Chapter 9   **Personal Finance**

Chapter 9 Prerequisite Skills

Chapter 9 Prerequisite Skills   **Question 1 Page 460**

a) $6.3 \times 2.1 = 13.23$ **b)** $7 \times 3.04 = 21.28$

c) $10\ 000(0.06)(9) = 5400$ **d)** $500(0.02)(6.5) = 65$

e) $450 + 450(0.075)(0.25) = 458.4375$ **f)** $6750 + 6750(0.035) = 6986.25$

Chapter 9 Prerequisite Skills   **Question 2 Page 460**

a) $0.08 \div 2 = 0.04$ **b)** $0.055 \div 4 = 0.013\ 75$

c) $0.072 \div 3 = 0.024$ **d)** $0.06 \div 4 = 0.015$

e) $0.085 \div 10 = 0.0085$ **f)** $0.09 \div 12 = 0.0075$

Chapter 9 Prerequisite Skills   **Question 3 Page 460**

a) $16\% = 16 \div 100 = 0.16$ **b)** $7\% = 7 \div 100 = 0.07$

c) $4.9\% = 4.9 \div 100 = 0.049$ **d)** $0.9\% = 0.9 \div 100 = 0.009$

e) $-2.85\% = -2.85 \div 100 = -0.0285$ **f)** $28.8\% = 28.8 \div 100 = 0.288$

Chapter 9 Prerequisite Skills   **Question 4 Page 460**

Answers may vary. Sample answers and thinking are given.
a) 75 (thinking: 10% of 750 is 75) or
70 (thinking: 10% of 700 is 70; increase percent and decrease number)

b) 425 (thinking: 9% of 5000 is 450; 8% of 5000 is 400; average 450 and 400)

c) 209 (thinking: 10% of 1900 is 190; 1% of 1900 is 19; add 190 and 19)

d) 45 (thinking: 2% of 1800 is 36; 3% of 1800 is 54; average 360 and 540)

e) 250 (thinking: 1% of 25 000)

f) 250 (thinking: 2% of 10 000 is 200; 3% of 10 000 is 300; average 200 and 300)

Chapter 9 Prerequisite Skills   **Question 5 Page 460**

a) 350 (10% = 0.1; multiplying by 0.1 moves decimal place one position left)

b) 175 (10% is 350; 5% is half of 10%; half of 350 is 175)

c) 1.6 (1% = 0.01; multiplying by 0.01 moves decimal place two positions left)

d) 3.2 (move decimal two positions left and then multiply by 2)

e) 2500 (25% $= \dfrac{1}{4}$; $\dfrac{1}{2}$ of 10 000 is 5000; $\dfrac{1}{2}$ of 5000 is 2500)

f) 250 (change question to 25% of 1000; half of half of 1000 is 250)

Chapter 9 Prerequisite Skills   **Question 6 Page 460**

Use a calculator.

a) 8% ÷ 4 = 0.02   **b)** 9.6% ÷ 3 = 0.032

c) 4.8% ÷ 12 = 0.004   **d)** 6% ÷ 4 = 0.015

e) 18% ÷ 12 = 0.015   **f)** 11.2% ÷ 4 = 0.028

g) 17.5% ÷ 2 = 0.0875   **h)** 15.9% ÷ 12 = 0.013 25

Chapter 9 Prerequisite Skills   **Question 7 Page 460**

a) $2^4 = 16$ **b)** $3^3 = 27$

c) $(1.2)^2 = 1.44$ **d)** $1^{50} = 1$

e) $(0.5)^3 = 0.125$ **f)** $0^{365} = 0$

Chapter 9 Prerequisite Skills   **Question 8 Page 460**

a) $(1.9)^4 = 13.0321$ **b)** $(2.95)^3 = 25.672\ 375$

c) $(1.25)^2 = 1.5625$ **d)** $(0.9)^{50} = 0.005\ 15$

e) $(0.55)^3 = 0.166\ 375$ **f)** $(0.07)^3 = 0.000\ 343$ (3.43E –4 on TI-83/84)

Chapter 9 Prerequisite Skills   **Question 9 Page 460**

a) $9\% \div 12 = 0.09 \div 12 = 0.0075$ **b)** $16.9\% \div 4 = 0.169 \div 4 = 0.04225$

c) $-4.65\% \div 2 = -0.02325$ **d)** $1.8\% \div 4 = 0.0045$

e) $0.5\% \div 12 = 0.00041666666 \approx 0.0004$ **f)** $28.8\% \div 365 = 0.000789041 \approx 0.0008$

Chapter 9 Prerequisite Skills   **Question 10 Page 461**

a) $4 \times 3 = 12$ **b)** $12 \times 5 = 60$

c) $2 \times 4 = 8$ **d)** $365 \times 0.5 \approx 183$ (6 months is half a year)

e) $365 \times 2 = 730$ **f)** $12 \times 45 = 540$

Chapter 9 Prerequisite Skills   **Question 11 Page 461**

a) $FV = 2000(1+0.03)^7$
$= 2459.747731$
$\approx \$2459.75$

b) $FV = 1000\left(1+\dfrac{0.09}{12}\right)^{3 \times 12}$
$= 1308.645371$
$\approx \$1308.65$

c) $FV = 500\left(1+\dfrac{0.048}{4}\right)^4$
$= 524.4354664$
$\approx \$524.44$

d) $FV = 300\left(1+\dfrac{0.20}{365}\right)^{30}$
$= 304.9708898$
$\approx \$304.97$

Chapter 9 Prerequisite Skills   **Question 12 Page 461**

a) $2459.75

b) $1308.65

c) $524.44

d) $304.97 ($N = 30/365$; $I\% = 20$; $PV = -300$; C/Y $= 365$)

Chapter 9 Section 1   **Question 1 Page 465**

a) $2001.64

b) $3007.65 (There are 62 days in July and August.)

```
N=.0821917808
I%=1
PV=-2000
PMT=0
■FV=2001.644489
P/Y=1
C/Y=365
PMT:END BEGIN
```

```
N=.1698630137
I%=1.5
PV=-3000
PMT=0
■FV=3007.653424
P/Y=1
C/Y=365
PMT:END BEGIN
```

c) $1500.95 (There are 92 days in October, November, and December.)

d) $410.13

```
N=.2520547945
I%=.25
PV=-1500
PMT=0
■FV=1500.9455
P/Y=1
C/Y=365
PMT:END BEGIN
```

```
N=1
I%=2.5
PV=-400
PMT=0
■FV=410.1256971
P/Y=1
C/Y=365
PMT:END BEGIN
```

e) $500.02

f) $2500.48

```
N=.002739726
I%=1.75
PV=-400
PMT=0
■FV=400.0191781
P/Y=1
C/Y=365
PMT:END BEGIN
```

```
N=.0191780822
I%=1
PV=-2500
PMT=0
■FV=2500.479491
P/Y=1
C/Y=365
PMT:END BEGIN
```

Chapter 9 Section 1   **Question 2 Page 465**

a) $FV = 2000\left(1+\dfrac{0.01}{365}\right)^{30}$

$= 2001.644489$

$\approx \$2001.64$

b) $FV = 3000\left(1+\dfrac{0.015}{365}\right)^{62}$

$= 3007.653424$

$\approx \$3007.65$

c) $FV = 1500\left(1+\dfrac{0.0025}{365}\right)^{92}$

$= 1500.9455$

$\approx \$1500.95$

d) $FV = 400\left(1+\dfrac{0.025}{365}\right)^{365}$

$= 410.1256971$

$\approx \$410.13$

e) $FV = 500\left(1+\dfrac{0.0175}{365}\right)^{1}$

$= 500.0239726$

$\approx \$500.02$

f) $FV = 2500\left(1+\dfrac{0.01}{365}\right)^{7}$

$= 2500.479491$

$\approx \$2500.48$

Chapter 9 Section 1   **Question 3 Page 465**

a) $6.95 + (14 - 12)(0.75) = \$8.45$

b) $\$6.95$

c) $6.95 + (21 - 12)(0.75) = \$13.70$

d) $\$6.95$

e) $6.95 + (18 - 12)(0.75) = \$11.45$

f) $6.95 + (26 - 12)(0.75) = \$17.45$

Chapter 9 Section 1   **Question 4 Page 465**

a) $\$9.95$

b) $\$9.95$

c) $9.95 + (21 - 20)(0.95) = \$10.90$

d) $\$9.95$

e) $\$9.95$

f) $9.95 + (26 - 20)(0.95) = \$13.65$

Chapter 9 Section 1   **Question 5 Page 466**

Answers may vary.

Chapter 9 Section 1   **Question 6 Page 466**

a) $\$1.60$ (With TVM Solver, *FV* is 601.6048107.)

b) $\$19.82$ (With TVM Solver, *FV* is 619.8194391.)

c) The account is earning interest on previously earned interest each new month.

Chapter 9 Section 1   Question 7 Page 466

a) 11
   If we assume there are only 4 weeks in a month the answer is 10.
   In a year of 52 weeks, he makes 104 ABM transactions and 24 automatic withdrawals, for a total of 128 transactions. This is an average of $128 \div 12 = 10.666$, or 11 transactions per month.

b) Option 1 is best. Jack will pay the minimum charge every month in all three plans. He will occasionally pay an extra $1.25 with plan 1.

c) Assume he makes 11 transactions per month.
   Option 1: Total: $9.75 + 1.25 = \$11$; Cost per transaction: $11 \div 11 = \$1.00$
   Option 2: Total: $14.75; Cost per transaction: $14.75 \div 11 = \$1.34$
   Option 3: Total: $24.95; Cost per transaction: $24.95 \div 11 = \$2.27$

d) Answers may vary. For example:
   Withdraw more cash so he makes fewer withdrawals.

Chapter 9 Section 1   Question 8 Page 466

a) Option 1. Alexa is making about 10 to 14 transactions per month. Her highest possible cost with Option 1 is $9.75 + 4(1.25) = \$14.75$, which is the standard cost for Option 2.

b) Option 1. The first charge is her basic fee and the second charge is for 6 additional transactions beyond the first 10 that are included in her basic fee.

c) 16

d) Her total cost is $9.75 + 7.50 = \$17.25$.
   $$\frac{17.25}{16} = 1.078125$$
   Her cost per transaction is $1.08.

Chapter 9 Section 1   Question 9 Page 467

a) approximately 65 (60+ debits and 4+ pay deposits)

b) Option 3 is her best choice.
   With Option 1, 65 transactions cost $78.50. With Option 2, 65 transactions cost $64.75.

c) Her total cost is $24.95 and her cost per transaction is $24.95 \div 65 = 0.3838$ or approximately $0.38

d) Answers may vary. For example:
   Make fewer bank transactions and then switch to a cheaper banking option to save money.

Chapter 9 Section 1   **Question 10 Page 467**

a) 10% of 312.73 = 0.10 × 312.73 = 31.273
He transfers $31.27.

b) 312.73 – 31.27 = 281.46
The first account has $281.46.

c) $0.04 ($FV$ = 31.31200508)

d) 10% of 286.91 = 0.10 × 286.91 = 28.691
He now transfers $28.69.

e) 31.27 + 28.69 = $59.96

f) $0.08 ($FV$ = 60.04054444)

g) He is saving approximately $60 every 4 weeks. In a year he will save approximately 52 ÷ 4 × 60 = 780.
His savings with interest will be approximately $800.

Chapter 9 Section 1   **Question 11 Page 467**

Answers may vary. For example:
A savings account is for money you are going to use soon; investing is for the longer term.

Chapter 9 Section 2   **Investment Alternatives**

Chapter 9 Section 2   **Question 1 Page 472**

Percent means per 100 or divided by 100.
To divide a decimal number by 100, move its decimal point 2 places to the left.

a) $6\% = 0.06$ **b)** $8\% = 0.08$

c) $10\% = 0.1$ **d)** $0.5\% = 0.005$

e) $3.25\% = 0.0325$ **f)** $4.9\% = 0.049$

g) $-2.6\% = -0.026$ **h)** $5.95\% = 0.0595$

i) $5.06\% = 0.0506$

Chapter 9 Section 2   **Question 2 Page 472**

r (%)	Compounding Frequency	i
9.0	monthly	0.0075
16.0	quarterly	0.0400
-4.6	semi-annually	-0.0230
1.8	quarterly	0.0045
0.5	monthly	0.0004
12.8	quarterly	0.0320

Chapter 9 Section 3   **Question 3 Page 472**

a) $FV = PV(1+i)^n$

$= 1000(1+0.0408)^3$

$= 1127.461837$

$\doteq \$1127.46$

b) $FV = PV(1+i)^n$

$= 5000(1+0.1642)^3$

$= 7889.560106$

$\doteq \$7889.56$

c) $FV = PV(1+i)^n$

$= 2000(1+0.0027)^3$

$= 2016.243779$

$\doteq \$2016.24$

Chapter 9 Section 2   **Question 4 Page 472**

a) $1127.46   **b)** $7889.56   **c)** $2016.24

Chapter 9 Section 2   **Question 5 Page 472**

a) $1126.46 - 1000 = \$127.46$ **b)** $7889.56 - 5000 = \$2889.56$

c) $2016.24 - 2000 = \$16.24$

Chapter 9 Section 2   **Question 6 Page 473**

Using the formula,
$$FV = PV(1+i)^n$$
$$= 2500(1-0.0642)^1$$
$$= 2339.5$$
$$\doteq \$2339.50$$

Chapter 9 Section 2   **Question 7 Page 473**

Use the TVM Solver with settings shown below.
Note that the payment is at the beginning of each year.

```
N=5
I%=3.8
PV=0
PMT=-2000
■FV=11221.63897
P/Y=1
C/Y=12
PMT:END BEGIN
```

His investment is $11 221.64 at the end of five years.

