LOG LAWS:

Logarithms can be manipulated using log laws, as seen below.

- $\log_a xy = \log_a x + \log_a y$

- $\log_a \dfrac{x}{y} = \log_a x - \log_a y$

- $\log_a 1 = 0$

- $\log_a a = 1$

- $\log_a x^p = p \log_a x$

- $\log_a a^x = x$

- $\log_a x = \dfrac{\log_b x}{\log_b a}$

- $a^{\log_a x} = x$

5.1 WORKED EXAMPLE

Write the following as the logarithm as a single expression or number:

1. $\log_a x + \log_a y - \log_a z$

2. $3 \log_a x + 2 \log_a y$

3. $\dfrac{\log_a 9}{\log_a 3}$

4. $\log_2 2^x$

5.2 WORKED EXAMPLE

Write the following as the sums and difference of logarithmic expressions:

1. $\log_a \left(x^3 y^4 \right)$

2. $\log_a \left(\dfrac{xy^2}{z^2} \right)$

3. $\log_a \left(\dfrac{x^2 + 1}{\sqrt{x - 1}} \right)$