

1. Emily likes to treat herself to a manicure once a month. Every three months she needs to schedule an extra appointment. With tax and tip, she usually spends \$30 for each appointment. She figures it's not a big indulgence. She wants to know how much she spends each year on manicures.

Solution: She gets 12 manicures (one per month) plus an additional 4 (every three months) for a total of 16 times per year. Thus

$$16 * \$30 = \$480$$

She spends \$480 on manicures per year. It's subjective if it's a big indulgence to her.

2. Deanna owes a clothing store \$700, but until she makes a payment, she pays 9% interest per month. How much will she pay in interest per month, if she doesn't make a payment?

Solution: Note that the interest rate is already in terms of months. (Always change the percentage to decimal form.) Thus

$$\$700 * .09 = \$63$$

If she doesn't make a payment, she will pay \$63 of interest per month.

3. Prorate the following expenses and find the corresponding monthly expenses. Juan pays \$500 per month in rent, a semiannual car insurance premium of \$800, and an annual health club membership fee of \$900.

Solution: Recall that semiannual means twice a year. That means you need to divide that expense by 6 to find the monthly expense. Similarly, divide an annual expense by 12 to find the monthly expense.

$$\$500 + \frac{\$800}{6} + \frac{\$900}{12} = \$708.33$$

4. If you stay in your hometown, you can go to Concord College at a reduced tuition of \$3000 per year and pay \$800 per month in rent. Or you can leave home, to go Versalia College on a \$10,000 scholarship (per year), pay \$16,000 per year in tuition, and pay \$350 per month to live in a dormitory. You will pay \$2000 per year to travel back and forth from Versalia College. Assuming all other factors are equal, which is the less expensive choice on an annual (12- month) basis?

Solution:

Cost for Concord College:

$$\$3000 + \$800 * 12 = \$12,600$$

Cost for Versalia College:

$$(\$16,000 - \$10,000) + \$350 * 12 + \$2000 = \$12,200$$

With the cheaper rent for the dormitory and the scholarship, it is cheaper to go to Versalia College.

5. Calculate the amount of money you will have in the following account after 5 years, assuming you will earn simple interest. You deposit \$500 in an account with an annual interest rate of 5%.

Solution: Use the simple interest formula.

$$A = \$500(1 + .05 * 5) = \$625$$

You will have \$625 in your account after 5 years if you make a single deposit of \$500.

6. Use the compound interest formula to compute the balance. Assume the interest is compounded annually. \$10,000 is invested at an APR for 4% for 12 years.

Solution: Use the compound interest formula for a single deposit with annual compounding.

$$A = \$10,000 \left(1 + \frac{.04}{1} \right)^{12*1} = \$16,010.32$$

You will have \$16,010.32 in your account after 12 years with annual compounding and a single deposit.

7. Use the appropriate compound interest formula to compute the balance. \$1500 is invested for 10 years with an APR of 3% with quarterly compounding.

Solution: Use the compound interest formula for a single deposit with more than one compounding period each year. Since it's quarterly compounding, $n = 4$.

$$A = \$1500 \left(1 + \frac{.03}{4} \right)^{4*10} = \$2022.52$$

A single deposit of \$1500 with quarterly compounding will grow to \$2022.52 in 10 years.

8. Find the annual percentage yield to the nearest point .01% for the following situation. A bank offers an APR of 5% compounded monthly for a \$1000 principal.

Solution: Use the formula for APY. Note that the principal will not affect the APY.

$$A = \left(\left(1 + \frac{.05}{12} \right)^{12} - 1 \right) * 100$$

$$A = 5.12\%$$

A 5% interest rate with monthly compounding will give a true interest rate of 5.12%.

9. How much do you deposit today into an account with quarterly compounding and an APR of 4.5% in order to have \$25,000 in 8 years for a down payment on a house? Assume no additional deposits are made.

Solution: Use the compound interest formula for a SINGLE deposit with compounding more than once a year.

$$\frac{\$25,000}{\left(1 + \frac{.045}{4} \right)^{4*8}} = P$$

$$P = \$17,477.00$$

You will need to make a single deposit of \$17,477 to have \$25,000 in 8 years.

10. If interest rates have an average annual rate of 7% and I deposit \$200 per month, what will my retirement fund be in 30 years?

