1. You start an account with $500 and an interest rate of 6% compounded yearly. How much is in the account after 3 years?

$$Y = 500(1 + 0.06)^3$$

$$Y = 500(1.06)^3$$

$$Y = \$595.51$$

2. From 2000 - 2010 a city had a 2.5% annual decrease in population. Write an Equation that represents this information.

10 years

$$y = 2,950,000 \left(1 - 0.025\right)^{10t}$$

$$y = 2,950,000 \left(0.975\right)^{t}$$

3. From 2000 - 2010 a city had a 2.5% annual decrease in population. If the city had 2,950,000 people in 2000, determine the city's population in 2008. 8 yrs

$$Y = 2,950,000(.975)^8$$

$$Y = 2409122.82$$

$$Y = 2,409,122$$

* have to Round Down Because it's population

4. You buy a car for $8000 that depreciates at a rate of 11% a year. How much is the care worth after 5 years?

$$Y = 8,000 \left(1 - .11\right)^5$$

$$Y = 8,000 \left(.89\right)^5$$

$$Y = \$4,467.25$$

5. You start an account with $2500 and an interest rate of 6.5% compounded yearly. How much is in the account after 7 years?

$$Y = 2500(1 + .065)^7$$

$$Y = 2500(1.065)^7$$

$$Y = \$3,884.97$$

6. A newly hatched channel catfish typically weighs about 0.06 gram. During the first 6 weeks of life, its weight increases by about 10% each day. Write a function to model the situation. How much does the catfish weigh after 6 weeks?
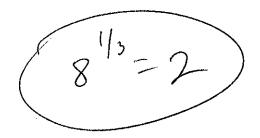
Compound Formula

$$y = a\left(1 + \frac{r}{n}\right)^{nt}$$

$$y = 0.06\left(1 + \frac{.1}{7}\right)^{7(6)}$$

$$y = 0.06(1.014)^{42}$$

$$y = 0.11 \text{ grams}$$

Express the equation in exponential form.

7. $\log_5 25 = 2$

$$5^2 = 25$$

Express the equation in exponential form.

8. $\log_8 2 = 1/3$

$$8^{1/3} = 2$$

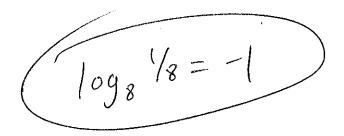Express the equation in logarithmic form.

9. $5^3 = 125$

$$\log_5 125 = 3$$

Express the equation in logarithmic form.

10. $8^{-1} = 1/8$

$$\log_8 \tfrac{1}{8} = -1$$

Evaluate the expression.

11. $\log_6 36$

$$\dfrac{\log 36}{\log 6} = \boxed{2}$$

Evaluate the expression.

12. $\log_9 81$

$$\frac{\log 81}{\log 9} = \boxed{2}$$

Evaluate the expression.

13. $\log_5 0.2$

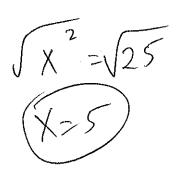$$\frac{\log 0.2}{\log 5} = \boxed{-1}$$

Use the definition of the logarithmic function to find x.

14. $\log_5 x = 4$

$5^4 = x$

$625 = x$

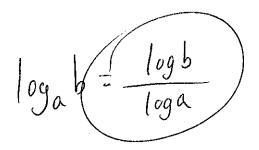Use the definition of the logarithmic function to find x.

15. $\log_4 x = 2$

$$4^2 = X$$

$$\boxed{16 = X}$$

Use the definition of the logarithmic function to find x.

16. $\log_x 25 = 2$

$$\sqrt{x^2} = \sqrt{25}$$

$$x = 5$$

17. What is the Change of Base Formula for $\log_a b$?

$$\log_a b = \frac{\log b}{\log a}$$

18. It takes Jill 2 hours to blow the leaves off of her yard. It takes Riley an hour and a half to blow the leaves off of his yard. How long would it take for both of them to blow the leaves off of their yard?

