

TI-30X Plus MathPrint™ Scientific Calculator

Quick Guide



 TEXAS INSTRUMENTS

TI-30X Plus MathPrint™ Scientific Calculator Quick Guide

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About this quick guide

This quick guide introduces some of the main features of the TI-30X Plus MathPrint™. In addition, it provides an overview of display settings, modes and menus, navigation, syntax and tips for efficient and accurate calculation across NSW Stages 4-6 Mathematics.

0 Getting started

All examples in this quick guide assume the default settings as shown on page 3 (modes). The TI-30X Plus MathPrint™ can be reset so that all students start at the same point.

To do this, press **2nd** [reset] **2**.

0.1 Switching the calculator on and off

Press **on** to turn the TI-30X Plus MathPrint™ on.

Press **2nd** [off] to turn it off.

0.2 Display contrast

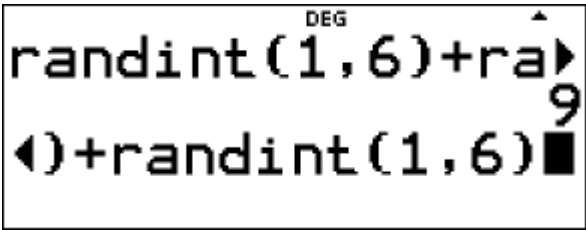
To adjust the contrast:

- (1) Press and release the **2nd** key.
- (2) Press [**◀**] to darken the screen or press [**▶**] to lighten the screen.

If needed, repeat the above steps to set the desired contrast.

0.3 Home screen

The TI-30X Plus MathPrint™ can display a maximum of 4 lines with a maximum of 16 characters per line.

<p><i>Keystrokes description:</i></p> <p>For entries and expressions longer than the visible screen area, scroll left and right (◀ and ▶) to view the entire entry or expression.</p> <p>Depending on space, the answer is displayed either directly to the right of the entry or on the right side of the next line.</p>	
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Special indicators and cursors may display on the screen to provide additional information concerning functions or results.

For example:

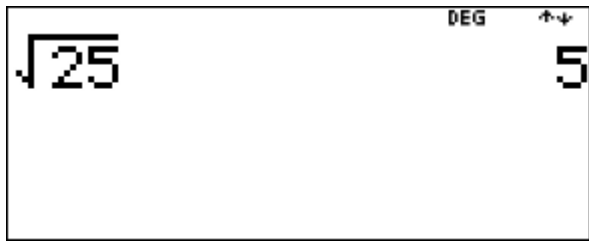
Indicator	Definition
2ND	2nd function.
SCI, ENG	Scientific or engineering notation.
DEG, RAD, GRAD	Angle mode (degrees, radians or gradians).

0.4 2nd functions

Press **[2nd]** to activate the secondary function of a given key.

Example

Use the TI-30X Plus MathPrint™ to calculate $\sqrt{25}$.

<p><i>Keystrokes and solution:</i></p> <p>Press [2nd] [√] and enter 25.</p> <p>Press [enter].</p> <p>$\sqrt{25} = 5$</p>	
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0.5 Modes

Press **[mode]** to choose modes.



Press **[←]** **[→]** **[↑]** **[↓]** to choose a mode and press **[enter]** to select it.

Press **[clear]** or **[2nd]** **[quit]** to return to the home screen and perform your calculations using the chosen mode settings.

Default mode settings are highlighted in these two sample screens.

	
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MATHPRINT mode displays most inputs and outputs in textbook format.

	
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0.6 Multi-tap keys

A multi-tap key cycles through multiple functions when you press it. Press the key repeatedly to display the function you wish to enter.

Multi-tap keys include **[x^{yz}/_{abcd}]**, **[sin⁻¹]**, **[cos⁻¹]**, **[tan⁻¹]**, **[e[□]10[□]]**, **[ln log]**, **[! nCr nPr]** and **[π^e/_i]**.

0.7 Menus

Press \blacktriangleright and \blacktriangleleft to scroll and select a menu item or press the corresponding number next to the item. To return to the previous screen without selecting the item, press $\boxed{\text{clear}}$. To exit a menu and return to the home screen, press $\boxed{2\text{nd}}$ $\boxed{[\text{quit}]}$.

<p><i>Keystrokes description:</i></p> <p>For example, press $\boxed{\text{math}}$ (key with multiple menus) to access MATH, NUM, DMS or R$\blacktriangleleft$$\blacktriangleright$P.</p>	
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0.8 Scrolling expressions and history

Press \blacktriangleleft or \blacktriangleright to move the cursor within an expression that you are entering or editing.

Press $\boxed{2\text{nd}}$ \blacktriangleleft to move the cursor directly to the beginning of the expression.

