

Directions: Show all work, and answer each question that is asked. Explanations should be given in complete sentences. All graphs should be drawn accurately on this sheet, and be fully labeled.

1. Use properties of logarithms to completely expand the logarithmic expression. Wherever possible, evaluate logarithmic expressions.

$$\log(30x^{-1}y)$$

2. Use properties of logarithms to completely expand the logarithmic expression. Wherever possible, evaluate logarithmic expressions.

$$\log_2 \left(\frac{8ab}{c^2\sqrt{d}} \right)$$

3. Use properties of logarithms to rewrite as a single logarithm:

$$- 2 \cdot \log(x) + 3 \cdot \log(y)$$

4. Use properties of logarithms to rewrite as a single logarithm:

$$13 \cdot \log_5(x) - 9 \cdot \log_5(y) - \frac{1}{7} \cdot \log_5(z) + 5 \cdot \log_5(w)$$