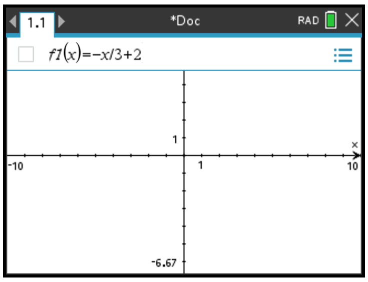
CHAPTER 1 - GRAPHING LINEAR FUNCTIONS

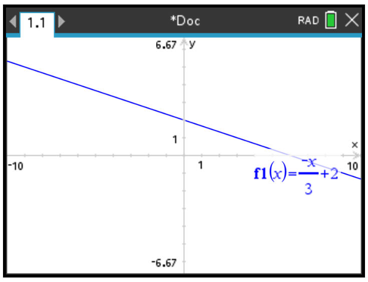
TI-$n$spire

To draw the graph of a linear function such as $y = -\frac{1}{3}x + 2$, press **ctrl** **doc ▼** (+ **page**), then select **2 Add Graphs** to open the Graphs application.

Enter $-\frac{1}{3}x + 2$ into **f1(x)**.



Press **enter** to draw the graph.



CHAPTER 1 - SOLVING SIMULTANEOUS EQUATIONS

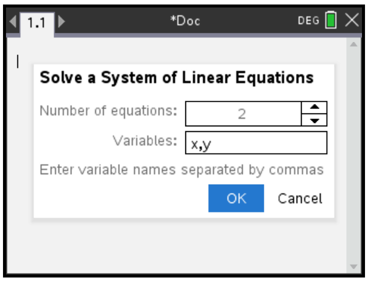
TI-$n$spire

To solve the system $\begin{cases} y = x - 3 \\ 2x + 3y = 16 \end{cases}$ using technology, first write the system in the form $\begin{cases} -x + y = -3 \\ 2x + 3y = 16. \end{cases}$

Press **ctrl** **doc ▼** (+ **page**), and select **1 Add Calculator** to open the Calculator application.

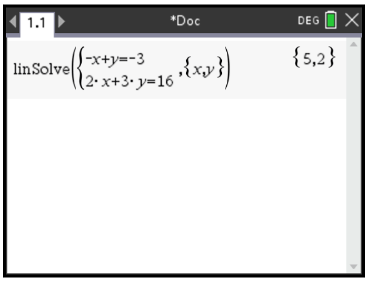
Press **menu**, select **3 Algebra**, **2 Solve System of Linear Equations....**

Set up the screen as shown, and press **enter**.



Enter the equations as shown, press **enter**, and the values x and y will be returned.

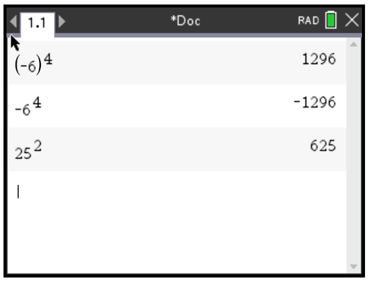
So, $x = 5$ and $y = 2$.



CHAPTER 3 - CALCULATING EXPONENTS

TI-$n$spire

The **TI-$n$spire** has an exponent key that looks like ∧. We type the base first, press the exponent key, then enter the index. We use the bracket keys (and) when we raise a negative number to a power.



For example, to evaluate $(-6)^4$ we type ((−) 6) ∧ 4 **enter**.

If we typed (−) 6 ∧ 4 **enter** the calculator would think we meant -6^4.

Numbers can be squared on the **TI-$n$spire** using the special key x^2.

For example, to evaluate 25^2 we type 25 x^2 **enter**.

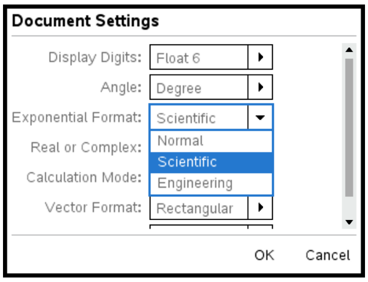
CHAPTER 3 - SCIENTIFIC NOTATION

TI-$n$spire

Press **ctrl** **doc ▼** (+ **page**), then select **1 Add Calculator** to open the Calculator application.

To set the format of your calculator to scientific, press **on**, select **5 Settings...**, then **2 Document Settings....** Set the **Exponential Format:** drop-box to **Scientific**. Press **enter** when you are done.

Select **4 Current** to return to the Calculator application.

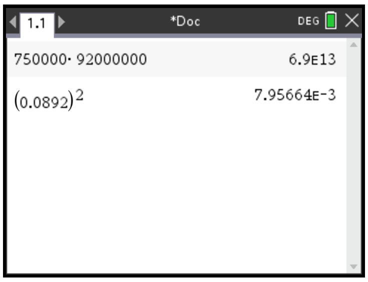


To evaluate $750\,000 \times 92\,000\,000$, press $750\,000$ **×** $92\,000\,000$ **ctrl** **enter**.

Note: The result is 6.9×10^{13} (your calculator writes $\times 10^{\square}$ as **E**).

We enter values in scientific notation using the EE function, which is accessed by pressing **EE**.

To find $(8.92 \times 10^{-2})^2$, press **(** 8.92 **EE** **(−)** 2 **)** **x^2** **enter**.



