Chapter Test

ACHIEVEMENT CHART				
Category	Knowledge / Understanding	Thinking / Inquiry / Problem Solving	Communication	Application
Questions	All	5, 7, 10	1, 5, 6, 8, 10	3, 4, 7, 10

1. Explain or define each of the following terms.

a) perfect negative linear correlation

b) experimental research

c) outlier

d) extraneous variable

e) hidden variable

2. Match the following.

	Correlation Type	Coefficient, r
a)	strong negative linear	1
b)	direct	0.6
c)	weak positive linear	0.3
d)	moderate positive linear	−0.8
e)	perfect negative linear	−1

3. The following set of data relates mean word length and recommended age level for a set of children's books.

Recommended Age	Mean Word Length
4	3.5
6	5.5
5	4.6
6	5.0
7	5.2
9	6.5
8	6.1
5	4.9

a) Create a scatter plot and classify the linear correlation.

b) Determine the correlation coefficient.

c) Determine the line of best fit.

d) Use this model to predict the average word length in a book recommended for 12-year olds.

Use the following information in order to answer questions 4–6.

Jerome has kept track of the hours he spent studying and his marks on examinations.

Subject	Hours Studied	Mark
Mathematics, grade 9	5	70
English, grade 9	3	65
Science, grade 9	4	68
Geography, grade 9	4	72
French, grade 9	2	38
Mathematics, grade 10	7	74
English, grade 10	5	69
Science, grade 10	6	71
History, grade 10	5	75
Mathematics, grade 11	12	76
English, grade 11	9	74
Physics, grade 11	14	78

4. a) Create a scatter plot for Jerome's data and classify the linear correlation.

b) Perform a regression analysis. Identify the equation of the line of best fit as y_1, and record the correlation coefficient.

c) Identify any outliers.

d) Repeat part b) with the outlier removed. Identify this line as y_2.

5. Which of the two linear models found in question 4 gives a more optimistic prediction for Jerome's upcoming biology examination? Explain.

6. **a)** Identify at least three extraneous variables in Jerome's study.

   b) Suggest some ways that Jerome might improve the validity of his study.

7. A phosphorescent material can glow in the dark by absorbing energy from light and then gradually re-emitting it. The following table shows the light levels for a phosphorescent plastic.

Time (h)	Light Level (lumens)
0	0.860
1	0.695
2	0.562
3	0.455
4	0.367
5	0.305
6	0.247

   a) Create a scatter plot for the data.

   b) Perform a quadratic regression. Record the equation of the curve of best fit and the coefficient of determination.

   c) Repeat part b) for an exponential regression.

   d) Compare how well these two models fit the data.

   e) According to each model, what will be the light level after 10 h?

   f) Which of these two models is superior for extrapolating beyond 6 h? Explain.

8. Explain how you could minimize the effects of extraneous variables in a correlation study.

9. Provide an example of a reverse cause-and-effect relationship.

ACHIEVEMENT CHECK

Knowledge / Understanding | Thinking / Inquiry / Problem Solving | Communication | Application

10. The table shown on the right contains data from the Ontario Road Safety Annual Report for 1999.

    a) Organize the data so that the age intervals are consistent. Create a scatter plot of the proportion of drivers involved in collisions versus age.

    b) Perform a regression analysis. Record the equations of the curves of best fit for each regression you try as well as the coefficient of determination.

    c) In Ontario, drivers over 80 must take vision and knowledge tests every two years to renew their licences. However, these drivers no longer have to take road tests as part of the review. Advocacy groups for seniors had lobbied the Ontario government for this change. How could such groups have used your data analysis to support their position?

Age	Licensed Drivers	Number of Collisions	% of Drivers in Age Group in Collisions
16	85 050	1 725	2.0
17	105 076	7 641	7.3
18	114 056	9 359	8.2
19	122 461	9 524	7.8
20	123 677	9 320	7.5
21–24	519 131	36 024	6.9
25–34	1 576 673	90 101	5.7
35–44	1 895 323	90 813	4.8
45–54	1 475 588	60 576	4.1
55–64	907 235	31 660	3.5
65–74	639 463	17 598	2.8
75 and older	354 581	9 732	2.7
Total	7 918 314	374 073	4.7