Maths Points

Junior and Leaving Cert

2017 PAPER 2 – Q2

Leaving Cert Higher Level

2017 LCHL Paper 2 – Table of Contents

An experiment measures the fuel consumption at various speeds for a particular model of car. The data collected are shown in Table 1 below.

Table 1							
Speed (km/hour)	40	48	56	64	88	96	112
Fuel consumption (km/litre)	21	16	18	16	13	11	9

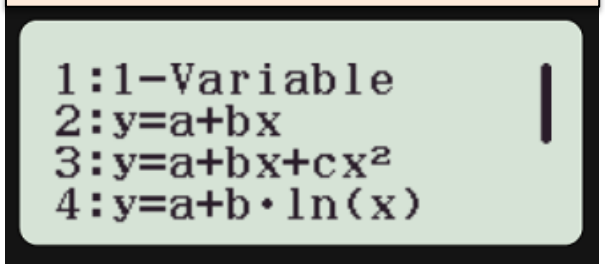
$r = -0.957$

Calculator Work

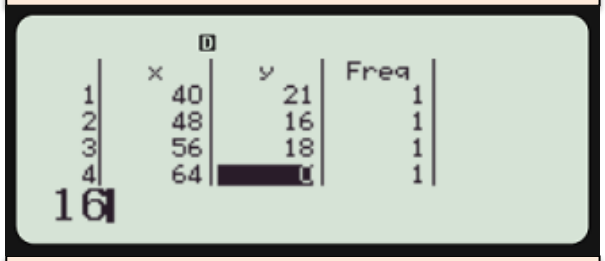
Table 1							
Speed (km/hour)	40	48	56	64	88	96	112
Fuel consumption (km/litre)	21	16	18	16	13	11	9

Press MENU and 2: Statistics

Press 2: $y = a + bx$ (bivariate data)



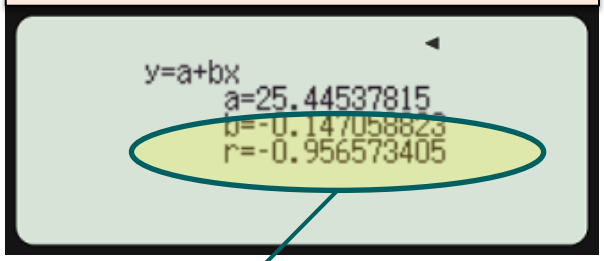
Enter the DATA and AC to store.



Note: Frequency can be ON or OFF.

Press OPTN and 3: Regression Calc

Read the correlation coefficient, r.



