Convert the following logarithms to the base indicated.

a) $\log_6 216$ to base 3 b) $\log 300$ to base 5

Find the exact value of the following.

a) $-\log_7\left(\frac{1}{343}\right)$ b) $6^{\log_6 216}$ c) $\log_2\sqrt{\frac{1}{1024}}$ d) $\log_7 49^{-5}$

Complete Assignment Questions #4- #15

Assignment

1. Evaluate.

a) $\log_{10}1000 = v$

$1000 = 10^v$

$10^3 = 10^v$

$v = 3$

$\log_{10}1000 = 3$

b) $\log_{12}144 = v$

$144 = 12^v$

$12^2 = 12^v$

$v = 2$

$\log_{12}144 = 2$

c) $\log_6 36 = v$

$36 = 6^v$

$6^2 = 6^v$

$v = 2$

$\log_6 36 = 2$

d) $\log_{36} 6 = v$

$6 = 36^v$ $6^1 = 6^{2v}$

$v = \frac{1}{2}$

$\log_{36} 6 = \frac{1}{2}$

e) $\log_5\sqrt{5} = v$

$\sqrt{5} = 5^v$

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

$v = \frac{1}{2}$

$\log_5\sqrt{5} = \frac{1}{2}$

f) $-4\log_{10} 0.001 = v$

$v = \log_{10} 0.001$

$10^v = 0.001$

$10^v = 10^{-3}$ $v = -3$

$-4(-3) = 12$

g) $\log_2\sqrt{\frac{1}{512}} = v$

$\sqrt{\frac{1}{512}} = 2^v$

$\left(\frac{1}{2^9}\right)^{\frac{1}{2}} = 2^v$

$2^{-\frac{9}{2}} = 2^v$ $v = -\frac{9}{2}$

$\log_2\sqrt{\frac{1}{512}} = -\frac{9}{2}$

h) $-4\log_8 8^{-4} = v$

$\log_8 8^{-4} = v$

$8^{-4} = 8^v$ $v = -4$

$-4 \cdot -4 = 16$

$-4\log_8 8^{-4} = 16$

2. State the value of

a) $\log_b 1$ 0

b) $\log_c c$ 1

c) $\log_x x^2$ 2

d) $b^{\log_b 10}$ 10

3. Solve for x.

a) $\log_x 125 = 3$

$125 = x^3$

$x = 5$

b) $\log_{125} 5 = x$

$5 = 125^x$

$5 = 5^{3x}$ $x = \frac{1}{3}$

$3x = 1$

c) $\log_4 x = -8$

$x = 4^{-8}$

$x = 0.0000153$

4. Evaluate each of the following logarithms.

a) $\log 100 = v$

$100 = 10^v$

$10^2 = 10^v$

$\log 100 = 2$

b) $\log 10^6 = v$

$10^6 = 10^v$

$v = 6$

$\log 10^6 = 6$

c) $\log\sqrt{10} = v$

$\sqrt{10} = 10^v$

$10^{\frac{1}{2}} = 10^v$

$v = \frac{1}{2}$

$\log\sqrt{10} = \frac{1}{2}$

d) $\log 0.01 = v$

$0.01 = 10^v$

$10^{-2} = 10$ $v = -2$

$\log 0.01 = -2$

5. Evaluate the following logarithms to the nearest tenth.

a) $\ln 20$ 3.0 **b)** $\log_e 8$ $(\ln 8)$ 2.1 **c)** $\ln e^2$ 2.0

6. Convert the following logarithms to the base indicated.

a) $\log_8 35$ to base 7 $\frac{\log_7 35}{\log_7 8}$ **b)** $\log \frac{1}{2}$ to base 6 $\frac{\log_6 \frac{1}{2}}{\log_6 10}$ **c)** $\log_3 50$ to base e $\frac{\log_e 50}{\log_e 3}$

7. Evaluate, to the nearest hundredth, using the change of base identity.

a) $\log_5 17$ $\frac{\log 17}{\log 5} = 1.76$ **b)** $\log_{0.5} 5.9$ $\frac{\log 5.9}{\log 0.5} = -2.56$ **c)** $\frac{1}{\log_5 3}$ $\frac{1}{\frac{\log 3}{\log 5}} = 1.46$ **d)** $-2 \log_{12} 6$ $\frac{-2 \log 6}{\log 12} = -1.44$ **e)** $\log_8 8$ $\frac{\log 8}{\log 8} = 1.00$

