Properties of Logarithms

1. Use properties of logarithms to expand each logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

$$\log_3(27x)$$

2. Use properties of logarithms to expand each logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

$$\log_2\left(\frac{16}{x}\right)$$

3. Use properties of logarithms to expand each logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

$$\log P^3$$

4. Use properties of logarithms to expand each logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

$$\log\left(\frac{x^5 y^3}{z^4}\right)$$

5. Use properties of logarithms to expand each logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

$$\log_3 \sqrt[4]{\frac{x^2 y^5}{27z}}$$

6. Use properties of logarithms to expand each logarithmic expression as much as possible. Where possible, evaluate logarithmic expressions without using a calculator.

$$\ln\left[\frac{e^2 x^5 \sqrt[4]{3+x}}{5(x-2)^4}\right]$$

7. Use properties of logarithms to condense each logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions without using a calculator.

$$\log_3 54 - \log_3 2$$

8. Use properties of logarithms to condense each logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions without using a calculator.

$$4\log_2 x + 7\log_2 y$$

9. Use properties of logarithms to condense each logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions without using a calculator.

$$2\ln x + 3\ln y - 4\ln z$$

10. Use properties of logarithms to condense each logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions without using a calculator.

$$\frac{1}{5}\left(\log_3 x - 4\log_3 y\right) + 5\log_3(x-7)$$

11. Use properties of logarithms to condense each logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Where possible, evaluate logarithmic expressions without using a calculator.

$$\ln x + \ln(x^2 - 9) - \ln(7) - \ln(x+3)$$

12. Use common logarithms or natural logarithms and a calculator to evaluate to four decimal places

$$\log_5 13$$

13. Use a graphing utility and the change-of-base property to graph each function

$$y = \log_5(x+3)$$