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 · $48.766..., or $585.20, and the total cost of the bank credit card is 12 · $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 · 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 · 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 · $827.340..., or $39 712.37, and the total cost of the bank loan will be 60 · $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.

4. a) Credit card:
The present value is 1450 + 3465.47, or $4915.47.
The regular payment amount is unknown.
The payment frequency is 12 times a year.
The number of payments is 10.
The payments are made at the end of the payment periods.
The annual interest rate is 14.3%.
The compounding frequency is 365 times a year.
The future value is $0.
Using the financial application on a graphing calculator, Cassie's monthly payments will be $524.529..., or $524.53.

Line of credit:
The present value is 1450 + 3465.47, or $4915.47.
The regular payment amount is unknown.
The payment frequency is 12 times a year.
The number of payments is 10.
The payments are made at the end of the payment periods.
The annual interest rate is 9.95%.
The compounding frequency is 12 times a year.
The future value is $0.
Using the financial application on a graphing calculator, Cassie's monthly payments will be $514.241..., or $514.25.
b) Interest will cost $329.821... or $329.83 for the credit card.

Interest will cost $226.942... or $226.95 for the line of credit.

5. a) Balance: 104.75 + 128.37 = $233.12
233.12(0.04) = $9.324...
The minimum monthly payment will always be $20 since 4% of the highest possible balance is less than $20.
The present value is $233.12.
The regular payment amount is $20.
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 18.7%.
The compounding frequency is 365 times a year.
The future value is $0.
Using the financial application on a graphing calculator, the length of the term is 12.974... months.
It will take Troy 13 months to pay off the balance if he pays only the minimum.
b) Troy will pay $26.370... or $26.38 in interest.

6. a) Since Suella will be paying $60 in the first 3 months with no interest, her balance at the end of the third month will be $180 less than the starting balance.
The present value is 448.50 – 180, or $268.50.
The regular payment amount is $60.
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 18.9%.
The compounding frequency is 365 times a year.
The future value is $0.
Using the financial application on a graphing calculator, the length of the term is 4.678... months.
After the first 3 months, Suella will need to make payments for 5 more months. It will take Suella 3 months + 5 months, or 8 months, to pay off the balance.
b) She will pay $12.215... or $12.22 in interest.
c) The present value is $448.50.
The regular payment amount is $60.
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 18.9%.
The compounding frequency is 365 times a year.
The future value is $0.
Using the financial application on a graphing calculator, the number of payment periods is 8.019... or 9. The total interest charged is $32.692... or $32.70.
Difference in interest:
$32.70 – $12.22 = $20.48
Therefore Suella would have had to pay $20.48 more in interest.

7. No. e.g., With the rebate, Joanne will pay less in total with the credit card option.
Line of credit:
The present value is 3600 + 450, or $4050.
The regular payment amount is unknown.
The payment frequency is 12 times a year.
The number of payments is 4.
The payments are made at the end of the payment periods.
The annual interest rate is 10.4%.
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 $1034.532..., or $1034.54. The total cost will be $4138.128..., or $4138.13.

Credit card:
The present value is 4050 – 100, or $3950.
The regular payment amount is unknown.
The payment frequency is 12 times a year.
The number of payments is 4.
The payments are made at the end of the payment periods.
The annual interest rate is 13.7%.
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 $1016.002..., or $1016.01. The total cost will be $4064.011..., or $4064.02.
Although the line of credit has a lower interest rate, the credit card will cost less overall.

8. a) The present value is $3500.
The regular payment amount is $400.
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 2% + 0.5%, or 2.5%.
The compounding frequency is 12 times a year.

The future value is $0.
Using the financial application on a graphing calculator, it will take Trish 8.839... or 9 months to pay off her line of credit.
b) Months 1-4:
The present value is $3500.
The regular payment amount is $400.
The payment frequency is 12 times a year.
The number of payments is 4.
The payments are made at the end of the payment periods.
The annual interest rate is 2% + 0.5%, or 2.5%.
The compounding frequency is 12 times a year.
The future value is unknown.
Using the financial application on a graphing calculator, the balance at the end of 4 months is $1924.250....

