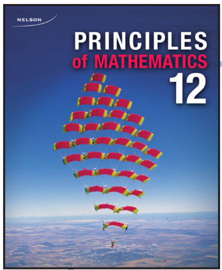


- If you have any difficulty with these solutions, please contact your teacher before continuing.

Page 377, *Question 1*

a. This is not an exponential function because, after dividing the first few consecutive y-values, you can see that they are not equal. Therefore, there is not a constant rate of change.

$5.1 \div 0 = \textit{undefined}$

$10.2 \div 5.1 = 2$

$15.3 \div 10.2 = 1.5$

b. This is exponential growth because, after dividing the first few consecutive y-values, you can see that they are equal and greater than one. The equation is $y = (2.5)^x$.

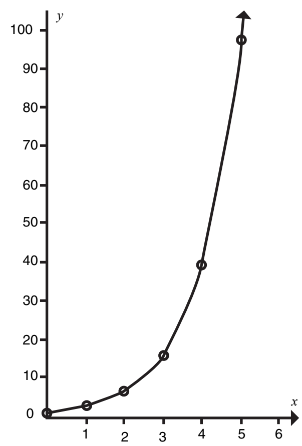
$2.50 \div 1.00 = 2.5$

$6.25 \div 2.50 = 2.5$

$15.62 \div 6.25 = 2.5$

$39.06 \div 15.62 = 2.5$

$97.66 \div 39.06 = 2.5$

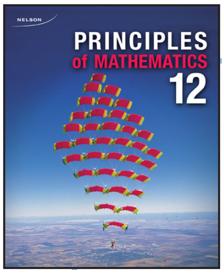


c. This is not an exponential function because, after dividing the first few consecutive y-values, you can see that they are not equal. Therefore, there is not a constant rate of change.

$-1.00 \div -2.25 = 0.\overline{4}$

$-0.25 \div -1.00 = 0.25$

$0.00 \div -0.25 = 0$



- If you have any difficulty with these solutions, please contact your teacher before continuing.

Page 373, *Your Turn*

a. *L1* = x-values = actual year
L2 = y-values = actual population

```
WINDOW
Xmin= 1800
Xmax= 2020
Xscl= 1
Ymin= 2400000
Ymax= 22000000
Yscl= 1000000
Xres= 1
```

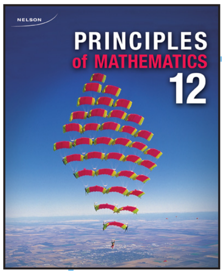
```
ExpReg
y= a*b^x

a= 8.864401E-12

b= 1.021743076
```

Regression Equation: $y = (8.864 \times 10^{-12})(1.022)^x$

b. Both my model and Luba's model are exponential growth functions. However, her values for a and b are different than mine.

c. Using the *value* feature of the graphing calculator, I found the value when $x = 2011$. According to my model, the population of Canada was 54 176 964 in 2011. My model predicts about the same population of Canada in 2011 as Luba's model does.

d. I prefer Luba's model because her values of x and y are less cumbersome.



- If you have any difficulty with these solutions, please contact your teacher before continuing.

Page 376, *Your Turn*

a. *L1* = x-values = Time (min)
L2 = y-values = Temperature (°C)

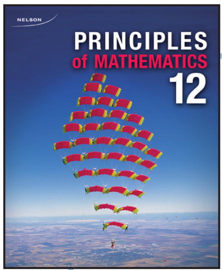
```
WINDOW
Xmin= -5
Xmax= 50
Xscl= 1
Ymin= 20
Ymax= 100
Yscl= 10
Xres= 1
```

```
ExpReg
y= a*b^x

a= 89.72650942

b= 0.9725860033
```

Regression Equation: $y = 89.73(0.97)^x$

b. Both Emma's and Sonja's graphs and equations represent exponential decay models. The y-intercept of Emma's function is 89.73, and the y-intercept of Sonja's function is 78.68. There is very little difference between the value of b in both functions. This means that the y-values of both functions decrease at about the same rate.

c. In Emma's experiment, the water reached a temperature of 51 °C after a little more than 20 minutes from the start (20.39 minutes). It took about 5 minutes longer for the water to reach 51 °C in Emma's experiment than it did in Sonja's experiment.



- If you have any difficulty with these solutions, please contact your teacher before continuing.

