

Solve each equation. Show all work.

1. $3^x - 12 = 15$
 $+12 \quad +12$
 $3^x = 27$
 $x = 3$

2. $\log 5x + 3 \log 2 = 2$
 $\log_{10} 40x = 2$
 $10^2 = 40x$
 $\frac{100}{40} = \frac{40x}{40}$
 $x = \frac{5}{2}$

Describe how the graph of each function is related to the graph of its parent function.

3. $y = -5^{x-3}$
 reflected across x-axis
 translate 3 units to the right

parent $\rightarrow y = 5^x$

4. $y = 2 \log x + 7$
 stretched by a factor of 2
 shifted (translated) up 7 units

Evaluate each logarithm.

5. $\log_5 125 = 0$
 $5^x = 125$
 $x = 3$

6. $\log_{\frac{1}{3}} 81 = -4$

$\frac{1}{3}^{-4} = 81$
 $3^{-(-4)} = 3^4$
 $3^{-x} = 3^4$
 $-x = 4$
 $x = -4$

Write the equation in logarithmic form.

7. $5^{-3} = \frac{1}{125}$
 $\log_5 \frac{1}{125} = -3$

Write the equation in exponential form.

8. $\ln 1 = 0$
 $e^0 = 1$

Write each logarithmic expression as a single logarithm.

9. $\ln 72x - 2 \ln(2y)^2$
 $\ln \frac{72x}{4y^2} = \ln \frac{18x}{y^2}$

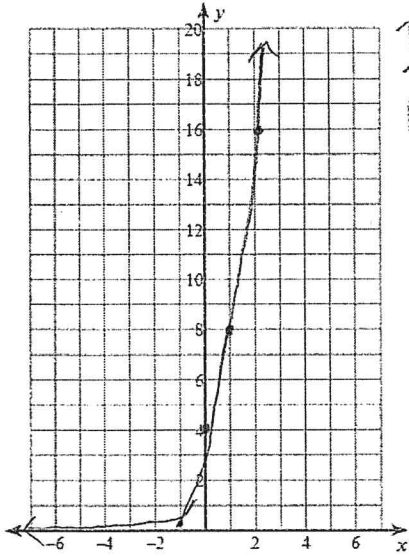
Use the Change of Base Formula to rewrite the expression.

10. $\log_{26} 111$
 $\frac{\log 111}{\log 26}$

Name _____

Graph each function. Identify the domain, range, and asymptote.

$y = 4 \cdot 2^x$

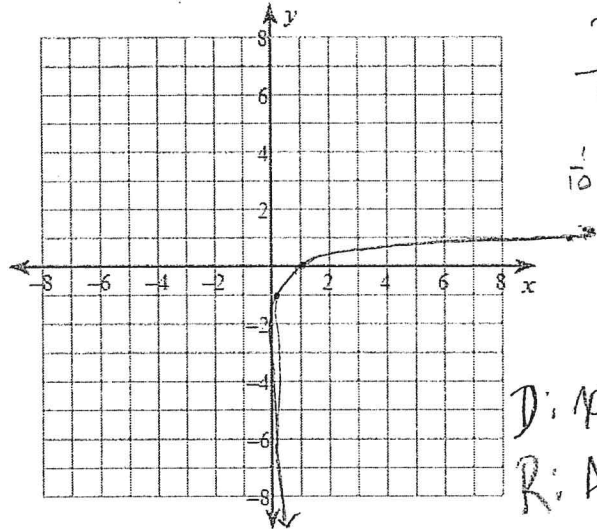


D: \mathbb{R}
 R: $y > 0$
 A: $y = 0$

| x | y |
|----|---------------|
| 1 | 8 |
| 0 | 4 |
| 2 | 16 |
| -1 | $\frac{1}{8}$ |

11.

$y = \log_{10} x$



D: $x > 0$
 R: \mathbb{R}
 A: $x = 0$

| x | y |
|----------------|----|
| 10 | 1 |
| 1 | 0 |
| $\frac{1}{10}$ | -1 |

12.

Solve.

$x = 0.496$

13. $3^{7x} + 9.8 = 55$
 $-9.8 \quad -9.8$

$\log_3 44.2 = 7x$

147. $\log_2(x + 8) = 4$

$3^{7x} = 44.2$

$\frac{1 \cdot \log 44.2}{7 \log 3} = \frac{7x}{7}$

$2^4 = x + 8$

$16 = x + 8$

$x = 8$

15. The population of a bee colony is growing at a rate of 3.7% each year. There are currently 3400 bees in the colony. At this rate, in how many years will there be 10,200 bees in the colony?

$A = a(1+r)^t$

$\frac{10,200}{3400} = \frac{3400(1+0.037)^t}{3400}$

30.2 yrs.

$3 = 1.037^t$

$\log_{1.037} 3 = t$
 $t = 30.2$

16. Continuously compounded interest is represented by the formula $A = Pe^{rt}$ [let A be the final amount, P be the starting principal, r be the continuous interest rate, and t be the time in years.

If \$1000 compounded continuously is worth \$1066 in 5 years, what is the interest rate?

- A. 1.28%
- B. 0.05%
- C. 5%
- D. 25%

$A = Pe^{rt}$

$\frac{1066}{1000} = e^{5r}$

$r = 0.0128$

$\frac{1066}{1000} = \frac{1000e^{r \cdot 5}}{1000}$

$\ln \frac{1066}{1000} = 5r$ $r = 1.3\%$

17. In 1985, Mexico was hit by an earthquake with a magnitude of 8.3 on the Richter scale. Eight years later, India was hit by an earthquake with a magnitude of 6.7. How many times more intense was the earthquake in Mexico than the earthquake in India? Use the formula $\log \frac{I_1}{I_2} = M_1 - M_2$.

$\log \frac{I_1}{I_2} = 8.3 - 6.7$

$10^{1.6} = \frac{I_1}{I_2}$

$\log \frac{I_1}{I_2} = 1.6$

40 times $\frac{I_1}{I_2}$