Press $\boxed{2\text{nd}}$ \blacktriangleright to move the cursor directly to the end of the expression.

Press \blacktriangleleft or \blacktriangleright to move the cursor through previous entries in the history. Pressing $\boxed{\text{enter}}$ from an input or output in history will copy and paste that expression back to the cursor position on the edit line.

Press $\boxed{2\text{nd}}$ \blacktriangleleft from the denominator of a fraction in the expressions edit to move the cursor to the history. Pressing $\boxed{\text{enter}}$ from an input or output in the history will paste that expression to the denominator.

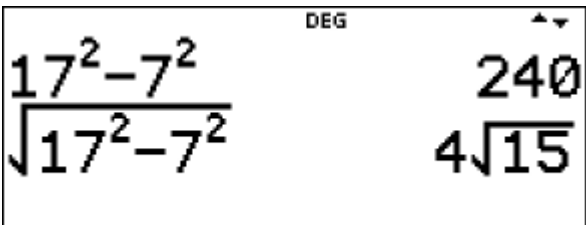
Example

Press $\boxed{x^2}$ to calculate the square of a value.

Use the TI-30X Plus MathPrint™ to calculate

(a) $17^2 - 7^2$.

(b) $\sqrt{17^2 - 7^2}$, giving your answer in exact form.

<p><i>Keystrokes and solution:</i></p> <p>(a)</p> <p>Enter 17 and press $\boxed{x^2}$ $\boxed{-}$.</p> <p>Enter 7 and press $\boxed{x^2}$ $\boxed{\text{enter}}$.</p> <p>$17^2 - 7^2 = 240$</p> <p>(b)</p> <p>Press $\boxed{2\text{nd}}$ $\boxed{[\sqrt{\quad}]}$ \blacktriangleleft \blacktriangleleft $\boxed{\text{enter}}$ $\boxed{\text{enter}}$.</p> <p>$\sqrt{17^2 - 7^2} = 4\sqrt{15}$</p>	
--	--

0.9 Answer toggle

Press $\left[\frac{\square}{\square}\right]$ to toggle the display result (when possible) between fraction and decimal answers, surd and decimal answers and multiples of π and decimal answers.

Example

Use the TI-30X Plus MathPrint™ to calculate $4\sqrt{15}$, giving your answer in decimal form.

<p><i>Keystrokes and solution:</i></p> <p>Enter $4\sqrt{15}$ (or using the last output from the previous example).</p> <p>Press $\left[\frac{\square}{\square}\right]$ to toggle between exact form and decimal form.</p> <p>$4\sqrt{15} = 15.49\dots$</p>	
---	--

0.10 Last answer

The last entry performed on the home screen is stored to the variable **ans**.

To recall the value of **ans**:

Press $\left[2^{nd}\right]$ $\left[answer\right]$ (**ans** displays on the screen), or

Press any operation key ($+$, $-$ etc.) in most edit lines as the first part of an entry.

ans and the operator are both displayed.

Example

<p><i>Keystrokes description:</i></p> <p>Enter 2 and press $\left[\times\right]$.</p> <p>Enter 2 and press $\left[enter\right]$.</p> <p>$2 \times 2 = 4$</p> <p>Press $\left[\times\right]$ and enter 2.</p> <p>Press $\left[enter\right]$.</p> <p>$2 \times 2 \times 2 = 8$</p> <p>Enter 3 and press $\left[2^{nd}\right]$ $\left[\sqrt{\square}\right]$ $\left[2^{nd}\right]$ $\left[answer\right]$ $\left[enter\right]$.</p> <p>$\sqrt[3]{2 \times 2 \times 2} = 2$</p>	
--	--

0.11 Order of operations

Order of operations hierarchy.

(1st) Expressions inside parentheses.
(2nd) Functions that need a closing bracket and precede the argument such as **sin**, **log** and all **R◀▶P** menu items.

(3rd) Functions that are entered after the argument, such as x^2 and angle unit modifiers.

(4th) Exponentiation (^) and roots.

In MathPrint™ mode, exponentiation using the x^{\square} key is evaluated from right to left.

For example, 2^{3^2} is evaluated as $2^{(3^2)} = 512$.

The TI-30X Plus MathPrint™ evaluates expressions entered with x^{\square} and $\left[\frac{\square}{\square}\right]$ from left to right in both Classic and MathPrint™ modes.

For example, pressing $2 \ x^{\square} \ x^{\square}$ is calculated as $(2^2)^2 = 16$.

(5th) Negation $\left[(-)\right]$.

(6th) Fractions.

(7th) Permutations (**nPr**) and combinations (**nCr**).

(8th) Multiplication, implied multiplication, division and angle indicator \angle .

