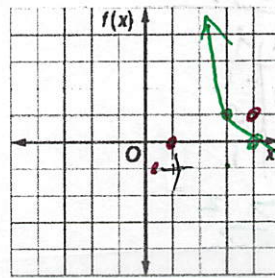
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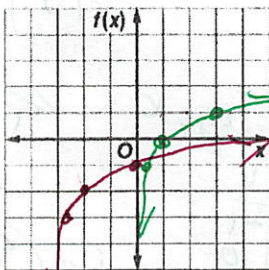


$\log_4 x$

x	y
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flip and on x-axis $\rightarrow 3$

17. ~~$f(x) = \log_3(x + 3) - 2$~~

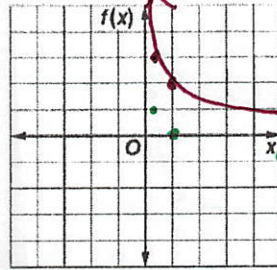


$y = \log_3 x$

x	y
1/3	-1
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3	1

$\leftarrow 3 \downarrow 2$

18. $f(x) = -\log_5 x + 2$



$\log_5 x$

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1/5	1
1	0
5	-1

flip x-axis $\uparrow 2$

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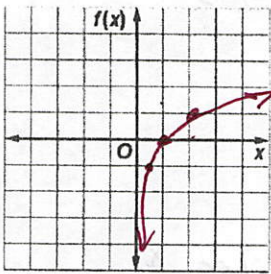
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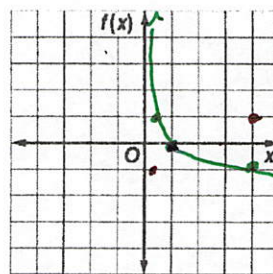
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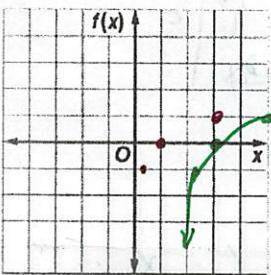


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(-) flips on x-axis

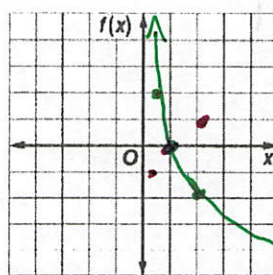
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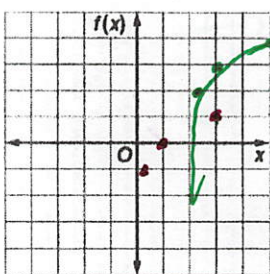
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19. $f(x) = \log_3(x - 2) + 3$

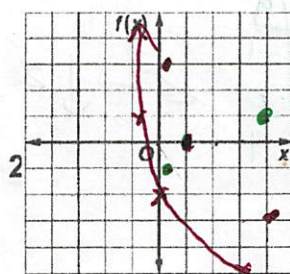


$\log_3 x$

x	y
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2 → ↑ 3

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$y = \log_4 x$

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2 ↓

x	y	-3y
1/4	-1	3
1	0	0
4	1	-3

Stretch 3 flip x