

Logarithm Notes:

Remember:

Logarithm Properties:

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|----|--|---------------------|
| 1. | $\log_b(pq) = \log_b p + \log_b q$ | Product Rule |
| 2. | $\log_b\left(\frac{p}{q}\right) = \log_b p - \log_b q$ | Quotient Rule |
| 3. | $\log_b(p^n) = n \cdot \log_b p$ | Power Rule |
| 4. | $\log_a c = \frac{\log_b c}{\log_b a}$ | Change of Base Rule |

Simplify:

1. $\log_a a = 1$
2. $\log_e e = 1$
3. $\log_a 1 = 0$
4. $\log_2 16 = 4$
5. $\log_3 9 = 2$

Rewrite the exponentials as logarithms:

1. $4^3 = 64$ $\log_4(64) = 3$
2. $2^4 = 16$ $\log_2(16) = 4$
3. $c^a = w$ $\log_c(w) = a$

$\ln(864)$ Rewrite in terms of $\ln(3)$ and $\ln(2)$

Solution: Factor $864 = 2(432) = 2(2)(216) = 2(2)(2)(108) = 2(2)(2)(2)(54) = 2(2)(2)(2)(2)(27)$
 $= 2(2)(2)(2)(2)(3)(9) = 2(2)(2)(2)(2)(3)(3)(3) = 2^5 \cdot 3^3$: $\ln(864) = \ln(2^5 \cdot 3^3) = \ln(2^5) + \ln(3^3)$
 $= \boxed{5 \ln(2) + 3 \ln(3)}$

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