

Reminder that exponentials and logarithmic functions are inverses!

TASK 1: Simplify the expression using laws of exponents.

a) $(-3x^{-2})^3$

$(-3)^3(x^{-2})^3$
 $(-27)(x^{-6})$
 $\boxed{\frac{-27}{x^6}}$

b) $\frac{81(a)^7}{36a^{-2}}$

$\frac{9 \cdot 9 \cdot 7 \cdot (-2)}{4}$
 $\boxed{\frac{9a^9}{4}}$

c) $(2b^0c^3)(-5b^{-2}c^6)$

$(2 \cdot -5)(b^{0-2})(c^{3+6})$
 $-10b^{-2}c^9 = \boxed{\frac{-10c^9}{b^2}}$

OBJECTIVE 1: Properties of Logarithms

Let $b, m,$ and n be positive real numbers with $b \neq 1$.

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 $\log_b m^n = n \log_b m$

CRF stands for calculator ready form. It is the same as exact in geometry. Do not round your answer.

TASK 2: Evaluate the logarithmic expression given $\log_6 5 \approx 0.898$ and $\log_6 8 \approx 1.161$.

a) $\log_6 \frac{5}{8}$

$\log_6 5 - \log_6 8$
 $0.898 - 1.161$
 $\boxed{-0.263}$

b) $\log_6 40$

$\log_6 5 + \log_6 8$
 $0.898 + 1.161$
 $\boxed{2.059}$

c) $\log_6 64$

$2(\log_6 8)$
 $2(1.161) = \boxed{2.322}$

d) $\log_6 125$

$3(\log_6 5)$
 $3(0.898) \approx \boxed{2.694}$

OBJECTIVE 2: Expanding VS Condensing

- **Expanding:** use properties of exponents above to write your expression using more than one log
- **Condensing:** use properties of exponents above to write your expression as a single logarithm

TASK 3: Expand or Condense the logarithmic expression provided. Leave in CRF.

EXPAND:

a) $\ln \frac{5}{12x}$

$$\ln 5 - \ln 12x$$
$$\ln 5 - (\ln 12 + \ln x)$$

CONDENSE:

a) $\log x - \log 9$

$$\log \frac{x}{9}$$

b) $\log_6 3x^4$

$$\log_6 3 + \log_6 x^4$$
$$\log_6 3 + 4\log_6 x$$

b) $\ln 4 + 3 \ln 3 - \ln 12$

$$\ln 4 + \ln 3^3 - \ln 12$$
$$\ln \frac{4 \cdot 3^3}{12}$$

c) $\ln \frac{3x^5}{y}$

$$\ln 3 + \ln x^5 - \ln y$$
$$\ln 3 + 5 \ln x - \ln y$$

c) $\log 6 + 4 \log 3 - \log 3$

$$\log 6 + \log 3^4 - \log 3$$
$$\log \frac{6 \cdot 3^4}{3}$$

OBJECTIVE 3: Change of Base Formula

TASK 4: Change the expressions provided to allow the calculator to work.

a) $\log_3 8$

$$\frac{\log 8}{\log 3}$$

b) $\log_6 24$

$$\frac{\log 24}{\log 6}$$

c) $\log_7 9$

$$\frac{\log 9}{\log 7}$$

$$b \neq 1$$

$$\& c \neq 1$$

$$\log_c a = \frac{\log_b a}{\log_b c}$$

Still need help with: