Example:

a) Crystal researched average life savings versus age for people living in her town. Her results are shown. Does the relation appear to be linear or non-linear? Explain.

b) Chad surveyed a number of students and collected data on age versus number of coins in their pocket or purse. The data are shown. Advise whether Chad should use a line of best fit to model these data. Explain your reasoning.
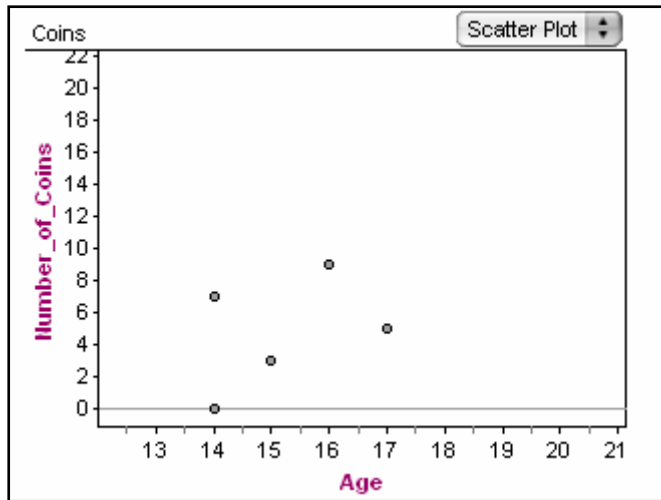
c) As part of her commercial pilot training, Sunita was required to fly a cross-country trip with multiple legs. In her flight log, she kept track of the time, in hours, and the fuel burn, in litres, for each leg. The data are shown.

i) Make a scatter plot of the data.

ii) Add a line of best fit to the scatter plot. Comment on whether a line of best fit is a good model for these data.

Time (h)	Fuel (L)
1.5	44
2.2	65
1.8	49
3.6	108
2.8	85
3.2	95
1.1	33
2.5	75

iii) Use a line of best fit to estimate the fuel burn for a trip of 2.0 h and for a trip of 5.0 h.

Solution:

a) The points do not appear to follow a straight line. The last few points definitely follow a curve. The relation appears to be non-linear.

b) Chad should not use a line of best fit to model these data. There are not many data points. Those that are there do not appear to follow any apparent pattern.

c) The scatter plot and line of best fit are shown. The points appear to follow a straight line. A line of best fit is a good model for these data.

Interpolate the graph to estimate a fuel burn of about 60 L for a 2.0 h flight.

Extrapolate the graph to estimate a fuel burn of about 150 L for a 5.0 h flight.

Fuel_L = 30.6Time_h_ - 2.4; r^2 = 1.00
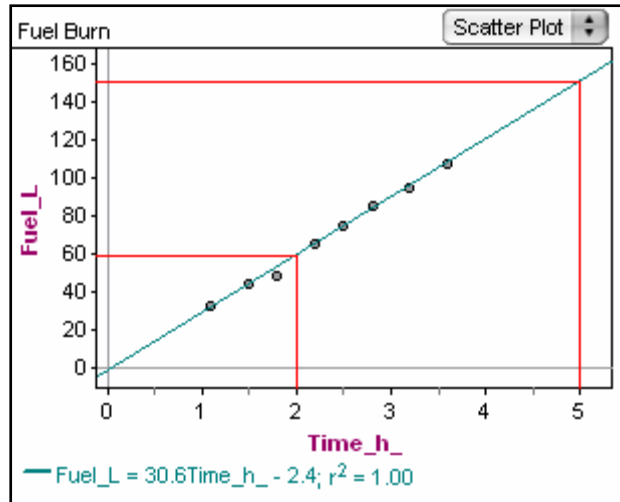
Practice:

1. Lawrence is an avid bicycle rider. He kept track of time and distance for his last eight rides. The data are shown in the table.

a) Make a scatter plot of the data.

b) Add a line of best fit to the scatter plot. Comment on whether a line of best fit is a good model for these data.

c) Use a line of best fit to estimate the distance for a ride of 4.0 h and for a ride of 8.0 h.

Time (h)	Distance (km)
2.5	48
5.3	105
4.4	86
3.6	72
4.8	95
2.9	58
1.4	25
6.3	125

Answers:

1. a) The scatter plot and line of best fit are shown.

b) The points appear to follow a straight line. A line of best fit is a good model for these data.

c) Interpolate the graph to estimate a distance of about 80 km for a 4.0 h ride.

Extrapolate the graph to estimate a distance of about 160 km for a 8.0 h ride.

Bicycle Trips   Scatter Plot

Distance_km = 20.3Time_h − 2.2; r^2 = 1.00