

This resource sheet is designed for use with the Casio fx-CG20. However it can be used with the Casio fx-9860GII or the Casio fx-9750GII although there may be some differences in the key sequences needed and in the screen displays.

Aim

This activity will show you how to use some of the statistics functions of the calculator. There is the opportunity to look at how to display scatter graphs as well exploring how the calculator deals with regression and correlation.

Here is an excerpt from one of the statistics4schools* databases showing vegetable consumption in the UK. 20 men and 20 women were asked their age and how many portions of vegetables and fruit they consumed the previous day. We are going to use this data to explore how the Casio fx-CG20 can be used to analyse and display data.

	Female age	Female portions of veg	Male age	Male portions of veg
1	79	10	38	0
2	65	4	38	4
3	53	4	53	6
4	70	3	60	6
5	63	5	23	5
6	52	0	61	1.5
7	87	2	23	4
8	60	0	70	6
9	65	6	47	3
10	32	2	57	0
11	60	9	51	4
12	55	8	79	2
13	55	8	23	0
14	68	4	68	3.5
15	28	0	42	3
16	80	3	64	4
17	32	5	36	5
18	55	5	22	3
19	69	6	26	4
20	78	7	46	6

Correlation

Set your calculator to STAT mode. Press **MENU** **2**

To label the lists move the cursor to the SUB row and give the column a title. Letters (marked in red on the keyboard) can be accessed by first pressing **ALPHA**

To enter the numbers in the list, move the cursor to the correct position, key in the value and press **EXE**.

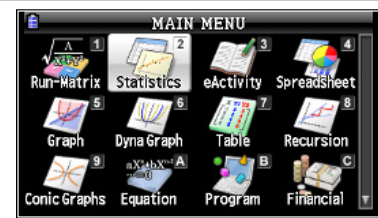
Enter the numbers from the table above into the lists on the calculator.

To display the data in graphical form select GRPH which is accessed by pressing **F1**

We now need to set up the type of graph. Select SET **F6**

To change any of the settings, scroll down and select the correct setting from the menu bar.

Set up StatGraph 1 as shown. This will display a scatter graph of list 1 vs list2



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

GRAPH CALC TEST INTR. DIST >

	List 1	List 2	List 3	List 4
SUB	F AGE	F VEG	M AGE	M VEG
18	55	5	22	3
19	69	6	26	4
20	78	7	46	6
21				

GRAPH CALC TEST INTR. DIST >

	List 1	List 2	List 3	List 4
SUB	F AGE	F VEG	M AGE	M VEG
18	55	5	22	3
19	69	6	26	4
20	78	7	46	6
21				

GRAPH1 GRAPH2 GRAPH3 SELECT SET

	List 1	List 2	List 3	List 4
SUB	F AGE	F VEG	M AGE	M VEG
18	55	5	22	3
19	69	6	26	4
20	78	7	46	6
21				

StatGraph1

Graph Type : Scatter

XList : List1

YList : List2

Frequency : 1

Mark Type :

Color Link : Off

GRAPH1 GRAPH2 GRAPH3

Correlation

Set up StatGraph2 the same as above but for lists 3 and 4.

To return to your list screen press **EXIT**

To display the graphs select graph1 **F1** (list1 vs list2). This shows a scattergram for females, age vs number of portions of vegetables.

Looking at the graph would you say that there is a good correlation between age and vegetable consumption in women?

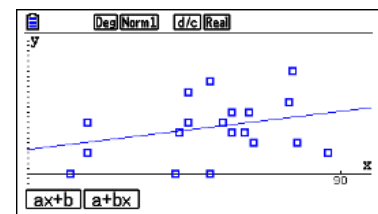
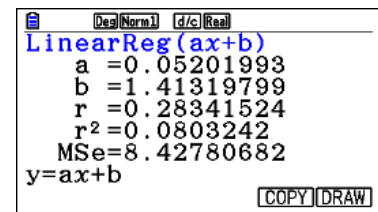
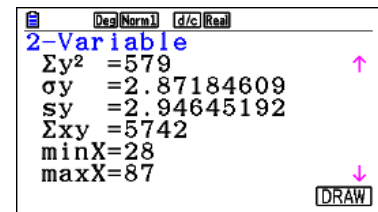
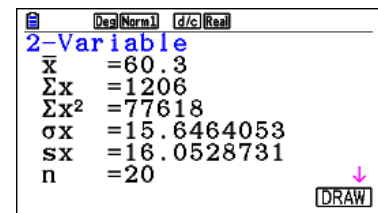
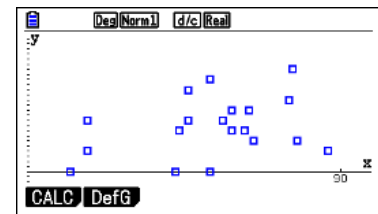
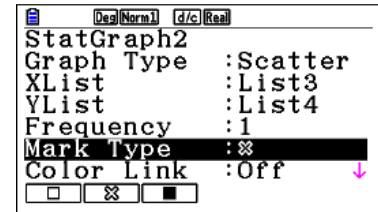
To access all the statistical calculations, select CALC **F1** and select 2-variable **F1**. You will see \bar{x} , $\sum x$down to n, the number of items.