CHAPTER 4 - SOLVING POLYNOMIAL EQUATIONS

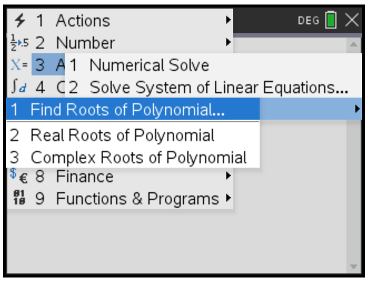
TI-$n$spire

To solve the quadratic equation $2x^2 + 4x = 7$, we rearrange to get $2x^2 + 4x - 7 = 0$.

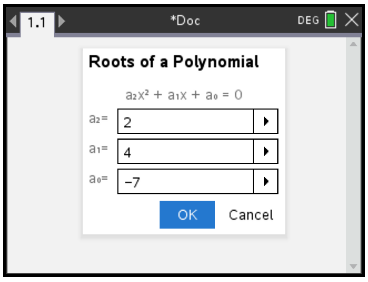
Press **ctrl** **doc ▼** (**+ page**), then select **1 Add Calculator** to open the Calculator application.

Press **menu**, select **3 Algebra**, select **3 Polynomial Tools**, then select **1 Find Roots of Polynomial...**.

Press **enter** to select polynomial degree 2.

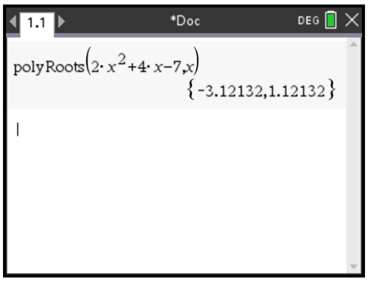


Set up the screen as shown, then move down to **OK** and press **enter**.



Press **enter** again to solve the equation.

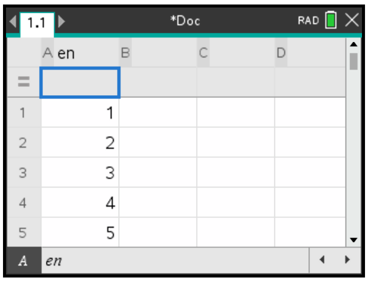
So, $x \approx -3.12$ or $x \approx 1.12$.



CHAPTER 5 - GENERATING SEQUENCES

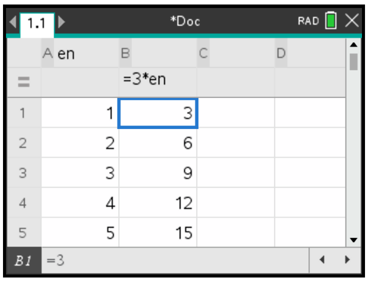
TI-$n$spire

To find the first five terms of the sequence represented by $\{3n\}$, enter the numbers $1, 2, 3, 4, 5$ into list **A** and give the list a name such as **en**.



Move the cursor to the second row of list **B** and press 3 [×] [E] [N] [enter].

So, the first five terms of the sequence are $3, 6, 9, 12, 15$.



CHAPTER 5 - GEOMETRIC SEQUENCES

TI-$n$spire

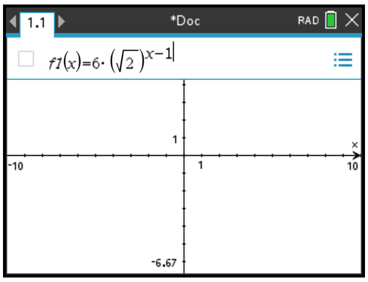
Find the first term of the sequence $6, 6\sqrt{2}, 12, 12\sqrt{2}, ...$ which exceeds 1400.

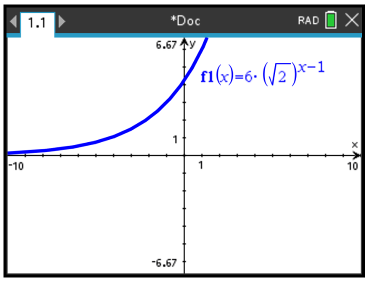
The sequence is geometric with $u_1 = 6$ and $r = \sqrt{2}$

$$\therefore\ u_n = 6 \times (\sqrt{2})^{n-1}$$

We need to find n such that $u_n > 1400$.

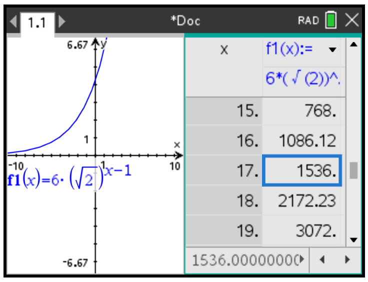
Press **ctrl** **doc ▼** (+ **page**), then select **2 Add Graphs** to open the Graphs application. Enter the formula for u_n into **f1(x)** as shown alongside, and press **enter**.





Press **ctrl** **T** to view a table of values for u_n, then scroll down to the first term that exceeds 1400.

The first term to exceed 1400 is $u_{17} = 1536$.



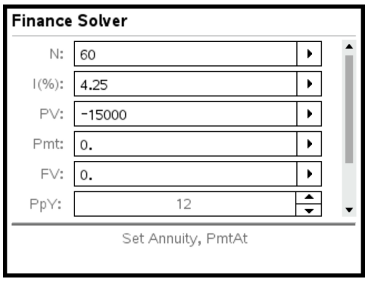
CHAPTER 5 - TVM SOLVER

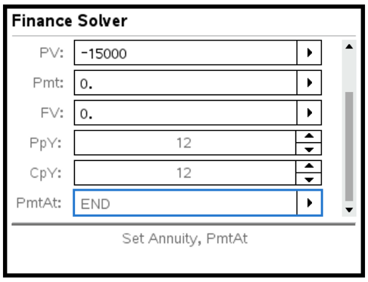
TI-$n$spire

Sally invests $\$15\,000$ in an account that pays 4.25% p.a. compounded monthly. To find the value of Sally's investment after 5 years, press **ctrl** **doc ▾** (+ **page**), then select **1 Add Calculator** to open the calculator application.