$r = -0.95657$

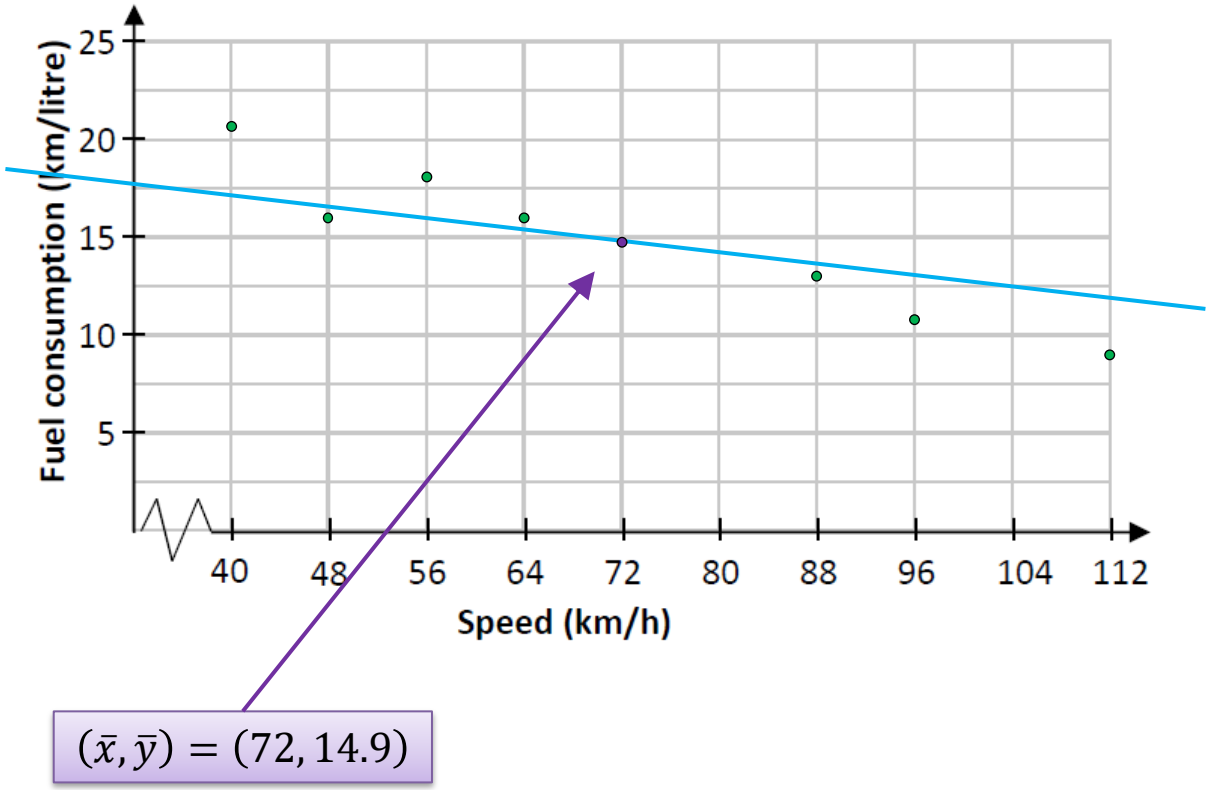
$r \approx -0.957$

Correct to 3 decimal places.

$r = -0.957$

Plot the points from the table on the grid below **and** draw the line of best fit (by eye).

Table 1							
Speed (km/hour)	40	48	56	64	88	96	112
Fuel consumption (km/litre)	21	16	18	16	13	11	9



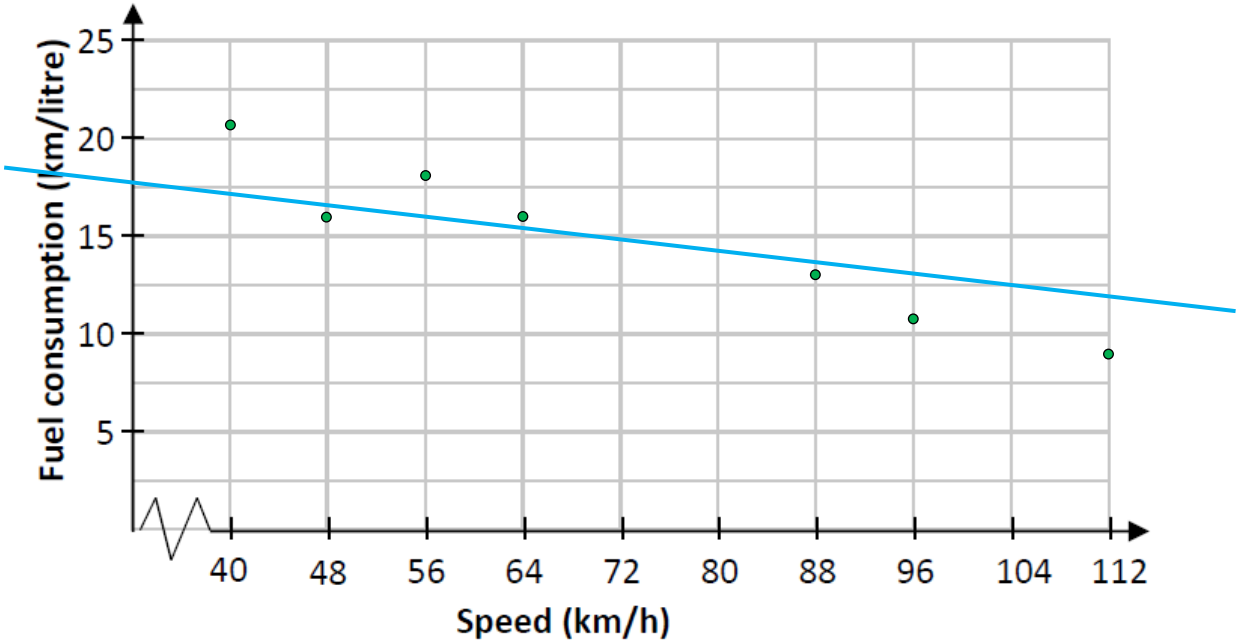
$(\bar{x}, \bar{y}) = (72, 14.9)$

The **line of best fit** roughly goes through the middle of the scatter points. Try and have an equal amount of points above and below the line. The line of best fit best represents the relationship between the two points.