(9th) Addition and subtraction.

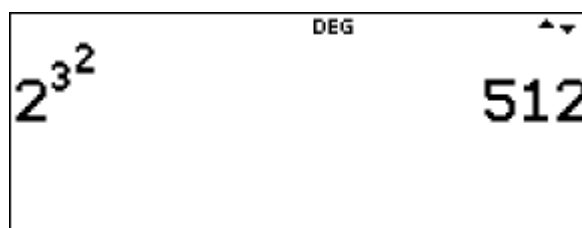
(10th) Logic operators **and**, **nand**.

(11th) Logic operators **or**, **xor**, **xnor**.

(12th) Conversions such as **▶n/d◀▶Un/d, F◀▶D, ▶DMS**.

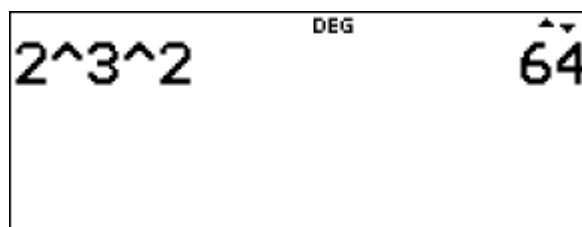
(13th) $\left[\text{sto}\rightarrow\right]$

(14th) $\left[\text{enter}\right]$ evaluates the input expression.



Note: In Classic mode, exponentiation using the x^{\square} key is evaluated from left to right. For example, 2^3^2 is evaluated as

$(2^3)^2 = 64$.

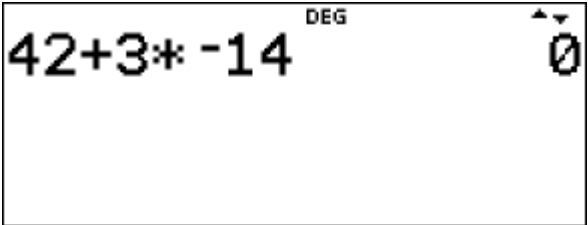
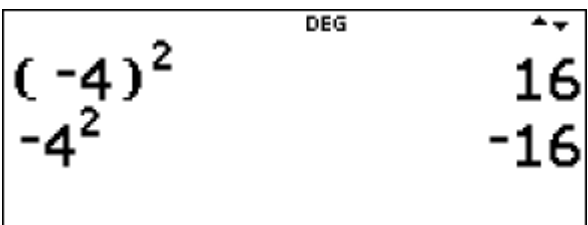


Example

Use the TI-30X Plus MathPrint™ to calculate

(a) $42 + 3 \times -14$.

(b) $(-4)^2$ and -4^2 .

<p><i>Keystrokes and solution:</i></p> <p>(a) $\times \div + -$</p> <p>Enter 42 and press $\boxed{+}$.</p> <p>Enter 3 and press $\boxed{\times} \boxed{(-)}$.</p> <p>Enter 14 and press $\boxed{\text{enter}}$.</p> <p>$42 + 3 \times -14 = 0$</p> <p>(b) $()$ and $-$</p> <p>Press $\boxed{(} \boxed{(-)}$ and enter 4.</p> <p>Press $\boxed{)} \boxed{x^2} \boxed{\text{enter}}$.</p> <p>$(-4)^2 = 16$</p> <p>Press $\boxed{(-)}$ and enter 4.</p> <p>Press $\boxed{x^2} \boxed{\text{enter}}$.</p> <p>$-4^2 = -16$</p>	 <p>The calculator display shows the expression $42+3*-14$ with the result 0 on the right. The mode is set to DEG.</p>  <p>The calculator display shows the expression $(-4)^2$ with the result 16 on the right, and -4^2 with the result -16 on the right. The mode is set to DEG.</p>
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0.12 Clearing and correcting

Press $\boxed{2nd} \boxed{\text{quit}}$ to return the cursor to the home screen.

Press $\boxed{\text{clear}}$ to clear an error message. It also clears characters on an entry line.

Press $\boxed{\text{delete}}$ to delete the character at the cursor. When the cursor is at the end of an expression, it will backspace and delete.

Press $\boxed{2nd} \boxed{\text{insert}}$ to insert (rather than replace) a character at the cursor.

Press $\boxed{2nd} \boxed{\text{clear var}} \boxed{1}$ to clear variables x, y, z, t, a, b, c, d back to their default values of 0.

0.13 Memory and stored variables

The TI-30X Plus MathPrint™ has eight memory variables, x, y, z, t, a, b, c and d .

Press $\boxed{\text{sto}\rightarrow}$ to store a variable and press $\boxed{x_{abcd}^{yzt}}$ to select the variable to store.