Page 390, *Your Turn*

a. Initial value = a = \$3000

Interest rate: 3.5%/a compounded semi-annually

Growth rate per compounding period = $\frac{0.035}{2} = 0.0175$

$b = 1 + 0.0175 = 1.0175$

Semi annual interest – the number of compounding periods after t years = $2t$

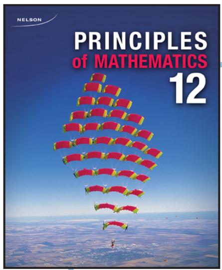
First year: $y = 3000(1.0175)^2 = 3105.92$

Second year: $y = 3000(1.0175)^4 = 3215.58$

Third year: $y = 3000(1.0175)^6 = 3329.11$

Fourth year: $y = 3000(1.0175)^8 = 3446.65$

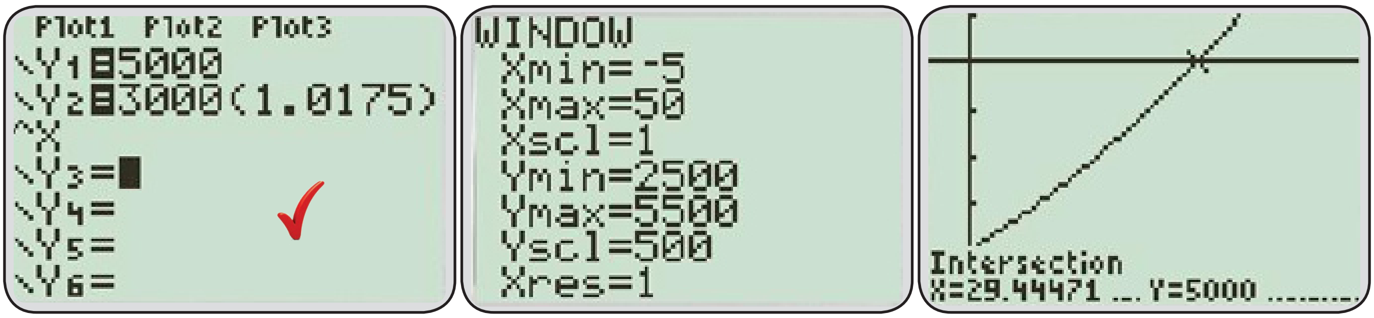
Brittany's investment will be worth \$3105.92 at the end of the first year, \$3215.58 at the end of the second year, \$3329.11 at the end of the third year, and \$3446.65 at the end of the fourth year.



- If you have any difficulty with these solutions, please contact your teacher before continuing.

Page 390, *Your Turn*

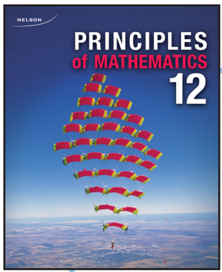
b. To determine the value of n when the future value is \$5000, solve $5000 = 3000(1.0175)^x$. Graph the expressions on either side of the equation and find the intersection point.



$x \cong 29.4$

This value of x represents the number of compounding periods. Because there are two compounding periods per year, you must divide by two to find the number of years, $29.4 \div 2 = 14.7$

Brittany's investment will take 15 years to reach \$5000.

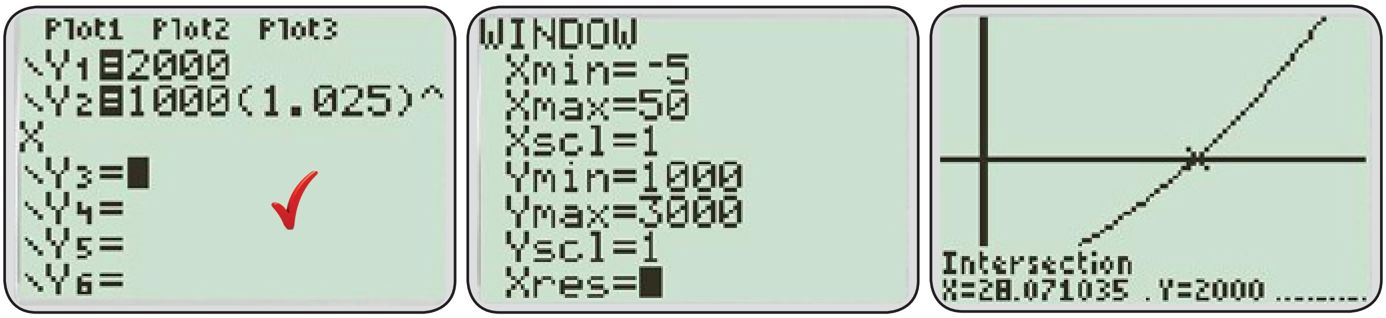


- If you have any difficulty with these solutions, please contact your teacher before continuing.