Press **menu**, select **8 Finance**, then select **1 Finance Solver...**.

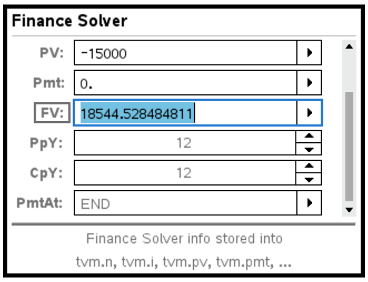
Set up the screen as shown.





Move the cursor to **FV**, and press **enter** to display the future value of the investment.

So, the value of the investment after 5 years is $\approx \$18\,544.53$.



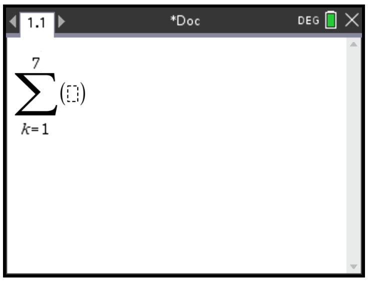
CHAPTER 5 - SIGMA NOTATION

TI-$n$spire

To evaluate $\sum_{k=1}^{7}(k+1)$, press **ctrl** **doc ▼** (+ **page**), then select **1 Add Calculator** to open the Calculator application.

Press **menu**, select **4 Calculus**, then select **3 Sum**.

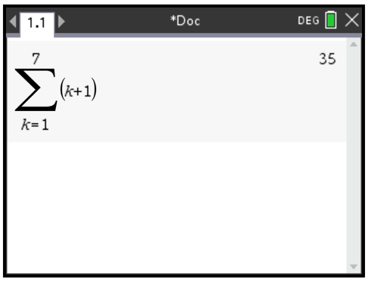
First enter the limits of the sum by pressing **K** **▶** 1 **▲** **▲** 7.



Then enter the formula in the brackets by pressing **▶** **K** **+** 1.

Press **enter** to evaluate the sum.

So, $\sum_{k=1}^{7}(k+1) = 35$.



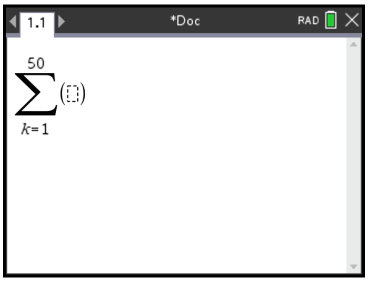
CHAPTER 5 - EVALUATING SERIES

TI-$n$spire

We can write the series $4+7+10+....$ to 50 terms as $\sum_{k=1}^{50}(3k+1)$.

To evaluate $\sum_{k=1}^{50}(3k+1)$, press **menu**, select **4 Calculus**, then select **3 Sum**.

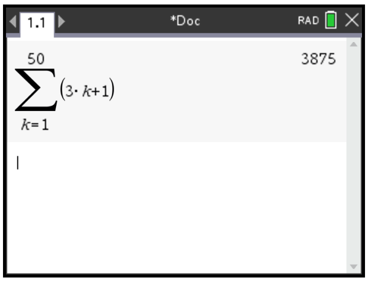
First enter the limits of the sum by pressing **K** ▶ 1 ▲ ▲ 50.



Then enter the formula in the brackets by pressing ▶ 3 **K** **+** 1.

Press **enter** to evaluate the sum.

So, $\sum_{k=1}^{50}(3k+1)=3875$.



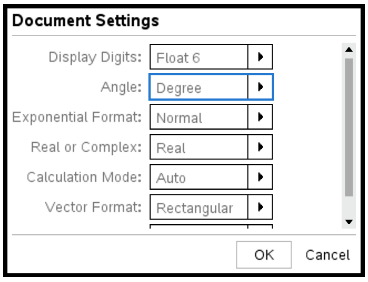
CHAPTER 7 - TRIGONOMETRIC RATIOS

TI-$n$spire

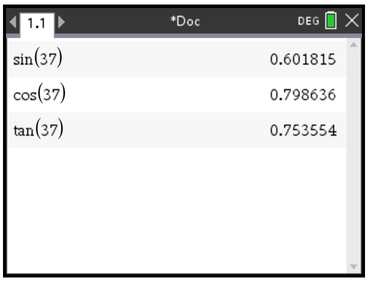
To check that your calculator is in DEGREE mode, press **on**, select **5 Settings...**, then **2 Document Settings...**.

Check that **Angle:** is set to **Degree**.

Press **enter** when you are done.



To find the trigonometric ratios of the angle $37°$, press **trig**, then tap **sin**, **cos**, or **tan**. Then press 37 **)** **enter**.



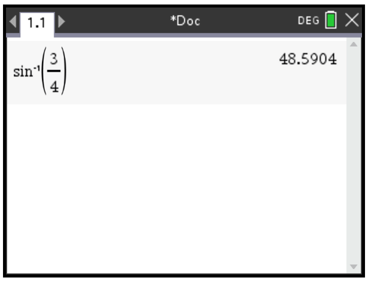
CHAPTER 7 - INVERSE TRIGONOMETRIC RATIOS

TI-$n$spire

If $\sin\theta = \frac{3}{4}$, then $\theta = \sin^{-1}(\frac{3}{4})$.