$LCD = 6x$

$$\frac{1}{2} + \frac{1}{1.5} = \frac{1}{x}$$

$\frac{1}{2} \cdot \frac{3x}{3x} = \frac{3x}{6x}$

$\frac{1}{1.5} \cdot \frac{4x}{4x} = \frac{4x}{6x}$

$$\frac{3x}{6x} + \frac{4x}{6x} = \frac{6}{6x}$$

$\frac{1}{x} = \frac{6}{6} = \frac{6}{6x}$

$$\frac{3x + 4x}{6x} = \frac{6}{6x}$$

$$6x \cdot \left(\frac{7x}{6x} = \frac{6}{6x} \right) \cdot 6x$$

$\frac{7x}{7} = \frac{6}{7}$

$X = \frac{6}{7}$

$X = 0.86$

About 52 minutes

19. Write an exponential equation that passes through the points (0, 25) and (1, 260)

$$Y = a \cdot b^x$$

$$Y = 25 \cdot b^x$$

$$\frac{260}{25} = \frac{25 \cdot b^1}{25}$$

$$10.4 = b$$

$$Y = 25 \,(10.4)^x$$

20. Write an exponential equation that passes through the points (0, 2) and (2, 65)

$$Y = a \cdot b^x$$

$$Y = 2 \cdot b^x$$

$$65 = 2 \cdot b^2$$

$$\sqrt{32.5} = \sqrt{b^2}$$

$$5.7 = b$$

$$Y = 2(5.7)^x$$

21. If x varies inversely as y and x = 8 when y = 15, find x when y is 10.

$$y = \frac{k}{x}$$

$$15 = \frac{k}{8}$$

$$120 = k$$

$$y = \frac{120}{x}$$

$$10 = \frac{120}{x}$$

$$\boxed{x = 12}$$

22. *Compare/Contrast:* You want to put your savings into a bank account that will provide you with the most interest per year. You have saved up a total of $2,000 and you have narrowed your banks down to two choices. Tell which bank is better for your money:

(Hint: Find out which bank gives you the most interest)

Bank 1: offers you 0.7% interest, compounded monthly

Bank 2: offers you 0.65%, compounded quarterly.

Bank 1

$$A = a\left(1 + \frac{r}{n}\right)^{nt}$$

$$A = 2000\left(1 + \frac{0.007}{12}\right)^{12(t)}$$

$$A = 2000\left(1.0006\right)^{12(1)}$$

$$A = 2014.45$$

Better BANK

Bank 2

$$A = a\left(1 + \frac{r}{n}\right)^{t}$$

$$A = 2000\left(1 + \frac{0.0065}{4}\right)^{4(t)}$$

$$A = 2000\left(1.0016\right)^{4(1)}$$

$$A = 2012.83$$

23. An account was opened with $4000 and it is put into an account paying 2.25% interest compounded quarterly. How much should be in the account at the end of 3 years?

$$A = a\left(1 + \frac{r}{n}\right)^{nt}$$

$$A = 4000\left(1 + \frac{.0225}{4}\right)^{4(3)}$$

$$A = 4000\left(1.0056 25\right)^{12}$$

$$A = \$4,278.51$$

24. If you invest $10,000 in an account paying 8% annual interest compounded monthly, how much should be in the account at the end of 5 years?

$$A = a \left(1 + \frac{r}{n} \right)^{nt}$$

$$A = 10,000 \left(1 + \frac{.08}{12} \right)^{12(5)}$$

$$A = 10,000 \left(1.007 \right)^{60}$$

$$A = 15,197.36$$

25. Solve for x:

$$\frac{4}{n^2} = \frac{5}{n} - \frac{1}{n^2}$$

LCD $= n^2$

$$\frac{5}{n} \cdot \frac{n}{n} = \frac{5n}{n^2}$$

$$\frac{4}{n^2} = \frac{5n}{n^2} - \frac{1}{n^2}$$

$$4 = 5n - 1$$
$$5 = 5n$$
$$\boxed{1 = n}$$

26. Solve for x: $\dfrac{3}{x} + 2 = \dfrac{1}{5}$

$LCD = 5x$

$\dfrac{3}{x} \cdot \dfrac{5}{5} = \dfrac{15}{5x}$

$\dfrac{2}{1} = \dfrac{5x}{5x} = \dfrac{10x}{5x}$

$\dfrac{1}{5} \cdot \dfrac{x}{x} = \dfrac{x}{5x}$

$\dfrac{15}{5x} + \dfrac{10x}{5x} = \dfrac{x}{5x}$

$15 + 10x = x$

$15 = -9x$

$\dfrac{-5}{3} = x$

27. Solve the following equation

$$3^{x-4} = 9^{x+6}$$

$$3^{x-4} = 3^{2(x+6)}$$

$$x - 4 = 2x + 12$$

$$-4 = x + 12$$

$$\boxed{-16 = x}$$

28. Solve the following equation

$$8^x = 4^{x-1}$$

$$2^{3x} = 2^{2(x-1)}$$

$$3x = 2x - 2$$

$$\boxed{x = -2}$$

29. The value of a dump truck can be modeled by the function $V(t) = 35,000(.76)^t$ where t is the number of years since the car was purchased. To the nearest tenth of a percent, what was the *monthly* rate of depreciation?

$$1 - r = .76$$

$$r = 0.24$$

$$\frac{.24}{12} = 0.02$$

$$\boxed{2\%}$$

30. If a snowmobile is purchased for $14,350 and depreciates at a rate of 15% per year, **about how long** will it take for the snowmobile to be worth **half of its initial value?**

$$y = 14350(1 - 0.15)^t$$
$$y = 14,350(.85)^t$$

$$\frac{14,350}{2} = 7,175$$

$$7,175 = 14,350(.85)^t$$

$$t = 4.265$$

$$t \approx 4 \text{ years}$$