LOGARITHMS REVIEW

Evaluate/Simplify:

1. $\log_4 \sqrt{128}$

2. $log_x \frac{1}{\sqrt{x^2}}$

3. $a^{log_a x} + log_a a^x$

4. $10^{\log_{100} c}$

5. $\log_9 \sqrt{3^5}$

6. $e^{6 \ln k}$

7. $\log_4 \frac{1}{\sqrt{32}}$

8. $\log_7 7000$

9. $(\log_x y)(\log_y x)$

10. Solve: $\left(\frac{1}{9}\right)^{2x+5} = 27^{(1-x)}$

11. Solve: $\log_x 9 = -\frac{2}{3}$

12. Solve: $5^x = 37$

13. Express $-2\log_\pi a - \frac{1}{2}\log_\pi b + \log_\pi\left(\frac{a}{3}\right)$ as a single logarithm.

14. Which of the following statements is/are true?

I. $\log(2 \cdot 9) = \log 18$

II. $\log(2 \cdot 9) = \log 2 + \log 9$

III. $\log(2 \cdot 9) = \log 2 + 2\log 3$

IV. $\log(2 \cdot 9) = \log 1.8 + 1$

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15. Which of the following statements is/are true?

I. $\log(3 + 5) = \log 15$

II. $\log(3 \cdot 5) = \log 3 + \log 5$

III. $\log(3 + 5) = 3\log 2$

IV. $\log(3 \cdot 5) = \log 10^{\log(15)}$

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16. If $log_{16}x = a$, express $log_{64}x$ in terms of a.

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17. If $\log_2 7 = x$, express $\log_2 \frac{49}{16}$ in terms of x

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18. Given the function $f(x) = \log_b x$, how is $y = \log_{\frac{1}{b}} x$ related to $f(x)$?

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19. A population of 20 million people is growing at 1.7% annually.

a) What will the population be in 10 years?

b) When will the population reach 30 million?

c) Determine the doubling time.

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20. A poison has a tenth-life (reduces to one-tenth) in the bloodstream of 720 minutes.

a) Determine the half-life of the poison.

b) How much of a 1.20 g sample would remain after 300 minutes?

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21. An iron pipe is rusting so that it loses 9% of its mass each year. What fraction of its original mass will remain after 10 years?

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22. Consider an earthquake registering 7.7 on the Richter Scale:

    a) Determine the Richter Scale magnitude of an earthquake that is 7000 times more powerful.

    b) Determine the Richter Scale magnitude of an earthquake that has half the intensity.

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23. A population of insects can double in 30 days.

    a) By what factor will the population have grown in an 80 day period?

    b) How long will it take the population to triple?

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24. An amount is invested at an interest rate of 6.4% p.a. compounded twice every day.

    a) Determine the effective annual interest rate

    b) Calculate the number of years for an investment of \$1800 to grow to \$5000.

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25. Determine the half-life of a decaying radioactive material of which 0.4%, or $\frac{4}{1000}$, remains after 420 000 years.

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26. A population increases by a factor of 1.50 every 8 years.

    a) If the population now is 1.8 million, estimate the population 20 years earlier.

    b) How long will it take the population to reach 4 million?

    c) If this growth is expressed in the form $y = y_0 e^{kt}$, determine the growth constant "k".

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27. What annual percent growth will increase an amount by a factor of 2 in seven years?

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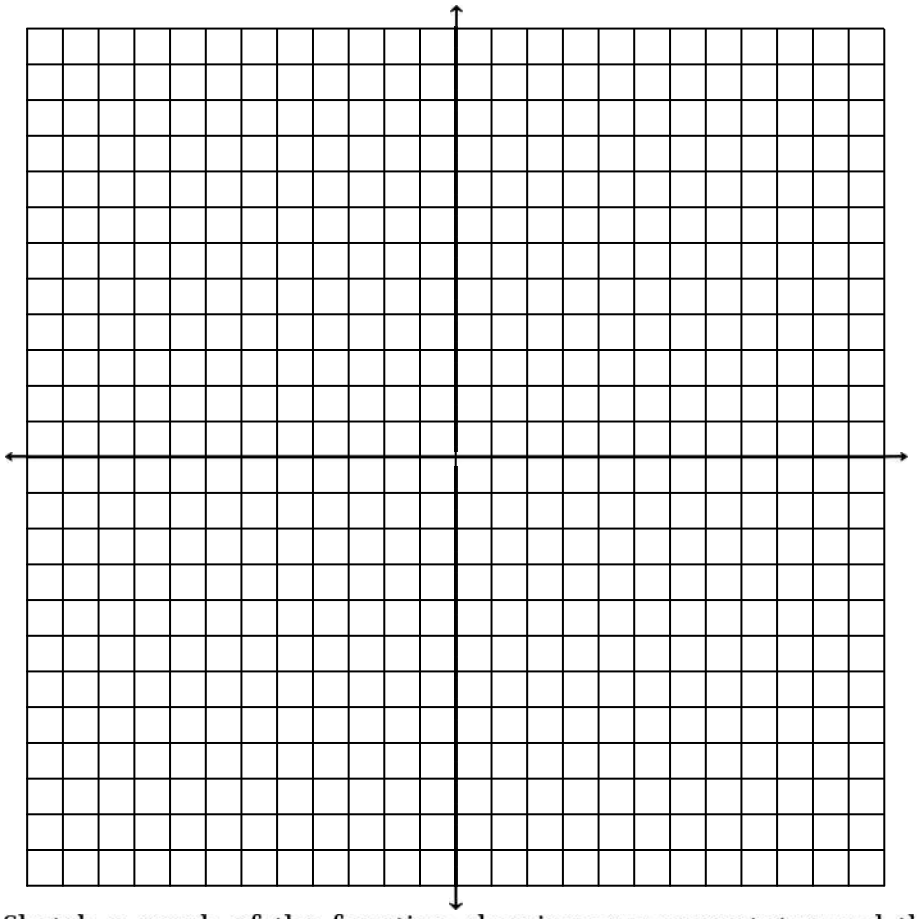
28. Consider the function $y = \log_4(x+2) - 3$

a)



Sketch a graph of the function showing any asymptotes and their equations, and labelling EXACT coordinates of at least two points on the graph.

b) Find the x and y intercepts (exact) of the function by algebra.

c) Graph the inverse of $f(x)$ on the same grid, and also determine the the equation of $f^{-1}(x)$.

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29. Solve algebraically, leaving answer in exact form: $3^{2x-5} = 7(5)^{x+1}$

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30. Solve algebraically: $2\log_2(3-x) - \log_2(x+5) = 2$