Press $\boxed{\text{enter}}$ to store the value in the selected variable.

$\boxed{x_{abcd}^{yzt}}$ is a multi-tap key that cycles through the variables x, y, z, t, a, b, c and d .

Press $\boxed{x_{abcd}^{yzt}}$ to recall and use the stored values for these variables. The variable, say y , is inserted into the current entry and the value assigned to y is used to evaluate the expression.

To recall values of variables, press $\boxed{2\text{nd}}$ [recall] to display a menu of variables and their stored values. Select the variable you wish to recall and press $\boxed{\text{enter}}$. The value assigned to the variable is inserted into the current entry and used to evaluate the expression.

Press $\boxed{2\text{nd}}$ [clear var] and select **1: Yes** to clear all variable values.

Example

Given that $x = 5$ and $y = 12$, use the TI-30X Plus MathPrint™ to find the value of $x^2 + y^2$.

<p><i>Keystrokes and solution:</i></p> <p>Press $\boxed{2\text{nd}}$ [clear var] $\boxed{1}$ to clear variables.</p> <p>Enter 5 and press $\boxed{\text{sto}\rightarrow}$ $\boxed{x_{abcd}^{yzt}}$ $\boxed{\text{enter}}$.</p> <p>Enter 12 and press $\boxed{\text{sto}\rightarrow}$ $\boxed{x_{abcd}^{yzt}}$ $\boxed{x_{abcd}^{yzt}}$ $\boxed{\text{enter}}$.</p> <p>Press $\boxed{2\text{nd}}$ [recall] $\boxed{1}$ $\boxed{x^2}$ $\boxed{+}$ $\boxed{2\text{nd}}$ [recall] $\boxed{2}$ $\boxed{x^2}$ $\boxed{\text{enter}}$.</p> <p>$x^2 + y^2 = 169$</p> <p>Note: This calculation can also be performed directly.</p>	<p>The calculator screen shows the following sequence of operations and results:</p> <ul style="list-style-type: none"> Initial state: DEG mode, cursor at 5. Store 5 to x: $5 \rightarrow x$ Store 12 to y: $12 \rightarrow y$ Calculate $x^2 + y^2$: $x^2 + y^2$ = 169 Direct calculation: $5^2 + 12^2$ = 169
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1 Basic mathematical functions

1.1 Fractions

In MathPrint™ mode, press $\boxed{\frac{\square}{\square}}$.

Press \ominus or \ominus to move the cursor between the numerator and denominator.

Fraction results are automatically simplified and the output is in improper fraction form.

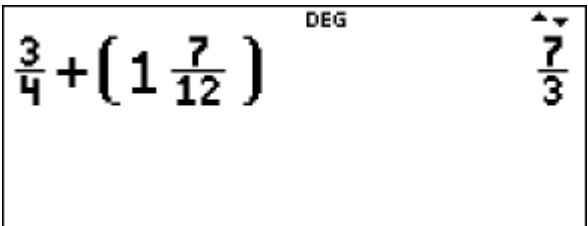
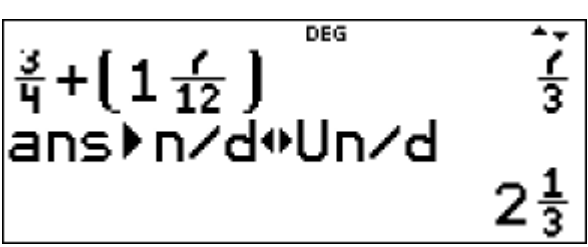
Use the \blacktriangleright n/d \blacktriangleleft Un/d conversion (press $\boxed{\text{math}}$ $\boxed{1}$) when a mixed number output is required.

Press $\boxed{2\text{nd}}$ $\boxed{\frac{\square}{\square}}$ to enter a mixed number. Use the arrow keys to cycle through the unit, numerator and denominator.

Example

Use the TI-30X Plus MathPrint™ to calculate $\frac{3}{4} + 1\frac{7}{12}$.

Give your answer as an improper fraction and as a mixed number.

<p><i>Keystrokes and solution:</i></p> <p>Press $\frac{\square}{\square}$ and enter 3.</p> <p>Press \ominus and enter 4.</p> <p>Press \rightarrow \oplus and enter 1.</p> <p>Press 2^{nd} $\frac{\square}{\square}$ and enter 7.</p> <p>Press \ominus and enter 12.</p> <p>Press enter.</p> $\frac{3}{4} + 1\frac{7}{12} = \frac{7}{3}$ <p>To give the answer as a mixed number:</p> <p>Press math 1 enter.</p> $\frac{3}{4} + 1\frac{7}{12} = 2\frac{1}{3}$	 <p>Note: Parentheses are added automatically.</p> 
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If decimal numbers are used or calculated in a fraction's numerator or denominator, the result will display as a decimal.

