Name____Date____________________________

Algebra 2-2: 7-4 to 7-5 Review

olve each equation. Give both the exact answer *and* the rounded answer to the nearest hundredth.

1. ln 3*x* = 8

$e^8 = 3x$

$\frac{e^8}{3} = x$

$993.65 \approx x$

2. $2\left(\frac{1}{2}\ln 5x\right) = (4)\,2$

$\ln 5x = 8$

$\frac{e^8}{5} = \frac{5x}{5}$

$\boxed{\frac{e^8}{5} = x}$

$596.19 \approx x$

3. log (*x* − 4) = 2

$10^2 = x - 4$

$+4 \quad +4$

$\boxed{104 = x}$

4. $2\log 3x - 4 = 2$

$+4 \quad +4$

$\frac{2\log 3x}{2} = \frac{6}{2}$

$\log 3x = 3$

$10^3 = 3x$

$\frac{1000}{3} = \frac{3x}{3}$

$\boxed{\frac{1000}{3} = x}$

Write each expression as a single logarithm. Simplify as much as possible.

5. $\log_5 3 + \log_5 6$ $= \cancel{\log_5 \frac{6}{3} = \log_5 2}$

$= \log_5 3\cdot 6 = \boxed{\log_5 18}$

6. $\log_2 32 - \log_2 8$

$= \log_2 \frac{32}{8} = \log_2 4 = 2$

7. $\frac{1}{2}\log_4 25 + \log_4 2$

$= \log_4 25^{\frac{1}{2}} + \log_4 2$

$= \log_4 \sqrt{25} + \log_4 2$

$= \log_4 5 + \log_4 2$

$= \log_4 10$

8. $\frac{1}{2}\log x + \frac{1}{3}\log y - 2\log z$

$= \log x^{\frac{1}{2}} + \log y^{\frac{1}{3}} - \log z^2$

$= \log\left(x^{\frac{1}{2}} y^{\frac{1}{3}}\right) - \log z^2$

$= \boxed{\log\left(\frac{x^{\frac{1}{2}} y^{\frac{1}{3}}}{z^2}\right)}$

Solve each equation. Give both the exact answer *and* the rounded answer to the nearest hundredth.

9. $4^x = 16$

$4^x = 4^2$

$x = 2$

10. $9^{y-3} = 81$

$9^{y-3} = 9^2$

$y - 3 = 2$

$y = 5$

11. $5 - 3^x = -40$

$-5 \quad -5$

$\frac{-3^x}{-1} = \frac{-45}{-1}$

$\log 3^x = \log 45$

$\frac{x \log 3}{\log 3} = \frac{\log 45}{\log 3} = \log_3 45$

$x \approx 3.46$

12. $\log 3^{x+3} = \log 6$

$\frac{(x+3)\log 3}{\log 3} = \frac{\log 6}{\log 3}$

$x + 3 = \frac{\log 6}{\log 3}$

$x = \frac{\log 6}{\log 3} - 3 \approx -1.37$

$x = \log_3 6 - 3$

Expand each logarithm.

13. $\log_4 \frac{m}{n}$

$\log_4 m - \log_4 n$

14. $\log_5 \left(x \cdot \sqrt[3]{y} \right)$

$= \log_5 x + \log_5 \sqrt[3]{y}$

$= \log_5 x + \frac{1}{3} \log_5 y$

15. $\log_3 \frac{x^4}{y^2} = \log_3 x^4 - \log_3 y^2$

$= 4\log_3 x - 2\log_3 y$

16. $\log \frac{2x^2 y}{3k^3}$

$= \log(2x^2 y) - \log(3k^3)$

$= \log 2 + \log x^2 + \log y - (\log 3 + \log k^3)$

$= \log 2 + 2\log x + \log y - \log 3 - 3\log k$

Use logarithm properties to *evaluate* the following expressions.

17. $\log_2 160 - \log_2 5$

$= \log_2 \left(\frac{160}{5}\right)$

$= \log_2 32$

$\log_2 32 = x$

$2^x = 32$

$x = 5$

18. $\log_7 14 - \log_7 2$

$= \log_7 \frac{14}{2}$

$= \log_7 7$

$= 1$

19. The equation $y = 6.72(1.014)^x$ models the world population *y* in billions of people *x* years after the year 2000. Find the year in which the world population is about 8 billion.

$\frac{8}{6.72} = \frac{\cancel{6.72}(1.014)^x}{\cancel{6.72}}$

$\log\left(\frac{8}{6.72}\right) = \log 1.014^x$

$\frac{\log\left(\frac{8}{6.72}\right)}{\log 1.014} = \frac{x \cancel{\log 1.014}}{\cancel{\log 1.014}}$

$12.54 = x$

So, about 12.54 years after 2000, which is 2000 + 12.54 = 2012.54

So about half-way thru 2012.

20. Suppose an initial investment of *P* dollars is put into an account that pays 5% compounded semi-annually. About how long would it take to double your initial investment? Give the number of years and months.

$\frac{2P}{P} = \frac{P\left(1 + \frac{.05}{2}\right)^{2t}}{P}$

$\log 2 = \log\left(1 + \frac{.05}{2}\right)^{2t}$

$\frac{\log 2}{2 \cdot \log(1.025)} = \frac{2t \cdot \log(1.025)}{2 \cdot \log(1.025)}$

$14.0355 = t$

$.0355(12) = .426$

$\boxed{\text{So, 14 years and .426 months}}$