

- 4** For a growing annuity over  $n$  periods with initial deposit  $PV$ , interest rate  $i$  per period, and growth rate  $g$  per period, the initial withdrawal  $w$  is given by  $w = \frac{PV \times (i - g) \times (1 + i)^n}{(1 + i)^n - (1 + g)^n}$ .
- Verify that this formula gives the correct initial withdrawals for the scenarios in **1** and **2**.
  - What happens to this formula when  $g = 0$ ? Compare your answer with the formula found in **Activity 2** on page 38.

## REVIEW SET 2A

- Alberto takes out a personal loan for \$23 000 at 7% p.a. over 5 years. Calculate:
    - his monthly repayments
    - the total of the repayments
    - the total interest charged.
  - Alexandra takes out a loan of €2000 to pay for an emergency vet bill. She will repay the loan over 6 months at 8.12% p.a. interest compounded fortnightly. Calculate:
    - Alexandra's fortnightly repayments
    - the outstanding balance on the loan after 6 fortnights.
  - Simone borrows \$410 000 to purchase a house. She agrees to repay the loan over 25 years at 6.95% p.a. interest compounded monthly.
    - Find Simone's minimum monthly repayments.
    - Show that the total interest Simone will pay is greater than the amount she originally borrowed.
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- Yasmin retires at age 60 with \$500 000 in her savings fund. She rolls the money into an annuity fund earning 5.25% p.a. interest compounded monthly.
    - How long will Yasmin's money last if she withdraws \$6000 per month?
    - If Yasmin wants her money to last for 25 years, how much can she afford to withdraw per month?
  - After retiring at age 65, Vasili rolls €1 400 000 of savings into an annuity account earning 5.4% p.a. interest compounded monthly. He wants his money to last for 30 more years.
    - How much can Vasili withdraw per month?
    - How long will it take for the balance of the fund to fall below €1 000 000?
    - How much of Vasili's annuity will be left after 20 years?
  - When Scott retires at 68, he will deposit his savings in an annuity fund which pays 5.4% p.a. interest compounded monthly. He wants to be able to withdraw \$6000 per month from the fund until he is 85.
    - Calculate the amount Scott will need to have in savings when he retires.
    - How much money will be left in Scott's account when he is 80?

## REVIEW SET 2B

- 1 Nicola and Hamish take out a personal loan of \$12 000 to pay for their wedding. The loan is to be repaid over 4 years at 5.5% p.a. Calculate:
    - a their monthly repayments
    - b the total interest charged on the loan.
  
  - 2 Peter has saved \$4500 towards buying a car. The car he wants to buy is valued at \$22 000, so he will borrow the remaining money. He is able to get a loan for 4 years at 6.9% p.a. interest, compounded quarterly.
    - a How much will Peter borrow?
    - b Calculate Peter's quarterly repayments.
    - c Calculate the total interest charged on the loan.
    - d Find the outstanding balance after 2 years.
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- 3 A loan of 500 000 pesos is taken out at 6% p.a. interest compounded monthly.
    - a Calculate the monthly loan repayments if the loan is taken out for:
      - i 4 years
      - ii 6 years.
    - b Which loan charges the least total interest? Explain your answer.
  - 4 Answer the **Opening Problem** on page 32.
  - 5 Pia retires at age 62 with €350 000 in her savings fund. She rolls this money into an annuity fund earning 5.8% p.a. interest compounded monthly.
    - a How much will she be able to withdraw each month if her money is to last another 2 decades?
    - b How much *more* will she be able to withdraw each month if her money was to only last 15 years?
  - 6 Harold rolls his £800 000 of savings into an annuity account. He wants the money to last for 15 years.
    - a Given that Harold can withdraw £6284.75 each month, find the annual interest rate, compounded monthly, of the account.
    - b How much longer would Harold's money last if he withdrew only £5000 each month?