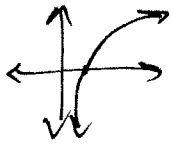
8. Evaluate each expression:

a) $4^{\log_4 4}$ $4 = 4^v$ $v = 1$ $= 4^1 = 4$

b) $10^{\log_{10} 1000}$ $\log_{10} 1000 = v$ $1000 = 10^v$ $10^3 = 10^v$ $v = 3$ $10^3 = 1000$

9. Describe how to graph $y = \log_3 x$ using a graphing calculator. Sketch the graph and determine the x-intercept.

graph: $y = \frac{\log x}{\log 3}$



x-int = 1

10. In each of the following

i) estimate the value, to the nearest whole number, without using technology and explain the reasoning

ii) approximate the value to the nearest hundredth using technology

a) $\log_3 26$ $\log_3 27 = 3$ i) 3 ii) 2.97

b) $\log_2 100$ $\log_2 64 = 6$ $\log_2 128 = 7$ i) 7 ii) 6.64

c) $\log_4 60$ $\log_4 64 = 3$ i) 3 ii) 2.95

Multiple Choice

11. Which of the following has a negative value?

A. $-\log_4(0.1)$ 1.66 **B.** $\log_4\left(\frac{5}{2}\right)$ 0.66 **C.** $\log_{\frac{1}{2}}\left(\frac{2}{3}\right)$ 0.58 **(D)** $\log_4\left(\frac{2}{3}\right)$ −0.29

12. Without using a calculator, an estimate of the value of $\log_2 30 - \log_3 30$ is

$\log_2 32 = 5$ $\log_3 27 = 3$

A. 5.0 **B.** 2.4

(C) 1.8 **D.** −1.9

$\sim 4.8 - 3.2 = 1.6$

best choice.

Numerical response

13. The value of the expression $\log_{\sqrt{2}} 8 + 2\log_9 3$, to the nearest tenth, is _____.

(Record your answer in the numerical response box from left to right.)

7	.	0	

$= \frac{\log 8}{\log\sqrt{2}} + \frac{2\log 3}{\log 9}$ $= 6 + 1$

$= 6 + 2\left(\frac{1}{2}\right)$ $= 7$

14. Given the equation $\log_7 x = \log_4 60$, the value of x to the nearest whole number is ____

(Record your answer in the numerical response box from left to right.)

3	1	3	

$\frac{\log x}{\log 7} = \frac{\log 60}{\log 4}$ $\log x = \frac{\log 60 \cdot \log 7}{\log 4}$

$x = 10 = 313.2\ldots$

If $\log x = 2.49595$
$x = 10^{2.49595}$.
(use 2nd LOG ANS)

15. If $\log_x 27 = \log_{12} 3$, the value of x to the nearest whole number is _____.

(Record your answer in the numerical response box from left to right.)

1	7	2	8

$\frac{\log 27}{\log x} = \frac{\log 3}{\log 12}$ $\frac{\log 27 \cdot \log 12}{\log 3} = \log x$

$\log x = 3.2375\ldots$
$x = 10^{3.2375\ldots}$

Answer Key

1. **a)** 3 **b)** 2 **c)** 2 **d)** $\frac{1}{2}$ **e)** $\frac{1}{2}$ **f)** -12 **g)** $-\frac{9}{2}$ **h)** 16

2. **a)** 0 **b)** 1 **c)** z **d)** 10 **3.** **a)** 5 **b)** $\frac{1}{3}$ **c)** $4^{-8} = 0.000015$

4. **a)** 2 **b)** 6 **c)** $\frac{1}{2}$ **d)** -2 **5.** **a)** 3.0 **b)** 2.1 **c)** 2.0

6. **a)** $\frac{\log_7 35}{\log_7 8}$ **b)** $\frac{\log_6\left(\frac{1}{2}\right)}{\log_6 10}$ **c)** $\frac{\log_e 50}{\log_e 3}$

7. **a)** 1.76 **b)** -2.56 **c)** 1.46 **d)** -1.44 **e)** 1.00

8. **a)** 4 **b)** 1000 **9.** Graph $y = \frac{\log x}{\log 3}$, x-intercept is 1

10.a) i) $\log_3 26$ is slightly less than $\log_3 27$ which equals 3. Therefore the estimate for $\log_3 26$ is 3.
ii) 2.97

b) i) $\log_2 100$ is greater than $\log_2 64$ (equal to 6) and smaller than $\log_2 128$ (equal to7). Therefore an estimate for $\log_2 100$ is 7.
ii) 6.64

c) i) $\log_4 60$ is slightly less than $\log_4 64$ which equals 3. Therefore the estimate for $\log_4 60$ is 3.
ii) 2.95

11. D **12.** C

13.

7	.	0	

14.

3	1	3	

15.

1	7	2	8