Chapter 9 Section 2   **Question 8 Page 473**

a) Use the TVM Solver. $I = 1.92 – 2.5$.

```
N=1
I%=-.58
PV=-2000
PMT=0
■FV=1988.4
P/Y=1
C/Y=1
PMT:END  BEGIN
```

She has $1988.40 at the end of
the first year

b) Use the TVM Solver. $I = 8.83 – 2.5$

```
N=1
I%=6.33
PV=-1988.4
PMT=0
■FV=2114.26572
P/Y=1
C/Y=1
PMT:END  BEGIN
```

She has $2114.27 at the end of
the second year.

c) Use the TVM Solver. $I = 7.3 – 2.5$

```
N=10
I%=4.8
PV=-2000
PMT=0
■FV=3196.265316
P/Y=1
C/Y=1
PMT:END  BEGIN
```

She has $3196.27 at the end of ten years.

Chapter 9 Section 2   **Question 9 Page 473**

a) Answers may vary. For example:
A GIC or Guaranteed Investment Certificate is a type of risk-free investment that lasts a fixed
amount of time.

b) Low-risk. Most GICs are covered by government insurance that guarantees that the principal
will be paid even if the issuing institution should go bankrupt.

c) Answers may vary. For example:
Assume the interest rate is 2%. Use the TVM Solver. $N = 30/365$

```
N=.0821917808
I%=2
PV=-1000
PMT=0
■FV=1001.628938
P/Y=1
C/Y=1
PMT:END  BEGIN
```

The interest earned would be $1.63.

Chapter 9 Section 2   Question 10 Page 473

a) Use the TVM Solver.

```
N=1
I%=4.1
PV=-1000
PMT=0
■FV=1041
P/Y=1
C/Y=1
PMT:END BEGIN
```

She has $1041.00 after one year.

b) Use the TVM Solver.

```
N=2
I%=4.1
PV=-1000
PMT=0
■FV=1083.681
P/Y=1
C/Y=1
PMT:END BEGIN
```

She has $1083.68 after two years.

c) $FV = 1000(1.041)^n$

d) Using the formula in part c),
$$FV = 1000(1.041)^7$$
$$= 1324.814603$$
The value at the end of seven years is $1324.81.

e)
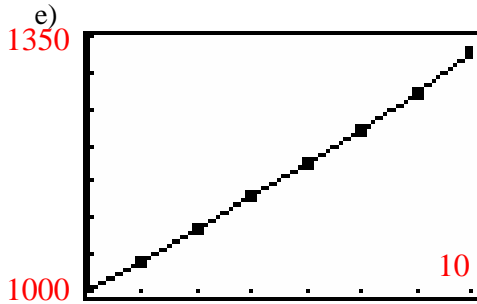
Chapter 9 Section 2   Question 11 Page 474

a) Answers may vary. For example:
   i)   low-risk
   ii) medium-risk
   iii) high-risk
   iv) low-risk
   v)   medium-risk
   vi) high-risk
   vii) medium-risk

b) Answers may vary.

Chapter 9 Section 2   **Question 12 Page 474**

a) She will have made 52 payments of $10 each for a total of $520.

b) Use the TVM Solver.

```
N=52
I%=3.85
PV=0
PMT=-10
■FV=530.1394996
P/Y=52
C/Y=1
PMT:END BEGIN
```
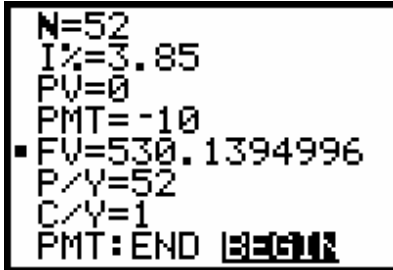
She will have earned $10.14 interest in one year.

c) The government contribution is 20% of 520 = $104.

d) She will have $634.14.

Chapter 9 Section 2   **Question 13 Page 474**

a) Use the TVM Solver.

```
N=2548
I%=7
PV=0
PMT=-25
■FV=550396.5377
P/Y=52
C/Y=12
PMT:END BEGIN
```
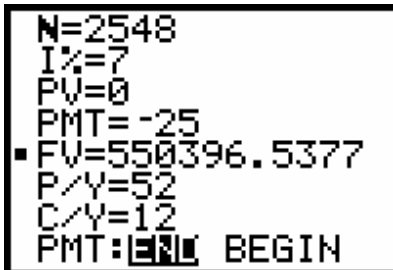
He will have $550 396.54.

b) He has invested 25(52)(49) = $63 700.

c) His interest earned is 550 396.54 – 63 700 = $486 696.54.

d) He expects to get higher paying jobs.

Chapter 9 Section 2   **Question 14 Page 475**

Calculate each year separately.

Year	Principal at Start ($)	Interest Rate	Amount at End ($)
1	800.00	3.85%	800(1.0385) = 830.80
2	830.80	4.05%	830.80(1.0405) = 864.4474
3	864.45	4.2%	864.45(1.042) = 900.7541908

The value of the GIC at the end of three years is $900.75.

Chapter 9 Section 2   **Question 15 Page 475**

Solutions for Achievement Checks are shown in the Teacher's Resource.

Chapter 9 Section 2   **Question 16 Page 475**

Answers may vary.

Chapter 9 Section 3   **Manage Credit Cards**

Chapter 9 Section 3   **Question 1 Page 479**

a) 17.9% ÷ 365 = 0.0490%   **b)** 28.8% ÷ 365 = 0.0789%

c) 13.9% ÷ 365 = 0.0381%   **d)** 3.9% ÷ 365 = 0.0107%

Chapter 9 Section 3   **Question 2 Page 479**

a) $i = 0.0490\% = 0.000490$

$$FV = PV(1+i)^n$$
$$= 1500(1+0.000490)^{55}$$
$$= \$1540.96$$

b) $i = 0.0789\% = 0.000789$

$$FV = PV(1+i)^n$$
$$= 1500(1+0.000789)^{55}$$
$$= \$1566.50$$

c) $i = 0.0381\% = 0.000381$

$$FV = PV(1+i)^n$$
$$= 1500(1+0.000381)^{55}$$
$$= \$1531.76$$

d) $i = 0.0107\% = 0.000107$

$$FV = PV(1+i)^n$$
$$= 1500(1+0.000107)^{55}$$
$$= \$1508.85$$

Chapter 9 Section 3   **Question 3 Page 479**

a) $1541.00

```
N=.1506849315
I%=17.9
PV=-1500
PMT=0
■FV=1540.999296
P/Y=1
C/Y=365
PMT:END BEGIN
```

b) $1566.50

```
N=.1506849315
I%=28.8
PV=-1500
PMT=0
■FV=1566.502232
P/Y=1
C/Y=365
PMT:END BEGIN
```

c) $1531.74

```
N=.1506849315
I%=13.9
PV=-1500
PMT=0
■FV=1531.743036
P/Y=1
C/Y=365
PMT:END BEGIN
```

d) $1508.84

```
N=.1506849315
I%=3.9
PV=-1500
PMT=0
■FV=1508.840547
P/Y=1
C/Y=365
PMT:END BEGIN
```

Chapter 9 Section 3   **Question 4 Page 479**

Her payment was due on April 29. The company processed her payment on May 22. She is charged interest for 37 days (from April 15 to May 22). Actually, interest may be charged for more than 37 days since unpaid balances are charged interest from the date of purchase.

Chapter 9 Section 3   **Question 5 Page 480**

a) February 8 (using a calendar)

b) March 11 (assuming February has 28 days that year)

Chapter 9 Section 3   Question 6 Page 480

a) 3% of 289.40 = $8.68. Her minimum payment will be $10.

b) 3% of $1220.74 = $36.62. Her minimum payment will be $36.62.

Chapter 9 Section 3   Question 7 Page 480

Answers may vary. For example:
An advantage is that she has fewer bank transactions and therefore a lower service charge that month.

A disadvantage is that she might buy more than she can afford to pay at once and so will pay an interest charge on the unpaid balance.

Chapter 9 Section 3   Question 8 Page 480

a) 18.9% = 0.189

Her daily interest rate on cash advances is $\dfrac{0.189}{365} = 0.000\,518 = 0.0518\%$.

b) 12.9% = 0.129

Her daily interest rate on credit card purchases is $\dfrac{0.129}{365} = 0.000\,353 = 0.0353\%$.

Chapter 9 Section 3   Question 9 Page 480

a) His purchases and new balance is 48.00 + 22.75 + 28.49 = $99.24.

b) 3% of 99.24 = $2.98. Therefore his minimum payment is $10.

c) August 17 (using a calendar)

d) Answers may vary. For example:
They are responsible for his charges. They may be worried that he will overspend his ability to pay.

e) 16.9% ÷ 365 = 0.046% = 0.000 46

f) $0

Chapter 9 Section 3   **Question 10 Page 481**

a) His current debt is $2527 + 4318 + 227 + 1308 = \$8380$.

b) $0.03(2527) + 0.03(4318) + 20 + 100 = 325.28$
His minimum payment is $325.35.

c) Bank 1:
$$FV = PV(1+i)^n$$
$$= 2527\left(1 + \frac{0.139}{365}\right)^{30}$$
$$= \$2556.03$$
Interest charged $= 2556.03 - 2527 = \$29.03$

Bank 2:
$$FV = PV(1+i)^n$$
$$= 4318\left(1 + \frac{0.149}{365}\right)^{30}$$
$$= \$4371.19$$
Interest charged $= 4371.19 - 4318 = \$53.19$

Gasoline Retailer:
$$FV = PV(1+i)^n$$
$$= 227\left(1 + \frac{0.189}{365}\right)^{30}$$
$$= \$230.55$$
Interest charged $= 230.55 - 227 = \$3.55$

Furniture Retailer:
$$FV = PV(1+i)^n$$
$$= 1308\left(1 + \frac{0.288}{365}\right)^{30}$$
$$= \$1339.32$$
Interest charged $= 1339.32 - 1308 = \$31.32$

d) He should pay Bank 2 first since that is the largest debt and it will attract the highest interest payment.

e) It will take 36 monthly payments (3 years) of $272.37 to pay off his $8380 debt at 10.5% interest, compounded monthly.

Chapter 9 Section 4   **Obtain a Vehicle**

Chapter 9 Section 4   **Question 1 Page 486**

a) 1.14 × 22 995 = $26 214.30   **b)** 1.14 × 36 250 = $41 325.00

c) 1.14 × 17 999 = $20 518.86   **d)** 1.14 × 12 995 = $14 814.30

Chapter 9 Section 4   **Question 2 Page 486**

a) $127.20   **b)** $209.51

```
N=36
I%=9
PV=4000
■PMT=-127.19893…
FV=0
P/Y=12
C/Y=12
PMT:END BEGIN
```

```
N=48
I%=8.5
PV=8500
■PMT=-209.51057…
FV=0
P/Y=12
C/Y=12
PMT:END BEGIN
```

c) $313.20

```
N=60
I%=9.25
PV=15000
■PMT=-313.19847…
FV=0
P/Y=12
C/Y=12
PMT:END BEGIN
```

Chapter 9 Section 4   **Question 3 Page 486**

a) Total payment is 36 × 127.20 = $4579.20.

b) Total payment is 48 × 209.51 = $10 056.48.

c) Total payment is 60 × 313.20 = $18 792.00.

Chapter 9 Section 4   **Question 4 Page 486**

a) Total interest paid is 4579.20 – 4000 = $579.20.

b) Total interest paid is 10 056.48 – 8500 = $1556.48.

c) Total interest paid is 18 792 – 15 000 = $3792.

Chapter 9 Section 4   **Question 5 Page 486**

a) Total cost: $1000 + 36 \times 299 = \$11\ 764$ **b)** Total cost: $0 + 48 \times 399 = \$19\ 152$

c) Total cost: $7500 + 39 \times 899 = \$42\ 561$

Chapter 9 Section 4   **Question 6 Page 486**

a) PST charge: $0.08 \times 2500 = \$200$ **b)** PST charge: $0.08 \times 4200 = \$336$

c) PST charge: $0.08 \times 300 = \$24$

Chapter 9 Section 4   **Question 7 Page 487**

Answers may vary. For example:
Some possible reasons include different mileage, condition, or damage.

