

# Further Practice: Credit and Borrowing

Remember: all questions match the numbered examples on pages 1–10.

**1** Find the simple interest earned if \$7250 is invested for 5 years at 6.5% p.a.

**2** Find the amount of simple interest charged if \$1100 is borrowed at 0.7% per month for 8 months.

**3** Courtney places \$12 000 in an account earning 1.4% per quarter simple interest. How much interest is earned in five years?

**4** Find the amount borrowed over 3 years at 7% p.a. simple interest if \$433.44 interest was charged.

**5** Find the rate of simple interest paid per year if an amount of \$1600 earned \$1152 in interest over nine years.

**6** Paul borrowed \$7000 at 5.6% p.a. simple interest. He paid a total of \$1960 in interest. How long was the term of the loan?

**7** Jordan borrows \$6100 at 0.8% per month simple interest. He repays the loan over five years.  
 a How much interest does Jordan pay?  
 b How much must Jordan repay?

**8** Sylvie borrows \$9000 and repays the loan with equal monthly instalments of \$240 over four years. How much does Sylvie repay?

**9** Matt borrows \$6800 to buy a motorbike. He repays the loan with equal instalments of \$73.46 per week over two years.  
 a How much does Matt repay?  
 b What was the total interest paid?

**10** Carmen borrows \$11 000 to buy a car. She agrees to repay the loan over five years with equal monthly instalments of \$247.50.  
 a How much does Carmen repay?  
 b How much interest does she pay?  
 c What rate of simple interest is charged?

**11** \$3900 is borrowed for a year. Simple interest of 5% p.a. is charged on the loan. If the loan is to be repaid with 26 equal fortnightly instalments, find the amount of each instalment.

**12** A loan of \$32 000 is to be repaid over six years. A flat rate of 5.5% p.a. interest is charged on the loan. Find to the nearest cent the amount of each monthly instalment.

**13** Juliet decides to buy a car priced at \$21 000. She pays \$6000 deposit and borrows the remainder at 8% p.a. simple interest over 4 years. Find:  
 a the amount of interest charged  
 b the amount of each monthly repayment  
 c the total amount Juliet pays for the car.

**14** Zane paid \$7000 deposit and 60 monthly instalments of \$800.00 when he bought his ute.  
 a What is the total amount Zane paid?  
 b Find the interest rate if the cash price of the ute was \$37 000.

**15** A table has been drawn up for the first three months of a loan.

Amount borrowed:		\$25 000		
Reducible-interest rate:		0.8% per month		
Monthly repayments:		\$409.88		
Mth	Principal	Interest	$P + I$	$P + I - R$
1	\$25 000.00	\$200.00	\$25 200.00	\$24 790.12
2	\$24 790.12	\$198.32	\$24 988.44	\$24 578.56
3	\$24 578.56	\$196.63	\$24 775.19	\$24 365.31

a How much was owing at the beginning of the second month?  
 b How much interest was paid in the third month?  
 c By how much had the loan reduced after three months?  
 d What is the total of the repayments made after three months?  
 e How much is the difference between the answers to parts c and d? What does this represent?

**16** Roslyn borrowed \$22 000 at a reducible-interest rate of 1% per month. The monthly repayments were \$489.38. Draw up a repayment table for the first four months.

- 17** Allan borrowed \$34 000 and agreed to repay it with four yearly instalments of \$10 726.00. The reducible-interest rate was 10% p.a. By drawing up a table show that the loan will be repaid after four years.

- 18** The table below covers the first five months of a loan.
- How much is each repayment?
  - What monthly interest rate is charged?
  - What will be the principal in month 7?

Mth	Principal	Interest	$P + I$	$P + I - R$
1	\$60 000.00	\$420.00	\$60 420.00	\$59 472.83
2	\$59 472.83	\$416.31	\$59 889.14	\$58 941.97
3	\$58 941.97	\$412.59	\$59 354.56	\$58 407.39
4	\$58 407.39	\$408.85	\$58 816.24	\$57 869.07
5	\$57 869.07	\$405.08	\$58 274.15	\$57 326.98

- 19** Jamie borrowed \$5000 and agreed to repay it over three years. Interest of 8.5% p.a. is calculated annually and added to the loan. Jamie agreed to repay \$2000 per year at the end of the first two years and pay the balance owing at the end of the third year.
- Find the interest charged at the end of the first year.
  - Find the amount owing at the beginning of the second year.
  - Find the balance that Jamie must pay at the end of the third year.

- 20** Beccy received her quarterly statement for her home loan. The interest is calculated daily and charged monthly. Beccy accidentally tore the statement and the entries for December cannot be read.

Interest rate: 9% p.a. calculated daily			
Date	Details	Amount	Balance
			\$42 374.33
Oct. 1	Interest	\$313.45	\$42 687.78
	Repayment	\$791.36	\$41 896.42
Nov. 1	Interest	\$320.25	\$42 216.67
	Repayment	\$791.36	\$41 425.31

- Briefly explain why the interest charged on November 1 is higher than that charged on Oct. 1.
  - What amount of interest will be charged on Dec. 1?
  - What will be the balance at the end of the statement, given that the repayment has remained the same?
- 21** Melinda wants to borrow some money to buy a business. She is trying to decide between two options with the following repayments:
- Loan A: \$971.28 per month for 6 years  
 Loan B: \$1106.17 per month for 5 years
- How much in total will Melinda pay if she chooses loan A?

