

Advanced Compound Interest #18

Percent, exponents, order of operations, multiplication, division, addition

There are times when interest compounds more than once a year. The basis of the formula remains the same but you must adjust the annual interest rate to the rate per period. The formula looks like this:

$$A = P(1 + r/n)^{nt}$$

A = amount in the future

P = amount paid at the beginning (principal)

r = interest rate per year

t = number of years

n = number of payments per year



Example: I have 1 million dollars to invest at a 4% interest rate, compounded monthly.

Problem: How much would I make in interest after 6 years?

Solution: Plug the numbers into the formula. You will need a scientific calculator. If you do not have one, you can find one online.

$$A = 1,000,000(1 + .04/12)^{12 \times 6}$$

$$A = 1,000,000(1 + .003333)^{72}$$

$$A = 1,000,000(1.003333)^{72}$$

$$A = 1,000,000(1.271)$$

$$A = 1,271,000$$

$$\text{Interest} = 1,272,000 - 1,000,000$$

I would make 271,000 in interest after 6 years.

Directions: Calculate the compound interest and the amount in the future. Round your answers to the nearest cent. Use the formula:

$$A = P(1 + r/n)^{nt}$$

- Use the formula above and fill in the table below for an investment earning 4.5% annually and compounded twice a year.

	Principal	Interest Paid Per Year	Annual Running Total
Year 1	16,250		
Year 2			
Year 3			
Year 4			
Year 5			

- Use the information in Question One. Calculate the compound interest and future amount after 10 years.
- How much interest does a \$10,000 investment earn at 5.6% over 18 years compounded quarterly (4 times per year)?

Saving Money

4. How much does the investment in questions #3 earn if the interest is compounded annually? How much is the difference?

5. You just won \$1,000,000 in the lottery. You would like to invest your money. You decide to invest your money for 20 years in a 4.5% interest rate compounded semi-annually (2 times per year). How much money will you have after 20 years?

6. You decide to take your money out after 10 years. How much will you have in 10 years?

7. Let's say your parents decide to invest some money for you on your 18th birthday. They invest \$15,000 at a 10% interest rate that is compounded quarterly. They have told you that you can't take out the money until you are 65.
 - a. How much money will you have at age 65? Round your answer off to the nearest cent. _____
 - b. Are you surprised by this number? _____
 - c. How much would you get if you decided to take your money out when you were 50 years old? _____
 - d. What is the difference in money? _____

8. Let's say you decide to invest \$3000 at an 8% interest rate compounded semi-annually for your 5 year old.
- How much money will she or he get when she or he turns 65?

 - Are you surprised by this number? _____
 - How much would your child get if he or she took the money out when he or she turned 21? _____