Chapter 9 Section 4   **Question 8 Page 487**

The abbreviations mean: 5-speed, automatic, or best offer, power steering, 170 000 (kilometres), all-wheel drive, emission test, power brakes, certified, power windows, air conditioning, front-wheel drive, all extra options, power (door) locks, year 2000 model.

Chapter 9 Section 4   **Question 9 Page 487**

a) Total lease cost: $1000 + 48 \times 525 = \$26\ 200$

b) Average monthly cost: $26\ 200 \div 48 = \$545.83$

c) Answers may vary. For example:
They can make an additional payment to buy the car or begin a new lease on a different car.

Chapter 9 Section 4   **Question 10 Page 487**

a) After-tax cost: $1.08 \times 6500 = \$7020$

b) Use the TVM Solver.

```
N=104
I%=3.25
PV=0
■PMT=-65.3505285
FV=7020
P/Y=52
C/Y=365
PMT:END BEGIN
```
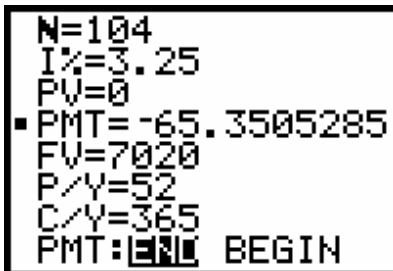
He needs to save $65.35 each week for two years.

c) The monthly cost will be $(760 + 52 \times 20) \div 12 = \$150$.

Chapter 9 Section 4   **Question 11 Page 488**

a) The total lease cost is $5000 + 48 \times 695 = \$38\ 360$.

b) The average cost per month is $38\ 360 \div 48 = \$799.17$.

Chapter 9 Section 4   **Question 12 Page 488**

Solutions for Achievement Checks are shown in the Teacher's Resource.

Chapter 9 Section 4   **Question 13 Page 488**

Answers may vary.

Chapter 9 Section 4   **Question 14 Page 488**

a) PDI is an acronym for pre-delivery inspection. This is a charge car dealers add to the cost of a new vehicle for inspecting and cleaning the car before you pick it up.

b) The cost of the truck is $(22\ 180 + 1100) \times 1.14 = \$26\ 539.20$.

c) Use the TVM Solver.

```
N=48
I%=.9
PV=21539.2
■PMT=-457.02723…
FV=0
P/Y=12
C/Y=12
PMT:END BEGIN
```

The monthly payment will be $457.03.

d) Total amount spent is $5000 + 48 \times 457.03 = \$26\ 937.44$.

e) Consider the basic price of the truck, $22 180.
Use the TVM Solver.

```
N=4
I%=-15
PV=22180
PMT=0
■FV=-11578.09863
P/Y=1
C/Y=1
PMT:END BEGIN
```

The truck will be worth $11 578.10 after four years.

Chapter 9 Section 5   **Operate a Vehicle**

Chapter 9 Section 5   **Question 1 Page 493**

a) On the monthly payment plan, Vic pays $169 \times 12 = \$2028$.
The difference is $2028 - 1948 = \$80$.

b) Using the quarterly plan, Faith pays $118 \times 4 = \$472$.
The difference is $472 - 466 = \$6$.

c) Using the weekly plan, Ramon pays $74.42 \times 52 = \$3869.84$.
The difference is $3869.84 - 3780 = \$89.84$.

Chapter 9 Section 5   **Question 2 Page 493**

Answers may vary.

Chapter 9 Section 5   **Question 3 Page 493**

Answers may vary. For example:
In each case, multiply the tank size by the cost of 1 L of gasoline.

a) Use a proportion.

$$\frac{1.4 \text{ L}}{100 \text{ km}} = \frac{14 \text{ L}}{x \text{ km}}$$
$$x = \frac{14 \times 100}{1.4}$$
$$x = 1000$$

The motorcycle can travel 1000 km on one tank of gas.

b) Use a proportion.

$$\frac{5.9 \text{ L}}{100 \text{ km}} = \frac{30 \text{ L}}{x \text{ km}}$$
$$x = \frac{30 \times 100}{5.9}$$
$$x \doteq 508.47$$

The sub-compact car can travel 508 km on one tank of gas.

c) Use a proportion.

$$\frac{7.8 \text{ L}}{100 \text{ km}} = \frac{55 \text{ L}}{x \text{ km}}$$
$$x = \frac{55 \times 100}{7.8}$$
$$x \doteq 705.13$$

The mid-sized car can travel 705 km on one tank of gas.

d) Use a proportion.

$$\frac{10.2 \text{ L}}{100 \text{ km}} = \frac{75 \text{ L}}{x \text{ km}}$$
$$x = \frac{75 \times 100}{10.2}$$
$$x \doteq 735.29$$

The minivan can travel 735 km on one tank of gas.

e) Use a proportion.

$$\frac{13.5 \text{ L}}{100 \text{ km}} = \frac{92 \text{ L}}{x \text{ km}}$$
$$x = \frac{92 \times 100}{13.5}$$
$$x \doteq 681.48$$

The full-sized car can travel 681 km on one tank of gas.

Chapter 9 Section 5   **Question 5 Page 493**

a) 14 ÷ 3.785 = 3.7 gallons

b) 30 ÷ 3.785 = 7.9 gallons

c) 55 ÷ 3.785 = 14.5 gallons

d) 75 ÷ 3.785 = 19.8 gallons

e) 92 ÷ 3.785 = 24.3 gallons

Chapter 9 Section 5   **Question 6 Page 494**

Answers may vary. For example:

a) fixed

b) variable

c) fixed

d) variable

e) variable

f) fixed

g) fixed

h) fixed

i) variable

j) fixed

Chapter 9 Section 5   **Question 7 Page 494**

a) 14 595 – 12 259 = $2336

b) 52 999 – 43 000 = $9999

c) 22 950 – 18 500 = $4450

Chapter 9 Section 5   **Question 8 Page 494**

a) $\dfrac{2336}{14\ 595} \times 100 = 16\%$

b) $\dfrac{9999}{52\ 999} \times 100 = 19\%$

c) $\dfrac{4450}{22\ 950} \times 100 = 24\%$

Chapter 9 Section 5   **Question 9 Page 494**

1200 + 0.10 × 1200 = $1320

Chapter 9 Section 5   **Question 10 Page 494**

a) Rado's consumption is $\dfrac{622}{47.6} = 13$ km/L.

b) Sharlee's consumption is $\dfrac{385}{32.8} = 12$ km/L.

c) Steve's consumption is $\dfrac{1070}{54.6} = 20$ km/L.

Chapter 9 Section 5   **Question 11 Page 495**

a) The value after one year is 24 500 – 0.21 × 24 500 = $19 355

b) A two-year-old pickup truck costs 19 355 – 0.21 × 19 355 = $15 290.
A three-year-old pickup truck costs 15 290 – 0.21 × 15 290 = $12 079.
A four-year-old pickup truck costs 12 079 – 0.21 × 12 079 = $9542.
A five-year-old pickup truck costs 9542 – 0.21 × 9542 = $7538.
A six-year-old pickup truck costs 7538 – 0.21 × 7538 = $5955.
Rhys can afford a six-year-old pickup truck.

Chapter 9 Section 5   **Question 12 Page 495**

Answers may vary.

Chapter 9 Section 5   **Question 13 Page 495**

Solutions for Achievement Checks are shown in the Teacher's Resource.

Chapter 9 Section 5   **Question 14 Page 495**

a)

Date	Odometer Reading	Distance (km)	Fuel Use (US gallons)	Fuel Use (L)	Fuel Costs (US$)	Fuel Costs (CDN$)	Unit Fuel Cost (CDN$/L)	Fuel Efficiency (km/L)
Mar. 15	236 083	--------	------	-----	---------	--------	--------	--------
Mar. 16	236 948	865	12.7	48.1	41.00	48.38	1.01	18
Mar. 17	237 760	812	12.3	46.6	40.00	47.20	1.01	17
Mar. 22	237 897	137	2.6	9.8	8.50	10.03	1.02	14
Mar. 23	238 780	883	12.5	47.3	40.25	47.50	1.00	19
Mar. 24	239 541	761	----------	42.9	-------	42.85	1.00	18

b) Distance travelled is $865 + 812 + 137 + 883 + 761 = 3458$ km.

c) The gas consumption is $\dfrac{3458}{48.1 + 46.6 + 9.8 + 47.3 + 42.9} = \dfrac{3458}{194.7} = 17.8$ km/L, or

$\dfrac{194.7}{3458} \times 100 = 5.6$ L/100 km.

d) He spent $48.38 + 47.20 + 10.03 + 47.50 + 42.85 = $ CDN$195.96.

Chapter 9 Review

Chapter 9 Review   **Question 1 Page 496**

a) Her total bank fees are $11.50 + (19 - 12)1.25 = \$20.25$.

b) Answers may vary. For example:
She could make fewer transactions and use a credit card.

Chapter 9 Review   **Question 2 Page 496**

a) $425\left(1 + \dfrac{0.0025}{365}\right)^{31} = 425.090249$

$$\approx 425.09$$

The interest earned is $425.09 - 425 = \$0.09$.

b) $0.09

```
N=.0849315068
I%=.25
PV=-425
PMT=0
∎FV=425.090249
P/Y=1
C/Y=365
PMT:END BEGIN
```

Chapter 9 Review   **Question 3 Page 496**

Use the TVM Solver.

```
N=.0849315068
I%=3.5
PV=-425
PMT=0
∎FV=426.265175
P/Y=1
C/Y=365
PMT:END BEGIN
```

The interest earned is $426.27 - 425 = \$1.27$.

Chapter 9 Review   **Question 4 Page 496**

Use the TVM Solver.

```
N=1
I%=12.13
PV=-4000
PMT=0
■FV=4485.2
P/Y=1
C/Y=1
PMT:END BEGIN
```

The current value of the investment is $4485.20.

Chapter 9 Review   **Question 5 Page 496**

a) $FV = PV(1.0365)^n$

b)   Use the formula in part a).

$FV = 2000(1.0365)^5$

$= 2392.635421$

The GIC will be worth $2392.64.

c)   Use the TVM Solver.

```
N=5
I%=3.65
PV=-2000
PMT=0
■FV=2392.635421
P/Y=1
C/Y=1
PMT:END BEGIN
```

The GIC will be worth $2392.64.

Chapter 9 Review   **Question 6 Page 496**

Answers may vary. For example:
One advantage is that it groups all purchases into one payment.
One disadvantage is that there is a high interest rate if you are unable to pay the full amount by the due date.

Chapter 9 Review   **Question 7 Page 496**

He is charged interest from the date of the transaction to the date he pays the bill, i.e., from
February 10 to April 3, which is 52 days.
Use the TVM Solver.

```
N=.1424657534
I%=16.9
PV=-344
PMT=0
▪FV=352.3809369
P/Y=1
C/Y=365
PMT:ENDⅡ BEGIN
```

His interest payment is 352.38 – 344.00 = $8.38.

Chapter 9 Review   **Question 8 Page 496**

The only tax charged is PST.

Chapter 9 Review   **Question 9 Page 496**

a) The total lease cost is 4500 + 48 × 399 = $23 652.

b) The average cost per month is 23 652 ÷ 48 = $492.75.

Chapter 9 Review   **Question 10 Page 497**

a) $136.37   **b)** $211.74

```
N=24
I%=8.5
PV=3000
▪PMT=-136.36702…
FV=0
P/Y=12
C/Y=12
PMT:ENDⅡ BEGIN
```

```
N=60
I%=9
PV=10200
▪PMT=-211.73522…
FV=0
P/Y=12
C/Y=12
PMT:ENDⅡ BEGIN
```

Chapter 9 Review   **Question 11 Page 497**

a) Use the TVM Solver.
Retaining 92% of its value is the same as losing 8% of its value.

```
N=3
I%=-8
PV=-36000
PMT=0
■FV=28032.768
P/Y=1
C/Y=1
PMT:END  BEGIN
```

The value of the three-year-old car is $28 032.77.

b) Use the TVM Solver.
Retaining 92% of its value is the same as losing 8% of its value.

```
N=5
I%=-8
PV=-87000
PMT=0
■FV=57340.09252
P/Y=1
C/Y=1
PMT:END  BEGIN
```

The value of the five-year-old car is $57 340.09.

Chapter 9 Review   **Question 12 Page 497**

a) Answers may vary.

b) Answers may vary.

c) The motorcycle's fuel efficiency is $\dfrac{425}{18} = 23.6$ km/L, or $\dfrac{18}{425} \times 100 = 4.2$ L/100 km.

Chapter 9 Review   **Question 13 Page 497**

a) The decrease is 58 960 – 50 705 = $8255.

b) The percent decrease is $\dfrac{8255}{58\ 960} = 0.14001 \times 100\% \square 14\%$.

c) The actual loss is 67 000 – 43 600 = $23 400.

   The percent loss is $\dfrac{23\ 400}{67\ 000} = 0.34925 \times 100\% \square 34.9\%$.

d) One solution uses the TVM Solver to solve for the annual depreciation rate.

```
 N=3
■ I%=-13.34295101
 PV=-67000
 PMT=0
 FV=43600
 P/Y=1
 C/Y=1
 PMT:END BEGIN
```

The annual rate of depreciation is 13.3%.

e) $FV = 67\ 000(0.867)^n$

f) The value after 10 years is $67000(0.867)^{10} = 16079.24962 \square \$16\ 079.25$.