- How much less will Melinda pay in total if she chooses loan B?
- Give a reason why loan A is better.
- Give a reason why loan B is better.

- 22** An electrical store advertises a television for \$1799 or \$395 deposit and \$54 per fortnight for one year.
- How much will you pay if you buy the television on terms?
  - Angus has the money to buy the television. Should he buy it outright or pay on terms? Justify your answer.

- 23** Lincoln wants to borrow \$16 000 and intends to repay the loan in annual instalments over four years. He has the option of choosing a flat-rate loan of 7% p.a. interest or a reducing-balance loan where the annual interest is 8.5%.
- How much are the equal annual instalments on the flat-rate loan?
  - If Lincoln chooses the reducing-balance loan, the first three instalments will be \$4900. By drawing up a table, find the amount of the final instalment.
  - With which loan will Lincoln pay back the least and by how much?

- 24** Danielle is considering taking a loan of \$280 000 to buy a house.
- One financial institution offers a loan with repayments of \$2544.36 per month for twenty-five years. How much will Danielle repay if she chooses to take this offer?
  - Another financial institution offers a loan with repayments of \$2457.20 per month for thirty years. How much interest will Danielle pay if she takes this offer?
  - Danielle says, 'if I take the first loan, I will have to pay back less than \$100 more each month but I will save over \$120 000.' Is Danielle correct? Justify your answer.
  - Danielle knows that both loans have the same variable interest rate. After checking the terms and conditions of the loans, Danielle finds that she can repay extra each month and there are no penalties for early repayment of the loan. If Danielle can afford to repay \$2600 per month, which loan would you recommend? Discuss.

- 25** Harry's credit card has up to 60 days interest free and an interest rate of 15.7% p.a., charged daily. He pays his monthly bill totalling \$2175 before the due date. How much interest will Harry have to pay?

- 26** Scarlett's credit card has an interest-free period and an interest rate of 16.06% p.a., charged daily. (Use 365 days in 1 year.)
- What is the daily interest rate?
  - Scarlett's bill shows a total owing of \$3475. How much interest will Scarlett pay if she pays the bill one day late?

- 27** Mark's credit card has an interest-free period and an interest rate of 16.8% p.a., charged daily.
- What is the daily interest rate to five decimal places? (Use 365 days in one year.)
  - Mark receives his bill for \$1750 and pays \$1000 on the due date. If he makes no further purchases in the next month, how much will he need to pay 31 days later?

- 28** Brooke takes a cash advance of \$4000 on her credit card. Cash advances attract immediate interest at the rate of 0.053% per day. How much interest will Brooke pay if she repays the advance in 28 days?

- 29** Leila's credit card has no interest-free period and a daily interest rate of 0.0495%. She uses her card to buy furniture costing \$2375 on 18th July. If she pays the bill on 6th August, find the total she would need to repay to cover the furniture and interest.

- 30** In 2007, Alison made the following purchases using her credit card.

Date	Item	Cost	Total
Feb 11	Clothes	\$328.00	\$328.00
Feb 19	Petrol	\$75.00	\$403.00
Feb 26	Insurance	\$294.00	\$697.00

Alison pays the total owing plus all interest charges on 7th March. The credit card has no interest-free period and an interest rate of 17.6% p.a., charged daily. Find:

- the daily interest rate to three decimal places
- the interest paid on the clothes
- the total interest Alison must pay.

- 31** Brendan pays 0.056% per day interest on his credit card and there are no interest-free days. From January 8th to January 23rd his balance is \$3680.
- How much interest will Brendan pay for the period from January 8th to January 23rd?
  - On January 23rd he charges an additional \$1095 to the account. If Brendan wishes to pay the whole amount owing on January 31st, how much will he need to pay?

- 32** The table shows the amount of each monthly repayment required to repay certain loans at a bank's current interest rate.

Loan amount	Term of loan (years)			
	15	20	25	30
\$50 000	\$600.08	\$550.54	\$526.61	\$514.31
\$80 000	\$960.13	\$880.87	\$842.58	\$822.89
\$140 000	\$1680.24	\$1541.52	\$1474.51	\$1440.06
\$220 000	\$2640.37	\$2422.39	\$2317.09	\$2262.95

- What is the amount of each monthly instalment if a loan of \$140 000 is repaid over 25 years?

- If \$80 000 is borrowed over 15 years, find the total amount that will be repaid.
- Find the total amount of interest paid on a \$220 000 loan taken over 30 years.
- How much extra will be repaid on a loan of \$50 000 taken over 20 years, than on a loan for the same amount over 15 years?

- 33** The following table shows the monthly instalments required to repay loans at a particular interest rate.

Repayments per \$1000 borrowed	
Number of years	Repayment
5	\$21.64
7	\$17.02
10	\$13.66
12	\$12.42
15	\$11.24

- How much is the monthly repayment on a \$15 000 loan over seven years?
- What is the monthly repayment on a twelve-year loan of \$60 000?
- Kay pays \$865.60 per month on a loan of \$40 000. What is the term of the loan?
- Ian is paying \$341.50 per month for ten years. How much interest will he pay?