To find $\sin^{-1}(\frac{3}{4})$, press **trig ▶**, tap $\mathbf{sin^{-1}}$, then press 3 **÷** 4 **)** **enter**.

So, $\theta \approx 48.6°$.

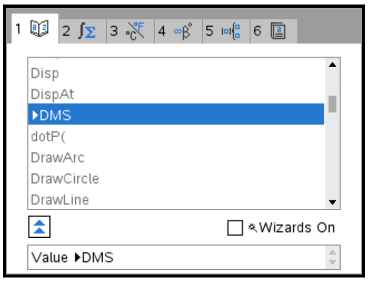


CHAPTER 8 - CONVERTING DEGREES INTO MINUTES AND SECONDS

TI-$n$spire

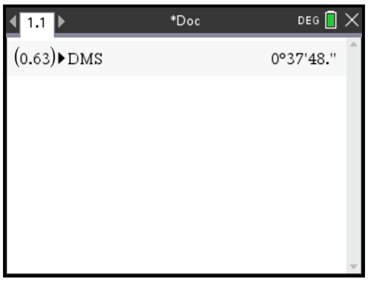
To convert $0.63°$ into minutes and seconds, begin in the Calculator application.

Press 0.63 [book] 1, select ▶ **DMS**, then press **enter**.



So, $0.63°$ is equivalent to 37 minutes and 48 seconds.

Note: Your calculator must be set to DEGREE mode.



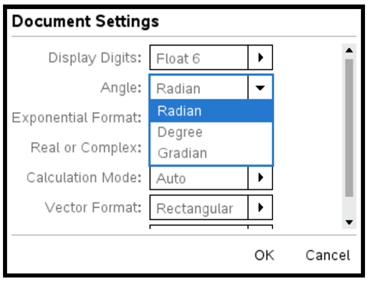
CHAPTER 8 - DEGREES AND RADIANS

TI-$n$spire

To change between degree and radian mode from the home screen, select **5 Settings...**, then select **2 Document Settings...**.

Press ▼ to scroll down to the **Angle** drop-box. Press ▶, use ▲ and ▼ to select **Radian** or **Degree**, and press **enter**.

Press **enter** again to save your settings.

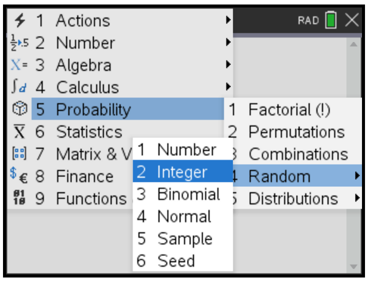


CHAPTER 12 - GENERATING RANDOM NUMBERS

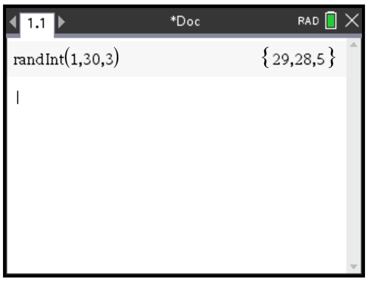
TI-$n$spire

To generate three random integers between 1 and 30 (inclusive), press **ctrl** **doc ▼** (+ **page**), then select **1 Add Calculator** to open the Calculator application.

Press **menu**, select **5 Probability**, **4 Random**, then select **2 Integer**.



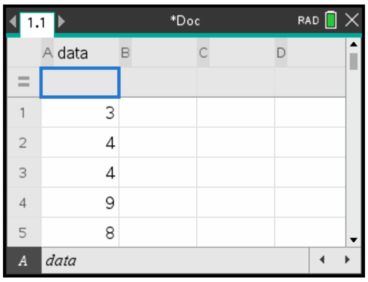
Press 1 **,** 30 **,** 3 **)** **enter**.



CHAPTER 13 - FINDING THE MEASURES OF CENTRE

TI-$n$spire

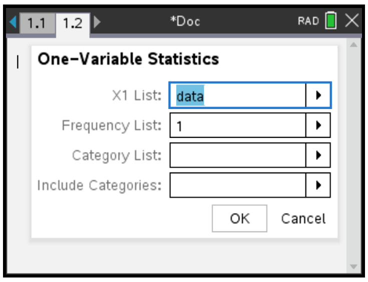
To find the mean, median and mode of $3, 4, 4, 9, 8, 8, 6, 4, 7, 9, 1, 3, 5, 3, 5, 9, 8, 6, 3, 7, 1$, start by entering the data into list **A**, and name the list **data**.



Press **ctrl** **doc ▼** (+ **page**), then select **1 Add Calculator** to open the Calculator application.

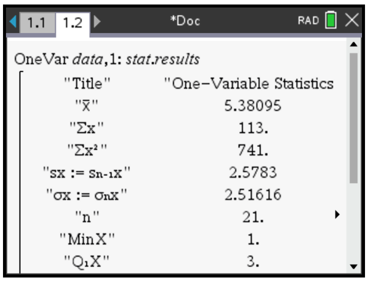
Press **menu**, select **6 Statistics**, select **1 Stat Calculations**, then select **1 One-Variable Statistics**.

