

Name:	Date:
Topic:	Class:

Main Ideas/Questions	Notes/Examples		
<p>Product Property</p> $\log_b(m \cdot n) =$	Condense into a single logarithm. Simplify if possible.		
	1. $\log_2 7 + \log_2 4$	2. $\log 25 + \log 4$	3. $\log_4 2x + \log_4 4x^2$
	Expand using the product property.		
	4. $\log 6$	5. $\log_7 45$	6. $\log_2(5x)$
<p>Quotient Property</p> $\log_b\left(\frac{m}{n}\right) =$	Condense into a single logarithm. Simplify if possible.		
	7. $\log_3 24 - \log_3 8$	8. $\log_2 15 - \log_2 15$	9. $\log_4 x^9 - \log_4 x^2$
	Expand using the quotient property.		
	10. $\log_8 4$	11. $\log_5 \frac{1}{3}$	12. $\log\left(\frac{m}{7}\right)$
<p>Power Property</p> $\log_b m^n =$	Condense into a single logarithm. Simplify if possible.		
	13. $5 \cdot \log_4 2$	14. $7 \cdot \log_2 x$	15. $\frac{1}{3} \cdot \log 8$
	Expand using the power property. Simplify if possible.		
	16. $\log_2 8^7$	17. $3 \cdot \log 4^{x-1}$	18. $\log_7 \sqrt{w}$

Putting it All Together!

CONDENSING LOGS

Directions: Rewrite as a single logarithm. Simplify if possible.

19. $2 \cdot \log 6 - \log 9$

20. $4 \cdot \log_4 a + 2 \cdot \log_4 b$

21. $7 \cdot \log_4 u - 3 \cdot \log_4 v^2$

22. $\log_2 15 + \log_2 4 - \log_2 6$

23. $\log_3 4 + \log_3 y + \frac{1}{2} \cdot \log_3 49$

24. $\frac{1}{3}(\log_5 8 + \log_5 27) - \log_5 3$

25. $3 \cdot \log_2 4 - \log_2 32$

26. $2 \cdot \log 6 - \frac{1}{4} \cdot \log 16 + \log 3$

EXPANDING LOGS

Directions: Expand each logarithm.

27. $\log_6 (xyz^4)$

28. $\log_4 \left(\frac{a^9}{b} \right)$

29. $\log_7 (q^4 r^2)^2$

30. $\log_2 \left(\frac{y}{z^5} \right)^2$

31. $\log \sqrt{7x^3}$

32. $\log_3 \sqrt[4]{m^5 n^2}$

PROPERTIES OF LOGARITHMS

GRAPHIC ORGANIZER

Name	Rule(s)	Example 1	Example 2
BASIC LOGARITHMS	$\log_b b =$; $\log_b 1 =$	Simplify: $\log_{14} 14 =$	Simplify: $\log_3 1 =$
PRODUCT RULE	$\log_b (m \cdot n) =$	Condense: $\log_5 6 + \log_5 7 =$	Expand: $\log_2 63 =$
QUOTIENT RULE	$\log_b \left(\frac{m}{n} \right) =$	Condense: $\log_4 84 - \log_4 12 =$	Expand: $\log 9 =$
POWER RULE	$\log_b m^n =$	Condense: $2 \cdot \log_3 8 =$	Expand: $\log_2 6^{x-1} =$
CHANGE OF BASE FORMULA	$\log_b a =$	Using a common base, evaluate the expression below. $\log_7 32 =$	

REMEMBER: BASE 10 LOGS ARE COMMON LOGS AND WRITTEN WITHOUT A BASE! ($\log x$)

Name: _____ Unit 7: Exponential & Logarithmic Functions

Date: _____ Bell: _____ Homework 4: Properties of Logarithms

**** This is a 2-page document! ******Directions:** Complete each rule.

PRODUCT RULE	QUOTIENT RULE	POWER RULE
$\log_b(m \cdot n) =$	$\log_b\left(\frac{m}{n}\right) =$	$\log_b m^n =$

Directions: Condense each expression into a single logarithm. Simplify if possible.

1. $\log_7 9 + \log_7 4$	2. $\log_2 80 - \log_2 5$
3. $\frac{1}{2} \cdot \log_3 81$	4. $3 \cdot \log_4 8 - 5 \cdot \log_4 2$
5. $7 \cdot \log_5 x + 3 \cdot \log_5 y^4$	6. $\log_3 a^7 + (\log_3 a^4 - 2 \cdot \log_3 b)$
7. $\log_4 x^7 - \log_4 x^2 + 4 \cdot \log_4 x^3$	8. $\frac{1}{2}(\log_6 45 - \log_6 5) + \log_6 12$

Directions: Condense, then use the **change of base formula** to evaluate the logarithm.

9. $\log_9 35 - \log_9 7$

10. $2 \cdot \log_3 8 - 4 \cdot \log_3 2$

11. $\frac{1}{3} \cdot \log_4 8 + \log_4 15$

12. $\log_2 27 + \log_2 4 - 2 \cdot \log_2 3$

Directions: Expand each expression.

13. $\log_8 (mn^2)$

14. $\log \left(\frac{x^9}{y^4} \right)$

15. $\log_2 (a^5 b^2)^3$

16. $\log \left(\frac{p^4}{q^7} \right)^2$

17. $\log_5 \sqrt{a^7 b}$

18. $\log_4 \sqrt[3]{c^2 d^{15}}$