- 34** The table shows the monthly repayment (in dollars) for every \$1000 borrowed at different interest rates over different numbers of years.

Term (years)	Monthly repayments per \$1000				
	6%	7%	8%	9%	10%
10	11.10	11.61	12.13	12.67	13.22
15	8.44	8.99	9.56	10.14	10.75
20	7.16	7.75	8.36	9.00	9.65
25	6.44	7.07	7.72	8.39	9.09

- Find the amount of each monthly instalment if \$35 000 is borrowed at 8% p.a. interest over 10 years.
- Tim borrows \$56 400 at 9% p.a. interest over 15 years. How much must he repay?
- How much interest will be paid in total if \$135 000 is borrowed at 6% p.a. interest over 25 years?
- How much more will each monthly instalment be if \$84 000 is borrowed over 15 years rather than over 20 years, if the interest rate is 10% p.a.?
- Nick wants to take out a loan of \$75 000 over 20 years. How much will he save each month if the interest rate is 7% p.a. instead of 8% p.a.?

Go to p 223 for **Quick Answers**  
or to pp 296–9 for **Worked Solutions**

# Challenge: Credit and Borrowing

- 1** Hannah buys some furniture priced at \$5600. She pays 15% deposit and borrows the remainder at 8% p.a. flat-rate interest over eighteen months. How much will Hannah pay altogether for the furniture?

*Hint 1*

- 2** Annette borrowed \$25 000 and agreed to repay it over 15 years. The repayment table is shown for the first three months.

Mth	Principal	Interest	$P+I$	$P+I-R$
1	\$25 000.00	\$225.00	\$25 225.00	\$24 943.98
2	\$24 943.98	\$224.50	\$25 168.48	\$24 887.46
3	\$24 887.46	\$223.99	\$25 111.45	\$24 830.43

- How much is each monthly repayment?
- By how much has the loan been reduced after three months?
- Complete the table for the next (4th) month.

*Hint 2*

- 3** Zac has a credit card with no interest-free period. The interest rate charged is 0.05% per day. He made purchases as shown in the table.

Date	Details	Amount
March 1	Opening balance	\$1763.20
March 13	Service station	\$80.00
March 21	Supermarket	\$230.48
March 26	Restaurant	\$150.76

Find the total amount (including interest) that Zac would need to pay to clear the card on the 31st of March. *Hint 3*

- 4** The table shows the monthly repayments required per \$1000 borrowed from a certain lending institution.

Number of years	Repayment per \$1000
15	\$11.24
20	\$10.19
25	\$9.66
30	\$9.37

Andy wants to borrow \$180 000 and he has worked out that he can afford to pay \$1750 per month. Over how many years should he take the loan? *Hint 4*

- 5** Michelle intends to borrow \$40 000 with a reducible-interest loan over seven years. The repayments are \$655.81 per month. What rate per annum of simple interest is this equivalent to? *Hint 5*

- 6** Ernie is considering a loan of \$60 000 over ten years. He has two options, both with flat rates of interest.  
 Option 1: 6% p.a. interest. No fees.  
 Option 2: 5.5% p.a. interest. Fees of \$25 per month.  
 Which loan is the better option? Justify your answer. *Hint 6*

- 7** Tanya borrowed \$4000 at the reducible-interest rate of 0.75% per month and intends to repay it over six months. Tanya pays \$700 per month for the first five months. How much will she need to pay in the sixth month to clear the debt? *Hint 7*

- 8** On 24th May 2007, Jonathan takes a \$3000 cash advance on his credit card. Cash advances attract immediate interest at the rate of 17.52% p.a. charged daily. Find the amount of interest that Jonathan will pay if he doesn't repay the money until September 16th. *Hint 8*

Go to p 283 for **Quick Answers**  
 or to p 299 for **Worked Solutions**

*Hint 1: Hannah will pay the price of the furniture plus interest. She will only pay interest on the amount she borrows.*

*Hint 2: You will need to find the monthly rate of interest. Use the principal and interest from the first month.*

*Hint 3: Different amounts earn interest for different numbers of days. You don't actually need to find the interest, just the amount that needs to be paid.*

*Hint 4: \$1750 per month for \$180 000 is how much per month for \$1000?*

*Hint 5: Find the total amount repaid and hence the total interest. Find the interest per year as a percentage of the amount borrowed.*

*Hint 6: Find the total cost of interest and fees.*

*Hint 7: Draw up a loan repayment table.*

*Hint 8: Divide the interest rate by 365 to find the daily rate.*

# Worked Solutions

## UNIT 1: Financial Mathematics

### Ch 1: Credit and Borrowing

#### Further Practice . . . . . p11

**1**  $P = \$7250, r = 0.065, n = 5$   
 $I = Prn$   
 $= \$7250 \times 0.065 \times 5$   
 $= \$2356.25$

**2**  $P = \$1100, r = 0.007, n = 8$   
 $I = Prn$   
 $= \$1100 \times 0.007 \times 8$   
 $= \$61.60$

**3**  $P = \$12\,000, r = 0.014, n = 20$   
 $I = Prn$   
 $= \$12\,000 \times 0.014 \times 20$   
 $= \$3360$   
 Courtney earns \$3360 interest.

