

**Example 5****Self Tutor**

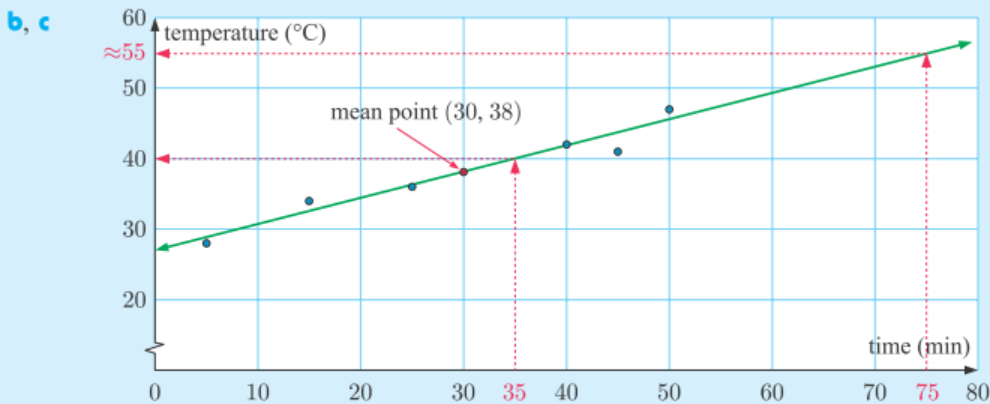
On a hot day, six cars were left in the sun in a car park. The length of time each car was left in the sun was recorded, as well as the temperature inside the car at the end of the period.



Car	A	B	C	D	E	F
Time $x$ (min)	50	5	25	40	15	45
Temperature $y$ ( $^{\circ}\text{C}$ )	47	28	36	42	34	41

- Calculate  $\bar{x}$  and  $\bar{y}$ .
- Draw a scatter diagram for the data.
- Plot the mean point  $(\bar{x}, \bar{y})$  on the scatter diagram. Draw a line of best fit through this point.
- Predict the temperature of a car which has been left in the sun for:
  - 35 minutes
  - 75 minutes.
- Comment on the reliability of your predictions in **d**.

$$\mathbf{a} \quad \bar{x} = \frac{50 + 5 + 25 + 40 + 15 + 45}{6} = 30, \quad \bar{y} = \frac{47 + 28 + 36 + 42 + 34 + 41}{6} = 38$$



- When  $x = 35$ ,  $y \approx 40$ .  
The temperature of a car left in the sun for 35 minutes will be approximately  $40^{\circ}\text{C}$ .
  - When  $x = 75$ ,  $y \approx 55$ .  
The temperature of a car left in the sun for 75 minutes will be approximately  $55^{\circ}\text{C}$ .

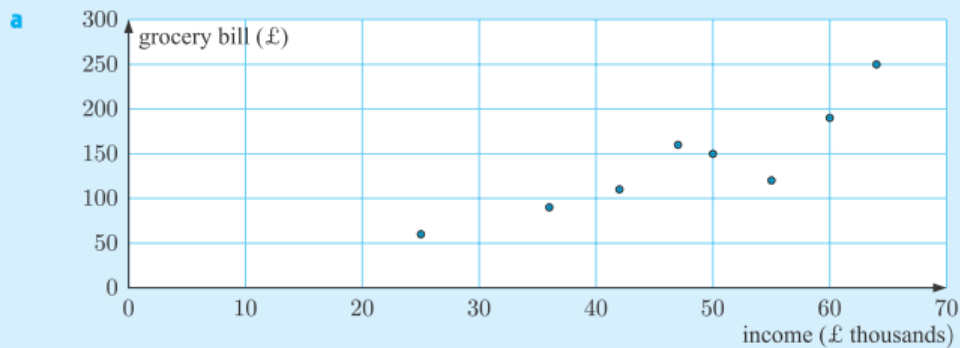
- The prediction in **d i** is reliable, as the data appears linear, and this is an interpolation. The prediction in **d ii** may be unreliable, as it is an extrapolation, and the linear trend displayed by the data may not continue beyond the 50 minute mark.

**Example 6****Self Tutor**

The annual income and average weekly grocery bill for a selection of families is shown below:

<i>Income</i> ( $x$ thousand pounds)	55	36	25	47	60	64	42	50
<i>Grocery bill</i> ( $y$ pounds)	120	90	60	160	190	250	110	150

- Construct a scatter diagram to illustrate the data.
- Use technology to find the least squares regression line.
- Estimate the weekly grocery bill for a family with an annual income of £95 000. Comment on whether this estimate is likely to be reliable.

**b****Casio fx-CG20**

```

LinearReg(ax+b)
a =4.17825196
b =-56.6946886
r =0.89484388
r²=0.80074556
MSe=839.7744
y=ax+b
  
```

**TI-84 Plus**

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LinReg
y=ax+b
a=4.178251967
b=-56.69468693
r²=.8007455697
r=.8948438801
  
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**TI-nspire**

```

1-2 DEG AUTO REAL
"Title" "Linear Regression (mx+b)"
"RegEqn" "m*x+b"
"m" 4.17825
"b" -56.6947
"r²" 0.800746
"r" 0.894844
"ResId" "(...)"
  
```

Using technology, the line of best fit is  $y \approx 4.18x - 56.7$

- When  $x = 95$ ,  $y \approx 4.18(95) - 56.7 \approx 340$   
So, we expect a family with an income of £95 000 to have a weekly grocery bill of approximately £340.  
This is an extrapolation, however, so the estimate may not be reliable.