Month 5 onward:
The present value is $1924.250....
The regular payment amount is $400.
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 2.5% + 3%, or 5.5%.
The compounding frequency is 12 times a year.
The future value is $0.
Using the financial application on a graphing calculator, the number of payments is 4.875..., or 5.
If the rate increases by 3% in September, it will take Trish 4 + 5, or 9 months; the same amount of time it would take to pay off her line of credit.

9. a) Line of credit:
The present value is $2756.43.
The regular payment amount is $50.
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 8.9%.
The compounding frequency is 12 times a year.
The future value is $0.
Using the financial application on a graphing calculator, it will take Jayce 71.146... or 72 months, or 6 years to pay off the line of credit. Jayce will pay $800.877... or $800.88 in interest.

Credit card:
The present value is $2756.43.
The regular payment amount is $60.
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 15.2%.
The compounding frequency is 365 times a year.
The future value is $0.
Using the financial application on a graphing calculator, it will take Jayce 69.540... or 70 months, or 5 years 10 months, to pay off the credit card. Jayce will pay $1415.993... or $1416.00 in interest.
b) Jayce should use the line of credit because he will pay less overall and he gets 2 more months to pay it off.
c) Line of credit:
The present value is $2756.43.
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 8.9%.
The compounding frequency is 12 times a year.
The future value is $0.
Using the financial application on a graphing calculator, Jayce will have to make monthly payments of $240.926..., or $240.93, to pay off the line of credit in a year.

Credit card:
The present value is $2756.43.
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 15.2%.
The compounding frequency is 365 times a year.
The future value is $0.
Using the financial application on a graphing calculator, Jayce will have to make monthly payments of $249.172..., or $249.18, to pay off the credit card in a year.

10. We only need to look at how much is saved with the two cards. First, Sean must determine how much he will pay in interest if he does not consolidate his debt.
Credit card A:
The present value is $1408.55.
The regular payment amount is unknown.
The payment frequency is 12 times a year.
The number of payments is 24.
The payments are made at the end of the payment periods.
The annual interest rate is 18.5%.
The compounding frequency is 365 times a year.
The future value is $0.
Using the financial application on a graphing calculator, each payment will equal $70.755..., or $70.76. The total interest paid is $289.593..., or $289.60.

Credit card B:
The present value is $295.08.
The regular payment amount is unknown.
The payment frequency is 12 times a year.
The number of payments is 24.
The payments are made at the end of the payment periods.
The annual interest rate is 19.9%.
The compounding frequency is 365 times a year.
The future value is $0.
Using the financial application on a graphing calculator, each payment will equal $15.027..., or $15.03. The total interest paid is $65.569..., or $65.57.

Total interest cost without consolidation:
289.59 + 65.57 = $355.16
Now, Sean must determine how much he will pay in interest if he does consolidate his debt.
The present value is 1408.55 + 295.08, or $1703.63.
The regular payment amount is unknown.
The payment frequency is 12 times a year.
The number of payments is 24.
The payments are made at the end of the payment periods.
The annual interest rate is 7.6%.
The compounding frequency is 365 times a year.
The future value is $0.
Using the financial application on a graphing calculator, each payment will equal $76.758... or $76.76. The total interest paid is $138.567... or $138.57.

The difference between Sean not consolidating his debt, and Sean consolidating his debt is
355.16 – 138.57, or $216.59.
Sean will save $216.59 by consolidating his debt.

11. a) Travis will have to repay the loan, the flat processing fee, and the additional fee.
Total cost = 750 + 20 + (20 · 7)
Total cost = 750 + 20 + 140
Total cost = $910
Travis will have to repay $910 altogether.
b) $A = P(1+rt)$

$$910 = 750\left(1+\left(\frac{3}{12}\right)(r)\right)$$

$$1.213... = 1+\left(\frac{3}{12}\right)(r)$$

$$0.213... = \left(\frac{3}{12}\right)(r)$$

$$0.853... = r$$

These fees are equivalent to a 85.3% annual simple interest rate.