**4**  $I = \$433.44, r = 0.07, n = 3$   
 $I = Prn$   
 $\$433.44 = P \times 0.07 \times 3$   
 $\$433.44 = 0.21P$   
 $P = \$2064$   
 The amount borrowed was \$2064.00.

**5**  $I = \$1152, P = \$1600, n = 9$   
 $I = Prn$   
 $\$1152 = \$1600 \times r \times 9$   
 $\$1152 = \$14\,400r$   
 $r = \$1152 \div \$14\,400$   
 $= 0.08$   
 Rate =  $0.08 \times 100\%$   
 $= 8\%$   
 The rate of interest paid is 8% p.a.

**6**  $I = \$1960, P = \$7000, r = 0.056$   
 $I = Prn$   
 $\$1960 = \$7000 \times 0.056 \times n$   
 $\$1960 = \$392n$   
 $n = \$1960 \div \$392$   
 $= 5$   
 The loan was for five years.

**7** a  $P = \$6100, r = 0.008, n = 60$   
 $I = Prn$   
 $= \$6100 \times 0.008 \times 60$   
 $= \$2928$   
 Jordan pays \$2928.00 in interest.

b Total to be repaid =  $\$6100 + \$2928$   
 $= \$9028$   
 Jordan must repay a total of \$9028.00.

**8** Total repayments =  $\$240 \times 48$   
 $= \$11\,520$   
 Sylvie repays a total of \$11 520.

**9** a Total repaid =  $\$73.46 \times 52 \times 2$   
 $= \$7639.84$

b Interest =  $\$7639.84 - \$6800$   
 $= \$839.84$

**10** a Total repaid =  $\$247.50 \times 60$   
 $= \$14\,850$

b Interest =  $\$14\,850 - \$11\,000$   
 $= \$3850$

c Total interest = \$3850  
 Interest per year =  $\$3850 \div 5$   
 $= \$770$   
 Interest rate =  $\frac{\$770}{\$11\,000} \times 100\%$   
 $= 7\%$

**11**  $P = \$3900, r = 0.05, n = 1$   
 $I = Prn$   
 $= \$3900 \times 0.05 \times 1$   
 $= \$195$   
 Total to be repaid =  $\$3900 + \$195$   
 $= \$4095$   
 Each instalment =  $\$4095 \div 26$   
 $= \$157.50$

**12**  $P = \$32\,000, r = 0.055, n = 6$   
 $I = Prn$   
 $= \$32\,000 \times 0.055 \times 6$   
 $= \$10\,560$   
 Total to be repaid =  $\$32\,000 + \$10\,560$   
 $= \$42\,560$   
 Number of instalments =  $6 \times 12$   
 $= 72$   
 Each instalment =  $\$42\,560 \div 72$   
 $= \$591.11$  (nearest cent)

**13** a Price = \$21 000, deposit = \$6000  
 Principal =  $\$21\,000 - \$6000$   
 $= \$15\,000$   
 $r = 0.08, n = 4$   
 $I = Prn$   
 $= \$15\,000 \times 0.08 \times 4$   
 $= \$4800$

b Total to be repaid =  $\$15\,000 + \$4800$   
 $= \$19\,800$   
 Number of instalments =  $4 \times 12$   
 $= 48$   
 Each instalment =  $\$19\,800 \div 48$   
 $= \$412.50$

c Total paid  
 $= \text{total to be repaid} + \text{deposit}$   
 $= \$19\,800 + \$6000$   
 $= \$25\,800$

**14** a Total paid =  $\$7000 + 60 \times \$800$   
 $= \$55\,000$

b Amount borrowed =  $\$37\,000 - \$7000$   
 $= \$30\,000$   
 Amount repaid =  $\$55\,000 - \$7000$   
 $= \$48\,000$   
 Interest =  $\$48\,000 - \$30\,000$   
 $= \$18\,000$   
 $I = \$18\,000, P = \$30\,000, n = 5$   
 $I = Prn$   
 $\$18\,000 = \$30\,000 \times r \times 5$   
 $\$18\,000 = \$150\,000r$   
 $r = 0.12$   
 The interest rate was 12% p.a.

**15**

Amount borrowed: \$25 000				
Reducible interest rate: 0.8% per month				
Monthly repayments: \$409.88				
Month	Principal	Interest	P + I	P + I - R
1	\$25 000.00	\$200.00	\$25 200.00	\$24 790.12
2	\$24 790.12	\$198.32	\$24 988.44	\$24 578.56
3	\$24 578.56	\$196.63	\$24 775.19	\$24 365.31

a \$24 790.12  
 b \$196.63  
 c After 3 months the amount owing is \$24 365.31  
 Reduction =  $\$25\,000 - \$24\,365.31$   
 $= \$634.69$   
 The loan had reduced by \$634.69.  
 d Total repaid =  $3 \times \$409.88$   
 $= \$1229.64$   
 e Difference =  $\$1229.64 - \$634.69$   
 $= \$594.95$   
 The difference is the amount of interest paid.

