

## Mid-Chapter Review, page 103

1. a)  $A = P(1 + rt)$   
 $A = 1020(1 + (0.04)(1.5))$   
 $A = 1020(1 + 0.06)$   
 $A = 1020(1.06)$   
 $A = 1081.20$

The school would need to repay \$1081.20.

b)  $A = P(1 + i)^n$

$$A = 1020 \left( 1 + \frac{0.04}{12} \right)^{18}$$

$$A = 1020(1 + 0.003\overline{3})^{18}$$

$$A = 1020(1.003\overline{3})^{18}$$

$$A = 1020(1.061\overline{1})$$

$$A = 1082.965\overline{5}$$

The school would need to repay \$1082.97.

2. a) Principal:  $(\$275)(40) = \$11\,000$

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

$$A = 11\,000 \left( 1 + \frac{0.053}{12} \right)^9$$

$$A = 11\,000(1 + 0.004\overline{4})^9$$

$$A = 11\,000(1.004\overline{4})^9$$

$$A = 11\,000(1.040\overline{0})$$

$$A = 11\,445.054\overline{4}$$

$$I = A - P$$

$$I = 11\,445.054\overline{4} - 11\,000$$

$$I = 445.054\overline{4}$$

\$445.06 in interest will be charged.

b) i) The present value is \$11 000.

*The regular payment amount is unknown.*

The payment frequency is 12 times a year.

The number of payments is 9.

The payments are made at the end of the payment periods.

The annual interest rate is 5.3%.

The compounding frequency is 12 times a year.

The future value is \$0.

Using the financial application on a graphing calculator, each payment will be \$1249.371..., or \$1249.38.

ii)  $I = A - P$

$$I = (9 \cdot \$1249.371\overline{1}) - 11\,000$$

$$I = \$11\,244.343\overline{9} - 11\,000$$

$$I = 244.343\overline{9}$$

The amount of interest charged will be \$244.343..., or \$244.35.

c) e.g., For the first schedule, interest is charged on the full original principal each month. For the second schedule, the remaining principal is reduced every month, and therefore the interest is also reduced,

3. a) The present value is \$6240.

The regular payment amount is \$80.

The payment frequency is 52 times a year.

*The number of payments is unknown.*

The payments are made at the end of the payment periods.

The annual interest rate is 7.1%.

The compounding frequency is 52 times a year.

The future value is \$0.

Using the financial application on a graphing calculator, the term length is 82.530... weeks.

It will take Abi 83 weeks or 1 year 31 weeks to repay the loan.

b) e.g., Actually, it will take Abi less than half the time to pay back the loan, because the principal paid will always be more than double the value.

To prove this, we can look at the first week of payments. In both cases, the interest is \$8.52.

When Abi is paying \$80 a week, the principal paid is \$71.48, and the balance is \$6168.52.

When Abi is paying \$160 a week, the principal paid is \$151.48, and the balance is \$6088.52.

The principal paid in this case is more than two times greater than the principal paid in the former case.

Also, since the balance remaining is smaller, the interest will be smaller in every week following the first week.

This means that for every week following the first, the principal paid will continue to be more than twice the size of the principal paid when the payment is half as large.

Yes, if Abi pays \$160 a week, his loan will be paid off in 41 weeks.

Yes, if Abi pays \$160 a week, his loan will be paid off in 41 weeks.

4. a) The present value is \$4300.

The regular payment amount is \$365.

The payment frequency is 12 times a year.

The number of payments is 12.

The payments are made at the end of the payment periods.

*The annual interest rate is unknown.*

The compounding frequency is 12 times a year.

The future value is \$0.

Using the financial application on a graphing calculator, the annual interest rate that Evelyn is charging is 3.416...%, or 3.4%, compounded monthly.

b) e.g., The simple interest rate would have been less because for simple interest, the rate is applied to the beginning balance for the whole term; whereas, for compounded interest, it is applied to a smaller and smaller balance, which is smaller than the beginning balance. In order to get the same figure for amount paid, the compounded interest rate needs to be higher to make up for this.

5. a) The present value is \$1250.

*The regular payment amount is unknown.*

The payment frequency is 12 times a year.

The number of payments is 12.

The payments are made at the end of the payment periods.

The annual interest rate is 15%.

The compounding frequency is 12 times a year.

The future value is \$0.

Using the financial application on a graphing calculator, each payment will be \$112.822..., or \$112.83.