12. a) The present value is 481.73 + 200, or $681.73.
The regular payment amount is unknown.
The payment frequency is 12 times a year.
The number of payments is 2.
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, Raul would have to pay $349.477..., or $349.48, each month. He would pay $17.224..., or $17.23, in interest.
b) The present value is $481.73 + $200, or $681.73.
The regular payment amount is $50.
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, it would take Raul 15.614... or 16 months, or 1 year 4 months, to pay off his credit card. He would pay $98.983..., or $98.99, in interest.

13. a) Maria's credit card:
The present value is $1618.76.
The regular payment amount is $150.
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 19.9%.
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 required is 11.999..., or 12.

Clint's credit card:
The present value is $1893.28.
The regular payment amount is $175.
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 365 times a year.
The future value is $0.
Using the financial application on a graphing calculator, the interest rate on Clint's credit card is 19.423...%, or 19.4%.
b) Using the financial application on a graphing calculator, Maria will pay $181.24 in interest, and Clint will pay $206.72 in interest. Therefore, Clint will pay 206.72 – 181.24 or $25.48 more in interest than Maria.

14. a) The total amount of money that Moh will have to pay at the time of purchase is $99.95.
b) Total cost = (4785)(1.15) + 99.95
Total cost = $5602.70
The total cost will be $5602.70.
c) $I = Prt$
99.95 = r(5502.75)(1)
99.95 = 5502.75r
r = 0.0181...
The administration fee is equal to a 1.82% simple interest rate.
d) New balance to pay after penalty:

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

$$A = 5502.75\left(1+\frac{0.1995}{365}\right)^{(365\cdot 7)}$$

$$A = 5502.75(1.225...)$$

$$A = \$6743.091...$$

The extra amount to repay is the interest:
$I = A - P$
I = 6743.091... – 5502.75
I = $1240.341...
Moh would have to repay $1240.34 more.
e) The present value is $6743.091....
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 19.95%.
The compounding frequency is 365 times a year.
The future value is $0.
Using the financial application on a graphing calculator, Moh would have to make monthly payments equal to $1190.683..., or $1190.69, to repay the new total in 6 months.

f) Balance after 12 months:

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

$$A = 5502.75\left(1+\frac{0.1995}{365}\right)^{365}$$

$$A = 6717.348...$$

Interest charged for first 12 months:

$$I = A - P$$
$$I = 6717.348... - 5502.75$$
$$I = \$1214.598...$$

For the last 6 months:
The present value is $6717.348.
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 19.95%.
The compounding frequency is 12 times a year.
The future value is $0.
Using the financial application on a graphing calculator, the payment amount is $1186.138... or $1186.14. The amount of interest charged is $399.480... or $399.49.

Total interest = 1214.598... + 399.480...
Total interest = $1614.078...
Moh would pay $1614.08 in interest.

15. e.g., Interest rate: The lower the rate the better the credit option if all other factors are equal. Total number of payments: The higher the number of total payments, the more interest is paid in total. As the interest rate rises, so does the total number of payments.

16. Line of credit:
The present value is $8000.
The regular payment amount is $330.
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 4.3%.
The compounding frequency is 12 times a year.
The future value is $0.
Using the financial application on a graphing calculator, the number of payment periods is 25.406.... or 26.
The total payment will be 25.406... · $330 = $8383.99, of which $383.99 will be interest.

Loan:
The present value is $7500.
The regular payment amount is unknown.
The payment frequency is 12 times a year.
The number of payments is 25.406....
The payments are made at the end of the payment periods.
The annual interest rate is 4.8%.
The compounding frequency is 12 times a year.
The future value is $0.
Using the financial application on a graphing calculator, the payment amount is $311.048... So the total paid is $7902.52, of which $402.52 is interest.

e.g., Line of credit payments of $330 will take 26 months to pay off the loan of $8000, and the total interest paid will be $383.98 Art gallery loan payments of $311.05 will take 26 months to pay off the loan of $7500, and the total interest paid is $402.52.

17. a) Bank loan:
The present value is $2775.20.
The regular payment amount is $500.
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 6.8%.
The compounding frequency is 12 times a year.
The future value is $0.
Using the financial application on a graphing calculator, the number of payments is 5.655..., or 6.
The amount of interest paid is $52.562... or $52.57.
It will take 6 months for James to pay off his bank loan.