**16** Amount borrowed: \$22 000  
 Interest rate: 1% per month  
 Repayment: \$489.38 per month

Month	Principal	Interest	P + I	P + I - R
1	\$22 000.00	\$220.00	\$22 220.00	\$21 730.62
2	\$21 730.62	\$217.31	\$21 947.93	\$21 458.55
3	\$21 458.55	\$214.59	\$21 673.14	\$21 183.76
4	\$21 183.76	\$211.84	\$21 395.60	\$20 906.22

- 17** Amount borrowed: \$34 000  
Interest rate: 10% p.a.  
Repayments: \$10 726.00

Year	Principal	Interest	P + I	P + I - R
1	\$34 000.00	\$3400.00	\$37 400.00	\$26 674.00
2	\$26 674.00	\$2667.40	\$29 341.40	\$18 615.40
3	\$18 615.40	\$1861.54	\$20 476.94	\$9 750.94
4	\$9 750.94	\$975.09	\$10 726.03	\$0.03

With the payment of an additional 3 cents the loan will be repaid after 4 years.

- 18** a  $R = \$60\,420.00 - \$59\,472.83$   
 $= \$947.17$

Month	Principal	Interest	P + I	P + I - R
1	\$60 000.00	\$420.00	\$60 420.00	\$59 472.83
2	\$59 472.83	\$416.31	\$59 889.14	\$58 941.97
3	\$58 941.97	\$412.59	\$59 354.56	\$58 407.39
4	\$58 407.39	\$408.85	\$58 816.24	\$57 869.07
5	\$57 869.07	\$405.08	\$58 274.15	\$57 326.98

- b Interest rate =  $\frac{\$420}{\$60\,000} \times 100\%$   
 $= 0.7\%$   
The interest rate per month is 0.7%.

- c Month 6:  $P = \$57\,326.98$   
Interest =  $0.007 \times \$57\,326.98$   
 $= \$401.29$  (nearest cent)  
 $P + I = \$57\,326.98 + \$401.29$   
 $= \$57\,728.27$   
 $P + I - R = \$57\,728.27 - \$947.17$   
 $= \$56\,781.10$   
The principal in month seven will be \$56 781.10

- 19** a Interest 1st year =  $0.085 \times \$5000$   
 $= \$425$

b  $P + I - R = \$5000 + \$425 - \$2000$   
 $= \$3425$

- c Interest 2nd year  
 $= 0.085 \times \$3425$   
 $= \$291.13$  (nearest cent)  
Amount owing at start of 3rd year  
 $= \$3425 + \$291.13 - \$2000$   
 $= \$1716.13$   
Interest 3rd year  
 $= 0.085 \times \$1716.13$   
 $= \$145.87$  (nearest cent)  
 $P + I = \$1716.13 + \$145.87$   
 $= \$1862.00$

Jamie must pay \$1862 to pay out the loan at the end of the third year.

**20** Interest rate: 9% p.a.

Date	Details	Amount	Balance
			\$42 374.33
Oct. 1	Interest	\$313.45	\$42 687.78
	Repayment	\$791.36	\$41 896.42
Nov. 1	Interest	\$320.25	\$42 216.67
	Repayment	\$791.36	\$41 425.31

- a The interest is higher on Nov. 1 because it is the interest for October and October has 31 days, but the interest charged on Oct. 1 was for September which only has 30 days.

- b November has 30 days.

$$\text{Interest} = \frac{30}{365} \times 0.09 \times \$41\,425.31$$

$$= \$306.43 \text{ (nearest cent)}$$

- c  $P + I - R$   
 $= \$41\,425.31 + \$306.43 - \$791.36$   
 $= \$40\,940.38$

- 21** a A: Total =  $\$971.28 \times 12 \times 6$   
 $= \$69\,932.16$

- b B: Total =  $\$1106.17 \times 12 \times 5$   
 $= \$66\,370.20$   
Difference =  $\$69\,932.16 - \$66\,370.20$   
 $= \$3561.96$

Melinda will pay \$3561.96 less with loan B.

- c The repayments for loan A are over \$130 less each month than for loan B.

- d Loan B will cost over \$3500 less in total than loan A.

- 22** a Total repaid =  $\$395 + \$54 \times 26$   
 $= \$1799$

- b The terms involve no interest. It would be better for Angus to buy on terms and invest the money so that it earns interest.

- 23** a  $P = \$16\,000$ ,  $r = 0.07$ ,  $n = 4$   
 $I = Prn$   
 $= \$16\,000 \times 0.07 \times 4$   
 $= \$4480$

$$\text{Total to repay} = \$16\,000 + \$4480$$

$$= \$20\,480$$

$$\text{Each instalment} = \$20\,480 \div 4$$

$$= \$5120$$

If Lincoln chooses the flat-rate loan, each instalment will be \$5120.

- b  $P = \$16\,000$ ,  $r = 8.5\%$ ,  $R = \$4900$

Year	Principal	Interest	P + I	P + I - R
1	\$16 000.00	\$1360.00	\$17 360.00	\$12 460.00
2	\$12 460.00	\$1059.10	\$13 519.10	\$8 619.10
3	\$8 619.10	\$732.62	\$9 351.72	\$4 451.72
4	\$4 451.72	\$378.40	\$4 830.12	-

The final instalment will be \$4830.12.