**b)** The present value is \$1250.  
 The regular payment amount is \$112.83.  
 The payment frequency is 12 times per year.  
 The number of payments is 6.  
 The payments are made at the end of the payment periods.  
 The annual interest rate is 15%.  
 The compounding frequency is 12 times per year.  
*The future value is unknown.*  
 Using the financial application on a graphing calculator, the future value is \$648.281...  
 After 6 months, the balance will be \$648.29, which is over half of \$1250. Therefore, half the loan will be paid off after more than 6 months.

**c)**  $I = A - P$   
 $I = (12 \cdot 112.822...) - 1250$   
 $I = 1353.874... - 1250$   
 $I = \$103.874...$

Dyami will pay \$103.874..., or \$103.88, in interest.  
**d)** e.g., Yes, his payments would double because it's equivalent to having two of the original loans.  
 The present value is \$2500.  
*The regular payment amount is unknown.*  
 The payment frequency is 12 times a year.  
 The number of payments is 12.  
 The payments are made at the end of the payment periods.  
 The annual interest rate is 15%.  
 The compounding frequency is 12 times a year.  
 The future value is \$0.  
 Using the financial application on a graphing calculator, each payment will be \$225.645..., which is exactly twice as large as the previous payment.

**6. Lauren's credit card:**  
 Cash back =  $13\,400(0.02) = \$268$   
 The present value is \$13 400.  
 The regular payment amount is \$1250.  
 The payment frequency is 12 times a year.  
*The number of payments is unknown.*  
 The payments are made at the end of the payment periods.  
 The annual interest rate is 17.2%.  
 The compounding frequency is 365 times a year.  
 The future value is \$0.  
 Using the financial application on a graphing calculator, the number of payments will be 11.730..., or 12. The total amount of interest paid will be \$1262.551... or \$1262.56. Therefore, the additional cost of using Lauren's credit card will be \$1262.56 - \$268, or \$994.56.

**Morgan's credit card:**  
 The present value is \$13 400.  
 The regular payment amount is \$1250.  
 The payment frequency is 12 times a year.  
*The number of payments is unknown.*  
 The payments are made at the end of the payment periods.  
 The annual interest rate is 16.5%.  
 The compounding frequency is 365 times a year.  
 The future value is \$0.  
 Using the financial application on a graphing calculator, the number of payments will be 11.684..., or 12. The total amount of interest paid will be \$1205.106... or \$1205.11.

They should use Lauren's credit card, because the 2% cash back is more than the difference in interest she will pay.

**7. Store credit card:**  
 The present value is \$3999.99.  
 The regular payment amount is \$250.  
 The payment frequency is 12 times a year.  
*The number of payments is unknown.*  
 The payments are made at the end of the payment periods.  
 The annual interest rate is 18.2%.  
 The compounding frequency is 365 times a year.  
 The future value is \$0.  
 Using the financial application on a graphing calculator, the number of payments is 18.486..., or 19. He will have to pay \$621.737... or \$621.74 in interest.  
 The total cost is \$4621.727..., or \$4621.73.

**Bank credit card:**  
 The present value is 3999.99(1.13), or \$4519.988...  
 The regular payment amount is \$250.  
 The payment frequency is 12 times a year.  
*The number of payments is unknown.*  
 The payments are made at the end of the payment periods.  
 The annual interest rate is 12.9%.  
 The compounding frequency is 365 times a year.  
 The future value is \$0.  
 Using the financial application on a graphing calculator, the number of payments is 20.224..., or 21. He will have to pay \$536.178... or \$536.18 in interest.  
 The total cost is \$5056.166..., or \$5056.17.  
 Jayson should use the store credit card. Not only can the balance be paid off in a shorter amount of time, but using the store credit card will cost less overall.

**8. Credit card:**  
 The present value is  $1734 + 100$ , or \$1834.  
 The regular payment amount is \$165.  
 The payment frequency is 12 times a year.  
*The number of payments is unknown.*  
 The payments are made at the end of the payment periods.  
 The annual interest rate is 14%.  
 The compounding frequency is 365 times a year.  
 The future value is \$0.  
 Using the financial application on a graphing calculator, the number of payments is 11.979..., or 12. Maris will have to pay \$142.625... or \$142.63 in interest. The total cost is \$1976.63.  
**Store financing:**  
 The present value is  $1734 - 50$ , or \$1684.  
 The regular payment amount is \$165.  
 The payment frequency is 12 times a year.  
*The number of payments is unknown.*  
 The payments are made at the end of the payment periods.  
 The annual interest rate is 19.995%.