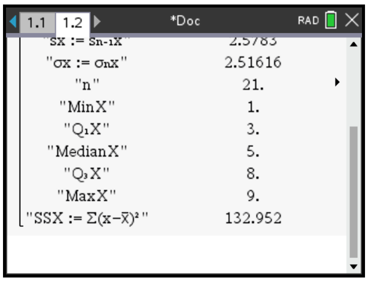
Press **enter** to choose 1 list. Select **data** from the **X1 List:** drop-box, and press **enter**.



So, the mean ≈ 5.38, and the median $= 5$.

Note: There is no built-in function to calculate the mode in this calculator model.



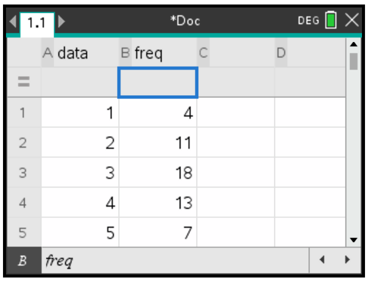


TI-$n$spire

Find the measures of centre for the data in the table alongside.

Data	*Frequency*
1	4
2	11
3	18
4	13
5	7
6	2

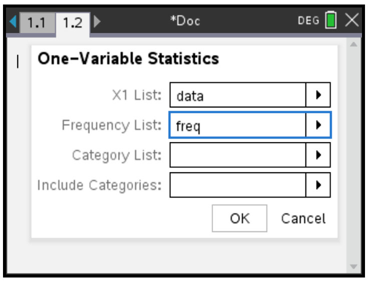
To obtain the measures of centre, enter the data values into list **A**, and the frequency values into list **B**. Give list **A** the name **data**, and list **B** the name **freq**.



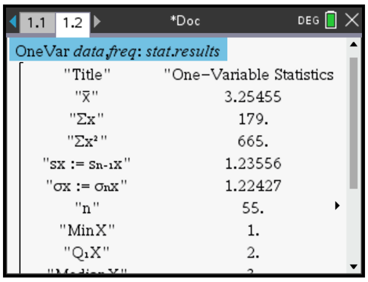
Press **ctrl** **doc ▼** (+ **page**), then select **1 Add Calculator** to open the Calculator application.

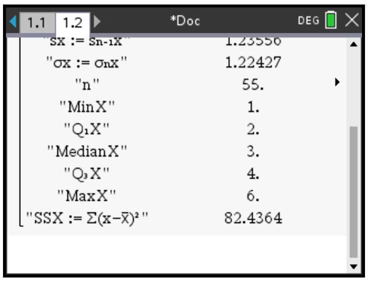
Press **menu**, select **6 Statistics**, **1 Stat Calculations**, then select **1 One-Variable Statistics**.

Press **enter** to choose 1 list. Select **data** from the **X1 List:** drop-box, and **freq** from the **Frequency List:** drop-box, then press **enter**.



So, the mean ≈ 3.25, and the median $= 3$.





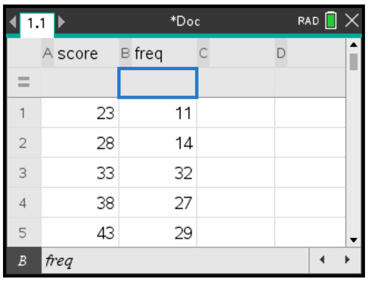
CHAPTER 13 - ESTIMATING THE MEAN OF GROUPED DATA

TI-$n$spire

The table below shows the ages of bus drivers. Estimate the mean age, to the nearest year.

Score	21 – 25	26 – 30	31 – 35	36 – 40	41 – 45	46 – 50	51 – 55
Frequency	11	14	32	27	29	17	7

To estimate the mean of the data alongside, enter the mid-interval values into list **A**, and label the list **score**. Enter the frequency values into list **B**, and label the list **freq**.



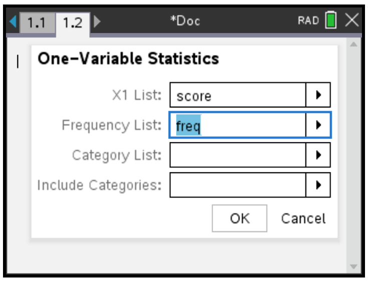
Press **ctrl** **doc ▾** (+ **page**), then select **1 Add Calculator** to open the Calculator application.

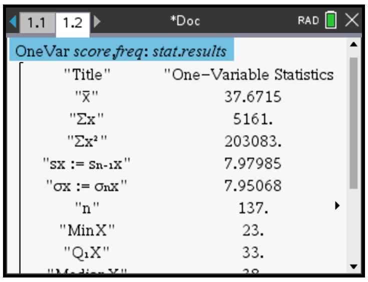
Press **menu**, select **6 Statistics**, select **1 Stat Calculations**, then select **1 One-Variable Statistics**.

Press **enter** to choose 1 list. Select **score** from the **X1 List:** drop-box, and **freq** from the **Frequency List:** drop-box.

Then press **enter**.

So, the mean age ≈ 38.

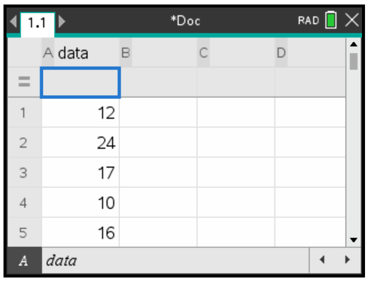




CHAPTER 13 - FINDING THE INTERQUARTILE RANGE

TI-$n$spire

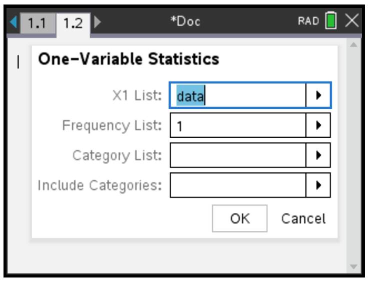
To find the lower and upper quartiles of $12, 24, 17, 10, 16, 29, 22, 18, 32, 20,$ start by entering the data into list **A** and name the list **data**.