- c With the flat-rate loan Lincoln will repay \$20 480.  
With the reducing-balance loan:  
Total repaid =  $3 \times \$4900 + \$4830.12$   
 $= \$19\,530.12$

$$\text{Difference} = \$20\,480 - \$19\,530.12$$

$$= \$949.88$$

Lincoln will pay \$949.88 less with the reducing-balance loan.

- 24** a Total repaid =  $\$2544.36 \times 12 \times 25$   
 $= \$763\,308.00$

Danielle would repay a total of \$763 308.

- b Total repaid =  $\$2457.20 \times 12 \times 30$   
 $= \$884\,592$

$$\text{Interest} = \$884\,592 - \$280\,000$$

$$= \$604\,592$$

The amount of interest that Danielle would pay is \$604 592.

- c Extra paid in total  
 $= \$884\,592 - \$763\,308$   
 $= \$121\,284$

$$\text{Difference in repayments}$$

$$= \$2544.36 - \$2457.20$$

$$= \$87.16$$

Yes, Danielle is correct.

- d Danielle could choose either loan. By choosing to pay \$2600 per month, Danielle should repay the loan in less than 25 years and save a lot of interest. If she takes the second loan she only needs to pay \$2457.20 per month, so if her finances become stretched in the future she can choose to pay less then. The interest rate is variable and could rise over the term of the loan. If Danielle committed herself to the twenty-five year loan, she may find it difficult to meet the higher repayments if interest rates rise.

- 25** Harry pays no interest. [Because the bill is paid in full by the due date.]

- 26** a Daily rate =  $16.06\% \div 365$   
 $= 0.044\%$

- b Interest = 0.044% of \$3475  
 $= 0.000\,44 \times \$3475$   
 $= \$1.53$  (nearest cent)

- 27** a Daily rate =  $16.8\% \div 365$   
 $= 0.046\,027\,397 \dots \%$   
 $= 0.046\,03\%$  (5 d.p.)

- b  $P = \$1750 - \$1000$   
 $= \$750$

$$r = 0.000\,4603, \quad n = 31$$

$$A = P(1 + r)^n$$

$$= \$750(1.000\,4603)^{31}$$

$$= \$760.78 \text{ (nearest cent)}$$

Mark would need to pay \$760.78 to clear the debt.

- 28**  $P = \$4000$ ,  $r = 0.000\,53$ ,  $n = 28$

$$A = P(1 + r)^n$$

$$= \$4000(1.000\,53)^{28}$$

$$= \$4059.786\,678 \dots$$

$$= \$4059.79 \text{ (nearest cent)}$$

$$I = \$4059.79 - \$4000$$

$$= \$59.79$$

Brooke will pay \$59.79 interest.

**29** From 18th July to 6th August is 19 days.

$$P = \$2375, r = 0.000495, n = 19$$

$$A = P(1 + r)^n$$

$$= \$2375(1.000495)^{19}$$

$$= \$2397.436665 \dots$$

$$= \$2397.44 \text{ (nearest cent)}$$

Leila would need to pay \$2397.44.

**30** [2007 was not a leap year.]

Date	Item	Cost	Total
Feb 11	Clothes	\$328.00	\$328.00
Feb 19	Petrol	\$75.00	\$403.00
Feb 26	Insurance	\$294.00	\$697.00

a Daily rate =  $17.6\% \div 365$   
 $= 0.048219178 \dots \%$   
 $= 0.048\% \text{ (3 d.p.)}$

b From 11th Feb to 7th Mar is 24 days.

$$P = \$328, r = 0.00048, n = 24$$

$$A = P(1 + r)^n$$

$$= \$328(1.00048)^{24}$$

$$= \$331.80 \text{ (nearest cent)}$$

$$\text{Interest} = \$331.80 - \$328.00$$

$$= \$3.80$$

Alison must pay \$3.80 interest on the clothes.

c Petrol:

From 19th Feb to 7th Mar is 16 days.

$$P = \$75, r = 0.00048, n = 16$$

$$A = P(1 + r)^n$$

$$= \$75(1.00048)^{16}$$

$$= \$75.58 \text{ (nearest cent)}$$

$$\text{Interest} = \$75.58 - \$75.00$$

$$= \$0.58$$

Insurance:

From 26th Feb to 7th March is 9 days.

$$P = \$294, r = 0.00048, n = 9$$

$$A = P(1 + r)^n$$

$$= \$294(1.00048)^9$$

$$= \$295.27 \text{ (nearest cent)}$$

$$\text{Interest} = \$295.27 - \$294.00$$

$$= \$1.27$$

$$\text{Total interest} = \$3.80 + \$0.58 + \$1.27$$

$$= \$5.65$$

Alison must pay a total of \$5.65 in interest.

