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Chapter 5 Review

5.1 Linear Models, pages 268–281

1. Karen drove at a constant speed, travelling 500 m in 40 s.

a) What was Karen's rate of change of distance with respect to time, in metres per second?

b) If Karen continues driving at the same speed, how long would it take her to drive 1000 m?

2. A storage tank containing heating oil initially contains 600 L of oil. The table shows the volume of oil remaining in the storage tank at the end of each week for eight weeks.

Week	Volume of Oil (L)
0	600
1	562
2	527
3	494
4	458
5	419
6	379
7	347
8	311

a) Does the relationship between time and volume of oil appear to be linear or non-linear? Justify your answer.

b) Create a scatter plot with time on the horizontal axis and volume of oil on the vertical axis.

c) Add a line of best fit to the graph. Write the equation for the line.

d) Use the graph to predict when the volume of oil remaining will be less than 100 L.

e) Verify your answer to part d) using the equation.

f) Consider the rate of change of volume of oil with respect to time. What are the appropriate units for this rate of change?

5.2 Quadratic Models, pages 282–293

3. Is this relation linear, quadratic, or neither? Explain how you know.

x	y
1	112
2	115
3	112
4	106
5	97
6	85

4. A computer program simulates the height of a rock dropped from a 320 m tall building over time. The results are shown in the table.

Time (s)	Height (m)
0.0	320
1.0	315
2.0	300
3.0	275
4.0	240

a) Use finite differences to determine whether a linear or a quadratic model best fits the data.

b) Is the rate of change of height with respect to time increasing, constant, or decreasing? Support your answer.

c) Use technology to determine an equation that models the data.

d) Use your equation from part c) to predict when the rock will hit the ground.

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5.3 Exponential Models, pages 294–305

5. The value of Deidre's condominium has been increasing by 2% per year. The condominium is currently worth $250 000.

a) How much will the condominium be worth after one year? after two years?

b) Explain why the increasing value of the condominium can be modelled with an exponential relation.

6. A Web site claims that its yearly number of visitors has been growing exponentially. The table shows the Web site's yearly number of visitors for the past six years. Does the growth in the number of visitors appear to be exponential? Justify your answer.

Year	Number of Visitors (millions)
1	0.102
2	0.204
3	0.425
4	0.880
5	1.734
6	3.517

5.4 Analyse Graphical Models, pages 310–319

7. The odometer in a vehicle measures the total distance travelled, in kilometres. Oscar purchased a car and recorded the odometer reading for the first five days of use, as shown in the table.

Day	Odometer Reading (km)
0	5000
1	5050
2	5100
3	5150
4	5200
5	5250

a) Show that the data can be represented by a linear model.

b) Show that the data can be represented by an exponential model.

c) Use technology to determine a linear and an exponential model. Write the equation for each model.

d) Oscar wants to know what the odometer reading could be after using the car for 14 days. Which model will predict a higher reading? Explain how you know.

e) Use technology to graph each model. Extend each graph to determine the odometer reading after 14 days.

f) Do your results in part e) support your answer to part d)? Explain.

5.5 Select a Mathematical Model, pages 320–331

8. The table shows the gross national sales of gasoline in millions of litres from 2000 to 2006.

Year	Gross Sales of Gasoline (10^6 L)
2000	38.177
2001	38.126
2002	39.206
2003	39.797
2004	40.143
2005	39.785
2006	39.680

Source: Statistics Canada, CANSIM Table 405-0002, Database: E-STAT

a) Use technology to create a scatter plot of the data. Let 2000 be year 0.

b) Determine a linear, a quadratic, and an exponential model using regression. Which model fits the data best?

c) Use the best model to predict the gross national sales of gasoline in 2010 and in 2015.

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