Press **ctrl** **doc ▼** (+ **page**), then select **1 Add Calculator** to open the Calculator application.

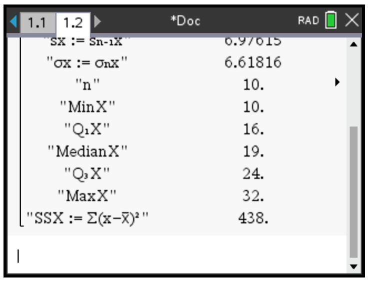
Press **menu**, select **6 Statistics**, select **1 Stat Calculations**, then select **1 One-Variable Statistics**.

Press **enter** to choose 1 list. Select **data** from the **X1 List:** drop-box, and press **enter**.



The lower quartile is $Q_1 = 16,$ and the upper quartile is $Q_3 = 24.$

So, the $\text{IQR} = Q_3 - Q_1 = 24 - 16 = 8.$



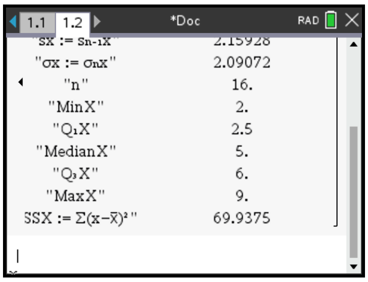
CHAPTER 13 - BOX AND WHISKER DIAGRAMS

TI-$n$spire

To find the five-number summary of 8, 2, 3, 9, 6, 5, 3, 2, 2, 6, 2, 5, 4, 5, 5, 6, press **ctrl** **doc ▼** (+ **page**), then select **4 Add Lists and Spreadsheets**. Enter the data into list **A** and give the list a name such as **data**.

Press **ctrl** **doc ▼** (+ **page**), then select **1 Add Calculator** to open the Calculator application.

Press **menu**, select **6 Statistics**, select **1 Stat Calculations**, then select **1 One-Variable Statistics....** Press **enter** to select 1 list, then choose **data** for the **X1 List:** drop-box and press **enter**.



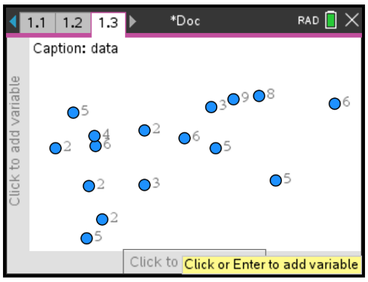
So, the five-number summary is:

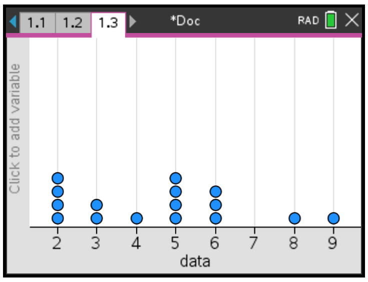
$$\text{minimum} = 2, \ \text{Q}_1 = 2.5, \ \text{median} = 5, \ \text{Q}_3 = 6, \ \text{maximum} = 9.$$

To draw a box plot for the data press **ctrl** **doc ▼** (+ **page**), then select **5 Add Data and Statistics**.

Move the cursor to the bottom of the screen until the "Click or Enter to add variable" box appears.

Press **enter**, then select **data**.

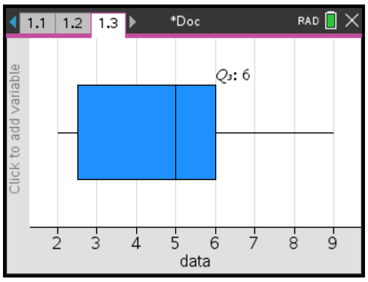




Press **menu**, select **1 Plot Type**, then select **2 Box Plot**.

Hovering over an area of the plot will show the important features.

So, range = max − min = $9 - 2 = 7$, and IQR = $\text{Q}_3 - \text{Q}_1 = 6 - 2.5 = 3.5$.



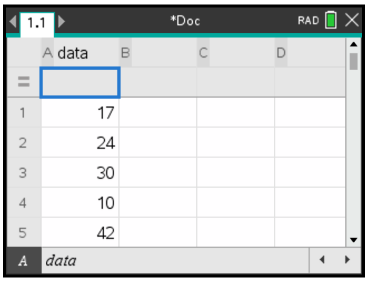
CHAPTER 13 - STANDARD DEVIATION

TI-$n$spire

Kylie is interested in the ages of spectators at a rugby match. She selects a sample of 30 spectators. Their ages are:

17 24 30 10 42 48 37 19 28 53 29 40 11 21 9 43 22 59 46 52 31 13 7 26 32 47 22 15 26 42.

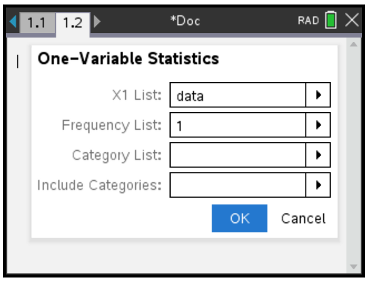
To find the sample standard deviation, enter the data into list **A** as shown alongside. Give list **A** the name **data**.



