

1. Consider the graph of the exponential function $f(x) = 2^x - 3$.

(a) Describe the characteristics of the function, with respect to the domain & range, intercepts, and asymptote(s).

Domain: _____ Range: _____ Equation of Asymptote: _____
0.5 0.5 0.5

(b) State the domain, range, intercept, and asymptote for the **inverse** of $f(x)$.

4 Domain: _____ Range: _____ Equation of Asymptote: _____
0.5 0.5 0.5

(c) Determine the **equation of the inverse** function.

1

2. For the function $y = -5\log_3(x + 3)$ state the indicated characteristics.

4 Domain: _____ Range: _____ Equation of Asymptote: _____ Any x intercepts: _____ Any y intercepts: _____
0.5 1 0.5 0.5 0.5

1 Algebraically determine the intercepts, show your work on **separate paper**.

3. Express in logarithmic form: $12^2 = 144$

1

4. Express in exponential form: $\log(x + 3) = y$

1

2

5. Evaluate using *without using a calculator*: You must show steps.

(a) $\log_5 125$

1

(b) $\log_{1/3} 27$

1

2

6. Solve each equation. (Show all steps / justification)

(a) $\log_3 x = 4$

1

(b) $\log_x \left(\frac{1}{8}\right) = -3$

1

(c) $\log_2 \sqrt{32} = x$

1

3

7. Simplify (show all steps) to evaluate $\log_5 625 + \log_7 49^3 + \log_2 \left(\frac{1}{16}\right) + \log_b b + \log_a 1$

8. Use the laws of logarithms to simplify (write as a single log) and then evaluate each expression.

$$\frac{(a) \log_{12} 24 - \log_{12} 6 + \log_{12} 36}{1}$$

$$\frac{(b) \log_2 72 - \frac{1}{2}(\log_2 3 + \log_2 27)}{1}$$

2

9. If $\log 3 = P$ and $\log 5 = Q$, write an algebraic expression in terms of P and Q for each:

$$\frac{(a) \log 15}{1}$$

$$\frac{(b) \log \frac{25}{\sqrt{3}}}{1}$$

2

10. If $\log x = 4$, evaluate:

$$(a) \log(100x)$$

$$(b) \log\left(\frac{\sqrt{x}}{1000}\right)$$

2

11. Solve each equation algebraically.

$$(a) 8^{3x+4} = 4^{x-9}$$

$$(b) \log_2 x - \log_2 3 = 5$$

2

12. Write as a single logarithm: $2\log x - \frac{\log z}{2} + 3\log y$

2