

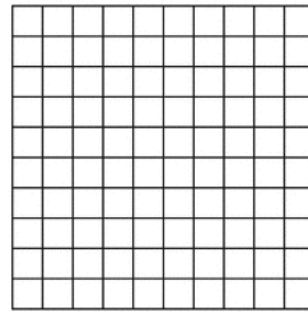
**Aim: How do we work with logarithms?****I. Do Now:**1. Solve for  $x$ :

(a)  $x^2 = 16$

(b)  $x^3 = 8$

\*(c)  $2^x = 10$

2. Graph and label each equation on the same set of axes.



(a)  $y = 2^x$

(b)  $y = 2^{-x}$

(c) the inverse of  $y = 2^x$ **II. Development:****III. Applications:**

A) Find each log without using a calculator:

1.  $\log_2 16 =$

2.  $\log_3 27 =$

3.  $\log_4 2 =$

4.  $\log_{10} 1 =$

5.  $\log_8 8 =$

6.  $\log_{10} \left(\frac{1}{1000}\right) =$

B) Find each log to 3 decimal places:

7.  $\log_{10} 500 =$

8.  $2(\log_{10} 2) =$

9.  $\log_{10} (-4) =$

**IV. Basic Properties of Logarithms**

(1)  $\log_a 1 =$

(2)  $\log_a a =$

(3)  $\log_a a =$

(4)  $\log_a x = \log_a y \Rightarrow$

V. Find each log to 3 decimal places:

(a)  $\log 2 =$

(c)  $\log 20 =$

(e)  $\log 6 =$

(b)  $\log 3 =$

(d)  $\log 300 =$

(f)  $\log 9 =$

What do you notice?

**VI. More Properties of Logarithms**

(5)

(6)

(7)

Note: The logarithmic function with base 10 is called the *common logarithmic function* and is represented by  $\log$ .**VII. More Applications:**

Use the properties of logs to expand the following:

10.  $\log(3x^3y^2) =$

11.  $\log\left(\frac{\sqrt{3x-5}}{7x^3}\right) =$

12.  $\log\left(\frac{4x^3}{y}\right)^2 =$

Use the properties of logs to condense the following (i.e., express as a single logarithm):

13.  $2\log(x+2) - \frac{1}{3}(\log x + \log y) =$

14.  $\log x - 3\log(x+1) =$

Given that  $\log 2 \approx 0.301$ , find each of the following without using a calculator:

15.  $\log 2^3 =$

18.  $\log \sqrt{2} =$

16.  $\log 20 =$

19.  $\log \frac{1}{2} =$

17.  $\log 2000 =$

20.  $\log 0.02 =$

**HW10**

Read pages 252 – 255, 264 – 265.

p. 247: 17, 19, 21

p. 259: 1, 3, 19, 20, 21, 25

p. 267: 19, 21, 37, 43, 45, 67, 68, 70, 73