

Exponential Worksheet

The formula $P_n = P \cdot \left[\frac{1-(1+i)^{-n}}{i} \right]$ is used by banks to compute the amount of loan payments where P_n is the loan amount, n is the number of total payments that will be made, **i is the interest rate per payment**, and P is the monthly payment.

1. If I bought my first house for \$113,500 at a yearly interest rate of 7%, what were my monthly payments? (A typical loan is for 30 years and you usually make one payment each month)

After finding the monthly payment, determine how much money I will end up paying back to the bank. How much did the bank earn in interest from me?

2. Luckily before buying my first house, I discovered that my great uncle Jerry had left me \$40,000 in a will that I used as a down payment. How much money did I have to borrow from the bank, and what was the new amount of my monthly payments?
3. Now I am thinking about moving to a bigger house. If I have \$2,000 each month that I can put towards a house payment, how big of a loan can I be pre-approved for?

The formula $F_n = P \left[\frac{(1+i)^n - 1}{i} \right]$ is used to compute how much money a retirement account will be worth if you make regular payments. F_n represents the final value of your IRA (individual retirement account) and P represents the periodic payments that you make. n stands for the total number of payments made and i is the interest rate that account earns for the period.

4. At age 28, I started investing \$7500 every year into an IRA account that earns approximately 7.5% yearly interest rate. If I continue to do this, how much money will my account have by the time I retire at age 55? If I decided that I wanted to continue working until age 65, how much would the account then be worth?

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5. You decide that you want to retire by the age of 55. If you begin saving today, how much money would you need to invest every year if you wanted to retire with \$1,000,000? Assume that you will be investing in the same 7.5% interest rate account that I use.
6. After seeing how much money you would have to sock away per year, you realize that you will have to sell your kidney and other various body parts to cover the payment. You decide to find an account that pays a higher interest rate of 10%. How much money do you have to save each year with this account in order to retire with \$1,000,000 at the age of 55?
7. Carbon-14 tests are often used to determine the age of an organism that died a long time ago. Carbon-14 has a half-life of 5730 years. If a turtle shell has 65% of its Carbon-14 remaining, how old is it?
8. Radon gas is a deadly gas that leaks into basements. The half-life of the gas is 3.82 days. Suppose a basement contained 38 grams of radon gas when a family moved in. If the source that was producing the gas was removed, how long would it take for the gas to decline to 6.8 grams?
9. Find the amount of time required for an amount to double at a rate of 5.4% interest in an account that is compounded continuously.
10. A certain bacteria will triple in 6 hours. If the final count is 8 times the original count, how much time has passed?