The compounding frequency is 365 times a year.  
The future value is \$0.  
Using the financial application on a graphing calculator, the number of payments is 11.289..., or 12. Maris will have to pay \$178.779... or \$178.78 in interest. The total cost is \$1862.78.  
Maris should use the store financing, because the overall cost is lower.

### Lesson 2.3: Solving Problems Involving Credit, page 114

1. a) Assume that Rilla will make monthly payments.  
The present value is \$526.83.  
*The regular payment amount is unknown.*  
The payment frequency is 12 times a year.  
The number of payments is 12.  
The payments are made at the end of the payment periods.  
The annual interest rate is 19.7%.  
The compounding frequency is 365 times a year.  
The future value is \$0.

Using the financial application on a graphing calculator, each payment will be \$48.766..., or \$48.77

b) i) The present value is  $526.83 - 100$ , or \$426.83.  
*The regular payment amount is unknown.*  
The payment frequency is 12 times a year.  
The number of payments is 12.  
The payments are made at the end of the payment periods.  
The annual interest rate is 16.7%.  
The compounding frequency is 365 times a year.  
The future value is \$0.

Using the financial application on a graphing calculator, the payments for this card are \$38.891... or \$38.90.

ii) The total cost of the first credit card is  $12 \cdot \$48.766...$ , or \$585.20, and the total cost of the bank credit card is  $12 \cdot \$38.891...$ , or \$466.70. Therefore, Rilla could have saved \$118.50 if she had used the new credit card.

2. a) Financing through the dealership:  
The present value is \$36 425.  
*The regular payment amount is unknown.*  
The payment frequency is 12 times a year.  
The number of payments is  $(12 \cdot 4)$ , or 48.  
The payments are made at the end of the payment periods.  
The annual interest rate is 4.3%.  
The compounding frequency is 12 times a year.  
The future value is \$0.  
Using the financial application on a graphing calculator, each monthly payment will be \$827.340..., or \$827.35.

Bank loan:  
The present value is  $\$36\,425 + \$1300$ , or \$37 725.  
*The regular payment amount is unknown.*  
The payment frequency is 12 times a year.  
The number of payments is  $(12 \cdot 5)$ , or 60.  
The payments are made at the end of the payment periods.  
The annual interest rate is 4%.  
The compounding frequency is 12 times a year.  
The future value is \$0.  
Using the financial application on a graphing calculator, each monthly payment will be \$694.763..., or \$694.77.

b) The total cost of financing will be  $48 \cdot \$827.340...$ , or \$39 712.37, and the total cost of the bank loan will be  $60 \cdot \$694.763...$ , or \$41 685.80.

c) Dealership financing:  
Advantages: Lower total interest, lower total payment, no shipping charge, debt paid off sooner.  
Disadvantages: Higher monthly payments.  
Bank loan:  
Advantages: Lower monthly payments.  
Disadvantages: Higher total interest, higher total payment, must pay shipping charge, debt takes longer to pay off.

3. a) Assume that Bruce will make monthly payments.  
Tire shop financing:  
The present value is  $1150 - 100$ , or \$1050.  
*The regular payment amount is unknown.*  
The payment frequency is 12 times a year.  
The number of payments is 6.  
The payments are made at the end of the payment periods.  
The annual interest rate is 16.8%.  
The compounding frequency is 12 times a year.  
The future value is \$0.  
Using the financial application on a graphing calculator, each payment will be \$183.674..., or \$183.68.

Credit card:  
The present value is \$1150.  
*The regular payment amount is unknown.*  
The payment frequency is 12 times a year.  
The number of payments is 6.  
The payments are made at the end of the payment periods.  
The annual interest rate is 14.6%.  
The compounding frequency is 365 times a year.  
The future value is \$0.  
Using the financial application on a graphing calculator, each payment will be \$199.959..., or \$199.96.

The tire shop financing will require lower payments.

b) The tire shop financing will cost \$52.046... or \$52.05 in interest.  
The credit card will cost \$49.759... or \$49.76 in interest. Therefore, the credit card will charge less interest.

c) The total cost of the financing is  $\$183.674... (6) = \$1102.046...$  or \$1102.05.  
The total cost of the credit card is  $\$199.959... (6) = \$1199.759...$  or \$1199.76.  
Therefore, the tire shop financing will cost Bruce less overall.