Page 392, *Your Turn*

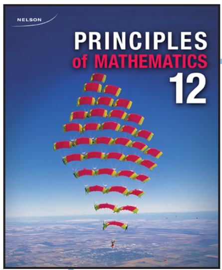
a. The coins are increasing in value by 2.5% each year. This means that the base of the exponential regression function should be 1.025. The starting value is 1000; therefore, this is the value of a in the function. The equation is $y = 1000(1.025)^x$

b. To determine the value of n when the future value is \$2000, I need to solve $2000 = 1000(1.025)^x$. Graph the expressions on either side of the equation and find the intersection point.



$x \cong 28.07$

It will take about 28 years for the coins to be worth \$2000.



- If you have any difficulty with these solutions, please contact your teacher before continuing.

Page 397, *Question 12*

a. initial value = a = 35 000

depreciation = 20% = 0.20

$b = 1 - 0.20 = 0.80$

$y = 35\ 000(0.80)^x$

Beginning of 3rd year: $y = 35\ 000(0.80)^1 = 28\ 000$

Beginning of 4th year: $y = 35\ 000(0.80)^2 = 22\ 400$

Beginning of 5th year: $y = 35\ 000(0.80)^3 = 17\ 920$

Beginning of 6th year: $y = 35\ 000(0.80)^4 = 14\ 336$

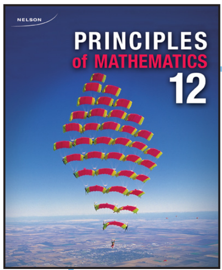
Beginning of 7th year: $y = 35\ 000(0.80)^5 = 11\ 468.80$

Beginning of 8th year: $y = 35\ 000(0.80)^6 = 9\ 175.04$

b. $y = 35\ 000(0.80)^x$

c. 10 years after the purchase date is equivalent to 8 years after depreciation started. Therefore, use $y = 35\ 000(0.80)^8 = 5\ 872.03$

The equipment will be worth $5 872.03.



- If you have any difficulty with these solutions, please contact your teacher before continuing.

Page 393, *Your Turn*

a. Add the new amount that Jessica borrowed to the original amount.

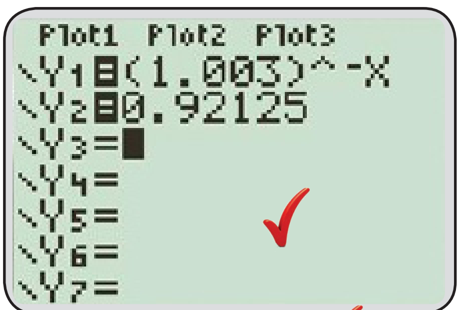
$7500 + 3000 = 10\ 500$

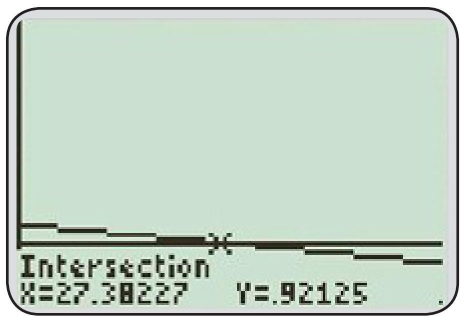
Jessica is borrowing $10 500 now.

b. I used the equation given to determine how long it will take Jessica to pay the loan.

$(1.003)^{-n} = 0.921\ 25$

Graph the expression on either side of the equation and find the point of intersection.





$x \cong 27.38$

It will take Jessica about 28 months to pay the loan. I subtracted the previous value to determine how much longer it will take her.

$28 - 20 = 8$

It will take Jessica eight extra months to pay the loan.

c. Total of loan payments = (Payment amount)(Number of payments)

Total value of loan payments = (400)(28) = 11 200

Interest = (Total value of loan payments) – (Amount borrowed) = 11 200 – 10 500 = 700

Jessica will pay $700 in interest on the loan.