

MA 15200 Supplemental Worksheet, Lesson 39

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.

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

(The amount at the end for an ordinary annuity with regular payments.)

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.)

- 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) Hank's regular \$1200 quarterly contributions to his retirement fund have earned 6.5% annual interest, compounded quarterly, since he started saving 25 years ago. How much is in his account now? Round to the nearest dollar.
- 3) 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.
- 4) 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 $8\frac{1}{2}\%$, compounded semiannually, what would be a fair amount? Round to the nearest dollar.
- 5) Marvin plan to invest \$4000 at an annual interest rate of $2\frac{1}{4}\%$ compounded semiannually. How much will be in the account in $8\frac{1}{2}$ years? Assume he makes no additional deposits or withdrawals. Round to the nearest cent.
- 6) A company's new corporation headquarters will be completed in $1\frac{1}{2}$ 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.
- 7) 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.
 - 8) The Lucas family begins saving for next year's vacation. They family decides to put away \$250 a month in an account paying 3.2% annual interest compounded monthly. How much will the family have for their vacation in 1 year (to the nearest dollar)?
 - 9) 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.
 - 10) Laura had 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.
 - 11) 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.
 - 12) 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.

Hint for one of the online problems: For number 5 of the online homework for this lesson, you will need to find the amount of the annual payment. You also assume that the interest is compounded annually.