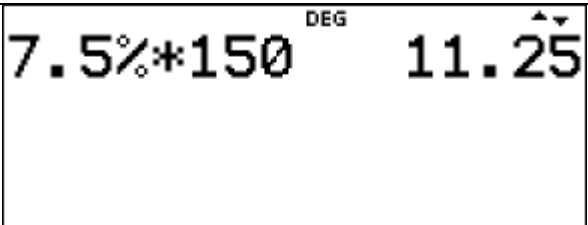
Press 2^{nd} $f\leftrightarrow d$ when attempting fraction to decimal conversions.

1.2 Percentages

Press 2^{nd} $\%$ after entering the value of the percentage.

Example

Use the TI-30X Plus MathPrint™ to calculate 7.5% of 150.

<p><i>Keystrokes and solution:</i></p> <p>Enter 7.5 and press 2^{nd} $\%$ \times.</p> <p>Enter 150 and press enter.</p> <p>7.5% of 150 is 11.25</p>	
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1.3 Pi (symbol pi)

To access π , press $\boxed{\pi}$ (multi-tap key).

Example

Use the TI-30X Plus MathPrint™ to find the area of a circle whose radius is 8 cm. Give your answer correct to one decimal place.

<p><i>Keystrokes and solution:</i></p> <p>Press $\boxed{\pi}$ $\boxed{\times}$ and enter 8.</p> <p>Press $\boxed{x^2}$ $\boxed{\text{enter}}$.</p> <p>This gives $A = 64\pi$.</p> <p>Press $\boxed{\rightarrow\approx}$ to convert to a decimal.</p> <p>$A = 201.1$ (cm²) correct to 1 dec. place.</p>	
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1.4 Surds

Example

Use the TI-30X Plus MathPrint™ to express $\frac{4}{2\sqrt{2}-\sqrt{3}}$ with a rational denominator.

<p><i>Keystrokes and solution:</i></p> <p>Press $\boxed{4}$ and enter 4.</p> <p>Press $\boxed{\ominus}$ and enter 2.</p> <p>Press $\boxed{\times}$ $\boxed{2\text{nd}}$ $\boxed{\sqrt{\quad}}$ and enter 2.</p> <p>Press $\boxed{\ominus}$ $\boxed{2\text{nd}}$ $\boxed{\sqrt{\quad}}$ and enter 3.</p> <p>Press $\boxed{\text{enter}}$.</p> $\frac{4}{2\sqrt{2}-\sqrt{3}} = \frac{4\sqrt{3}+8\sqrt{2}}{5}$	
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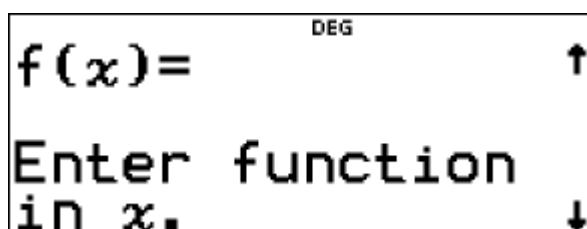
2 Function table feature

Press **table** to access the function table.



1: Add/Edit Func

Lets you define the function $f(x)$ or $g(x)$ or both and generates a table of values.



2: f(

Pastes **f(** to the home screen to evaluate the function at a point (for example, **f(5)**).

3: g(

Pastes **g(** to the home screen to evaluate the function at a point (for example, **g(2)**).

To set up a function table:

Press **table** **1** to select **Add/Edit Func**. [Press **clear** if required.]

Enter one or two functions as appropriate and press **enter**.

Select the **Start**, **Step**, **Auto**, or $x = ?$ options and press **enter**.

Press **⏪** and **⏩** to move around the function table feature.

Start: Specifies the starting value for the independent variable, x . It is set to start at **0**.

Step: Specifies the step value for the independent variable, x . The step can be positive or negative, but cannot be zero. It is set at **1**.

Auto: The TI-30X Plus MathPrint™ automatically generates a series of values for the dependent variable, y , based on the table start and the table step values.

$x = ?$: Lets you build a table manually for the dependent variable, y , by allowing entry of specific values for the independent variable, x .

To display a table, highlight **CALC** and press **enter**.

In function table view, press **clear** to display and edit the Table Setup wizard as needed.

Example

All people attending a party shook hands with each other as a way of exchanging a greeting. The number of handshakes, N , exchanged between x people at the party is given by

$$N(x) = \frac{x}{2}(x-1) \text{ where } x \in \mathbb{N}^+.$$

- Use the TI-30X Plus MathPrint™ function feature to find the number of handshakes that would be exchanged between 5, 10 and 50 people respectively.
- Given that 136 handshakes were exchanged, use the TI-30X Plus MathPrint™ function feature to determine how many people at the party shook hands.

