F Math 12

6.4 Modelling Data With A Curve of Best Fit p. 413

Name _____

Date _____

Goal: Determine the quadratic or cubic function that best fits a set of data, and use the function to solve a problem.

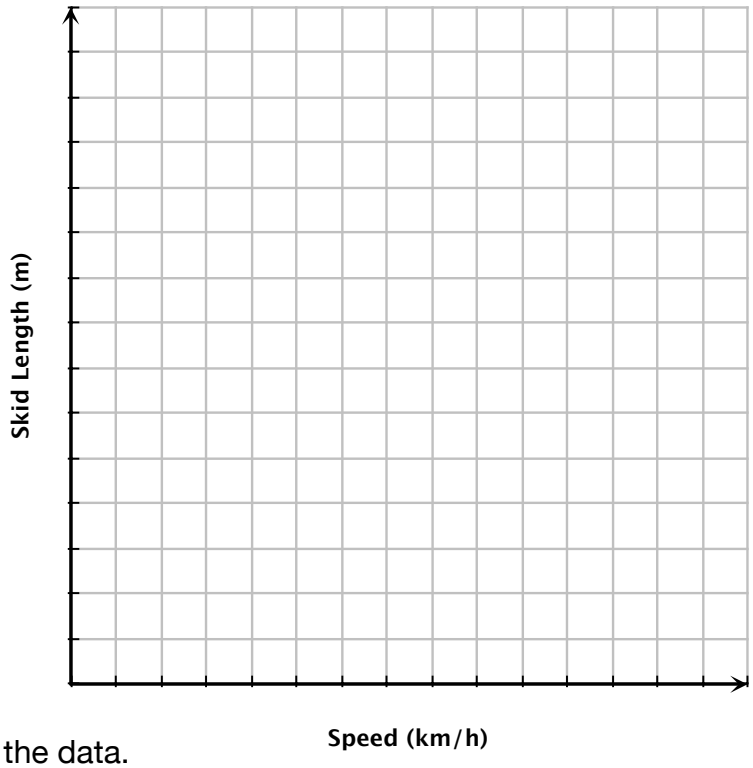
1. **curve of best fit**: A curve that best approximates the trend on a scatter plot.

Example 1: Shannon is a police officer who investigates accidents. Shannon can estimate the speed of a car before a collision based on skid length.

Speed on Dry Pavement (km/h)	0	10	20	30	40	50	60	70	80	90	100
Skid Length (m)	0	0.6	2.3	5.3	9.1	14.0	20.4	27.6	35.9	45.5	56.3

a. Create a scatter plot on the graphing calculator
(Use Window Settings: Xmin = –10, Xmax = 140, Xscl = 10, Ymin = –10, Ymax = 120, Yscl = 10, Xres = 1)

b. Plot the points on a graph



c. How can you describe the **trend** in the data?

d. What ***term*** best describes the trend?

e. Write the regression equation of the data.

f. Based on these data, how long might a skid length be if a car had been travelling

i) 65 km/h? ii) 84 km/h? iii) 120 km/h?

g. Based on these data, at what speed would a car have been travelling if there was a skid length measuring

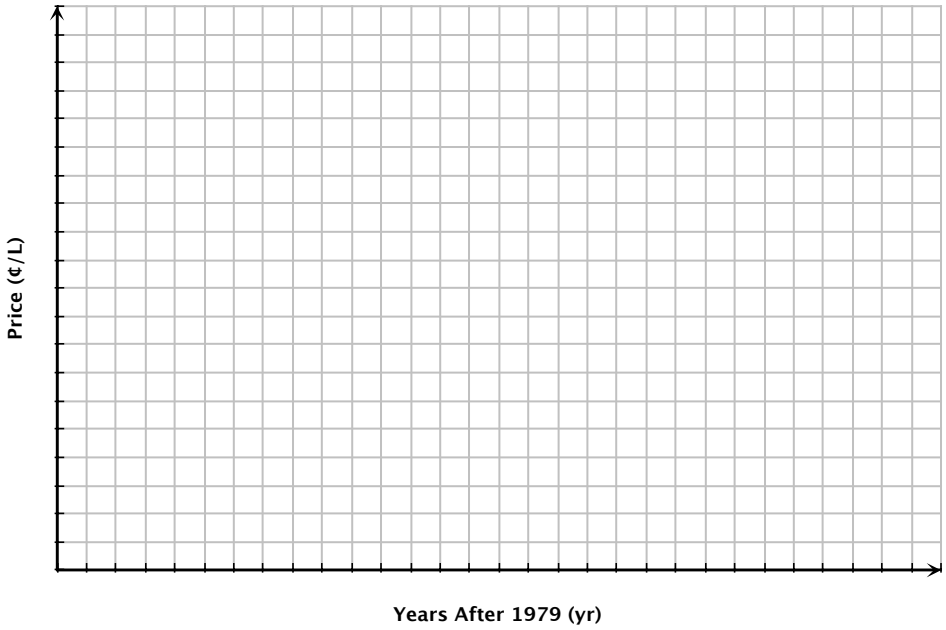
i) 7.2 metres? ii) 32.5 metres? iii) 95 metres?

Example 2: The following data shows that average retail price of gasoline, per litre, for a selection of years in a 30-year period beginning in 1979.

a. Create a scatter plot on the graphing calculator
(Use Window Settings: Xmin = –10, Xmax = 40, Xscl = 10, Ymin = –10, Ymax = 130, Yscl = 10, Xres = 1)

b. Plot the points on a graph

Year after 1979 (yr)	Price of Gas (¢ / L)
0	21.98
1	26.18
2	35.63
3	43.26
4	45.92
7	45.78
8	47.95
9	47.53
12	57.05
14	54.18
17	58.52
20	59.43
22	70.56
23	70.00
24	74.48
25	82.32
26	92.82
27	97.86
28	102.27
29	115.29



c. What ***term*** best describes the trend?

d. Write the regression equation of the data.

e. Based on these data, what would the average gas price have been (or will be) in

i) 1984? ii) 2000? iii) 2015?

f. Based on these data, when would the average gas price have been (or will be)

i) 50 ¢/L? ii) 100 ¢/L? iii) 120 ¢/L?

In Summary

Key Idea

- If the points on a scatter plot seem to follow a predictable curved pattern, then there may be a quadratic or cubic relationship between the independent variable and the dependent variable.

Need to Know

- If the points on a scatter plot follow a quadratic or cubic trend, then graphing technology can be used to determine and graph the equation of the curve of best fit.
- To solve an equation, you can graph the corresponding function of each side of the equation. The *x*-coordinate of the point of intersection is the solution to the equation.
- Technology uses polynomial regression to determine the curve of best fit. Polynomial regression results in an equation of a curve that balances the points on both sides of the curve.
- A curve of best fit can be used to predict values that are not recorded or plotted. Predictions can be made by reading values from the curve of best fit on a scatter plot or by using the equation of the curve of best fit.

HW: 6.4 pp.419-422 #2-4, 7, 8 & 10