Chapter 9 Practice Test

Chapter 9 Practice Test   **Question 1 Page 498**

A (Savings account interest rates are usually quite low.)

Chapter 9 Practice Test   **Question 2 Page 498**

C (Bank credit card interest rates are usually between 15% and 20%.)

Chapter 9 Practice Test   **Question 3 Page 498**

B (The value of a new car is certain to go down due to depreciation.)

Chapter 9 Practice Test   **Question 4 Page 498**

C

Chapter 9 Practice Test   **Question 5 Page 498**

a)   The total amount invested is $49 \times 12 \times 100 = \$58\ 800$.

b)   Use the TVM Solver.
     Assuming that \$100 is invested at the beginning of every month:

```
N=588
I%=6
PV=0
PMT=-100
▪FV=357333.4356
P/Y=12
C/Y=12
PMT:END BEGIN
```
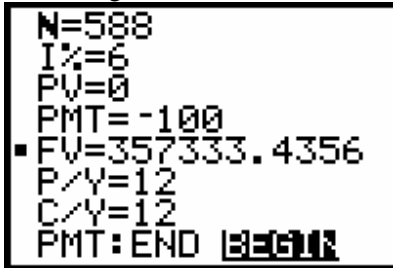
     You will have \$357 333.44 upon retirement.

c)   The interest earned is 357 333.44 – 58 800 = \$298 533.44.

Chapter 9 Practice Test   **Question 6 Page 498**

For the first fund, $FV = 14\ 000(1 + 0.0772) = \$15\ 080.80$.
For the second fund, $FV = 9000(1 - 0.0498) = \$8551.80$.
The total value of her RRSPs is 15 080.80 + 8551.80 = \$23 632.60.

Chapter 9 Practice Test   **Question 7 Page 498**

a)   The total cost of the lease is $2500 + 48 \times 339 = \$18\ 772$.

b)   The average cost per month is $18\ 772 \div 48 = \$391.08$.

Chapter 9 Practice Test   **Question 8 Page 498**

a) The van requires 12.2 L of fuel to drive 100 km.

b) Use a proportion.

$$\frac{12.2 \text{ L}}{100 \text{ km}} = \frac{80 \text{ L}}{x \text{ km}}$$

$$12.2x = 8000$$

$$x = \frac{8000}{12.2}$$

$$x \approx 655.74$$

The van can travel approximately 656 km on one tank of fuel.

c) $\dfrac{425}{100} \times 12.2 = 51.85$

The van would use approximately 52 L of fuel for the trip.

Chapter 9 Practice Test   **Question 9 Page 499**

Answers may vary.

Chapters 7 to 9 Review

Chapters 7 to 9 Review	**Question 1 Page 500**

a) $6^3 \times 6^2 = 6^5$
$= 7776$

b) $10^8 \div 10^2 = 10^4$
$= 10\ 000$

c) $\left(\dfrac{1}{4}\right)^2 \times \left(\dfrac{1}{4}\right)^3 = \left(\dfrac{1}{4}\right)^5$
$= \dfrac{1}{1024}$

d) $\dfrac{7^{11}}{7^9} = 7^2$
$= 49$

e) $(2^5)^2 = 2^{10}$
$= 1024$

f) $[(-1)^3]^8 = (-1)^{24}$
$= 1$

Chapters 7 to 9 Review	**Question 2 Page 500**

a) $(-2)^{-2} = \dfrac{1}{(-2)^2}$
$= \dfrac{1}{4}$

b) $33^0 = 1$

c) $5^{-3} = \dfrac{1}{5^3}$
$= \dfrac{1}{125}$

d) $2^0 = 1$

e) $10^{-3} = \dfrac{1}{10^3}$
$= \dfrac{1}{1000}$

f) $135^{-1} = \dfrac{1}{135}$

Chapters 7 to 9 Review	**Question 3 Page 500**

Every time the x-value increases by 1, the y-value is multiplied by 3.

Chapters 7 to 9 Review	**Question 4 Page 500**

a) It is a negative exponential model because every 5 s, the speed is divided by 2; graph B

b) It is a positive linear model because every second, the speed increases by 10; graph A

c) It is a quadratic model (parabola) because gravity involves a quadratic relation; graph C

d) It is a positive exponential model because every year, the population is multiplied by 1.02; graph D

a)
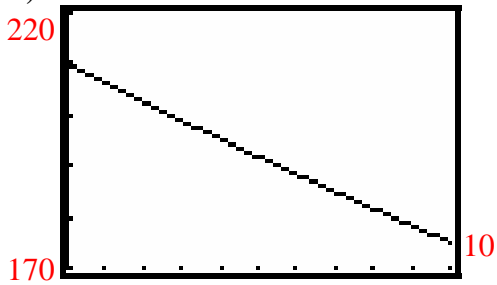
b) The current population is 210 foxes.

c) The population in eight years will be $210(0.982)^8 = 181.598 \approx 182$ foxes.

Chapters 7 to 9 Review   **Question 6 Page 500**

a) After 6 months, the amount remaining is $1000\left(\dfrac{1}{2}\right)^{\frac{0.5}{87}} = 996.024 \approx 996$ mg.

b) After 25 years, the amount remaining is $1000\left(\dfrac{1}{2}\right)^{\frac{25}{87}} = 819.402 \approx 819$ mg.

c) After 500 years, the amount remaining is $1000\left(\dfrac{1}{2}\right)^{\frac{500}{87}} = 18.618 \approx 18.6$ mg.

Chapters 7 to 9 Review   **Question 7 Page 500**

Years	Simple Interest ($)	Compound Interest ($)
0	1500	1500.00
1	1590	1590.00
2	1680	1685.40
3	1770	1786.52
4	1860	1893.71
5	1950	2007.33
6	2040	2127.77
7	2130	2255.44
8	2220	2390.77
9	2310	2534.22
10	2400	2686.27
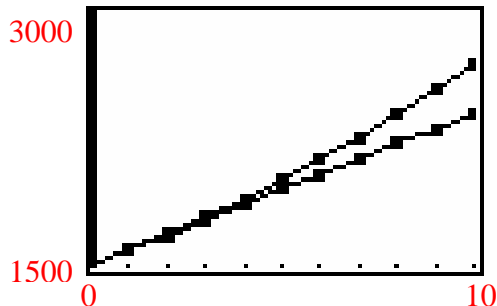
Chapters 7 to 9 Review   **Question 8 Page 500**

a) $25(1.025)^3 = 26.9222$
$\Box\ 26.92$

b) $300(1.0175)^{16} = 395.9788$
$\Box\ 395.98$

c) $25(1.025)^{-3} = 23.2149$
$\Box\ 23.21$

d) $300(1.0175)^{-16} = 227.2848$
$\Box\ 227.28$

Chapters 7 to 9 Review   **Question 9 Page 501**

a) After one year, the value is $3000(1 + 0.0125)^4 = 3152.836011$ $\Box$ $3152.84.
After two years, the value is $3000(1 + 0.0125)^8 = 3133.458304$ $\Box$ $3313.46.

b) Calculate the value after five years minus the value after four years.
$3000(1 + 0.0125)^{20} - 3000(1 + 0.0125)^{16} = 3846.11 - 3659.67 = \$186.44$

Chapters 7 to 9 Review   **Question 10 Page 501**

a) Using the formula,

$P = A(1+i)^{-n}$

$= 4000(1.055)^{-2}$

$= 3593.8096$

$\Box$ $3593.81

b) Using the formula,

$P = A(1+i)^{-n}$

$= 2000(1.02)^{-4}$

$= 1847.6908$

$\Box$ $1847.69

c) Using the formula,

$P = A(1+i)^{-n}$

$= 12500\left(1+\dfrac{0.75}{4}\right)^{-28}$

$= 7430.4754$

$\Box$ $7430.48

Chapters 7 to 9 Review   **Question 11 Page 501**

a) Use the TVM Solver.

```
N=12
■ I%=9.19011468
 PV=-1
 PMT=0
 FV=3
 P/Y=1
 C/Y=12
 PMT:END BEGIN
```

The required interest rate is 9.2%.

b) Use the TVM Solver.

```
N=15
■ I%=7.346478373
 PV=-1
 PMT=0
 FV=3
 P/Y=1
 C/Y=12
 PMT:END BEGIN
```

The required interest rate is 7.35%.

c) Use the TVM Solver.

```
N=20
■ I%=5.505653034
 PV=-1
 PMT=0
 FV=3
 P/Y=1
 C/Y=12
 PMT:END BEGIN
```

The required interest rate is 5.51%.

Chapters 7 to 9 Review   **Question 12 Page 501**

Both graphs start together, but as time increases, the investment at 6% increases faster than the other and the gap between the total investment increases. The 6% investment has a greater return than the 4.5% investment.
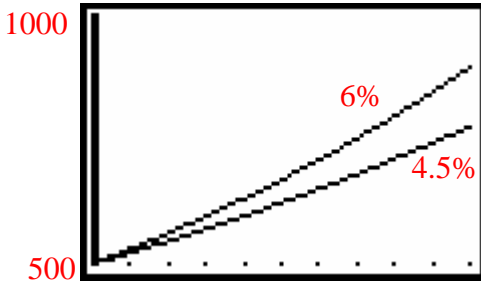
Chapters 7 to 9 Review   **Question 13 Page 501**

a) $4.95

b) $4.95 + 0.50(14 – 10) = \$6.95$

c) $4.95

d) $4.95 + 0.50(20 – 10) = \$9.95$

e) $4.95 + 0.50(17 – 10) = \$8.45$

f) $4.95 + 0.50(24 – 10) = \$11.95$

After one year, the value is $750\left(1+\dfrac{0.035}{12}\right)^{12}=\$776.68$.

After the second year, the value is $776.68\left(1+\dfrac{0.038}{12}\right)^{12}=\$806.71$.

After the third year, the value is $806.71\left(1+\dfrac{0.0525}{12}\right)^{12}=\$850.10$.

The future value, if the interest rate is 16.9%, is $652\left(1+\dfrac{0.169}{365}\right)^{25}=659.589\;\square\;\$659.59$.

The future value, if the interest rate is 18.5%, is $652\left(1+\dfrac{0.185}{365}\right)^{25}=660.312\;\square\;\$660.31$.

a) The total lease cost is $1650 + 36 \times 349 = \$14\ 214$.

b) The total lease cost is $48 \times 499 = \$23\ 952$.

a) Use a proportion.
$$\frac{12.5\ \text{L}}{100\ \text{km}}=\frac{68\ \text{L}}{x\ \text{km}}$$
$$12.5x=6800$$
$$x=\frac{6800}{12.5}$$
$$x=544$$
Her truck can travel approximately 544 km on one tank of fuel.

b) The fuel required is $\dfrac{607}{100}\times12.5=75.875$ L.

a) The depreciation is $13\ 895 - 11\ 500 = \$2395$.

b) The depreciation is $51\ 699 - 44\ 400 = \$7299$.

Chapters 1 to 9 Review

Use the primary trigonometric ratios.

a) $\tan 62° = \dfrac{EF}{150}$

$EF = 150 \tan 62°$

$EF \square 282$ cm

$\cos 62° = \dfrac{150}{DE}$

$DE = \dfrac{150}{\cos 62°}$

$DE \square 320$ cm

$\angle E = 180° - 90° - 62° = 28°$

b) $\angle X = 180° - 90° - 15° = 75°$

$\sin 15° = \dfrac{XY}{55}$

$XY = 55 \sin 15°$

$XY \square 14$ cm

$\cos 15° = \dfrac{55}{YZ}$

$YZ = \dfrac{55}{\cos 15°}$

$YZ \square 57$ cm

The diagram models this situation, with the boat at point B, the anchor at point A, and the seabed at S. The angle of depression is marked by $x°$. Note that $\angle A = x°$.

Solve for $\angle A$ using the sine ratio.

$\sin A = \dfrac{100}{440}$

$\angle A = \sin^{-1}\left(\dfrac{100}{440}\right)$

$\angle A \square 13.1°$
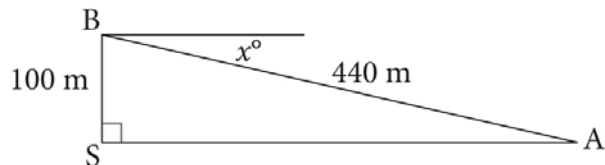
The fisherman is not safely anchored since the angle of depression is more than 13°.

a) $\angle Z = 180° - 56° - 58° = 66°$

The measure of $\angle Z$ is 66°.