The line will pass through $(\bar{x}, \bar{y})$ where $\bar{x}$ and $\bar{y}$ are the **means** of the speeds and fuel consumptions, respectively.

The slope of the line of best fit is found to be -0.15.

What does this value represent in the context of the data?

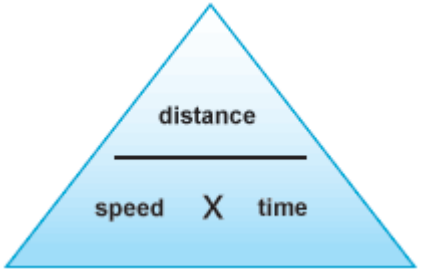


The slope of -0.15 stands for the rate of change of the y co-ordinate per unit change in the x co-ordinate.

As speed increases by 1 km/h the average distance travelled on 1 litre of fuel decreases by 0·15 km

Mary drove from Cork to Dublin at an average speed of 96 km/h.
Jane drove the same journey at an average speed of 112 km/h.
Each travelled 260 km and paid 132·9 cents per litre for the fuel.
Both used the model of car used to generate the data in Table 1.

Find how much longer it took Mary to complete the journey.
Give your answer correct to the nearest minute.



$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

Mary

$$\text{Time} = \frac{260}{96}$$

$$= \frac{65}{24} \text{ hours}$$

Jane

$$\text{Time} = \frac{260}{112}$$

$$= \frac{65}{28} \text{ hours}$$

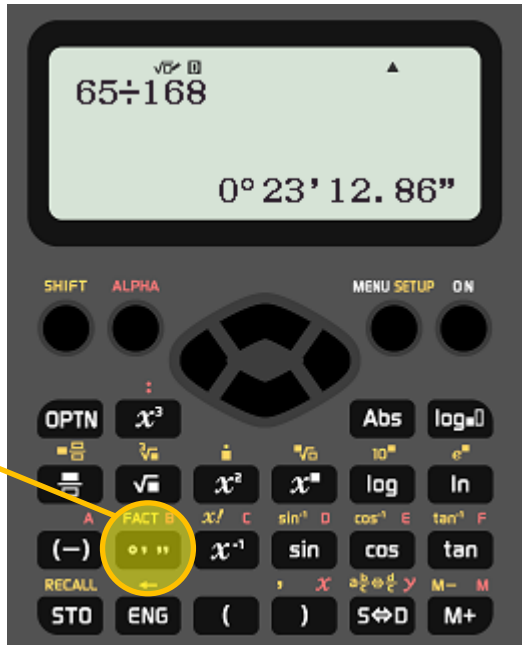
Difference

$$= \frac{65}{24} - \frac{65}{28}$$

$$= \frac{65}{168}$$

$$= 0.3869 \text{ hours}$$

$$\approx 23 \text{ minutes}$$



Based on the data in Table 1 and their average speeds, find how much more Jane spent on fuel during the course of this journey.

Table 1						Mary	Jane
Speed (km/hour)	40	48	56	64	88	96	112
Fuel consumption (km/litre)	21	16	18	16	13	11	9

Jane

$$\text{Cost} = \frac{260}{9} \times 1.329$$

$$\text{Cost} = €38.39$$

Mary

$$\text{Cost} = \frac{260}{11} \times 1.329$$

$$\text{Cost} = €31.41$$

Marking scheme kept the fractions:

$$\left(\frac{260}{9} \times 1.329\right) - \left(\frac{260}{11} \times 1.329\right) = €6.98$$

Calculate the difference.

$$€38.39 - €31.41 = €6.98$$