

Logarithmic Properties

1.20.16

22.3, 22.4

Product Property: $\log m + \log n = \log mn$

Example:

Rewrite $\log 30$ in two different ways

$$\log 30 = \log(6 \cdot 5) = \log 6 + \log 5$$

$$\log 30 =$$

I do:

Simplify the expression:

$$\log 100 = \log \quad + \log \quad + \log$$

$$\log 5 + \log 3 + \log 2 =$$

We do:

Simplify the expression:
 $\log 200 = \log \quad + \log \quad + \log$

$$\log 3 + \log 2 + \log 4 + \log 5 =$$

You do with your partner:
Simplify the expression:
 $\log 18 = \log \quad + \log \quad + \log$

$$\log 3 + \log 3 + \log 2 + \log 2 =$$

Quotient Property: $\log \left(\frac{m}{n} \right) = \log m - \log n$

I do:

Rewrite in 2 ways.

$$\log 100 = \log \left(\frac{200}{2} \right) = \log 200 - \log 2$$

I do:

Simplify the expression:

$$\log 30 = \log \quad - \log$$

$$\log 5 - \log 2 =$$

We do:

Simplify the expression:

$$\log 25 = \log \quad - \log$$

$$\log 10 - \log 5 =$$

You do with your partner:

Simplify the expression:

$$\log 15 = \log \quad - \log$$

$$\log 25 - \log 5 =$$

Power Property
 $m \log n = \log n^m$

I do:

Rewrite $\log 25$ using power property

$$\log 25 = \log 5^2 = 2 \log 5$$

$$\log 8 = \log 2^3 = 3 \log 2$$

We do:

Simplify the expression:

$$\log 100 =$$

$$\log 27 =$$

You do with your partner on whiteboards:

Simplify the expression:

$$\log 32 =$$

$$4\log 2 =$$

Combined properties

I do:

$$\log \frac{x^4 y}{3z}$$

Expand by quotient.	$(\log x^4 y) - \log 3z$
Expand by product	$(\log x^4 + \log y) - (\log 3 + \log z)$
Expand by power	$(4\log x + \log y) - (\log 3 + \log z)$

We do:

$$\log \frac{2x^3}{3y^4}$$

Expand by quotient.	
---------------------	--

Expand by product	
Expand by power	

You do with your partner:

$$\log \frac{15xy^4}{2a^3z}$$

Expand by quotient.	
Expand by product	
Expand by power	

Condense log expressions:

I do:

$$(2\log a + \log y + \log d) - (2\log f + \log z)$$

Condense by power	$(\log a^2 + \log y + \log d) - (\log f^2 + \log z)$
Condense by product	$(\log a^2 y d) - (\log f^2 z)$

Condense by quotient	$\log \frac{a^2 y d}{f^2 z}$
----------------------	------------------------------

We do:

$$(2\log x + 3\log y + \log d + \log 9) - (\log 3 + \log y)$$

Condense by power	
Condense by product	
Condense by quotient	

You do with your partner:

$$(\log x + \log y + \log 3) - (\log x + 2\log y + \log z)$$

Condense by power	
Condense by product	
Condense by quotient	

Exit Slip:

Condense

$$(\log z + 2\log y + \log 3) - (\log 9 + 2\log y + \log z)$$

Expand:

$$\log \frac{14ay^4z}{2a^2z^2}$$