Keystrokes and solution:

(a)

Press **table** **1** to access the function table.

[If required, press **clear**.]

Press **□** and press **x^{yzt}** to paste x .

Press **⏴** and enter **2**.

Press **⏴** **×** **(** **x^{yzt}** **-** and enter **1**.

Press **)** **⏴** **⏴**.

Move the cursor to highlight $x = ?$ and press **enter** (**CALC**) **enter**.

Enter **5** and press **enter**.

Enter **10** and press **enter**.

Enter **50** and press **enter**.

With 5 people, there are 10 handshakes.

With 10 people, there are 45 handshakes.

With 50 people, there are 1225 handshakes.

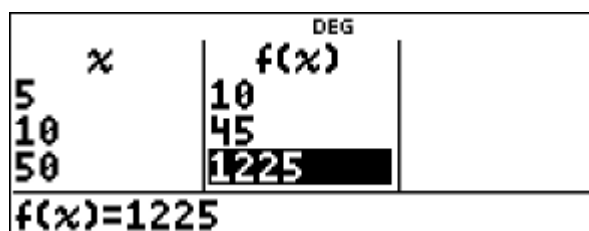
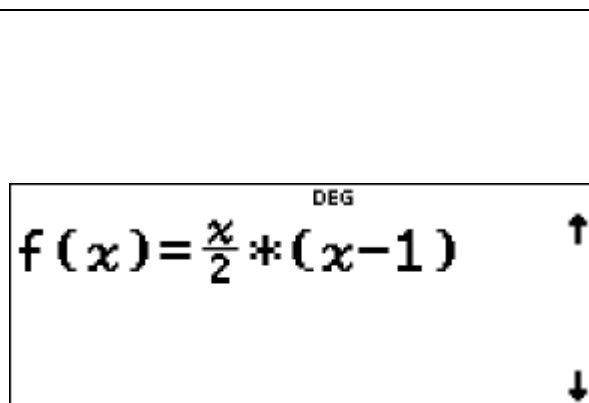
Alternatively, press **2nd** **[quit]** to go to the home screen.

Press **table** **2** and enter **5**.

Press **)** **enter**. So $f(5)$ is **10**.

Press **⏴** to go up and highlight $f(5)$.

Press **enter**.



Change $f(5)$ to $f(10)$ and press `enter`.

Repeat to change $f(10)$ to $f(50)$.

DEG

$f(5)$	10
$f(10)$	45
$f(50)$	1225

(b)

From part (a), we conclude that $x > 10$.

By entering values for x , starting with 15, for example, the two screenshots show that 17 people exchanged 136 handshakes.

DEG

x	$f(x)$
15	105
16	120
17	136

$x=17$

DEG

$f(15)$	105
$f(16)$	120
$f(17)$	136

3 Data editor and list formulas feature

Press `data` to access the data editor where you can enter data into lists **L1**, **L2** and **L3**. When editing a list, press `data` to access the **CLR**, **FORMULA** and **OPS** menus.

Use `⬅` `➡` `⬅` `➡` to highlight a cell in the data editor and then enter a value.

Press:

`delete` to delete a cell.

`enter` `clear` to clear the edit line of a cell.

`2nd` `quit` to return to the home screen.

`2nd` `⬅` to go to the top of a list.

`2nd` `➡` to go to the bottom of a list.

4 Stored operations feature

Press `2nd` `[set op]` to store an operation and press `2nd` `[op]` to paste an operation to the home screen. To set an operation and then recall it:

Press `2nd` `[set op]`.

Enter any combination of numbers, operations, and/or data values.

Press `enter` to store the operation.

Press `2nd` `[op]` to recall the stored operation and apply it to the last answer or the current entry.

If you apply `2nd` `[op]` directly to a `2nd` `[op]` result, a **n = 1** iteration counter is incremented.

Example

On a particular July day, a weather forecast listed the following predicted maximum temperatures.

Canberra 13°C

Sydney 18°C

Thredbo 2°C

The formula to convert from degrees Celsius to degrees Fahrenheit is given by the function

$$F(C) = \frac{9}{5}C + 32.$$

- (a) Convert these temperatures from degrees Celsius to degrees Fahrenheit using the TI-30X Plus MathPrint™
- (i) Data editor and list formulas feature.
 - (ii) Stored operations feature.
- (b) If Katoomba is predicted to have a maximum temperature of 9°C, use the TI-30X Plus MathPrint™ to convert this temperature to degrees Fahrenheit.

Keystrokes and solution:

(a) (i)

Using the data editor and list formulas feature:

Press **[data]**.

