

# 5.3 day 4

Wednesday, February 22, 2017 9:36 AM

## Algebra 2 Trig H

Name:

### 5.3 day 4 notes

#### Log properties

Use your calculator to determine which of the provided answers are equal to the given. There can be more than one answer.

1. $\log(18) =$ a. $\log(6) + \log(2)$ b. $\log(6) + \log(3)$ c. $\log(2) + \log(9)$ d. $\log(10) + \log(8)$	B, C
2. $\log(20) =$ a. $\log 20 - \log 2$ b. $\log 40 - \log 2$ c. $\log 10 * \log 2$ d. $\log 60 - \log(3)$	B, D
3. $\log 16 =$ a. $4 * \log(4)$ b. $2 \log(8)$ c. $\log(32) - \log(2)$ d. $4 * \log(2)$	C, D
4. $\log 9 =$ a. $\log(4.5) + \log(4.5)$ b. $\log 9 - \log 1$ c. $2 \log(3)$ d. $\log(18)/2$	B, C
5. $\log 125 =$ a. $\log 100 + \log 20$ b. $\log 130 - \log 5$ c. $5 \log 3$ d. $3 \log 5$	D
6. $\log(64) =$ a. $\log(16) + \log(4)$ b. $2 \log(8)$ c. $\log(2) + \log(32)$ d. $\log(8) + \log(8)$	all of them!

These are three logarithm properties. Can you figure them out!?

Property 1:

$$\log_x m + \log_x n = \log_x (m \cdot n)$$

Property 2:

$$\log_x m - \log_x n = \log_x \left( \frac{m}{n} \right)$$

Property 3:

$$b \log_x m = \log_x m^b$$

Use  $A = \log_x 3$  and  $B = \log_x 5$  to write an equivalent expression using A and B.

1.  $\log_x 25$   
 $\log_x (5 \cdot 5) = 2 \cdot \log_x 5$   
 $= \log_x 5 + \log_x 5 = 2B$

2.  $\log_x 27$   
 $\log_x 3^3 = 3 \log_x 3 = 3A$

3.  $\log_x \frac{3}{5}$   
 $= \log_x 3 - \log_x 5$   
 $= A - B$

4.  $\log_x \frac{5}{3}$   
 $B - A$

5.  $\log_x 15$   
 $B + A$

6.  $\log_x 45$   
 $2A + B$

7.  $\log_x 75$   
 $2B + A$

8.  $\log_x \frac{1}{3}$   
 $\log_x 1 - \log_x 3 = 0 - A = -A$   
 $\log_x 3^{-1} = -1 \cdot \log_x 3 = -A$

9.  $\log_x \frac{9}{5}$   
 $2A - B$

10.  $\log_x \sqrt[4]{3}$   
 $\log_x 3^{1/4}$   
 $= \frac{1}{4} \cdot \log_x 3$   
 $= \frac{1}{4} A$

11.  $(\log_x 81)(\log_x x^2)$   
 $(\log_x 3^4)(\log_x x^2)$   
 $(4 \log_x 3)(2 \log_x x)$   
 $4A \cdot 2 = 8A$

12.  $\frac{(\log_x \sqrt{x})(\log_x \frac{1}{125})}{\log_x 243}$   
 $\frac{(\log_x x^{1/2}) \cdot \log_x 5^{-3}}{\log_x 3^5}$   
 $\frac{\frac{1}{2} \cdot -3B}{5A} = \frac{-3B}{10A}$

Two more interesting log properties!

Property 4:  $\log_3 3^4 = 4$

Generalize:  $\log_x x^m = m$

Property 5:  $5^{\log_5 4} = 4$   
 $\log_5 x = \log_5 4$

Generalize:  $x^{\log_x m} = m$

Evaluate:

13.  $\log_3 9^7$   
 $\log_3 (3^2)^7$   
 $= 14$

14.  $\log_2 \left(\frac{1}{64}\right)^{21}$   
 $\log_2 (2^{-6})^{21}$   
 $= -126$

15.  $32^{\log \frac{1}{32}}$   
 $= \frac{1}{32}$

16.  $6^{\log_6 \sqrt[4]{\frac{1}{216}}}$   
 $= \sqrt[4]{\frac{1}{216}}$   
 $= (6^{-3})^{1/4}$   
 $= \frac{1}{\sqrt[4]{6}} \cdot \frac{\sqrt[4]{6}}{\sqrt[4]{6}} = \frac{\sqrt[4]{6}}{6}$