

Name _____ Date _____ Period _____

Find the exact solution algebraically. **DO NOT** use logarithms to solve! Show work!

1. $32\left(\frac{1}{4}\right)^{x/3} = 2$

2. $2 \cdot 5^{x/4} = 250$

3. $3(5^{-x/4}) = 15$

Solve each equation. Write the exact answer and if necessary, obtain a numerical approximation for your solution by rounding to the nearest ten thousandths. Show work!

4. $1.08^x = 6.45$

5. $3^x = 25$

6. $40e^{0.025x} = 200$

7. $7 - 4e^{-x} = -5$

8. $5^{x+3} = 30$

9. $4^{5-x} - 2 = 13$

10. $9^{(x-4)} + 2 = 5$

11. $\ln x = 6$

12. $\log x = 4$

$$13. \log_3(x + 2) = 2$$

$$14. 3 \ln(x - 2) + 6 = 7$$

$$15. 3 - \log(x + 3) = 4$$

$$16. \log_3 x = \log_3 7$$

$$17. \log_5 x = \log_5(2x - 3)$$

$$18. \log_3(3x - 2) = 3$$

$$19. \log_2(x + 2) + \log_2(x + 4) = 3$$

$$20. \log_{10} x + \log_{10}(x + 21) = 2$$

$$21. 2 \log_3(x + 4) - \log_3 9 = 2$$

$$22. 5 \log_3(x + 1) - \log_3 27 = 2$$

$$23. 3\log_2(x - 4) + \log_2 32 = 17$$

$$24. \log_3 2 + \log_3 8 = \log_3 2x$$

$$25. \log_5 42 - \log_5 7 = \log_5(3x - 1)$$

$$26. \log_9 5 + \log_9(n + 1) = \log_9 6n$$

Growth & Decay Applications Law of uninhibited growth or decay: $A(t) = A_0 e^{kt}$ A_0 = initial population,
k = rate of change, t = time in years

27. The size P of a certain insect population at time t (in days) obeys the function $P(t) = 500e^{0.02t}$.

a) Determine the number of insects at $t = 0$ days.

b) What is the growth rate of the insect population?

c) What is the population after 10 days?

d) When will the population reach 800? Round to the nearest tenth of a day.

e) When will the insect population double? Round to the nearest tenth of a day.

28. The population of a colony of mosquitos obeys the law of inhibited growth.

a) If there are 1000 mosquitos initially and there are 1800 after day 1, find the rate of increase. Round to the nearest hundredth of a percent.

b) What is the size of the colony after 3 days?

c) How long is it until there are 10,000 mosquitos? Round to the nearest tenth of a day.

d) How long is it until the population doubles? Round to the nearest tenth of a day.

29. If Tanisha has \$100 to invest at 8% per annum compounded monthly, how long will it be before she has \$150? Use formulas from 11.5.

Review: Solve the given equations. Show all work!

30. $x^2 - 7x - 30 = 0$

31. $x^2 - 4x + 3 = 0$