Use the sine law.

$$\frac{XY}{\sin 56°} = \frac{19}{\sin 58°}$$

$$XY = \frac{19 \times \sin 56°}{\sin 58°}$$

$$XY \doteq 18.6$$

Side XY is approximately 18.6 cm.

$$\frac{XZ}{\sin 66°} = \frac{19}{\sin 58°}$$

$$XY = \frac{19 \times \sin 66°}{\sin 58°}$$

$$XY \doteq 20.5$$

Side XY is approximately 20.5 cm.

b) Use the cosine law.

$$AC^2 = 15^2 + 18^2 - 2(15)(18)\cos 58°$$

$$AC^2 = 549 - 540 \cos 58°$$

$$AC = \sqrt{549 - 540 \cos 58°}$$

$$AC \doteq 16.2$$

Side AC is approximately 16.2 mm.

Use the sine law to find $\angle A$.

$$\frac{\sin A}{18} = \frac{\sin 58°}{16.2}$$

$$\sin A = \frac{18 \times \sin 58°}{16.2}$$

$$\angle A = \sin^{-1}\left(\frac{18 \times \sin 58°}{16.2}\right)$$

$$\angle A \doteq 70.4°$$

The measure of $\angle A$ is approximately 70.4°.

$$\angle C = 180° - 70.4° - 58° = 51.6°$$

The measure of $\angle C$ is approximately 51.6°.

Chapters 1 to 9 Review   **Question 4 Page 504**

Each end of the tent is an isosceles triangle. Sides are x m, 3 m, and 3 m; a vertical angle is 80°.
Use the cosine law to solve for x.

$$x^2 = 3^2 + 3^2 - 2(3)(3)\cos 80°$$

$$x^2 = 18 - 18 \cos 80°$$

$$x = \sqrt{18 - 18 \cos 80°}$$

$$x \doteq 3.86 \text{ m}$$

The shaded area is $3.86(6) = 23.16 \doteq 23 \text{ m}^2$.

Chapters 1 to 9 Review   **Question 5 Page 504**

a) primary trigonometric ratios

b) cosine law

c) sine law

a) $\angle B = 180° - 90° - 38° = 52°$

The measure of $\angle B$ is 52°.

$$\sin 38° = \frac{15}{AB}$$
$$AB = \frac{15}{\sin 38°}$$
$$AB \approx 24.4 \text{ cm}$$

Side AB is approximately 24.4 cm.

$$\tan 38° = \frac{15}{AC}$$
$$AC = \frac{15}{\tan 38°}$$
$$AC \approx 19.2 \text{ cm}$$

Side AC is approximately 19.2 cm.

b) $55^2 = 53^2 + 71^2 - 2(53)(71)\cos H$

$-4825 = -7526 \cos H$

$$\cos H = \frac{-4825}{-7526}$$
$$\angle H = \cos^{-1}\left(\frac{-4825}{-7526}\right)$$
$$\angle H \approx 50.1°$$

The measure of $\angle H$ is approximately 50.1°.

$53^2 = 55^2 + 71^2 - 2(55)(71)\cos F$

$-5257 = -7810 \cos F$

$$\cos F = \frac{-5257}{-7810}$$
$$\angle F = \cos^{-1}\left(\frac{-5257}{-7810}\right)$$
$$\angle F = 47.7°$$

The measure of $\angle F$ is approximately 47.7°.

$\angle G = 180° - 50.1° - 47.7° = 82.2°$

The measure of $\angle G$ is approximately 82.2°.

c) $\angle K = 180° - 70° - 60° = 50°$

The measure of $\angle K$ is $50°$.

$$\frac{\sin 60°}{KM} = \frac{\sin 50°}{13.5}$$
$$KM = \frac{13.5 \times \sin 60°}{\sin 50°}$$
$$KM \doteq 15.3 \text{ m}$$

Side KM is approximately 15.3 m.

$$\frac{\sin 70°}{KL} = \frac{\sin 50°}{13.5}$$
$$KL = \frac{13.5 \times \sin 70°}{\sin 50°}$$
$$KL \doteq 16.6 \text{ m}$$

Side KL is approximately 16.6 m.

Chapters 1 to 9 Review   **Question 7 Page 504**

a) If all 20 of the remaining customers are dissatisfied, 20 out of 360 are dissatisfied.

This is $\dfrac{20}{360} = 0.055555 \square \; 6\%$.

In this case, the employees would have to take the training program.

b) The percentage dissatisfied is $\dfrac{12}{360} = 0.033333 \square \; 3\%$.

In this case, the employees would also have to take the training program.

c) The employees would also likely have to take the training program.
If the ratio stays the same in the sample, there will be either 3 or 4 (3.3) dissatisfied customers in the sample, which is 3% or 4%.

Chapters 1 to 9 Review   **Question 8 Page 505**

a) The probability that it is a defenseman is $\dfrac{6}{2+6+10} = \dfrac{6}{18} = \dfrac{1}{3}$.

b) The probability that it is a goalie or a forward is $\dfrac{2+10}{2+6+10} = \dfrac{12}{18} = \dfrac{2}{3}$.

Another method is to calculate the probability that it is not a defenseman: $1 - \dfrac{1}{3} = \dfrac{2}{3}$.

c) The probability that it is a defenseman is $\dfrac{6}{6+10} = \dfrac{6}{16} = \dfrac{3}{8}$.

Chapters 1 to 9 Review   **Question 9 Page 505**

a) The experimental probability of an even sum is $\dfrac{10}{40} = \dfrac{1}{4}$.

b) There are 36 outcomes for rolling two regular dice: 18 with an even sum, and 18 with an odd sum. The theoretical probability of an even sum is $\dfrac{18}{36} = \dfrac{1}{2}$.

c) The next 40 rolls are not related to the first 40 rolls.

d) This command will generate 40 random numbers that are either 1 or 2. If "1" models odd and "2" models even, this will simulate rolling two dice 40 times. This only works because we know that the theoretical probability of even or odd is $\dfrac{1}{2}$ and that is what the graphing calculator is doing as well.

Chapters 1 to 9 Review   **Question 10 Page 505**

a) $\dfrac{2}{10} = \dfrac{1}{5}$ of the drivers involved in a collision are not drowsy, using a cell phone, or distracted.

b) The percent of drivers not involved in a collision in one year is 100% – 11% = 89%.

c) The percent of all drivers that are involved in a collision and are drowsy, using a cell phone, or distracted is 80% × 11% = 8.8%.

d) The percent of all drivers that are involved in a collision and are not drowsy, using a cell phone, or distracted is 20% × 11% = 2.2%.

Chapters 1 to 9 Review   **Question 11 Page 505**

Answers may vary. For example:
a) convenience sample

b) stratified random sample

c) cluster sample

d) simple random sample

Chapters 1 to 9 Review   **Question 12 Page 506**

Answers may vary. For example:
a) This is response bias. A better question is, "What is your favourite recreational activity?"

b) This is measurement bias since members of the audience probably like the guests. A group of random people would produce a more balanced set of questions for the guests.

Chapters 1 to 9 Review   **Question 13 Page 506**

Answers may vary. For example:
a) discrete; a bar graph or a circle graph suit this situation.

b) continuous; a histogram can display this data well by dividing the times into intervals.

Chapters 1 to 9 Review   **Question 14 Page 506**

The median is best when there are outliers that affect the mean and the data are all different (i.e., there is no mode).

Chapters 1 to 9 Review **Question 15 Page 506**

a) mean: $\dfrac{5+5+5+5+5+5+5+5+20+20+120}{11} = 18.2$. The mean is 18.2.

median: 5, 5, 5, 5, 5, 5, 5, 5, 20, 20, 120. The median is 5.
mode: The mode is 5.
The median or mode best describes these data.

b) mean: $\dfrac{2.2+3.7+3.4+2.4+3.0+3.7+2.6+3.5+2.9+3.8+2.7}{11} = 3.1$ The mean is 3.1.

median: 2.0, 2.2, 2.4, 2.6, 2.7, 2.9, 3.0, 3.4, 3.5, 3.7, 3.8. The median is 2.9.
mode: There is no mode.
The mean or the median can best describe these data.

Chapters 1 to 9 Review **Question 16 Page 506**

The greatest value is $168 + 55 = 223$.

a) mean $= \dfrac{4+3+5+1+17+5+1+4+2+9+2}{11}$

$= \dfrac{53}{11}$

$\doteq 4.8$

variance

$= \dfrac{(4-4.8)^2 + (3-4.8)^2 + (5-4.8)^2 + (1-4.8)^2 + (17-4.8)^2 + (5-4.8)^2 + (1-4.8)^2 + (4-4.8)^2 + (2-4.8)^2 + (9-4.8)^2 + (2-4.8)^2}{11}$

$= \dfrac{215.8}{11}$

$\doteq 19.62$

standard deviation $= \sqrt{19.62}$

$\doteq 4.4$

b) mean $= \dfrac{35+44+37+41+41+36+37+40+29+38}{10}$

$= \dfrac{378}{10}$

$= 37.8$

variance

$= \dfrac{(35-37.8)^2 + (44-37.8)^2 + (37-37.8)^2 + (41-37.8)^2 + (41-37.8)^2 + (36-37.8)^2 + (37-37.8)^2 + (40-37.8)^2 + (29-37.8)^2 + (38-37.8)^2}{10}$

$= \dfrac{153.6}{10}$

$= 15.36$

standard deviation $= \sqrt{15.36}$

$\doteq 3.9$

Chapters 1 to 9 Review   **Question 18 Page 506**

a) No, the data are continuous and a circle graph is not suited to this type of data.

b) The distribution is somewhat skewed left.

c) The sales occur more at the start of the day than later.

d) Answers will vary. For example:
Sales are fairly constant at about 100 sales per hour from 7 AM to 1 PM and then they lessen in the afternoon. There are no sales after 3 PM. The range of sales in an hour is from 0 to almost 140.

Chapters 1 to 9 Review   **Question 19 Page 506**

Answers may vary. For example:
One possible data set: the earnings of all real-estate salespersons in your city.

a) The graph below shows the data points and the standard parabola $y = x^2$.
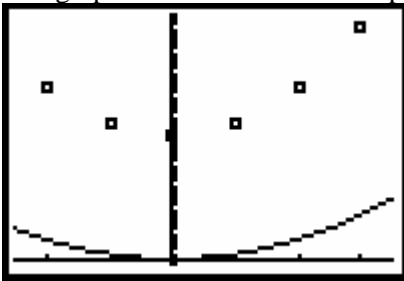
The vertex of the parabola is (0, 25) and the curve is stretched vertically.

The relation is of the form $y = a(x - 0)^2 + 25$.

Substituting (2, 35),

$$35 = a(2)^2 + 25$$

$$a = \frac{10}{4}$$

$$a = 2.5$$

The equation of the relation is $y = 2.5x^2 + 25$.

b) The graph below shows the data points and the standard parabola $y = x^2$.
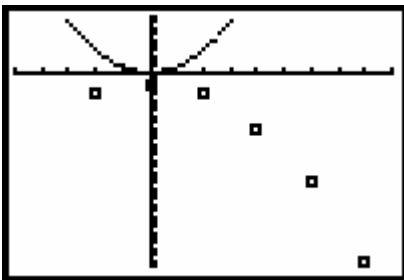
The vertex of the parabola is (0, –2), the curve opens down, and is compressed vertically.

The relation is of the form $y = a(x - 0)^2 - 2$.

Substituting (2, –4),

$$-4 = a(2)^2 - 2$$

$$a = \frac{-2}{4}$$

$$a = -0.5$$

The equation of the relation is $y = -0.5x^2 - 2$.

a)

Time (s)	Distance (m)
0	115
1	111.6
2	98.4
3	75.4
4	42.6
5	0

b) The equation has a t^2 term. You can tell that the relation is quadratic by looking at a table of first and second differences, where you would find constant second differences.

c)
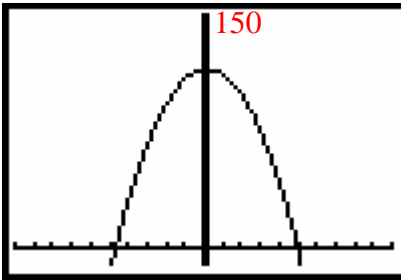
d) The graph or the table of values shows that the rock will land in approximately 5 s.

a)
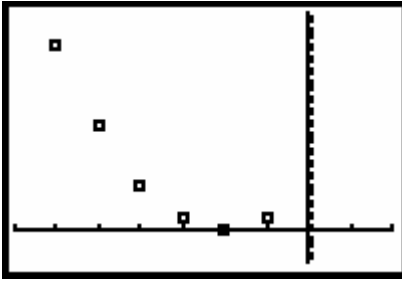
The vertex of the parabola is (–2, 0) and the curve opens up.

The relation is of the form $y = a(x+2)^2$.

Substituting (–1, 2),

$2 = a(-1)^2$

$a = \dfrac{2}{1}$

$a = 2$

The equation of the relation is $y = 2(x+2)^2$.

b)
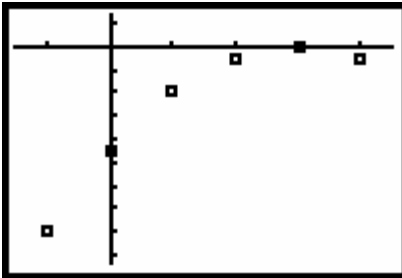
The vertex of the parabola is (3, 0) and the curve opens down.