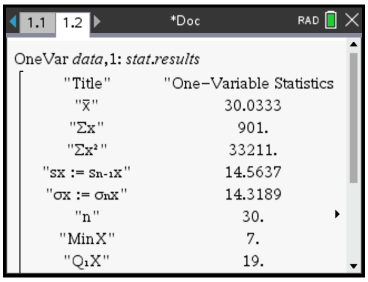
Press **ctrl** **doc ▼** (+ **page**), and select **1 Add Calculator** to open the Calculator application.

Press **menu**, select **6 Statistics**, **1 Stat Calculations**, then **1 One-Variable Statistics....**

Press **enter** to set the number of lists to 1. Select **data** in the **X1 List:** drop-box, and press **enter**.



So, the sample standard deviation is $s \approx 14.6$ years.



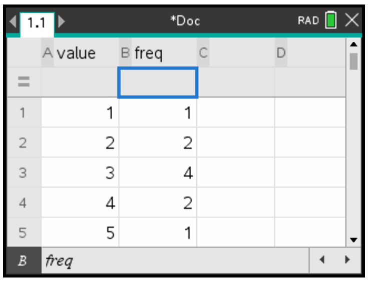
CHAPTER 13 - STANDARD DEVIATION FROM A FREQUENCY TABLE

TI-$n$spire

Find the population standard deviation of the data alongside.

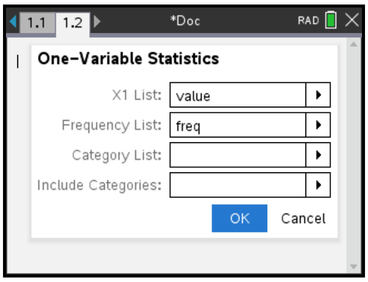
Value	1	2	3	4	5
Frequency	1	2	4	2	1

To find the standard deviation, enter the data values into list **A**, and name the list **value**. Enter the frequency values into list **B**, and name the list **freq**.



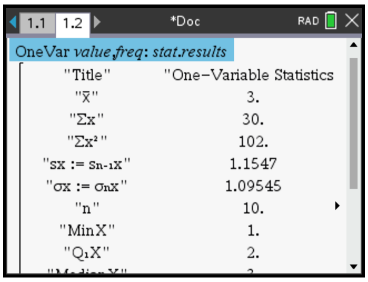
Press **ctrl** **doc ▼** (+ **page**), then select **1 Add Calculator** to open the Calculator application.

Press **menu**, select **6 Statistics**, **1 Stat Calculations**, then select **1 One-Variable Statistics...**. Press **enter** to choose 1 list. Select **value** from the **X1 List:** drop-box, and select **freq** from the **Frequency List:** drop-box.



Press **enter** to find the statistics.

So, $\sigma \approx 1.10$.



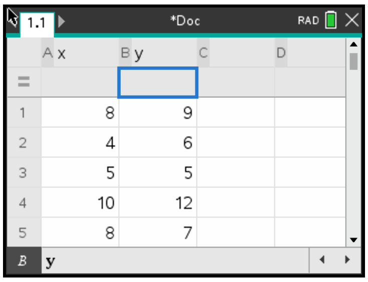
CHAPTER 17 - DRAWING SCATTER DIAGRAMS

TI-$n$spire

Draw a scatter diagram of the following data set:

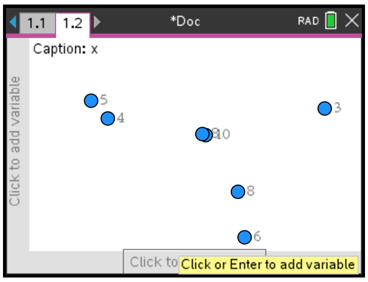
x	8	4	5	10	8	3	6
y	9	6	5	12	7	4	5

Step 1: Enter the x-values into list **A**, and name the list **x**. Enter the y-values into list **B**, and name the list **y**.



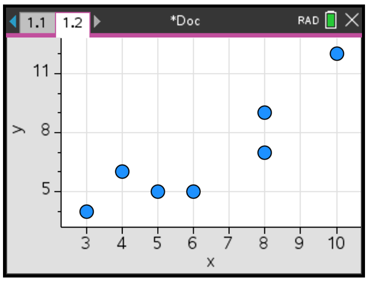
Step 2: Press **ctrl** **doc ▼** (+ **page**), then select **5 Add Data and Statistics** to open the data in the Statistics application.

You will see the data points randomly scattered on the screen.



Step 3: Move the cursor to the bottom of the screen until the "Click or Enter to add variable" box appears. Press **enter**, then select **x**.

Move the cursor to the left hand side of the screen until the "Click or Enter to add variable" box appears. Press **enter**, then select **y**.



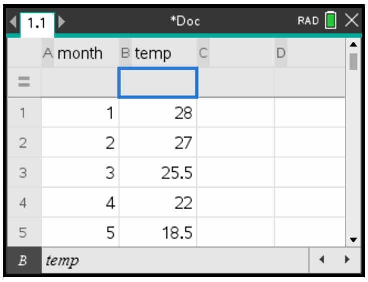
CHAPTER 17 - FITTING TRIGONOMETRIC MODELS TO DATA

TI-$n$spire

The mean monthly maximum temperatures for Cape Town, South Africa are shown below:

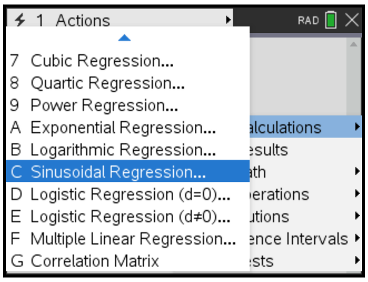
Month (t)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature (T °C)	28	27	25.5	22	18.5	16	15	16	18	21.5	24	26

To model the data with a trigonometric function of the form $T = a\sin(b(t-c))+d$, where Jan $\equiv 1$, Feb $\equiv 2$, and so on, enter the values for *Month* in list **A**, and the values for *Temperature* in list **B**. Give list **A** the name **month**, and list **B** the name **temp**.



