

## Chapter 7 / Example 5

# Regression equation

How to find the equation of the  $y$  on  $x$  regression line from your GDC.

As a car's tires become worn, it uses more fuel to travel the same distance. This table shows the age of the tires and the number of kilometres the car travelled on one litre of diesel.

Age(years)	1	2	3	4	5	6
km/l	20	18.5	17.4	15.6	14.8	13.2

- Write down the regression equation.
- Interpret the meaning of the constant value.
- Interpret the meaning of the gradient of the regression line.
- Use the equation of the regression line to estimate the distance the car would have travelled on 1 litre of diesel when the tires were 3.5 years old.

Press **MENU** 2 **STAT** to display the List Editor screen.

Enter the ages in the first column.

Press **EXE** after each number to move to the next cell.

**Note:** If the list contains other numbers, you can clear it by pressing **F4** DEL-ALL.

	List 1	List 2	List 3	List 4
SUB				
1	1			
2	2			
3	3			
4	4			

Press **▶** to move to the next column.

Enter the number km per l in the second column.

	List 1	List 2	List 3	List 4
SUB				
1	1	20		
2	2	18.5		
3	3	17.4		
4	4	15.6		

To calculate the equation of the regression line

Press **F2** CALC, press **F3** REG, press **F1** X

Press **F1**  $ax+b$

The form of the regression equation is ' $y = ax + b$ '

The GDC gives the values of  $m = -1.34$  and  $b = 21.3$

```
LinearReg(ax+b)
a = -1.34
b = 21.2733333
r = -0.9970639
r^2 = 0.99413656
MSe = 0.04633333
y = ax + b
```

Press **F6** COPY and press **EXE** to save the regression equation to Y1. Press **EXE**

```
Graph Func : Y=
Y1: [—]
Y2: [—]
Y3: [—]
Y4: [—]
Y5: [—]
Y6: [—]
```

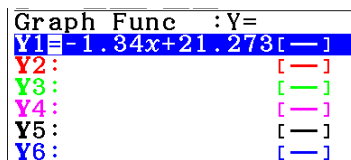
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You can confirm that the equation has been copied to Y1 by pressing **F6** COPY again.

The equation is  $y = -1.34x + 21.3$

With brand new tires, the car would probably have travelled 21.3 km on 1 litre of diesel. Every year, the car travels 1.34 km less far on 1 litre of fuel.



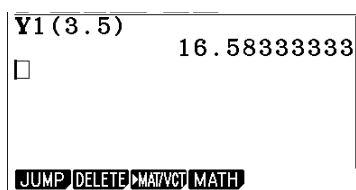
Graph Func : Y=  
Y1 = -1.34x + 21.273 [—]  
Y2: [—]  
Y3: [—]  
Y4: [—]  
Y5: [—]  
Y6: [—]

Press **MENU** 1 **RUN-MAT** to display the Run-Matrix screen for arithmetical calculations.

Press **VAR** **F3** GRAPH **F1** Y

Type 1 (3.5) and press **EXE**.

The distance the car would have travelled on 1 litre of diesel when the tires were 3.5 years old is 16.6 km.



Y1(3.5) 16.58333333  
☐  
JUMP DELETE MAT/VCT MATH