The relation is of the form $y = a(x-3)^2$.

Substituting (–1, –8),

$-8 = a(-1-3)^2$

$a = \dfrac{-8}{16}$

$a = -0.5$

The equation of the relation is $y = -0.5(x-3)^2$.

a) Use the vertex $(-1, -1)$ and the points $(-2, 0)$ and $(0, 0)$.
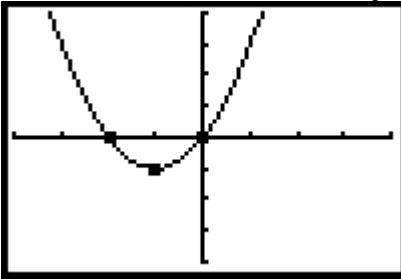
b) Use the vertex $(-8, -3)$ and the points $(-10, -6.2)$ and $(-6, -6.2)$.
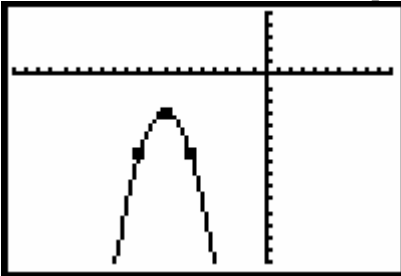
c) Use the vertex $(6, 2)$ and the points $(5, 0)$ and $(7, 0)$.
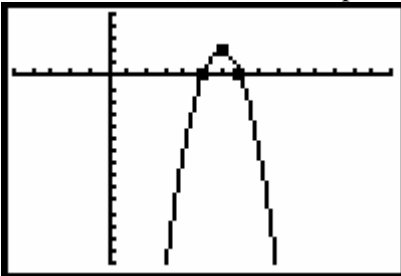
d) Use the vertex $(-3, -2)$ and the points $(-1, 10)$ and $(-5, 10)$.
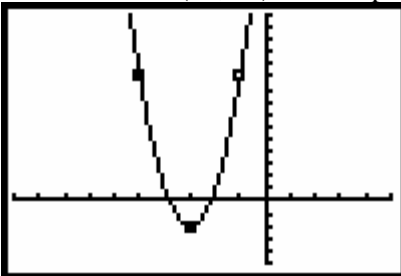
a)

A	R
4000	7 500
4600	11 700
4800	12 300
5000	12 500
5200	12 300
5400	11 700
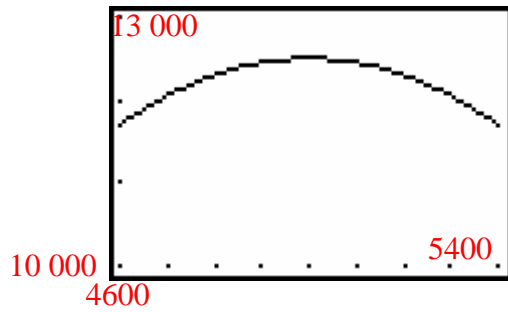
b) The vertex is (5000, 12 500). When her advertising budget is $5000, she will reach her maximum extra revenue, which is $12 500.

a) Sketch the reflector so that the origin is the vertex.
   The point (30, 27) is on the parabola.
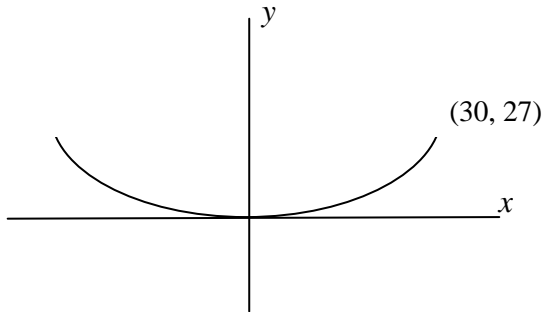
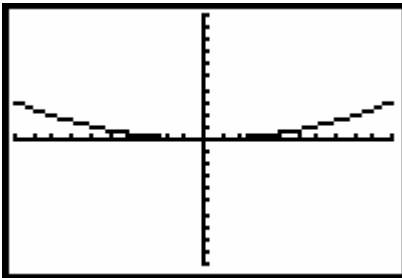The relation has an equation of the form $y = ax^2$.
Substitute (30, 27) into the equation to obtain a.

$$27 = a(30)^2$$
$$a = \frac{27}{900}$$
$$a = 0.03$$

The relation is $y = 0.03x^2$.

b)

a) $(3x+7)(8x+2) = 24x^2 + 6x + 56x + 14$ [FOIL]
$$= 24x^2 + 62x + 14$$

b) $(50-x)(5x+3) = 250x + 150 - 5x^2 - 3x$ [FOIL]
$$= -5x^2 + 247x + 150$$

c) $(x+11)(100x-10) = 100x^2 - 10x + 1100x - 110$ [FOIL]
$$= 100x^2 + 1090x - 110$$

d) $(8x-5)(8x+5) = 64x^2 + 40x - 40x - 25$ [FOIL]
$$= 64x^2 - 25$$

Chapters 1 to 9 Review   **Question 27 Page 508**

This shape is made up of two rectangles separated by a vertical line.

$A = (x+3)(12x-6)+(6x-2)(7x+1)$

$\quad = 12x^2 - 6x + 36x - 18 + 42x^2 + 6x - 14x - 2$

$\quad = 54x^2 + 22x - 20$

Chapters 1 to 9 Review   **Question 28 Page 508**

a) $y = 2x^2 + 6x + 11$

b) First write in vertex form, then expand and simplify.

$\quad y = 5(x-1)^2 + 4$

$\quad y = 5(x-1)(x-1) + 4$

$\quad y = 5(x^2 - 2x + 1) + 4$

$\quad y = 5x^2 - 10x + 5 + 4$

$\quad y = 5x^2 - 10x + 9$

c) Equation has form $y = -3x^2 + bx - 5$.
    Since it passes through (2, 11),

$\quad\quad 11 = -3(2) + 2b - 5$

$\quad -2b = -22$

$\quad\quad b = 11$

The relation is $y = -3x^2 + 11x - 5$.

d) The vertex is (–3, 0).
    First write in vertex form, then expand and simplify.

$\quad y = 5(x+3)^2 + 0$

$\quad y = 5(x+3)(x+3)$

$\quad y = 5(x^2 + 6x + 9)$

$\quad y = 5x^2 + 30x + 45$

Chapters 1 to 9 Review   **Question 29 Page 508**

In each case, let y = 0.

a) $y = x(x+12)$ **b)** $y = (x-2.4)(x+5)$

$\quad y = 0(0+12)$ $\quad y = (0-2.4)(0-5)$

$\quad y = 0$ $\quad y = -12$

The *y*-intercept is 0.   The *y*-intercept is –12.

a) $x^2 - 17x + 66$ [Find 2 numbers with sum -17 and product 66.]
$= (x - 6)(x - 11)$

b) $x^2 + 8x + 7$ [Find 2 numbers with sum 8 and product 7.]
$= (x + 1)(x + 7)$

c) $x^2 - 13x + 40$ [Find 2 numbers with sum -13 and product 40.]
$= (x - 5)(x - 8)$

d) $x^2 - 3x - 18$ [Find 2 numbers with sum -3 and product -18.]
$= (x - 6)(x + 3)$

e) $x^2 + 13x$ [Factor out the GCF, x.]
$= x(x + 13)$

f) $x^2 - 9$ [Factor as a trinomial; find two numbers with sum 0 and product -9.]
$= (x - 3)(x + 3)$

a) $2x^2 - 2x - 4$ [Factor out the GCF, 2.]
$= 2(x^2 - x - 2)$ [Find 2 numbers with sum -1 and product -2.]
$= 2(x - 2)(x + 1)$

b) $-6x^2 - 12x + 144$ [Factor out the GCF, -6.]
$= -6(x^2 + 2x - 24)$ [Factor the trinomial; find two numbers with sum 2 and product -24.]
$= -6(x - 4)(x + 6)$

c) $3x^2 + 3x - 126$ [Factor out the GCF, 3.]
$= 3(x^2 + x - 42)$ [Find 2 numbers with sum 1 and product -42.]
$= 3(x - 6)(x + 7)$

d) $7x^2 + 42x - 49$ [Factor out the GCF, 7.]
$= 7(x^2 + 6x - 7)$ [Find two numbers with sum 6 and product -7.]
$= 7(x - 1)(x + 7)$

Chapters 1 to 9 Review   **Question 32 Page 508**

Expand the factored form.

a) $3(3+x)(x+7) = 3(3x+21+x^2+7x)$

$$= 3x^2 + 30x + 63$$

$$3x^2 + 30x + 63 \neq 3x^2 - 12x - 63$$

b) $7(x+7)(x-1) = 7(x^2 - x + 7x - 7)$

$$= 7(x^2 + 6x - 7)$$

$$= 7x^2 + 42x - 49 \quad \text{Equivalent.}$$

c) $4(3+x)(x+1.5) = 4(3x+4.5+x^2+1.5x)$

$$= 4(x^2 + 4.5x + 4.5)$$

$$= 4x^2 + 18x + 18 \quad \text{Equivalent.}$$

d) $-(x+1)(x-2) = -(x^2 - 2x + 1x - 2)$

$$= -x^2 + x + 2$$

$$-x^2 + x + 2 \neq -x^2 - x + 2$$

Chapters 1 to 9 Review   **Question 33 Page 508**

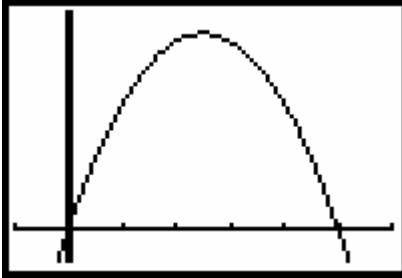**a)** Zeros are $x = -3$ and $x = 3$.   **b)** Zeros are $x = 14$ and $x = 1$.

c) Zero is $x = 0$.   **d)** Zero is $x = -4$.

e) Zeros are $x = 8$ and $x = -0.5$.   **f)** Zeros are $x = 0$ and $x = 9$.

a) This is meaningless since time cannot be negative.

b) Graph the relation. It looks like the other zero is close to 5. Zooming in or using the Zero function will suggest the zero value is actually 5.

Verify that this is the zero by substitution.
$$-10(5)^2 + 49.8(5) + 1 = -250 + 249 + 1$$
$$= 0$$
The zero is at $x = 5$. This means the rocket will land after 5 s.

a) The grass area is the difference between the areas of the large and small rectangles.

$$A = (2x-3)(x-3)-(x-8)(x-6)$$

$$A = (2x^2 - 6x - 3x + 9) - (x^2 - 6x - 8x + 48)$$

$$A = (2x^2 - 9x + 9) - (x^2 - 14x + 48)$$

$$A = 2x^2 - 9x + 9 - x^2 + 14x - 48$$

$$A = x^2 + 5x - 39$$

b) The area relation is $A = x^2 + 5x - 39$.
Find the point $(x, 111)$.

Solution 1: Trial and Error

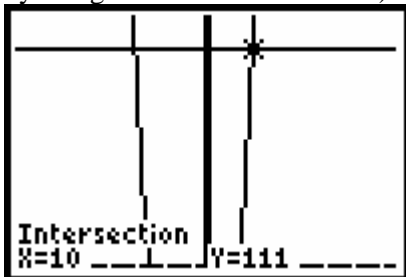Try $x = 7 \Rightarrow y = 7^2 + 5(7) - 39 = 45$

Try $x = 11 \Rightarrow y = 11^2 + 5(11) - 39 = 137$

Try $x = 10 \Rightarrow y = 10^2 + 5(10) - 39 = 111$

The value of x is 10.

Solution 2: Graphing

Graph the relations $A = x^2 + 5x - 39$ and $y = 111$ on the same axes.

Find the point where the two graphs intersect (either by Zooming or by using CALC 5:INTERSECT).

Solution 3: Quadratic Formula

We are solving the equation $x^2 + 5x - 39 = 111$ for x.

Rearrange: $x^2 + 5x - 150 = 0$

Use the quadratic formula.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-5 \pm \sqrt{5^2 - 4(1)(-150)}}{2}$$

$$x = \frac{-5 \pm \sqrt{625}}{2}$$

$$x = \frac{-5 \pm 25}{2}$$

$$x = \frac{20}{2} \text{ or } \frac{-30}{2}$$

$$x = 10 \text{ or } -15$$

Since the lengths of the sides must be positive, $x = 10$ is the only possible answer.

Chapters 1 to 9 Review   **Question 36 Page 509**

a) $\dfrac{34}{21} = 1.61905; \quad \dfrac{55}{34} = 1.61765; \quad \dfrac{89}{55} = 1.61818; \quad \dfrac{144}{89} = 1.61798$

b) The decimals are all close in value, close to the golden ratio, studied in Chapter 6.

c) $13 \times 1.618 = 21.034$
There are probably 21 counter-clockwise spirals.