Credit card A:
The present value is $1200.35.
The regular payment amount is $40.
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 19.9%.
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 42.009..., or 43. The amount of interest paid is $480.024... or $480.03.
It would take 43 months to pay off Credit card A.

Credit card B:
The present value is $687.38.
The regular payment amount is $30.
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 19.95%.
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 29.151..., or 30. The amount of interest paid is \$187.163... or \$187.17.
It would take 30 months to pay off Credit card B.

It would take James 43 months, or 3 years 7 months, to pay off all of his balances.
b) Line of credit:
The present value is 2775.20 + 1200.35 + 687.38, or \$4662.93.
The regular payment amount is \$570.
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 6.8%.
The compounding frequency is 12 times a year.
The future value is \$0.
Using the financial application on a graphing calculator, the number of payments is 8.399..., or 9. The amount of interest paid is \$125.054... or \$125.06.

It would take James 9 months to become debt-free if he consolidated his loan and credit card balances.
c) Without consolidation:
Interest paid = 52.562... + 480.024... + 187.163...
Interest paid = \$719.750...

With consolidation:
Interest paid = \$125.054...

Difference = \$719.750... – \$125.054...
Difference = \$594.696...

James would save \$594.70 in interest if he consolidated his debts.

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Sample Solution
Answers will vary, e.g., \$544.3 billion (September 29, 2010).

The debt would be $\frac{\$544\,300\,000\,000}{260\,000}$ or \$15 887.33 per person.
The first year, \$13.7645 billion in interest would accumulate.
This is \$3 771 097.84 per day.
The present value is \$544.3 billion.
The regular payment amount is \$4 billion.
The payments are made 12 times per year.
The number of payments is unknown.
The payments are made at the end of the payment periods.
The annual interest rate is 2.5%.
The compounding frequency is 12 times per year.
The future value is \$0.
Therefore, the number of payments is 160.180....
It would take 160.18 months, or 13 years 4 months.

Lesson 2.4: Buy, Rent or Lease?, page 129

1. a) e.g., renting cost for 4 months or 120 days:
(120)(75) = \$9000;
benefits: cleaning service, utilities
leasing: costs for 4 months:
(4)(1600) + (4)(125) + 1600 = \$8500;
benefits: \$1600 refund if no damage
b) e.g. I would recommend leasing. Even if the deposit is lost, it is less expensive.
2. a) Leasing costs:
Computer cost: (3)(5548.20) = \$16 644.60
Server cost: (3)(2200) = \$6600
Printer cost: (3)(215) = \$645
Total leasing cost:
16 644.60 + 6600 + 645 = \$23 889.60

Purchasing costs:
Computer: \$24 000
Resale value: $24\,000(1 - 0.4)^3$ = \$5184
Computer cost: 24 000 – 5184 = \$18 816

Server: \$7200
Resale value: $7200(1 - 0.4)^3$ = \$1555.20
Server cost: 7200 – 1555.20 = \$5644.80

Printers: \$5200
Resale value: $5200(1 - 0.4)^3$ = \$1123.20
Printer cost: 5200 – 1123.20 = \$4076.80

Total purchasing cost:
18 816 + 5644.80 + 4076.80 = \$28 537.60

Leasing: costs: \$23 889.60; benefits: e.g., could upgrade earlier than 3 years; no need to resell equipment
purchasing: costs: \$28 537.60; benefits: e.g., own equipment, which is cheaper from the fourth year onward

b) e.g., I would suggest that this company lease, because the total cost of leasing is less than purchasing the equipment.

3. a) Rental cost: (45)(14) = \$630
Buy:
Canoe cost = \$3000
Safety equipment cost = \$160
Paddle cost: (120)(3) = \$360
Total cost: 3000 + 160 + 360 = \$3520
They should rent because it is cheaper.
b) Let x represent the number of days the gear is rented.
Rental cost = Total cost
$45x = 3520$
$x = 78.222...$
Paul and Ali could rent for up to 78 days for less than it would cost to buy.
c) 78.222... ÷ 30 = 2.607...
It would take 3 full canoeing seasons for purchasing to be more economical than renting.