Solution: Use the savings plan formula.

$$A = \$200 \frac{\left[\left(1 + \frac{.07}{12} \right)^{12*30} - 1 \right]}{\left(\frac{.07}{12} \right)}$$

$$= \$243,994.20$$

If you deposit \$200 per month for 30 years with an interest rate of 7%, you will have \$243,994.20.

11. At age 35 you start saving for retirement. If your investments plan pays an APR of 6% and you want to have \$2 million when you retire in 30 years, how much should you deposit monthly?

Solution: Use the savings plan formula.

$$PMT = \frac{2,000,000 \left(\frac{.06}{12} \right)}{\left(\left(1 + \frac{.06}{12} \right)^{12 \cdot 30} - 1 \right)}$$

$$PMT = \$1991.01$$

If you want to save \$2 million in 30 years with an interest rate of 6%, you will need to deposit \$1991.01 per month.

12. Suppose you want to accumulate \$50,000 for a college fund over the next 15 years. Determine if this situation will allow you to reach your goal. You deposit \$200 per month into an account with an APR of 5%.

Solution: Use the savings plan formula.

$$\begin{aligned} A &= \$200 \frac{\left[\left(1 + \frac{.05}{12} \right)^{15 \cdot 12} - 1 \right]}{\left(\frac{.05}{12} \right)} \\ &= \$53,457.79 \end{aligned}$$

The accumulated value of \$53,459.56 is more than \$50,000. So you have reached your goal!

13. If you invested \$50 cash in 1950, how much would you have in 2003? Assume an annual compound interest rate is 1%.

Solution: If you're not given the number of compounding periods per year, assume that it is annual compounding. Use the formula for a single deposit with annual compounding.

$$\$50(1 + .01)^{53} = \$84.72$$

An investment of \$50 cash will grow to \$84.72 in 53 years.

14. Consider a home mortgage of \$350,000 with a fixed APR of 3.7% for 30 years. Find the monthly payment, the total amount paid over the term of the loan, and determine what percentage of the total amount is paid toward the interest and what percentage is paid toward the principal.

Solution: Use the installment loan equation:

$$PMT = \frac{\$350,000 \left(\frac{.037}{12} \right)}{\left(1 - \left(1 + \frac{.037}{12} \right)^{-12 \cdot 30} \right)}$$

$$= 1610.99$$

The total amount that you will pay over the life of the loan

$$\$1610.00 \cdot 12 \cdot 30 = \$579,956.40$$

The percentage that goes toward the principal

$$\frac{350,000}{579,956.40} = .603 = 60\%$$

Thus the remaining 40% goes toward to the interest.

15. Suppose you just graduated college. Now that you're entering the real world, you must start paying back your student loans. Determine your monthly payment if you have \$20,000 in loans and you need to pay them back in 10 years with a 5.75% interest rate.

$$PMT = \frac{\$20,000 \left(\frac{.0575}{12} \right)}{\left(1 - \left(1 + \frac{.0575}{12} \right)^{-12 \cdot 10} \right)}$$

$$= \$219.54$$

16. Find the gross income, adjusted gross income, and taxable income. Isabella earned wages of \$88,750, received \$4900 in interest from a savings account, and contributed \$6200 to a tax-deferred retirement plan. She was entitled to a personal exemption of \$3300 and had deductions totaling \$9050.

Solution: Gross income

$$\$88,750 + \$4900 = \$93,650$$

Adjusted gross income

$$\$93,650 - \$6200 = \$87,450$$

Taxable income

$$\$87,450 - \$3300 - \$9050 = \$75,100$$

17. Compute the gross income, adjusted gross income, and taxable income in the following situation. Wanda is married, but she and her husband filed separately. Her salary was \$35,400 and she earned \$500 in interest. She had \$1500 in itemized deductions and claimed three exemptions for herself and two children. Use the table.

Solution: Gross income

$$\$35,400 + \$500 = \$35,900$$

Adjusted gross income. This will not be different from the gross income because she doesn't have any adjustments.

Taxable income. She will take the standard deduction over the itemized deduction because the standard deduction is more.

$$\$35,900 - \$6100 - \$3900 * 3 = \$18,100$$

18. Use the marginal tax rates in table 9 to compute the tax owed. Winona and Jim are married filing jointly with a taxable income of \$105,500. They also are entitled to a \$2000 tax credit.

Solution: Taxes owed

$$\begin{aligned} & .10(\$17,850) + .15(\$72,500 - \$17,850) + .25(\$105,500 - \$72,500) - 2000 \\ & = 16,232.50 \end{aligned}$$