

Name: Key

<p>1. Rewrite as a log:</p> $k^3 = 216$ $\log_k 216 = 3$	<p>2. Rewrite as a log:</p> $h^m = t$ $\log_h t = m$
<p>3. Rewrite as a log:</p> $\left(\frac{2}{3}\right)^4 = \frac{16}{81}$ $\log_{2/3} \left(\frac{16}{81}\right) = 4$	<p>4. Rewrite as a log:</p> $5^{x-2} = w$ $\log_5 w = x - 2$
<p>5. Rewrite as an exponential</p> $\log_5 x = 3$ $5^3 = x$	<p>6. Rewrite as an exponential</p> $\log_3 \left(\frac{1}{27}\right) = x$ $3^x = \frac{1}{27}$
<p>7. Rewrite as an exponential</p> $\log_5 625 = x$ $5^x = 625$	<p>8. Rewrite as an exponential</p> $\log_3 p = x$ $3^x = p$
<p>9. Expand</p> $\log_3 3x^2y^5$ $1 + 2\log_3 x + 5\log_3 y$	<p>10. Expand</p> $\ln \frac{a\sqrt{b}}{c^2}$ $\ln a + \frac{1}{2} \ln b - 2 \ln c$
<p>11. Expand</p> $\log_2 \frac{5b^2}{a^4b^3}$ $\log_2 5 + 2\log_2 b - 4\log_2 a - 3\log_2 b$	<p>12. Expand</p> $\log_5 x^3 \sqrt{x-2}$ $3\log_5 x + \frac{1}{2} \log_5 (x-2)$
<p>13. Condense</p> $\ln 5 + 2\ln x + 3\ln y$ $\ln 5x^2y^3$	<p>14. Condense</p> $\log_5 a + 5\log_5 m - \log_5 n - 3\log_5 p$ $\log_5 \frac{am^5}{np^3}$

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<p>15. Condense</p> $3 \ln r - \ln 4 - \ln t - 4 \ln w$ $\ln \frac{r^3}{4tw^4}$	<p>16. Condense</p> $\log_3 7 + \frac{1}{2} \log_3 (x-1) - 3 \log_3 z$ $\log_3 \frac{7\sqrt{x-1}}{z^3}$
<p>17. Solve: $3^{x+1} + 4 = 85$</p> $3^{x+1} = 81$ $3^{x+1} = 3^4$ $x+1 = 4$ $x = 3$	<p>18. Solve: $2^{x-3} = \frac{1}{32}$</p> $2^{x-3} = 2^{-5}$ $x-3 = -5$ $x = -2$
<p>19. Solve</p> $8(6^x) = 384$ $6^x = 48$ $\log_6 48 = x$ $x \approx 2.161$	<p>20. Solve</p> $\log_7 (8x-12) = \log_7 (3x-18)$ $8x-12 = 3x-18$ $5x = -6$ $x = -\frac{6}{5}$ <p>\emptyset</p>
<p>21. Solve</p> $5e^{2x} - 7 = 28$ $5e^{2x} = 35$ $e^{2x} = 7$ $\ln 7 = 2x$ $\frac{\ln 7}{2} = x$ $x \approx .973$	<p>22. Solve</p> $9(5^{x-2}) - 8 = 892$ $5^{x-2} = 100$ $\log_5 100 = x-2$ $x \approx 4.861$
<p>23. Solve</p> $4 + \ln(3x) = 9$ $\ln 3x = 5$ $e^5 = 3x$ $x \approx 49.471$	<p>24. Solve</p> $2 \log_4 (x-3) + 12 = 16$ $\log_4 (x-3) = 2$ $x-3 = 16$ $x = 19$
<p>25. Solve</p> $\log_4 x + \log_4 (x-6) = 2$ $\log_4 x^2 - 6x = 2$ $x^2 - 6x = 4^2$ $x^2 - 6x - 16 = 0$ $(x-8)(x+2) = 0$ $x = 8$ <p>$x = -2$</p>	<p>26. Solve</p> $125^{3x-1} = 5^x$ $(5^3)^{3x-1} = 5^x$ $5^{9x-3} = 5^x$ $9x-3 = x$ $-3 = -8x$ $x = \frac{3}{8}$

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27. You purchase a stereo for \$1200. The value of the stereo system decreases 11% each year.

a. Write the equation for the stereo's value in terms of the number of years since the purchase.

$$A = 1200(1 - .11)^t$$

b. What is the value of the system after 2 years?

$$A = 1200(.89)^2$$

$$\$ 950.52$$

c. When will the stereo be worth half the original value?

$$600 = 1200(.89)^t$$

$$\frac{1}{2} = .89^t$$

$$\log_{.89} \frac{1}{2} = t$$

$$t \approx 5.948 \text{ yrs}$$

28. The tuition at a private college in 1995 was \$16,000. During the next 10 years, the tuition increased by an average of 5% each year.

a. Write a model for the tuition at the college since 1995.

$$A = 16000(1 + .05)^t$$

b. What is the tuition in 2005 at this college?

$$16000(1.05)^{10}$$

$$\$ 26,062.31$$

c. What year will the tuition double?

$$32,000 = 16000(1.05)^t$$

$$2 = (1.05)^t$$

$$\log_{1.05} (2) = t$$

$$t = 14.207 \text{ yrs}$$

$$2009.207$$

29. You deposit \$2500 in an account that earns 6.5% annual interest. Find the balance after 5 years if the interest is compounded:

a. Annually $2500(1 + .065)^5 = \$3425.22$

b. Quarterly $2500\left(1 + \frac{.065}{4}\right)^{4(5)} = \3451.05

c. Continuously $2500 e^{.065(5)} = \$3460.08$

d. How long would it take to double your investment if it is compounded continuously?

$$5000 = 2500 e^{.065(t)}$$

$$2 = e^{.065t}$$

$$\ln 2 = .065t$$

$$t = 10.664 \text{ yrs.}$$