**31** a From Jan 8th to Jan 23rd is 16 days.

$$P = \$3680, r = 0.00056, n = 16$$

$$A = P(1 + r)^n$$

$$= \$3680(1.00056)^{16}$$

$$= \$3713.11 \text{ (nearest cent)}$$

$$\text{Interest} = \$3713.11 - \$3680.00$$

$$= \$33.11$$

b Balance =  $\$3713.11 + \$1095$

$$= \$4808.11$$

$$P = \$4808.11, r = 0.00056, n = 8$$

$$A = P(1 + r)^n$$

$$= \$4808.11(1.00056)^8$$

$$= \$4829.69 \text{ (nearest cent)}$$

Brendan will need to pay a total of \$4829.69

Loan amount	Term of loan (years)			
	15	20	25	30
\$50 000	\$600.08	\$550.54	\$526.61	\$514.31
\$80 000	\$960.13	\$880.87	\$842.58	\$822.89
\$140 000	\$1680.24	\$1541.52	\$1474.51	\$1440.06
\$220 000	\$2640.37	\$2422.39	\$2317.09	\$2262.95

a Loan: \$140 000, term: 25 years

$$\text{Monthly instalment} = \$1474.51$$

b Loan: \$80 000, term: 15 years

$$\text{Monthly instalment} = \$960.13$$

$$15 \text{ years} = 15 \times 12 \text{ months}$$

$$= 180 \text{ months}$$

$$\text{Total repaid} = 180 \times \$960.13$$

$$= \$172\,823.40$$

If \$80 000 is borrowed over 15 years a total of \$172 823.40 will be repaid.

c Loan: \$220 000, term: 30 years

$$\text{Monthly instalment} = \$2262.95$$

$$30 \text{ years} = 30 \times 12 \text{ months}$$

$$= 360 \text{ months}$$

$$\text{Total repaid} = 360 \times \$2262.95$$

$$= \$814\,662$$

$$\text{Interest} = \$814\,662 - \$220\,000$$

$$= \$594\,662$$

If \$220 000 is borrowed over 30 years, a total of \$594 662 will be paid in interest.

d Loan: \$50 000, term: 20 years

$$\text{Monthly instalment} = \$550.54$$

$$20 \text{ years} = 20 \times 12 \text{ months}$$

$$= 240 \text{ months}$$

$$\text{Total repaid} = 240 \times \$550.54$$

$$= \$132\,129.60$$

Loan: \$50 000, term: 15 years

$$\text{Monthly instalment} = \$600.08$$

$$15 \text{ years} = 15 \times 12 \text{ months}$$

$$= 180 \text{ months}$$

$$\text{Total repaid} = 180 \times \$600.08$$

$$= \$108\,014.40$$

$$\text{Difference} = \$132\,129.60 - \$108\,014.40$$

$$= \$24\,115.20$$

If a \$50 000 loan is taken over 20 years compared to 15 years, an additional \$24 115.20 would need to be repaid.

Number of years	Repayments per \$1000 borrowed	
	Repayment	Interest rate
5	\$21.64	6%
7	\$17.02	7%
10	\$13.66	8%
12	\$12.42	9%
15	\$11.24	10%

a 7 years:

$$\text{Repayment} = \$17.02 \text{ per } \$1000$$

\$15 000 loan:

$$\text{Repayment} = \$17.02 \times 15$$

$$= \$255.30$$

b 12 years:

$$\text{Repayment} = \$12.42 \text{ per } \$1000$$

\$60 000 loan:

$$\text{Repayment} = \$12.42 \times 60$$

$$= \$745.20$$

c Repayment = \$865.60 on \$40 000 loan

$$\text{Repayment per } \$1000 = \$865.60 \div 40$$

$$= \$21.64$$

The term of the loan is 5 years.

d 10 years:

$$\text{Repayment} = \$13.66 \text{ per } \$1000$$

Amount of loan

$$= (\$341.50 \div \$13.66) \times \$1000$$

$$= \$25\,000$$

$$\text{Total repayments} = \$341.50 \times 10 \times 12$$

$$= \$40\,980$$

$$\text{Interest} = \$40\,980 - \$25\,000$$

$$= \$15\,980$$

Ian will pay a total of \$15 980

in interest.

Term (years)	Repayments per \$1000 borrowed				
	6%	7%	8%	9%	10%
10	11.10	11.61	12.13	12.67	13.22
15	8.44	8.99	9.56	10.14	10.75
20	7.16	7.75	8.36	9.00	9.65
25	6.44	7.07	7.72	8.39	9.09

a 8% p.a., 10 years, \$35 000

Monthly repayment

$$= \$12.13 \text{ per } \$1000$$

$$= 35 \times \$12.13$$

$$= \$424.55$$

b 9% p.a., 15 years, \$56 400

$$\text{Repayment} = 56.4 \times \$10.14$$

$$= \$571.90 \text{ (nearest cent)}$$

$$15 \text{ years} = 15 \times 12 \text{ months}$$

$$= 180 \text{ months}$$

$$\text{Total repaid} = 180 \times \$571.90$$

$$= \$102\,942$$

Tim must repay a total of \$102 942.

c 6% p.a., 25 years, \$135 000

$$\text{Monthly repayment} = 135 \times \$6.44$$

$$= \$869.40$$

$$25 \text{ years} = 25 \times 12 \text{ months}$$

$$= 300 \text{ months}$$

$$\text{Total repaid} = 300 \times \$869.40$$

$$= \$260\,820$$

$$\text{Interest} = \$260\,820 - \$135\,000$$

$$= \$125\,820$$

The amount of interest paid will be \$125 820.

d 10% p.a., \$84 000

Over 15 years:

$$\text{Monthly repayment} = 84 \times \$10.75$$

$$= \$903$$

Over 20 years:

$$\text{Monthly repayment} = 84 \times \$9.65$$

$$= \$810.60$$

$$\text{Difference} = \$903.00 - \$810.60$$

$$= \$92.40$$

The repayments will be \$92.40 more each month if repaid over 15 years rather than 20 years.



