

Worksheet 7.6 B – More Applications of Exp. and Log Equations

$$N = N_0 (r)^{\frac{t}{d}} \quad \text{Exponential Growth or Decay}$$

$$A = Pe^{rt} \quad \text{Interest Compounded Continuously} \qquad A = P \left(1 + \frac{r}{n} \right)^{nt} \quad \text{Compound Interest}$$

1. You deposit \$1200 in an account that pays 5% interest. Find the balance in the account after 10 years if the interest was compounded continuously.
2. The percent risk, r , of an auto accident is related to the blood alcohol level, B , of the driver. The relation is given by $B = \frac{1}{21.4} \ln r$. What is the percent risk of an auto accident if the driver's blood alcohol level is 0.14?
3. You deposit \$2000 in an account that pays 6% annual interest, compounded quarterly. How long will it take for the balance to reach \$2500?
4. You deposit \$2000 in an account that pays 6% annual interest, compounded continuously. How long will it take the balance to reach \$2500?
5. How long will it take \$3000 to be worth \$4000 if it is invested at a rate of 6% interest compounded monthly?
6. The half-life of iodine is 13 hours. How long does it take 80 grams to decay to 50 grams?

7. If \$850 is invested at an annual interest rate of 5% compounded continuously, what is the amount in the account after 10 years?

8. How long will it take \$200 to be worth \$450 if it is invested at a rate of 8% interest compounded continuously?

9. If chromium 51 has a half-life of 28 days, how long will it take for 650 mg to decay to 200 mg?

10. Newton's law of cooling states that the temperature of coffee decreases exponentially according to $T = T_s + (T_o - T_s)e^{-.283 t}$ where T_o is the initial temperature, T_s is the surrounding temperature, t is time in minutes, and T is the final temperature. If the temperature at Joe's Cup of Java is 70° F and serves coffee at a piping hot 206° F, how long will it take my coffee to reach an optimal temperature of 140° F ?

11. How long will it take an investment of \$100 to triple in value if it is invested at an annual rate of 6% compounded quarterly?

Solve or Simplify. Round to three decimal places. Show your work.

12. $e^x = 45$

12. $\log 3x = 6$

13. $5^x - 20 = 100$

14. $4 \ln x = 10$

15. $\ln e^{28}$

16. $5e^x = 20$

17. $\log_2 5$

18. $\log_4 7$

19. $\log_4 30$

20. $\log_6 80$

21. $\log_5 35$

22. $7 \ln x + 12 = 33$