Scroll down to see more calculations.

To access the regression and correlation calculations go to the graph screen again by selecting Draw **F6** and then x **F2** and then ax+b **F1** and you will see that the best fit regression line has the equation $y = 0.052x + 1.413$.

The correlation coefficient is 0.28 which indicates a very weak positive correlation.

Draw **F6** will draw the regression line.



Correlation

Now look at lists 3 and 4 for males, plot the scattergram and find the correlation coefficient.

It should be clear from the calculations and scattergrams above that there is no evidence that older people eat more vegetables than younger people.

Use your calculator to answer the following questions.

1. Does the data suggest that women eat more vegetables than men?
2. Why might it be risky to compare eating habits for men and women based on the data provided?
3. The product moment correlation coefficient r is given by

$$r = \frac{s_{xy}}{\sqrt{s_{xx} \cdot s_{yy}}}$$

$$\text{Where } s_{xx} = \sum x^2 - \frac{(\sum x)^2}{n} ; s_{yy} = \sum y^2 - \frac{(\sum y)^2}{n}$$

$$\text{and } s_{xy} = \sum xy - \frac{\sum x \sum y}{n}$$

Use the calculations screens to calculate s_{xx} , s_{yy} and s_{xy} and hence find r . Compare your value for r with the correlation coefficient we found earlier.

Hint: To clear a list go to the list screen, scroll through the menu bar using **F6** and select DEL A **F4**

You should now feel confident using the statistical functions of the calculator to work with regression and correlation. Here is an investigation that will encourage your students to explore the relationship between spending and success in the English Premiership Football League.

Correlation



Investigation

In football, how much does spending on players affect the team's final league position?

Here is a table showing spending data for the top teams along with their league position. Use your Casio fx-CG20 to investigate.

Net Spend 03 - 10/11	Purchased Gross 2003 to 2011 (Buys Gross)	Net spending 2003 to 2011	Spending per Season	Position 10/11	
1	Chelsea	£524,700,000	£384,100,000	£48,012,500	2
2	Manchester City	£491,220,000	£365,645,000	£45,705,625	3
3	Liverpool	£379,680,000	£140,900,000	£17,612,500	6
4	Tottenham	£297,400,000	£129,150,000	£16,143,750	5
5	Manchester United	£317,250,000	£96,350,000	£12,043,750	1
6	Aston Villa	£177,400,000	£71,775,000	£8,971,875	9
7	Sunderland	£151,430,000	£53,480,000	£6,685,000	10
8	Stoke City	£54,825,000	£41,730,000	£5,216,250	13
9	Wolves	£57,275,000	£39,650,000	£4,956,250	17
10	Bolton	£60,650,000	£28,800,000	£3,600,000	14
11	Fulham	£75,680,000	£28,035,000	£3,504,375	8
12	Everton	£106,050,500	£22,950,500	£2,868,813	7
15	West Bromwich Albion	£70,085,000	£21,295,000	£2,661,875	11
14	QPR	£15,450,000	£13,550,000	£1,693,750	21*
15	Swansea	£7,420,000	£3,245,000	£405,625	23*
16	Wigan	£76,565,000	£1,665,000	£208,125	16
17	Arsenal	£157,650,000	£780,000	£97,500	4
18	Norwich City	£12,550,000	£-4,410,000	£-551,250	22*
19	Newcastle	£141,100,000	£-9,800,000	£-1,225,000	12
20	Blackburn Rovers	£68,702,000	£-31,888,000	£-3,986,000	15
	Birmingham City	£96,325,000	£39,600,000	£4,950,000	18
	West Ham	£120,730,000	£21,805,000	£2,725,625	20
	Blackpool	£5,450,000	£-1,900,000	£-237,500	19
	Middlesbrough	£76,900,000	£10,050,000	£1,256,250	32*
	Hull	£26,130,000	£15,655,000	£1,956,875	31*
	Burnley	£15,355,000	£-470,000	£-58,750	28*
	Portsmouth	£97,100,000	£-25,860,000	£-3,232,500	36*
	Leeds United	£5,900,000	£-34,350,000	£-4,293,750	27*

* Championship teams

Data taken from <http://www.transferleague.co.uk/>

What other factors might also affect league position?

*Statistics4Schools is a really useful source of real statistical data. You can find it at:

<http://webarchive.nationalarchives.gov.uk/20100406121152/http://www.stats4schools.gov.uk/default.asp>