

Summer Session, Worksheet for Lesson 29

For the following formulas: S is future value, P is present value, r is the annual interest rate, k is the number of compounding periods in a year, t is time in years, A is the amount of money, and R is the amount of payment; with the formula for the periodic interest rate

$$i = \frac{r}{k}.$$

It is possible a formula from the previous lesson may also be used for these problems.

10. Present Value of an Annuity: $P = R \left[\frac{1 - (1 + i)^{-kt}}{i} \right]$

(The present value of an ordinary annuity with regular payments.)

11. 'Sinking Fund' Payment for an Annuity: $R = \frac{Si}{(1 + i)^{kt} - 1}$

(The amount of a payment that will provide a future value of an ordinary annuity.)

12. Amortization Formula (Installment Payments): $R = A \left[\frac{i}{1 - (1 + i)^{-kt}} \right]$

(The amount of an installment payment when the amount borrowed is A .)

- 1) What regular payment should be made quarterly to provide \$20,000 in 10 years at an annual rate of 6% compounded quarterly? Round to the nearest cent.
- 2) What is the present value of an ordinary annuity where payments of \$800 are made monthly, the annual interest rate is 4.92%, compounded monthly, for 15 years? Round to the nearest cent.
- 3) Instead of receiving an annuity of \$12,000 every 6 months for the next 15 years, a young woman, Grace, would like a one-time payment, now. Assuming the annual interest rate is 8 ½ %, compounded semiannually, what would be a fair amount? Round to the nearest dollar.
- 4) A company's new corporation headquarters will be completed in 1 ½ years. At that time, \$800,000 will be needed for office equipment. How much should be invested monthly to fund this expense? Assume 9.8% annual interest, compounded monthly. Round to the nearest dollar.
- 5) Which account will require the lower **annual** contributions to fund a \$15,000 obligation in 20 years? How much lower? Bank A offers 5.5% annual interest rate compounded annually with annual payments. Bank B offers a 5.25% annual interest rate compounded monthly with monthly payments. Hint: You will have to determine a year's worth of payments for the monthly payments account.

- 6) To fund Jerry's lottery winnings of \$5000 a month for the next 20 years, the lottery commission needs to make a single deposit now. If they can invest at 9.6% annual interest rate compounded monthly, what amount should the deposit equal? Round to the nearest dollar.
- 7) Laura and Lynn were arguing concerning who had the better deal from their banks for their investments. Laura said she was investing her money at 4.5% compounded quarterly. Lynn said she was investing her money at 4.4% compounded monthly. Who is the winner of the argument? Why? Hint: Compare interest rates.
- 8) Joel wants to invest some money now at 6% annual interest rate compounded daily that equals \$10,000 in 12 years. How much money should he invest? Round to the nearest dollar.
- 9) For their first grandchild, Bob and Linda Green begin depositing \$500 every 3 months into a 'college' account. Assume they are earning 4.4% annual interest and it is compounded quarterly. How much money will the grandchild have in 18 years? Round to the nearest cent.
- 10) The Jackson's are buying a \$22,400 car and financing the full amount over 5 years. If they can secure a loan at 6.3% annual interest on unpaid balance, what will be the amount of the monthly payment? Round to the nearest cent.
- 11) Jean has offers from two different lending institutions to finance her mortgage of \$120,000. One institution (A) will offer her a 20 year mortgage at 6% annual interest rate. The other (B) will offer her a 25 year mortgage at 6.6% annual interest rate. What will be the monthly payment for each? Round to the nearest dollar.
- 12) Using your answers from problem 11, approximately how much total would Jean pay for her house if she made all of her payments to institution A? To institution B? How much approximate interest would be paid to each institution?
- 13) Judy borrows \$850 from her bank to pay for a computer, printer, and other accessories. If she pays 5% annual interest and the loan is for 1 year, how much is each monthly payment? Round to the nearest cent.
- 14) Maryanne plans on depositing \$150 every 6 months into an account that pays 4% annual interest compounded semiannually. How much would be in the account in 10 years? Round to the nearest cent. How much actual money did Maryanne deposit and how much interest was earned?
- 15) Jesse has been approved for a \$4000 personal loan from his bank. What would his **quarterly** payments be, if he is charged $6\frac{1}{4}\%$ annual interest and the loan is to be paid off in two years? Round to the nearest cent.

- 16) Lucy put \$2500 in a savings account that earns 5% annual interest compounded daily. How much is in this account in 8 years? Assume no additional deposits or withdrawals. Round to the nearest cent.
- 17) Jeff just won the lottery! He will be paid \$2500 a month for 15 years. If the account paying him earns 6% compounded monthly, what is the present value of these winnings to the nearest dollar?
- 18) The Cooper's car needs \$1200 in repairs, which the family does not have. A bank will loan them the full amount so they can fix the car, but they must repay the loan at $8\frac{1}{2}\%$ annual interest and they must make **semiannual** payments for 3 years. How much is each payment to the nearest cent?
- 19) Julie has been begging her parents for an iPod. Since she just turned 18, her parents suggested she go to the local bank and ask for a loan. The bank will loan Julie \$180 for her iPod and she must repay the loan in 18 months with 5.4% annual interest. How much are her monthly payments? Round to the nearest cent. How much over the \$180 cost of the iPod does Julie pay?