Press **[data]** **[4]** to clear all lists.

Enter **13** and press **[↵]**.

Repeat for **18** and **2**.

The three values should now be displayed in **L1**.

Press **[↵]** to scroll across to the top of **L2**.

Press **[data]** **[↵]** to highlight **FORMULA** and press **[1]**.

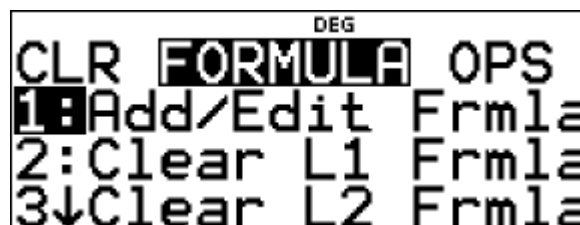
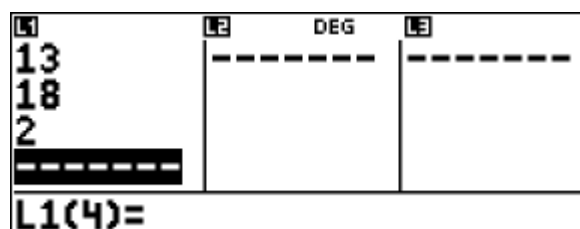
Now we enter the temperature conversion formula to **L2**.

Here we enter $\frac{9}{5}$ using the division key to ensure decimal outputs.

Enter **9** and press **[÷]**.

Enter **5** and press **[×]**.

Press **[data]** **[enter]** to paste **L1** into the author line.



Press $\boxed{+}$ and enter 32 .

Press $\boxed{\text{enter}}$.

L2 should now display the converted temperatures 55.4°F, 64.4°F and 35.6°F .

Note: These temperature conversions could also be performed using the function table feature.

(a) (ii)

Using the stored operations feature:

Press $\boxed{2\text{nd}}$ $\boxed{\text{set op}}$.

[If required, press $\boxed{\text{clear}}$ to clear any previous stored operations.]

Press $\boxed{\times}$ and enter 1.8 .

Press $\boxed{+}$ and enter 32 .

Press $\boxed{\text{enter}}$.

Enter 13 $\boxed{2\text{nd}}$ $\boxed{\text{op}}$.

Enter 18 $\boxed{2\text{nd}}$ $\boxed{\text{op}}$.

Enter 2 $\boxed{2\text{nd}}$ $\boxed{\text{op}}$.

The three converted temperatures are 55.4°F, 64.4°F and 35.6°F .

(b)

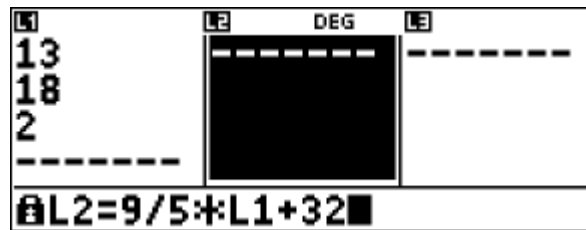
Using the data editor and list formulas feature:

Move to L1(4) = , enter 9 and press $\boxed{\text{enter}}$.

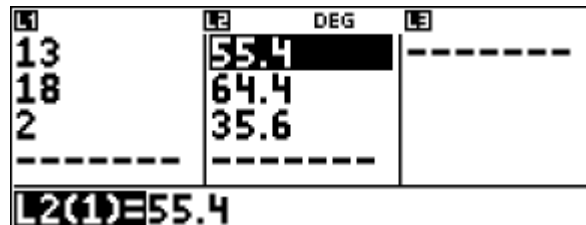
L2 should now display Katoomba's converted temperature of 48.2°F .

Using the stored operations feature:

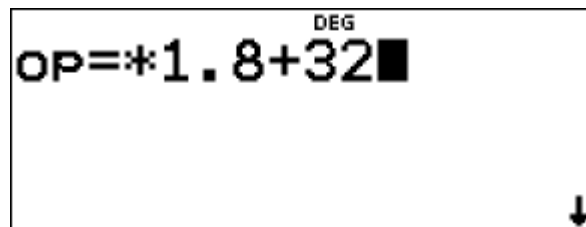
Enter 9 $\boxed{2\text{nd}}$ $\boxed{\text{op}}$.



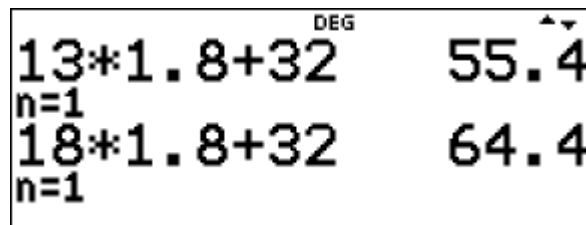
Calculator screen showing list editor. The list contains three rows: 13, 18, 2. The formula editor shows $L2=9/5*L1+32$.