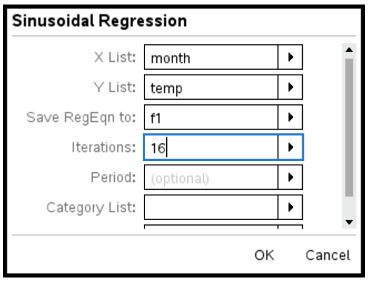
Press **ctrl** **doc▼** (+ **page**), then select **1 Add Calculator** to open the Calculator application.

Press **menu**, select **6 Statistics**, select **1 Stat Calculations**, then select **C Sinusoidal Regression...**.



Press **enter** and set up the screen as shown alongside.

Note: A number between 1 and 16 may be entered in **Iterations:**. A larger number will carry out the calculation more slowly but gives a more accurate answer, whilst a smaller number will carry out the calculations more quickly but give a less accurate answer.



Press **enter** to find a trigonometric model for the data.

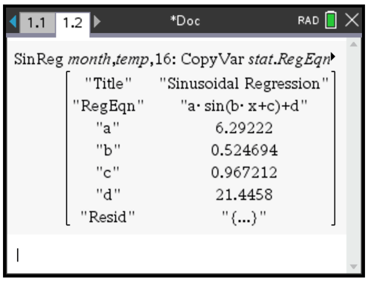
So, $T \approx 6.29\sin(0.525t + 0.967) + 21.4$

$\approx 6.29\sin(0.525t + 0.967 - 2\pi) + 21.4$

$\approx 6.29\sin(0.525t - 5.32) + 21.4$

$\approx 6.29\sin(0.525(t - 10.1)) + 21.4\,.$

So, $a \approx 6.29$, $b \approx 0.525$, $c \approx 10.1$, and $d \approx 21.4\,.$



CHAPTER 17 - SOLVING TRIGONOMETRIC EQUATIONS

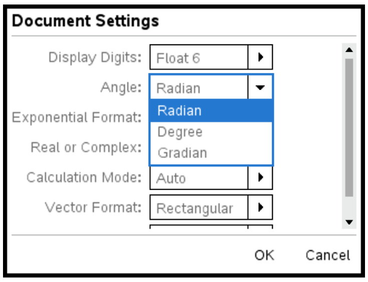
TI-$n$spire

To solve the equation $2\sin x - \cos x = 4 - x$ for $0 \leqslant x \leqslant 2\pi$, press **ctrl** **doc ▼** (+ **page**), then select **2 Add Graphs**.

Press **on**, select **5 Settings...**, then **2 Document Settings...**.

Select **Radian** from the **Angle:** drop-box, and press **enter**.

Press **4 Current** to return.

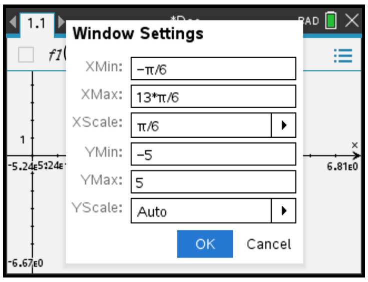


Press **menu**, select **4 Window/Zoom**, then **1 Window Settings...**.

Set **XMin** $= -\frac{\pi}{6}$, **XMax** $= \frac{13\pi}{6}$, **XScale** $= \frac{\pi}{6}$, **YMin** $= -5$, and **YMax** $= 5$.

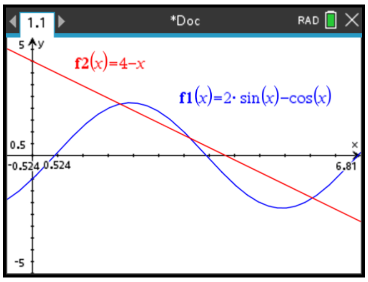
Note: π is entered by pressing **π ▶** then selecting π.

Press **enter** when you are done.



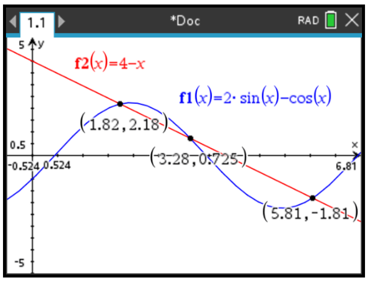
Store $2\sin x - \cos x$ into $f1(x)$, and press **enter** to plot the graph.

Press **ctrl** **G** and store $4 - x$ into $f2(x)$. Press **enter** to plot the graph.



To find where the graphs intersect, press **menu**, then select **6 Analyze Graph**, then select **4 Intersection**.

Place the lower and upper bounds either side of the first intersection point. The intersection point $(1.82, 2.18)$ is given. Repeat this process to find the remaining intersection points $(3.28, 0.725)$, and $(5.81, -1.81)$.



So the solutions to $2\sin x - \cos x = 4 - x$ are $x \approx 1.82, 3.28,$ and 5.81.