- e 20 years, \$75 000  
 At 7%:  
 Monthly repayments =  $75 \times \$7.75$   
 = \$581.25  
 At 8%:  
 Monthly repayments =  $75 \times \$8.36$   
 = \$627  
 Difference =  $\$627.00 - \$581.25$   
 = \$45.75  
 Nick would save \$45.75 every month.

### Challenge ..... p14

- 1 Deposit = 15% of \$5600  
 =  $0.15 \times \$5600$   
 = \$840  
 Balance =  $\$5600 - \$840$   
 = \$4760  
 Interest =  $\$4760 \times 0.08 \times 1.5$   
 = \$571.20  
 Total paid =  $\$5600 + \$571.20$   
 = \$6171.20

- 2 a Monthly repayment  
 =  $\$25\,225.00 - \$24\,943.98$   
 = \$281.02

- b Loan reduction  
 =  $\$25\,000.00 - \$24\,830.43$   
 = \$169.57

- c Interest rate =  $\frac{225}{25\,000} \times 100\%$   
 = 0.9%  
 In the 4th month:  
 Principal = \$24 830.43  
 Interest = 0.9% of \$24 830.43  
 =  $0.009 \times \$24\,830.43$   
 = \$223.473 87  
 = \$223.47 (nearest cent)  
 $P + I = \$24\,830.43 + \$223.47$   
 = \$25 053.90  
 $P + I - R = \$25\,053.90 - \$281.02$   
 = \$24 772.88

Month	Principal	Interest	P + I	P + I - R
1	\$25 000.00	\$225.00	\$25 225.00	\$24 943.98
2	\$24 943.98	\$224.50	\$25 168.48	\$24 887.46
3	\$24 887.46	\$223.99	\$25 111.45	\$24 830.43
4	\$24 830.43	\$223.47	\$25 053.90	\$24 772.88

- 3 First amount earns interest for 30 days.  
 $A = \$1763.20(1 + 0.0005)^{30}$   
 = \$1789.84 (nearest cent)  
 Service station: earns interest for 18 days.  
 $A = \$80(1.0005)^{18}$   
 = \$80.72 (nearest cent)  
 Supermarket: earns interest for 10 days.  
 $A = \$230.48(1.0005)^{10}$   
 = \$231.63 (nearest cent)  
 Restaurant: earns interest for 5 days.  
 $A = \$150.76(1.0005)^5$   
 = \$151.14 (nearest cent)  
 Total =  $\$1789.84 + \$80.72 + \$231.63$   
 + \$151.14  
 = \$2253.33

- 4 Repayment = \$1750 for \$180 000  
 = \$9.722 22 ... per \$1000  
 Andy must pay less than \$9.72 per month  
 He should take the loan over 25 years.

- 5 Total repaid =  $\$655.81 \times 12 \times 7$   
 = \$55 088.04  
 Total interest =  $\$55\,088.04 - \$40\,000.00$   
 = \$15 088.04  
 Annual interest =  $\$15\,088.04 \div 7$   
 = \$2155.43 (near. cent)  
 Interest rate =  $\frac{2155.43}{40\,000.00} \times 100\%$   
 = 5.4% (1 d.p.)

- 6 Option 1:  $I = \$60\,000 \times 0.06 \times 10$   
 = \$36 000  
 Option 2:  $I = \$60\,000 \times 0.055 \times 10$   
 = \$33 000  
 Fees =  $\$25 \times 12 \times 10$   
 = \$3000  
 Total interest and fees  
 =  $\$33\,000 + \$3000$   
 = \$36 000

Both options have the same costs.  
 There is no reason to prefer one loan  
 over the other.

- 7  $P = \$4000$ ,  $r = 0.0075$ ,  $R = \$700$

Month	Principal	Interest	P + I	P + I - R
1	\$4000.00	\$30.00	\$4030.00	\$3330.00
2	\$3330.00	\$24.98	\$3354.98	\$2654.98
3	\$2654.98	\$19.91	\$2674.89	\$1974.89
4	\$1974.89	\$14.81	\$1989.70	\$1289.70
5	\$1289.70	\$9.67	\$1299.37	\$599.37
6	\$599.37	\$4.50	\$603.87	\$0.00

Tanya will pay \$603.87 in the last month.

- 8 Daily rate =  $17.52\% \div 365$   
 = 0.048%  
 May 24th until Sep 16th is 115 days.  
 $A = \$3000(1.00048)^{115}$   
 = \$3170.21 (nearest cent)  
 $I = \$3170.21 - \$3000$   
 = \$170.21  
 Jonathan will pay \$170.21 in interest.