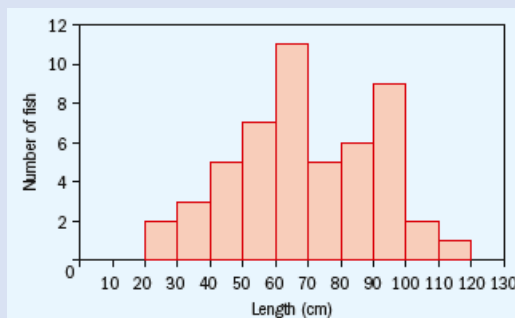


Chapter 5 / Example 5

Calculating measures of central tendency and dispersion

Later in this chapter, in 5.3, you are told to make sure you know how to use your GDC to find summary statistics and construct a box plot. In this example you will see how to do this.

Consider the following frequency histogram showing the length (x cm) of 51 fish caught in the River Avon.



- 1 State the median class.
- 2 State the range.
- 3 Comment on the distribution of the data.

Open a new document and add a Lists & Spreadsheet page.

Type 'length' in the first cell and press **enter**.

Type the numbers 25, 35, 45, 55, etc. in the first column.

These are the values of the midpoints of each bar in the frequency histogram.

Press **enter** or **▼** after each number to move to the next cell.

| A | length | B | C | D |
|----|--------|---|---|---|
| = | | | | |
| 1 | 25 | | | |
| 2 | 35 | | | |
| 3 | 45 | | | |
| 4 | 55 | | | |
| 5 | 65 | | | |
| #5 | 65 | | | |

Type 'freq' in the cell to the right of 'score' and press **enter**.

Enter the frequencies of each of the lengths in the second column.

Use the **▲ ▼ ► ◀** keys on the touchpad to navigate the spreadsheet.

| A | length | B | freq | C | D |
|----|--------|----|------|---|---|
| = | | | | | |
| 1 | 25 | 2 | | | |
| 2 | 35 | 3 | | | |
| 3 | 45 | 5 | | | |
| 4 | 55 | 7 | | | |
| 5 | 65 | 11 | | | |
| #5 | 11 | | | | |

To find the summary statistics

Press **menu** 4:Statistics | 1:Stat Calculations | 1:One-Variable Statistics...

Since the statistics refer to just one list click the touchpad on OK or press **enter**.

One-Variable Statistics

Num of Lists: 1

OK Cancel

Chapter 5 / Example 5

Calculating measures of central tendency and dispersion

Open the drop down lists with **►** and select using **▼** and **enter**.

Choose 'length' for X1 List and 'freq' for Frequency List.

The next two choices remain empty.

The 1st Result Column can remain as c[] as this is the third column in the spreadsheet.

Press **enter** or use the touchpad to click OK.

The dialog box 'One-Variable Statistics' has the following fields: X1 List: 'length', Frequency List: 'freq', Category List: (empty), Include Categories: (empty), 1st Result Column: 'c[]'. There are OK and Cancel buttons at the bottom right.

The GDC displays a list of statistics for the data.

| A | length | B | freq | C | D |
|---|--------|----|----------------------|----------|---------|
| 1 | | 2 | Title | =OneVar(| |
| 2 | 25 | 3 | \bar{x} | | 69.5098 |
| 3 | 35 | 5 | Σx | | 3545. |
| 4 | 45 | 7 | Σx^2 | | 270675. |
| 5 | 55 | 11 | $s_x := s_n - \dots$ | | 22.0285 |

D1 = "One-Variable Statistics"

Scroll down to see the median, lower quartile, Q_1X and the upper quartile Q_3X using **▼**.

The median is 65 and the quartiles are 55 and 85.

The range is $MaxX - MinX$.

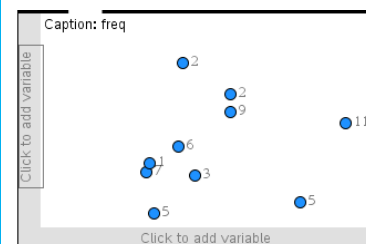
The interquartile range is $Q_3X - Q_1X$.

| A | length | B | freq | C | D |
|----|--------|---|------------|---|------|
| 8 | 95 | 9 | MinX | | 25. |
| 9 | 105 | 2 | Q_1X | | 55. |
| 10 | 115 | 1 | MedianX... | | 65. |
| 11 | | | Q_3X | | 85. |
| 12 | | | MaxX | | 115. |

D10 = 65.

Add a new Data & Statistics page to your document by pressing **ctrl** **doc** (**+page**) 5: Add Data & Statistics.

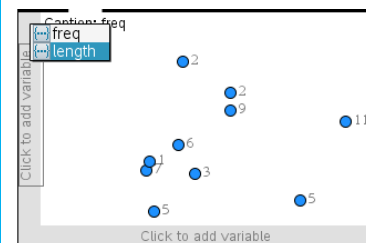
Note: Ignore the screen display that you see when this page first opens.



