7.2 Compound Interest

Refer to the Key Concepts on page 507.

1. Find the amount of each investment.
   a) $400 at 6% per annum, compounded monthly, for 5 years
   b) $1500 at 4.25% per annum, compounded semi-annually, for 4 years
   c) $3000 at 5.5% per annum, compounded quarterly, for 6 years
   d) $2000 at 6.5% per annum, compounded annually, for 20 years

2. College To save for college, Charlene invested her summer earnings of $4200 in an account with 6.2% interest per annum, compounded semi-annually. She plans to leave the money in the account for 4 years.
   a) What amount of money will she have at the end of the 4 years?
   b) How much interest will Charlene have earned?
   c) Charlene had the option of investing the money at 7% per annum, compounded annually for the same term. Do you think she made the right choice? Why or why not? Support your answer with calculations.

3. Comparing plans Eric is considering two investments plans: Plan A with 5.95% interest per annum, compounded quarterly, and Plan B with 5% interest per annum, compounded monthly. He is investing $2300 for 3 years.
   a) If he invests $1000 in Plan A and $1300 in Plan B, how much will he have after 3 years?
   b) If he invests $1300 in Plan A and $1000 in Plan B, how much will he have after 3 years?
   c) Which investment option do you think is better? Why?

4. Different rates Cecelia has $1000 to invest for the next 5 years. She can invest it at 4.65% per annum, compounded semi-annually, or at 5.15% per annum, compounded annually, or at 4.25% per annum, compounded quarterly. If you were her financial advisor, which option would you recommend? How would you convince her to follow your advice?
7.4 Present Value
Refer to the Key Concepts on page 522.

5. Find the present value of each amount.
   a) $3000 in 5 years at 4.9% per annum, compounded quarterly
   b) $2500 in 2 years at 5.5% per annum, compounded annually
   c) $2500 in 5 years at 3.9% per annum, compounded semi-annually
   d) $9000 in 8 years at 5.25% per annum, compounded quarterly

6. Furniture Amy wants to have $6500 to buy furniture when she moves into an apartment in 3 years. How much should she invest today at 6.3% per annum, compounded monthly?

7. Tuition Stephan will need $5500 for college tuition in 4 years. He has saved $3200 from his summer job. What interest rate compounded semi-annually does he need when he invests the $3200?

8. Buying a car Mackenzie's uncle just bought a new car and has agreed to let her buy it from him in 6 years for $9800. How much should she invest now in an account with interest at 4.95% per annum, compounded quarterly, so she can buy the car?

7.5 Amount of an Ordinary Annuity
Refer to the Key Concepts on page 531.

9. Find the amount for each ordinary annuity.
   a) a payment of $1500 at the end of every 3 months at 8% per annum, compounded quarterly
   b) a payment of $4000 at the end of every year for 12 years with interest at 6.5% per annum, compounded annually
   c) a payment of $700 at the end of every month, into an account that pays 10% per annum, compounded monthly
   d) a payment of $2800 at the end of every 6 months for 5 years with an interest rate of 9% per annum, compounded semi-annually

10. Travelling Gail's grandfather saved for a trip by depositing $400 at the end of each month for 18 months. The account earns 4.8% per annum, compounded monthly. How much will be in the account when the last deposit is made?
11. **RRSP** Barry plans to invest $7000 in his RRSP on each March 1 for 8 years, starting next year. The interest rate is 8.3% per annum, compounded annually. How much will this investment be worth when the last payment is made?

12. **Savings** Nancy deposits $300 into her savings account at the end of every 3 months for 2 years. If the account pays 3.5% per annum, compounded quarterly, how much money will Nancy have in her account at the end of 2 years?

### 7.6 Present Value of an Ordinary Annuity

Refer to the Key Concepts on page 540.

13. Find the present value for each of the following.
   a) a payment of $12 500 every year for 5 years, starting in a year, with interest at 6% per annum, compounded annually
   b) a payment of $600 every month for 24 months, starting in a month, with interest at 10% per annum, compounded monthly
   c) a payment of $3000 every 6 months for 3 years, starting in half a year, with interest at 7.5% per annum, compounded semi-annually

14. How much is each payment for an investment of $32 000?
   a) an interest rate of 12% per annum, compounded semi-annually, with payments every 6 months, starting in a half year
   b) an interest rate of 8.2% per annum, compounded annually, with payments every year, starting in a year
   c) an interest rate of 9.5% per annum, compounded monthly, with payment every month starting in a month
   d) an interest rate of 4.3% per annum, compounded quarterly, with payments every 3 months starting in 3 months

15. **Living expenses** Marcia wants to receive $10 000 every 6 months, for 3 years for living expenses when she goes back to school, starting 6 months from now. How much money must she invest now at 4.25% per annum, compounded semi-annually?

16. **Loan** Sandy is putting aside enough money to pay back a loan at a rate of $3000 a year for 5 years, starting in a year. To cover this loan, how much must Sandy put into an account that pays an interest rate of 7.2% per annum, compounded annually?
17. **Prize** Denis won a prize of $25 000. He has decided to invest in an account paying 6.25% per annum, compounded monthly. How much can he withdraw from the account each month over the next 3 years, starting in a month?

### 7.7 Technology: Amortization Tables and Spreadsheets

Refer to the Key Concepts on page 555.

18. Use a graphing calculator to find the monthly interest rate equivalent to each of the following semi-annual rates.
   - a) 6%
   - b) 10%
   - c) 5.5%
   - d) 20.46%

19. **Comparing principals** The Wrights arranged a $70 000 mortgage at an interest rate of 8.5%, amortized over 25 years. Use a spreadsheet to find how many months it will take for the principal to be less than half the original principal.

20. **Lower rates** Coral and Sam are looking at a house that would require them to take out a $102 000 mortgage. They would choose to amortize it over 25 years. The current mortgage rate is 7.6%. Use a spreadsheet to find out how much they would pay over a 5-year term.

21. **Cost of a mortgage** Dale has negotiated a $67 000 mortgage on his home at 9.25% interest, amortized over 20 years.
   - a) Use a spreadsheet to find how much interest he will pay on the mortgage by the end of the fourth year.
   - b) How much of the principal will he pay by the end of the fourth year?

### 7.8 Mortgages

Refer to the Key Concepts on page 566.

22. Determine the monthly mortgage payment.
   - a) $100 000 at 11.5%, amortized over 25 years
   - b) $54 000 at 6%, amortized over 15 years
   - c) $93 000 at 12%, amortized over 10 years
   - d) $26 000 at 5.5%, amortized over 20 years

Recall that since mortgages in Canada are given per annum, compounded semi-annually, this can be assumed in a mortgage rate.
23. **Condominium** Carla bought a condominium and arranged a mortgage of $155,000 at 12%, amortized over 15 years.
   a) What is her monthly mortgage payment?
   b) What will the mortgage cost if it continues for 15 years?
   c) What would the monthly mortgage payments be if she was able to increase the down payment by $40,000?

24. **Cash** To get some cash to expand his business, Todd took a $120,000 mortgage on his house at 6.25%, amortized over 25 years.
   a) What is the monthly payment of the loan?
   b) Assuming the interest rate remains constant, how much will Todd pay for the loan?

25. **Selling** Glen and Christine set up a mortgage on their house for $79,000 at 8.5%, amortized over 20 years, with a 5-year term.
   a) How much were their mortgage payments?
   b) When the term ended, they decided to pay off the mortgage and sell the house. What would it cost to pay off the mortgage?

26. **A decision** Would you choose a $50,000 mortgage at 5%, amortized over 20 years or over 25 years? Explain your choice. Include calculations in your explanation.