- 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 $w = \frac{PV \times (i-g) \times (1+i)^n}{(1+i)^n (1+g)^n}$.
 - a 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

- 1 Alberto takes out a personal loan for $$23\,000$ at 7% p.a. over 5 years. Calculate:
 - **a** his monthly repayments

b the total of the repayments

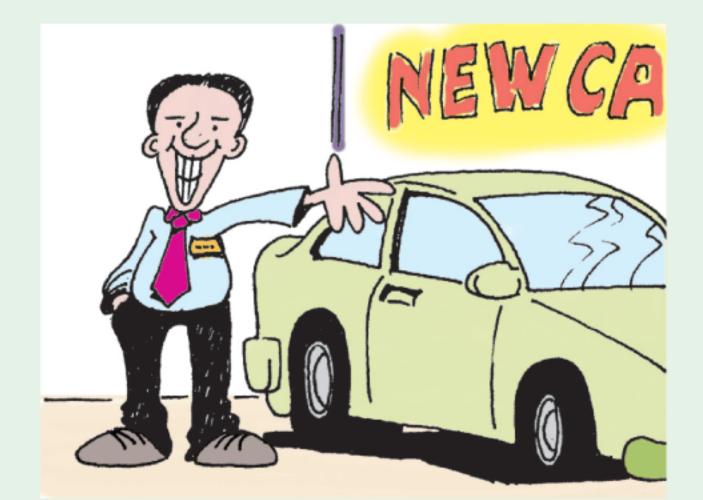
- c the total interest charged.
- Alexandra takes out a loan of €2000 to pay for an emergency vet bill. She will repay the loan over 6 months at 8.12% p.a. interest compounded fortnightly. Calculate:
 - **a** Alexandra's fortnightly repayments
 - **b** the outstanding balance on the loan after 6 fortnights.
- 3 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.
 - **a** Find Simone's minimum monthly repayments.
 - **b** Show that the total interest Simone will pay is greater than the amount she originally borrowed.



- Yasmin retires at age 60 with \$500000 in her savings fund. She rolls the money into an annuity fund earning 5.25% p.a. interest compounded monthly.
 - **a** How long will Yasmin's money last if she withdraws \$6000 per month?
 - **b** If Yasmin wants her money to last for 25 years, how much can she afford to withdraw per month?
- 5 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.
 - **a** How much can Vasili withdraw per month?
 - **b** 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?
- 6 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.
 - **a** Calculate the amount Scott will need to have in savings when he retires.
 - **b** 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.
- Peter has saved \$4500 towards buying a car. The car he wants to buy is valued at \$22000, 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.
 - Calculate the total interest charged on the loan.
 - **d** Find the outstanding balance after 2 years.



- **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?