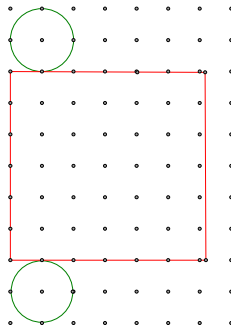**Chapters 1 to 9 Review**   **Question 37 Page 509**

Answers may vary. For example:
furniture, car bodies, popular songs, etc.

Chapters 1 to 9 Review   **Question 38 Page 509**

a) Assume the shape is a cylinder.
The formula for the volume of a cylinder is $V = \pi r^2 h$.
Here $h = 3d$ or $h = 6r$.
The new formula is $V = \pi r^2 (6r)$ or $V = 6\pi r^3$.
We want $V = 1200$ cm^3.
Try $r = 5 \Rightarrow V = 2356$
Try $r = 4.5 \Rightarrow V = 1718$
Try $r = 4 \Rightarrow V = 1206$

The minimum diameter will be 8 cm and the minimum height will be 24 cm.

b) For this net the scale is
the horizontal or vertical
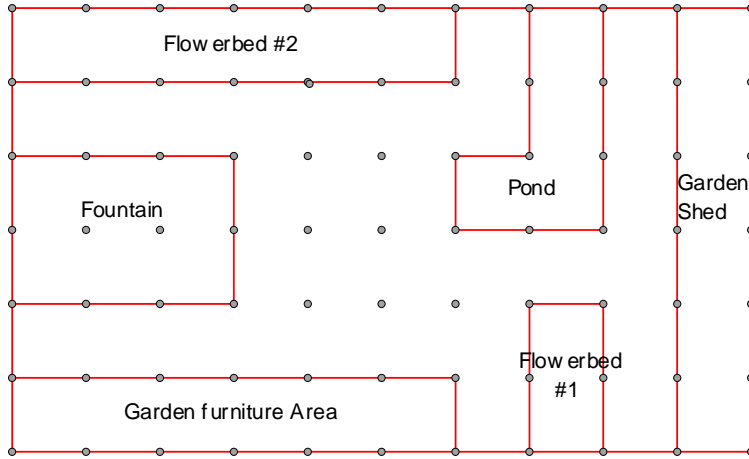distance between pairs of dots,
which is 4 cm.

Chapters 1 to 9 Review   **Question 39 Page 509**

Answers may vary. For example:
The scale is the horizontal or vertical distance between pairs of dots, which is 5 ft.
Note that each small square has an area of 25 ft^2.

Chapters 1 to 9 Review   **Question 40 Page 510**

Answers may vary. For example:
A possible scale could be 10 m to 1 cm.
The model would have length 31 cm, width 20 cm, and height 3 cm.

Chapters 1 to 9 Review   **Question 41 Page 510**

a)
$$4^1 \times 4^4 = 4^{1+4}$$
$$= 4^5$$
$$= 1024$$

b)
$$9^{31} \div 9^{28} = 9^{31-28}$$
$$= 9^3$$
$$= 729$$

c)
$$\left(\frac{1}{2}\right)^4 \times \left(\frac{1}{2}\right)^3 = \left(\frac{1}{2}\right)^{4+3}$$
$$= \left(\frac{1}{2}\right)^7$$
$$= \frac{1^7}{2^7}$$
$$= \frac{1}{128}$$

d)
$$\frac{11^6}{11^3} = 11^{6-3}$$
$$= 11^3$$
$$= 1331$$

e)
$$\left(3^3\right)^3 = 3^{3 \times 3}$$
$$= 3^9$$
$$= 19\ 683$$

f)
$$\left[\left(-2\right)^5\right]^2 = \left(-2\right)^{5 \times 2}$$
$$= \left(-2\right)^{10}$$
$$= 1024$$

Chapters 1 to 9 Review   **Question 42 Page 510**

Each unit on the Richter scale multiplies the intensity by 10 times.
The Alaska earthquake was $10 \times 10 \times 10 = 1000$ times more intense than the Japanese earthquake.

Chapters 1 to 9 Review   **Question 43 Page 510**

a)
$$10^{-4\,+\,3} = 10^{-1}$$
$$= \frac{1}{10^1}$$
$$= \frac{1}{10}$$

b)
$$4^{3\,\times\,-1} = 4^{-3}$$
$$= \frac{1}{4^3}$$
$$= \frac{1}{64}$$

c)
$$5^{(-1)\,-\,(-3)} = 5^{-1\,+\,3}$$
$$= 5^2$$
$$= 25$$

d)
$$\frac{1}{3^{-1\,\times\,5}} = \frac{1}{3^{-5}}$$
$$= \frac{1}{\frac{1}{3^5}}$$
$$= \frac{1}{\frac{1}{243}}$$
$$= 1 \div \frac{1}{243}$$
$$= 1 \times \frac{243}{1}$$
$$= 243$$

e)
$$(-7)^{-4\,+\,5} = (-7)^1$$
$$= -7$$

f)
$$-\left(\frac{1}{2}\right)^{9\,+\,(-10)} = -\left(\frac{1}{2}\right)^{-1}$$
$$= -\left(\frac{2}{1}\right)^1$$
$$= -2$$

Chapters 1 to 9 Review   **Question 44 Page 510**

a) $\dfrac{1}{20^7} = 20^{-7}$

b) $3^{11} = \left(\dfrac{1}{3}\right)^{-11}$

A.

x	0	1	2	3	4	5
y	6	12	24	48	96	192

This relation is exponential because the *y*-values are doubled (multiplied by 2) for each increase in *x*.

B.

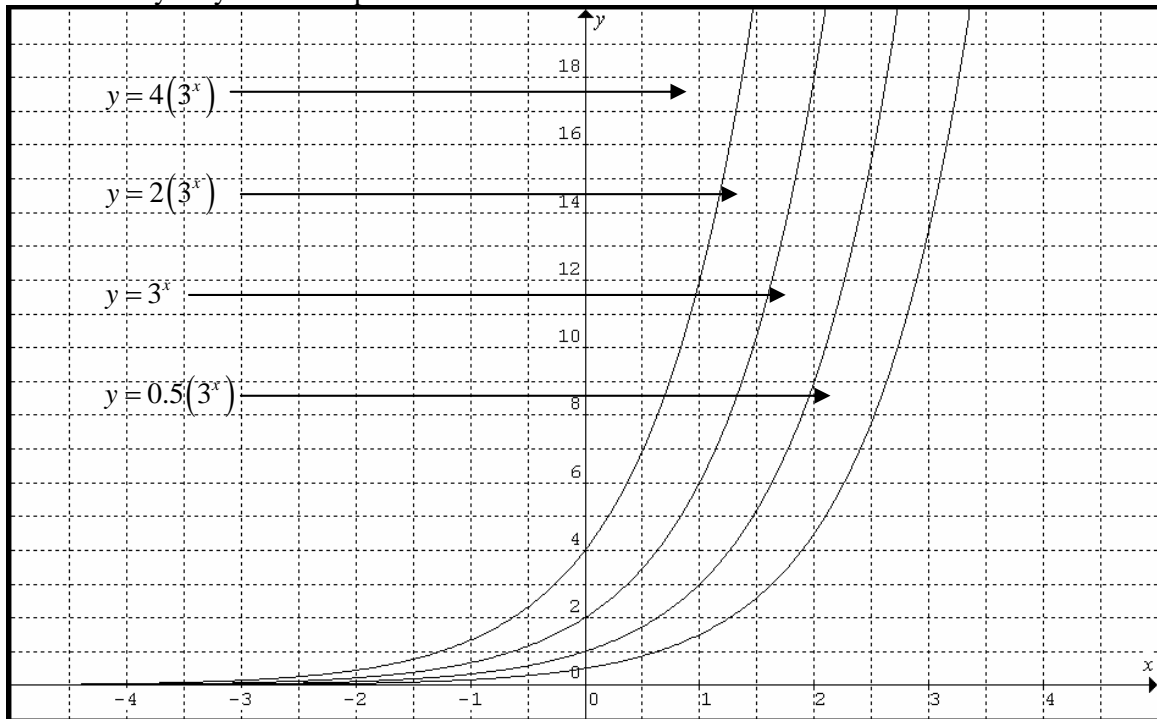| x	−3	−2	−1	0	1	2
y	1	2	4	8	9	15

This relation is not exponential. The *y*-values appear to be doubling for each increase in *x*, but the relationship breaks down at $x = 1$ and $x = 2$.
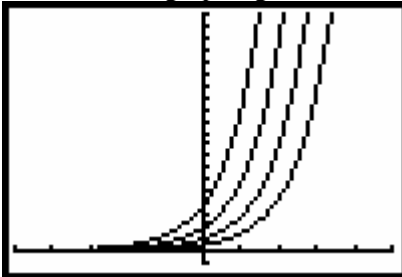
C.

x	1	2	3	4	5	6
y	125	25	5	1	0.2	0.04

This relation is exponential because the *y*-values are multiplied by 0.2 for each increase in *x*.

Chapters 1 to 9 Review   **Question 46 Page 510**

a) Sketches may vary. For example:

$y = 4(3^x)$

$y = 2(3^x)$

$y = 3^x$

$y = 0.5(3^x)$

Check with a graphing calculator:

This confirms that the sketches are correct.

b) The value of a determines how steep the exponential curve will be. A large value of a, such as 4, gives the steepest curve in this example.

Chapters 1 to 9 Review   **Question 47 Page 510**

C; in C, the number of bacteria (y) is multiplied by 3 for each 2 h increase in time (x), which is an exponential relation. The graph appears to be an increasing exponential relation.

Chapters 1 to 9 Review   **Question 48 Page 511**

A is probably a linear relation.
B is an exponential but decreasing model.
C is an increasing exponential relation.
D is probably a quadratic relation since gravity is involved.

Chapters 1 to 9 Review   **Question 49 Page 511**

a) The new image is 150% of 150% = $1.5 \times 1.5 = 2.25 = 225\%$ of the original.

b) Use trial and error.

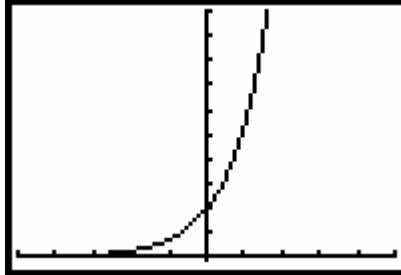$$(1.5)^2 = 2.25; \quad (1.5)^3 = 3.375$$

If the image is enlarged 150% three times, the result will be larger than three times the size of the original.

Chapters 1 to 9 Review   **Question 50 Page 511**

a) This is a difficult graph to view. Using a graphing calculator with these WINDOW settings gives the following graph.

b) Find the value of *N* when $d = 0$.
Substitute $d = 0$ into the relation or read the *N*-intercept from the graph.
There are 200 cells at the beginning.

c) Substitute values into the equation.

If $d = 1$, $N = 200(2.7)^1 = 540$ cells.

If $d = 5$, $N = 200(2.7)^5 = 28\ 698$ cells.

Chapters 1 to 9 Review **Question 51 Page 511**

Use substitution into the equation.

a) $C = \left(\dfrac{1}{2}\right)^{\frac{1000}{5730}}$

$= \left(\dfrac{1}{2}\right)^{0.17452}$

≈ 0.88606

The 1000-year-old cup has a carbon-14 concentration of 0.89 parts per trillion.

b) $C = \left(\dfrac{1}{2}\right)^{\frac{7500}{5730}}$

$= \left(\dfrac{1}{2}\right)^{1.30890}$

≈ 0.403628

The 7500-year-old frozen fly has a carbon-14 concentration of 0.40 parts per trillion.

c) $C = \left(\dfrac{1}{2}\right)^{\frac{30\,000}{5730}}$

$= \left(\dfrac{1}{2}\right)^{5.23560}$
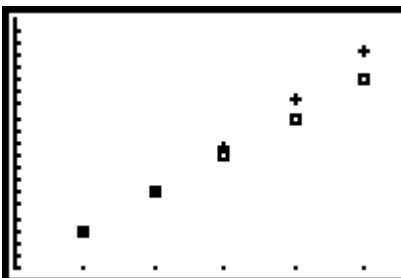
≈ 0.026542

The 30 000-year-old fossil has a carbon-14 concentration of 0.03 parts per trillion.

Chapters 1 to 9 Review **Question 52 Page 511**

Answers may vary. For example:

Year	Simple Interest $A = 4000(1 + 0.075n)$	Compound Interest $A = 4000(1.075)^{n}$
1	$4300	$4300.00
2	$4600	$4622.50
3	$4900	$4969.19
4	$5200	$5341.88
5	$5500	$5742.52


```
WINDOW
 Xmin=0
 Xmax=5.4
 Xscl=1
 Ymin=4000
 Ymax=5987.14
 Yscl=100
 Xres=1
```

Chapters 1 to 9 Review   **Question 53 Page 511**

Using the simple interest formula,

$A = 500(1 + .07(3))$

$\quad = \$605.00$

Using the compound interest formula,

$A = 500(1.0675)^3$

$\quad = \$608.24$

The two investments have almost equal values after three years, even though the interest rates are different.

