Bell Work: Day 1

Use any positive #.

1. $\log(\#)$
2. 2(answer #1)
3. Answer #2 + 4
4. $10^{\text{answer \#3}}$
5. $\sqrt{\text{answer \#4}}$
6. answer $5/100$

Properties of logarithms can be derived from the properties of exponents because logarithms and exponents have corresponding properties.

Let $x = \log_b m$ $y = \log_b n$

Product Property

$b^x = m$ $n = b^y$

$m \cdot n = b^x \cdot b^y$

$mn = b^{x+y}$

$\log_b mn = x + y$

$\log_b mn = \log_b m + \log_b n$

Properties of Logarithms

For any positive numbers, m, n and b where b ≠1

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

Quotient Property: $\log_b \frac{m}{n} = \log_b m - \log_b n$

Power Property: $\log_b m^n = n \log_b m$

Properties of Logarithms

Write each expression as a single logarithm.

1. $\log_5 4 + \log_5 3$

$\log_5 4 \cdot 3$

$\log_5 12$

2. $\log_2 4 + \log_2 2 - \log_2 8$

$\log_2 \frac{4(2)}{8}$

$\log_2 1$

3. $\log 7 - \log 3 + \log 6$

$\log \frac{7}{3}(6)$

$\log \frac{42}{3}$

$\log 14$

1. Use the power property if possible

4. $\log_3 4x + 2\log_3 5y$

$\log_3 4x + \log_3 (5y)^2$

$\log_3 4x + \log_3 25y^2$

$\log_3 100xy^2$

5. $2\log 4 + \log 2 + \log 2$

$\log y^2 + \log 2 + \log 2$

$\log 16 + \log 2 + \log 2$

$\log 64$

6. $5\log x + 3\log x^2$

$\log x^5 + \log x^{2\cdot 3}$

$\log x^5 + \log x^6$

$\log x^5 \cdot x^6$

$\log x^{11}$

7. $\log 2 + \log 4 - \log 7$

$\log \frac{8}{7}$

8. $3(4\log t^2)$

$3(\log t^{2\cdot 4})$

$3\log t^8$

$\log t^{24}$

Expand each logarithm. Simplify if possible.

9) $\log_2 \frac{x}{yz}$

$\log_2 x - \log_2 yz$

$\log_2 x - \log_2 y - \log_2 z$

10) $\log \sqrt{\frac{2rst}{5w}} = \log \left(\frac{2rst}{5w}\right)^{\frac{1}{2}}$

$\log \frac{2^{\frac{1}{2}} r^{\frac{1}{2}} s^{\frac{1}{2}} t^{\frac{1}{2}}}{5^{\frac{1}{2}} w^{\frac{1}{2}}}$

$\log 2^{\frac{1}{2}} + \log r^{\frac{1}{2}} + \log s^{\frac{1}{2}} + \log t^{\frac{1}{2}} - \log 5^{\frac{1}{2}} - \log w^{\frac{1}{2}}$

$\frac{1}{2}\log 2 + \frac{1}{2}\log r + \frac{1}{2}\log s + \frac{1}{2}\log t - \frac{1}{2}\log 5 - \frac{1}{2}\log w$

11) $\log_5 5x^{-5}$

$\log_5 5 + \log_5 x^{-5}$

$\log_5 5 + (-5\log_5 x)$

$\log_5 5 - 5\log_5 x$

or

$1 - 5\log_5 x$

17) $\log_4 (3xyz)^2$

$\log_4 3^2 x^2 y^2 z^2$

$\log_4 9 + \log_4 x^2 + \log_4 y_2 + \log_4 z^2$

$\log_4 9 + 2\log_4 x + 2\log_4 y + 2\log_4 z$

Bell work Day 2

Simplify

1) $2\log_4 6 - \log_4 9$

$\log_4 6^2 - \log_4 9$

$\log_4 36 - \log_4 9$

$\log_4 \frac{36}{9}$

$\log_4 4$

$= 1$

Expand

2) $\log_3 \frac{a^2b^3}{c^4}$

$\log_3 a^2b^3 - \log_3 c^4$

$\log_3 a^2 + \log_3 b^3 - \log_3 c^4$

$2\log_3 a + 3\log_3 b - 4\log_3 c$

Change of Base $\log_b m = \frac{\log_c m}{\log_c b}$

$b \neq 1, c \neq 1$

$\log_b m = x$

$b^x = m$

$\log_c b^x = \log_c m$

$x \log_c b = \log_c m$

$x = \frac{\log_c m}{\log_c b} \rightarrow \log_b m = \frac{\log_c m}{\log_c b}$

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Use the Change of Base Formula to evaluate each expression. Round your answer to the nearest thousandth.

1) $\log_4 32$

$\frac{\log 32}{\log 4} = 2.5$

$\log_4 32 = y$

$4^y = 32$

$2^{2y} = 2^5$

$2y = 5$

$y = 2.5$

2) $\log_2 15$

$\frac{\log 15}{\log 2}$

3.9069

Use the properties of logarithms to evaluate each expression. $162^{\frac{1}{4}} = \sqrt[4]{162}$

3) $\log_2 160 - \log_2 5$

$\log_2 \frac{160}{5}$

$\log_2 32$

$\frac{\log 32}{\log 2} = 5$

4) $\log_7 14 - \log_7 2$

$\log_7 \frac{14}{2}$

$\log_7 7$ $\frac{\log 7}{\log 7}$

$= 1$

5) $\frac{1}{4}\log_3 162 - \log_3 \sqrt[4]{2}$

$\log_3 162^{\frac{1}{4}} - \log_3 \sqrt[4]{2}$

$\log_3 \sqrt[4]{162} - \log_3 \sqrt[4]{2}$

$\log_3 \frac{\sqrt[4]{162}}{\sqrt[4]{2}}$

$\log_3 \sqrt[4]{81}$

$\log_3 3 = 1$

$\frac{\log 3}{\log 3}$