Press **menu** 2: Plot Properties | 5: Add X Variable.

The GDC displays the two variables you created in the spreadsheet: 'freq' and 'length'.

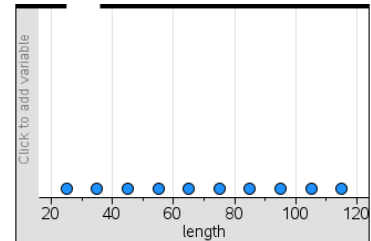
Select 'length' with the touchpad.



Chapter 5 / Example 5

Calculating measures of central tendency and dispersion

The GDC displays the values of lengths that you entered in the spreadsheet on the x-axis.

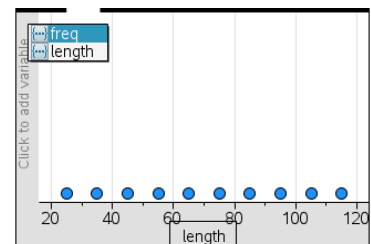


Press **menu** 2:Plot Properties | 9: Add Y Summary List.

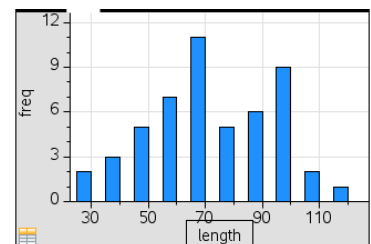
The GDC displays the two variables you created in the spreadsheet: 'f' and 'score'.

Select 'f' with the touchpad.

The term 'summary list' on this GDC is used to denote frequency.



The GDC displays a histogram of the data as this is the default display.

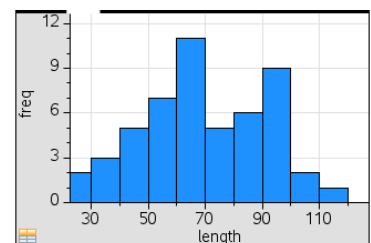


The bars are not the correct widths.

Press **menu** 2:Plot Properties | 2:Histogram Properties | 2:Bin Settings | 1:Equal Bin Width

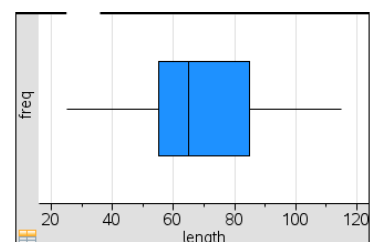
Change the Width to 10 and click the touchpad on OK or press **enter**.

The GDC now displays the histogram correctly.



Press **menu** 1:Plot Type | 2:Box Plot.

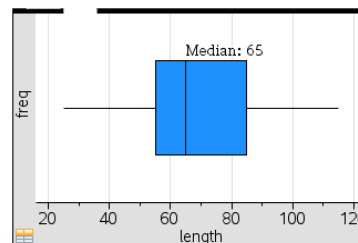
The GDC displays a box plot of the data.



Chapter 5 / Example 5

Calculating measures of central tendency and dispersion

Move the cursor across the box plot with the touchpad. The display will change to show the maximum and minimum values, the quartiles and the median.

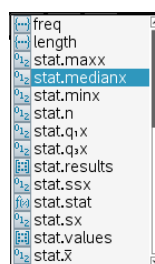


Add a new Calculator page to your document by pressing

ctrl **doc** **+** (page) 1: Add Calculator.

The statistics that you calculated earlier are all stored as variables.

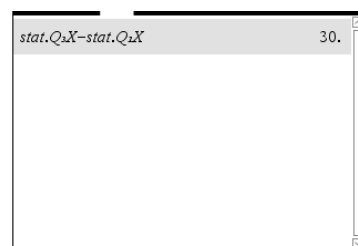
Press **var** **del**



To calculate the interquartile range Use $IQR = Q_3X - Q_1X$.

Select $stat.q_3x$ and $stat.q_1x$ from the list obtained by pressing **var** to enter the calculation $stat.Q_3X - stat.Q_1X$.

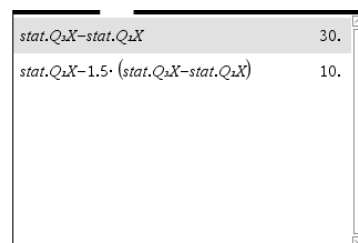
The inter quartile range is 30.



To determine whether 25 is an outlier us $Q_1X - 1.5(IQR)$

Select $stat.q_3x$ and $stat.q_1x$ from the list obtained by pressing **var** to enter the calculation $stat.Q_1X - 1.5(stat.Q_3X - stat.Q_1X)$.

$10 < 25$, so 25 is not an outlier.



To calculate the range Use $Range = MaxX - MinX$.

Select $stat.maxx$ and $stat.minx$ from the list obtained by pressing **var** to enter the calculation $stat.maxx - stat.minx$.

The range is 90.