Chapters 1 to 9 Review   **Question 54 Page 511**

a) $100(1.06)^6 = 141.8519$

$\qquad\qquad \doteq 141.85$

b) $750(1.085)^{10} = 1695.7375$

$\qquad\qquad\qquad \doteq 1695.74$

c) $100(1.06)^{-6} = 94.3396$

$\qquad\qquad\quad \doteq 94.34$

d) $750(1.085)^{-10} = 331.7140$

$\qquad\qquad\qquad \doteq 331.71$

Chapters 1 to 9 Review   **Question 55 Page 511**

a) Use the compound interest formula, with $n = 4$, $i = 0.0375$, and $P = 2400$.

$A = 2400(1.0375)^4$

$\quad = 2780.76$

Orton must pay $2780.76 after two years.

b) Do the calculations in two steps: at the end of year 1 and at the end of year 2.

Step 1: $n = 2$, $i = 0.0375$, and $P = 2400$

$A = 2400(1.0375)^2$

$\quad = 2583.38$

He owes $2583.38. If he pays off $1000, then he will owe $1583.38.

Step 2: $n = 2$, $i = 0.0375$, and $P = 1583.38$

$A = 1583.38(1.0375)^2$

$\quad = 1704.36$

Orton must pay $1704.36 at the end of the two years.

Chapters 1 to 9 Review   **Question 56 Page 511**

Use the compound interest formula with $n = 8$, $i = 0.104$, and $P = 3500$.

$A = 3500(1.104)^8$

$\quad = 7723.62$

The mutual fund investment is worth $7723.62 today.

Chapters 1 to 9 Review   **Question 57 Page 511**

a) $2500(1.02)^{-8} = 2133.73$ **b)** $8000(1.03)^{-5} = 6900.87$

Chapters 1 to 9 Review   **Question 58 Page 511**

Use the present value formula, with $n = 16$, $i = 5.5\% \div 4 = 0.01375$, and $A = 1000$.

$P = A(1+i)^{-n}$

$\quad = 1000(1.01375)^{-16}$

$\quad = 803.72$

You should invest $803.72 to have $1000 in four years. (Actually, you should round up to $803.73 since rounding down could leave you a few cents short of the $1000 goal, although that does not happen here.)

a) Use the present value formula, with, $n = 2$, $i = 6.5\% \div 2 = 0.0325$, and $A = 700$.

$$P = A(1+i)^{-n}$$
$$= 700(1.0325)^{-2}$$
$$= 656.63$$

The discounted value of the debt is $656.63.

b) Use the present value formula, with $n = 12$, $i = 5.2\% \div 4 = 0.013$, and $A = 4000$.

$$P = A(1+i)^{-n}$$
$$= 4000(1.013)^{-12}$$
$$= 3425.68$$

The discounted value of the debt is $3425.68.

c) Use the present value formula, with $n = 24$, $i = 6\% \div 12 = 0.005$, and $A = 2500$.

$$P = A(1+i)^{-n}$$
$$= 2500(1.005)^{-24}$$
$$= 2217.96$$

The discounted value of the debt is $2217.96.

d) Use the present value formula, with $n = 3$, $i = 8\% \div 2 = 0.04$, and $A = 1000$.

$$P = A(1+i)^{-n}$$
$$= 1000(1.04)^{-3}$$
$$= 889.00$$

The discounted value of the debt is $889.00.

Chapters 1 to 9 Review   **Question 60 Page 512**

Use the TVM Solver.

```
N=3
I%=6.5
■PV= -5762.874381
PMT=0
FV=7000
P/Y=1
C/Y=12
PMT:END BEGIN
```

Sandro should invest $5762.87 today in order to have $7000 for a down payment in three years' time.

Chapters 1 to 9 Review   **Question 61 Page 512**

Use the TVM Solver.

```
■N=4.177934058
I%=9.5
PV= -950
PMT=0
FV=1400
P/Y=1
C/Y=2
PMT:END BEGIN
```

Kai will have enough money after 5 years (actually 4.2 years but interest may only be deposited annually).

Solution 1:
Use the compound interest formula, with $n = 4$, $i = 7.6\% \div 4 = 0.019$, and $P = 2000$.

$A = 2000(1.019)^4$

$\quad = 2156.39$

Rose must repay $2156.39 at the end of the year.

Solution 2:
Use the TVM Solver.

```
N=1
I%=7.6
PV=2000
PMT=0
■ FV=-2156.387133
P/Y=1
C/Y=4
PMT:END BEGIN
```

Rose must repay $2156.39 at the end of the year.

Chapters 1 to 9 Review   **Question 63 Page 512**

Use the TVM Solver to compare the two situations.

```
N=3                      N=3
I%=3.5                   I%=4
■ PV=-2252.856354        ■ PV=-2218.623063
PMT=0                    PMT=0
FV=2500                  FV=2500
P/Y=1                    P/Y=1
C/Y=2                    C/Y=4
PMT:END BEGIN            PMT:END BEGIN
```

Harumi will need to invest $2252.86 if she chooses the 3.5% investment and $2218.62 if she chooses the 4% investment. The second investment requires a smaller initial investment to meet her three-year goal.

For A, use the simple interest formula.

$A = 4000(1 + 0.0545(2))$

$ = 4436.00$

Bethany will earn 4436 – 4000 = $36 in interest.

For B, use the compound interest formula, with $n = 4$, $i = 5.3\% \div 2 = 0.0265$, and $P = 4000$.

$A = 4000(1.0265)^4$

$ = 4441.15$

Bethany will earn 4441.15 – 4000 = $41.15 in interest with this choice.

For C, use the compound interest formula, with $n = 8$, $i = 5.2\% \div 4 = 0.013$, and $P = 4000$.

$A = 4000(1.013)^8$

$ = 4435.43$

Bethany will earn 4435.43 – 4000 = $35.43 in interest with this choice.

Choice B will give Bethany the highest amount of interest.

Use the TVM Solver for each part.

a) There are 31 days in May.

```
N=31
I%=.001369863
PV=-1600
PMT=0
■ FV=1600.679596
P/Y=1
C/Y=365
PMT:END BEGIN
```

The interest earned is
1600.68 – 1600 = $0.68.

b) There are 31 + 30 = 61 days in May and June.

```
N=61
I%=.002739726
PV=-350
PMT=0
■ FV=350.5854205
P/Y=1
C/Y=365
PMT:END BEGIN
```

The interest earned is
350.59 – 350 = $0.59.

c)

```
N=100
I%=.0017808219
PV=-2200
PMT=0
■ FV=2203.921299
P/Y=1
C/Y=365
PMT:END BEGIN
```

The interest earned is
2203.92 – 2200 = $3.92.

d)

```
N=1
I%=2.25
PV=-3000
PMT=0
■ FV=3068.262975
P/Y=1
C/Y=365
PMT:END BEGIN
```

The interest earned is
3068.26 – 3000 = $68.26.

e)

```
N=1
I%=.0047945205
PV=-4000
PMT=0
■ FV=4000.191785
P/Y=1
C/Y=365
PMT:END BEGIN
```

The interest earned is
4000.19 – 4000 = $0.19.

f)

```
N=7
I%=.0034246575
PV=-1250
PMT=0
■ FV=1250.299693
P/Y=1
C/Y=365
PMT:END BEGIN
```

The interest earned is
1250.30 – 1250 = $0.30.

Use the TVM Solver for each part.

a) Use the 17.5% interest rate for this calculation.

```
N=21
I%=.0534246575
PV=244.85
PMT=0
▪FV=-247.6124811
P/Y=1
C/Y=365
PMT:END  BEGIN
```

The interest due is 247.61 – 244.85 = $2.76.

b) Use the 19.5% interest rate for this calculation since it is a cash advance.

```
N=45
I%=.0534246575
PV=2500
PMT=0
▪FV=-2560.830987
P/Y=1
C/Y=365
PMT:END  BEGIN
```

The interest due is 2560.83 – 2500 = $60.83.

c) Use the 17.5% interest rate for this calculation.

```
N=3
I%=.0479452055
PV=642.11
PMT=0
▪FV=-643.0342468
P/Y=1
C/Y=365
PMT:END  BEGIN
```

The interest due is 643.03 – 642.11 = $0.92.

Chapters 1 to 9 Review   **Question 67 Page 513**

Use the TVM Solver. Set the payment to BEGIN since the question suggests he invests at the beginning of each year.

```
N=10
I%=5.2
PV=0
PMT=-1500
•FV=20149.77718
P/Y=1
C/Y=4
PMT:END BEGIN
```

Behrooz will have $20 149.78 in his investment after ten years.

Chapters 1 to 9 Review   **Question 68 Page 513**

His annual rate of interest is –2.74 – 1.2 = –3.94%.

```
N=1
I%=-3.94
PV=-3200
PMT=0
•FV=3073.92
P/Y=1
C/Y=1
PMT:END BEGIN
```

The current value of Terrant's investment is $3073.92.

Chapters 1 to 9 Review   **Question 69 Page 513**

a) 5% of 1439.19 = 71.96
    Lisa's minimum payment is $71.96.

b) 5% of 844.70 = 42.235
    Lisa's minimum payment is $42.24.

c) 5% of 383.68 = 19.184
    Lisa's minimum payment is $25.

d) 5% of 1052.58 = 52.629
    Lisa's minimum payment is $52.63.

Chapters 1 to 9 Review   **Question 70 Page 513**

If Bradley spends $3000, he will be refunded 0.5% of 3000 = $15.00.
He needs to spend more to recover his annual fee. He needs an additional rebate of $14.
If his additional spending is $x,
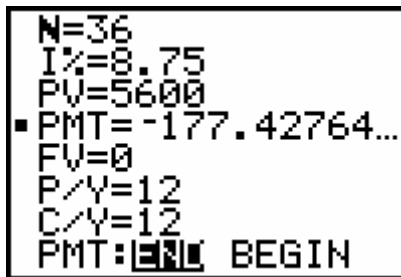$0.01x = 14$

$$x = \frac{14}{0.01}$$
$$x = 1400$$

He needs to spend an additional $1400, or $4400 in all, to recover the full cost of his annual fee.

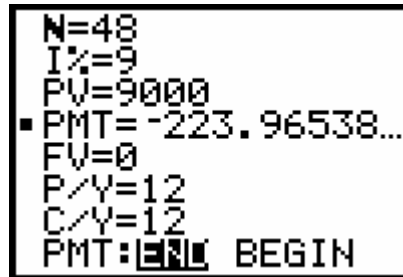**Chapters 1 to 9 Review**   **Question 71 Page 513**
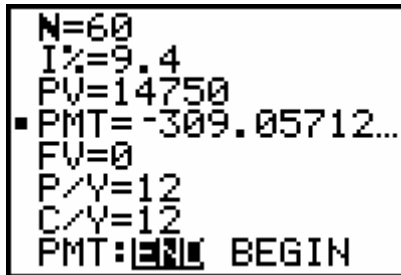
Use the TVM Solver.

a)

```
N=36
I%=8.75
PV=5600
■PMT=-177.42764…
FV=0
P/Y=12
C/Y=12
PMT:END BEGIN
```
The monthly payments will be $177.43.

b)

```
N=48
I%=9
PV=9000
■PMT=-223.96538…
FV=0
P/Y=12
C/Y=12
PMT:END BEGIN
```
The monthly payments will be $223.97.

c)

```
N=60
I%=9.4
PV=14750
■PMT=-309.05712…
FV=0
P/Y=12
C/Y=12
PMT:END BEGIN
```
The monthly payments will be $309.06.

Chapters 1 to 9 Review   **Question 72 Page 513**

Multiply the monthly payment by the number of payments.

a) The total paid is $177.43 \times 36 = \$6387.48$.

b) The total paid is $223.97 \times 48 = \$10\ 750.56$.

c) The total paid is $309.06 \times 60 = \$18\ 543.60$.

Chapters 1 to 9 Review   **Question 73 Page 513**

a) The annual cost of the monthly quote is $195 \times 12 = \$2340$.
The annual cost of the semi-annual quote is $1150 \times 2 = \$2300$.

b) The options from least to most expensive are: annual ($2250), semi-annual ($2300), and monthly ($2340).

c) Answers will vary.

Chapters 1 to 9 Review   **Question 74 Page 513**

a) Leo's consumption is $\dfrac{1584}{117.2} = 13.515 \,\square\, 13.5$ km/L .

b) Sheila's consumption is $\dfrac{600}{48} = 12.5$ km/L .

c) The fuel-efficient car's consumption is $\dfrac{1230}{62} = 19.8387 \,\square\, 19.8$ km/L .

Chapters 1 to 9 Review   **Question 75 Page 513**

a) The actual depreciation is $16\ 299 - 14\ 759 = \$1540$.
The percent depreciation is $\dfrac{1540}{16299} = 0.09448 \,\square\, 9.4\%$.

b) The actual depreciation is $56\ 850 - 48\ 290 = \$8560$.
The percent depreciation is $\dfrac{8560}{56850} = 0.15057 \,\square\, 15.1\%$.