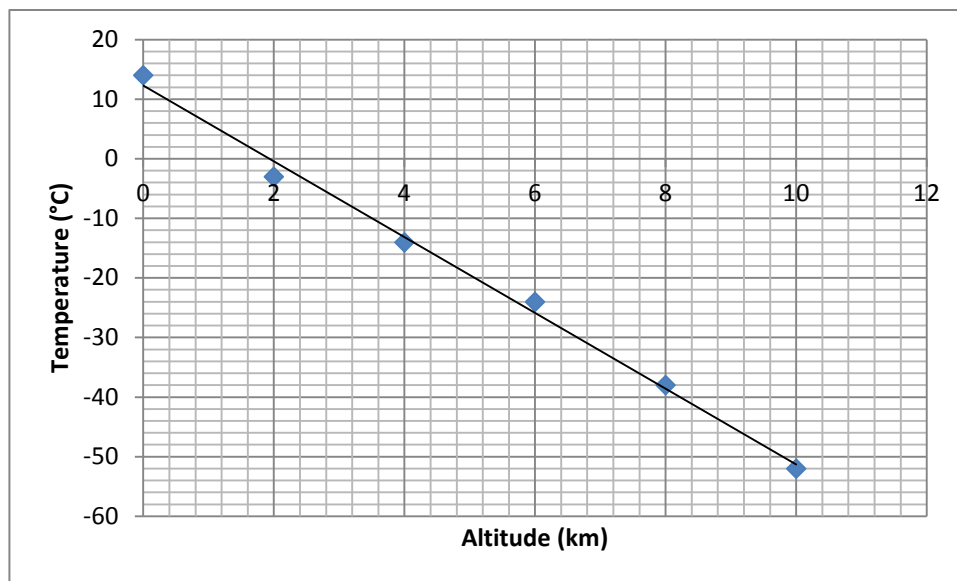


7. The troposphere is a layer of air around the Earth. It extends from surface level to an altitude of 11km. The table below show the air temperature at various altitudes.

Construct a scatterplot for the data and then determine the equation of the line of best fit by either method.

Altitude (km)	Temperature (°C)
0	14
2	-3
4	-14
6	-24
8	-38
10	-52



By eye: the y-intercept =12,

Using the points (0,12) and (10,-51) the slope is:

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\text{slope} = \frac{-51 - 12}{10 - 0}$$

$$\text{slope} = \frac{-63}{10}$$

$$\text{slope} = -6.3$$

The equation is $T = -6.3A + 12$. This means the temperature (T) decreases by 6.3°C for each kilometre in altitude.

Lines of Best Fit – Regression (Excel)

1. Graphs - See Qn 6 from Lines of Best Fit – Pen and Paper Methods (previous section)

Regression Equations:

(a) Power (Excel print out)

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.99861
R Square	0.997222
Adjusted R Square	0.996528
Standard Error	3.270915
Observations	6

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>Significance F</i>	
				<i>F</i>	<i>F</i>
Regression	1	15364.54	15364.5	1436.08	2.9E-06
Residual	4	42.79554	10.6988	9	
Total	5	15407.33			

	<i>Coefficient</i>	<i>Standard</i>			<i>Upper</i>	<i>Lower</i>	<i>Upper</i>
	<i>s</i>	<i>Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>95%</i>	<i>95.0%</i>
Intercept	-15.0126	3.93686	3.81334	0.01888	-25.9431	-4.08212	-25.9431
X Variable 1	66.8314	1.763559	37.8957	2.9E-06	61.93497	71.72782	61.93497

The equation is $P = 66.8e - 15$

(b) Torque (Excel print out)

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.997672
R Square	0.995349
Adjusted R Square	0.994187
Standard Error	6.714845
Observations	6

ANOVA



3. The working out for this question is similar to break even analysis situations.

The renter pay using the equation $C = 75$ or $C = 0.2km + 50$

(a) The number of km for equal cost is:

$$75 = 0.2km + 50$$

$$25 = 0.2km$$

$$125 = km$$

The number of kilometres for equal cost is 125.

(b) If you are travelling less than 125 km per day, choose the rate with the km charge. If you are travelling more than 125km, choose the fixed daily rate.