

# Today's Plan:

**Learning Target (standard):** I will use properties of logarithms to rewrite expressions.

**Students will:** Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

**Teacher will:** Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

**Assessment:** Board work, homework check and homework assignment

**Differentiation:** Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

p.317 #2-48 even

2)  $\log_4 16 = 2$

4)  $\log_a 2.1 = 3$

6)  $\log_{2.2} N = 3$

8)  $\log_3 4.6 = x$

10)  $\log_x e = \pi$

12)  $\ln M = 2.2$

14)  $3^{-2} = \frac{1}{9}$

16)  $b^2 = 4$

18)  $2^x = 6$

20)  $3^{2.1} = N$

22)  $\pi^{\frac{1}{2}} = x$

24)  $e^4 = x$

26)  $\log_8 8 = 1$

28)  $\log_3 \left( \frac{1}{9} \right) = -2$

30)  $\log_{\frac{1}{3}} 9 = -2$

32)  $\log_5 \sqrt[3]{25} = \frac{2}{3}$   $\log_5 \sqrt[3]{25} = x$

34)  $\log_{\sqrt{3}} 9 = 4$   $5^x = \sqrt[3]{25}$

36)  $\ln e^3 = 3$   $5^x = \sqrt[3]{5^2}$

38)  $D: \{x | x > 1\}$   $5^x = 5^{\frac{2}{3}}$

$I_x: (2, 0); I_y: -$   $5^x = 5^{\frac{2}{3}}$

40)  $D: \{x | x > 0\}$

$I_x: (1, 0); I_y: -$

42)  $D: \{x | x < -1, x > 1\}$

$I_x: (-\sqrt{2}, 0), (\sqrt{2}, 0); I_y: -$

p.317 #2-48 even

44)  $D: \{x \mid x < 0, x > 1\}$

$I_x: -; I_y: -$

46)  $\frac{\ln 5}{3} \approx 0.536$

48)  $\frac{\ln\left(\frac{2}{3}\right)}{-0.1} \approx 4.055$

$$h(x) = \log_3 \left( \frac{x}{x-1} \right)$$

$$\frac{x}{x-1} > 0$$

$$\begin{array}{r}
 x - \overset{+}{0} + \overset{+}{1} + \\
 x - 1 - \overset{-}{0} + \overset{+}{1} \\
 \hline
 \end{array}$$

Change to exponential form:

$\log_4 16 = 2$

$4^2 = 16$

$\ln 6 = x$

$e^x = 6$

$\log \frac{1}{10} = -1$

$10^{-1} = \frac{1}{10}$

$\log_5 7 = x$

$5^x = 7$

Change to logarithmic form:

$$4^{-2} = \frac{1}{16}$$

$$\log_4\left(\frac{1}{16}\right) = -2$$

$$e^x = 7$$

$$\ln 7 = x$$

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

$$\log_{25} 5 = \frac{1}{2}$$

$$10^3 = 1000$$

$$\log 1000 = 3$$

Find the exact value without a calculator.

$$\log_3 1 = x$$

$$3^x = 1 \quad x = 0$$

$$\log_{\frac{1}{4}} 16 = x$$

$$\left(\frac{1}{4}\right)^x = 16$$

$$x = -2$$

Find domain and intercepts.  $\mathcal{D}: \{x \mid x < 3\}$

$$f(x) = 3 \log_2(6-2x) + 4$$

$6-2x > 0$   
 $-2x > -6$   
 $x < 3$

$x^{\frac{m}{n}} = \sqrt[n]{x^m}$

$\mathcal{I}_x: (3 - \frac{\sqrt[3]{14}}{8}, 0)$

$$0 = 3 \log_2(6-2x) + 4$$

$$-4 = 3 \log_2(6-2x)$$

$$-\frac{4}{3} = \log_2(6-2x)$$

$$2^{-\frac{4}{3}} = 6-2x$$

$$(\frac{1}{2})^{\frac{4}{3}} = 6-2x$$

$$\sqrt[3]{(\frac{1}{2})^4} = 6-2x$$

$$\frac{1}{2^{\frac{4}{3}}} = 6-2x$$

$$\frac{1}{2^{\frac{4}{3}}} \cdot \frac{\sqrt[3]{4}}{\sqrt[3]{4}} = 6-2x$$

$$\frac{\sqrt[3]{4}}{4} = 6-2x$$

$$\frac{\sqrt[3]{4}}{4} - 6 = -2x$$

$$-\frac{\sqrt[3]{4}}{8} + 3 = x$$

$\mathcal{I}_y: (0, 3 \log_2 6 + 4)$

$$y = 3 \log_2(6-0) + 4$$

$$y = 3 \log_2 6 + 4$$

$\log_2 6 = c$   
 $2^c = 6$

Find the domain and intercepts:  $\mathcal{D}: \{x \mid x \neq 1\}$

$$f(x) = \log_{\frac{1}{2}}(x^2 - 2x + 1)$$

$x^2 - 2x + 1 > 0$   
 $(x-1)(x-1) > 0$   
 $(x-1)^2 > 0$

$x-1 \quad - \quad 0 \quad +$   
 $x-1 \quad - \quad 0 \quad +$

$\mathcal{I}_x: (0, 0), (2, 0)$

$$0 = \log_{\frac{1}{2}}(x^2 - 2x + 1)$$

$$(\frac{1}{2})^0 = x^2 - 2x + 1$$

$$1 = x^2 - 2x + 1$$

$$0 = x^2 - 2x$$

$$0 = x(x-2)$$

$$x = 0, 2$$

$\mathcal{I}_y: (0, 0)$

$$y = \log_{\frac{1}{2}}(0-0+1)$$

$$y = \log_{\frac{1}{2}} 1$$

$$(\frac{1}{2})^y = 1$$

$$y = 0$$

Find domain and intercepts.

$$f(x) = \log_5 \left( \frac{x+1}{x} \right)$$

$$I_x: (-, 0)$$

$$0 = \log_5 \left( \frac{x+1}{x} \right)$$

$$5^0 = \frac{x+1}{x}$$

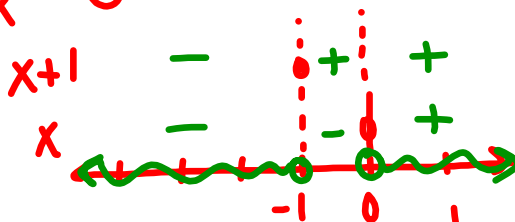
$$1 = \frac{x+1}{x}$$

$$x = x+1$$

$$0 \neq 1$$

$$D: \{x \mid x < -1, x > 0\}$$

$$\frac{x+1}{x} > 0$$



$$I_y: (0, -)$$

$$y = \log_5 \left( \frac{0+1}{0} \right)$$

Properties of Logarithms:

$$\log_a 1 = 0$$

$$\log_a 1 = x$$

$$a^x = 1$$

$$x = 0$$

$$\log_a a = 1$$

$$\log_a a = x$$

$$a^x = a$$

$$x = 1$$

## Properties of Logarithms:

$$a^{\log_a M} = M$$

$$a^{\log_a M} = x$$

↓

$$a^y = x$$

$$\log_a x = y$$

$$\log_a x = \log_a M$$

$$x = M$$

$$\log_a a^r = r$$

$$\log_a a^r = x$$

$$a^x = a^r$$

$$x = r$$

## Assignment:

## Logarithm Practice

#1-16, 31, 32