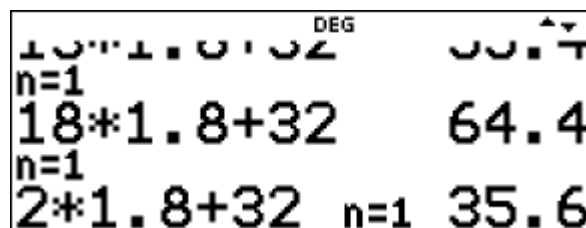
Calculator screen showing list editor. The list contains three rows: 13, 18, 2. The converted values are 55.4, 64.4, 35.6. The formula editor shows $L2(1)=55.4$.



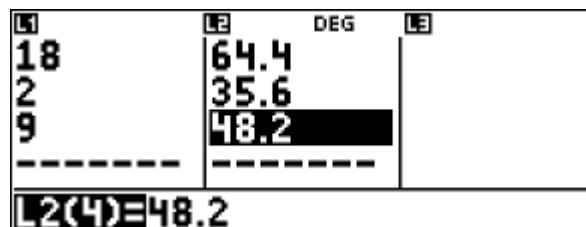
Calculator screen showing stored operation $OP=*1.8+32$.



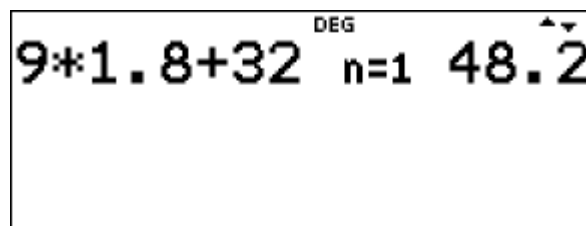
Calculator screen showing function table for three rows. The table shows the formula $13*1.8+32$ resulting in 55.4, $18*1.8+32$ resulting in 64.4, and $2*1.8+32$ resulting in 35.6.



Calculator screen showing function table for three rows. The table shows the formula $18*1.8+32$ resulting in 64.4, $2*1.8+32$ resulting in 35.6, and $9*1.8+32$ resulting in 48.2.



Calculator screen showing list editor. The list contains three rows: 18, 2, 9. The converted values are 64.4, 35.6, 48.2. The formula editor shows $L2(4)=48.2$.



Calculator screen showing stored operation $OP=*1.8+32$.

5 Expression evaluation feature

Press $\boxed{2\text{nd}}$ [expr-eval] to input and calculate an expression. Pressing $\boxed{2\text{nd}}$ [expr-eval] from a populated home screen expression pastes the content to **Expr =** .

If variables x, y, z, t, a, b, c and d are used in the expression, you will be prompted for values or use the stored values displayed for each prompt. The number stored in the variables will update in TI-30X Plus MathPrint™.

Example

Use the discriminant and the TI-30X Plus MathPrint™ to predict the number and nature of x -intercepts for the graph of $y = 2x^2 + 9x - 5$.

Keystrokes and solution:

Press $\boxed{2\text{nd}}$ [expr-eval].

[If required, press $\boxed{\text{clear}}$.]

$\boxed{x^{yzt}_{abcd}}$ is a multi-tap key that cycles through the variables x, y, z, t, a, b, c and d .

Continue to press $\boxed{x^{yzt}_{abcd}}$ until b appears.

Press $\boxed{x^2}$ $\boxed{-}$ and enter 4.

Press \boxed{x} and continue to press $\boxed{x^{yzt}_{abcd}}$ until a appears.

Press \boxed{x} and continue to press $\boxed{x^{yzt}_{abcd}}$ until c appears.

Press $\boxed{\text{enter}}$ $\boxed{\text{clear}}$ and enter 9.

Press $\boxed{\text{enter}}$ $\boxed{\text{clear}}$ and enter 2.

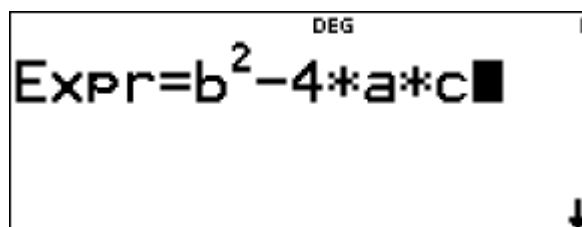
Press $\boxed{\text{enter}}$ $\boxed{\text{clear}}$ $\boxed{(-)}$ and enter 5.

Press $\boxed{\text{enter}}$.

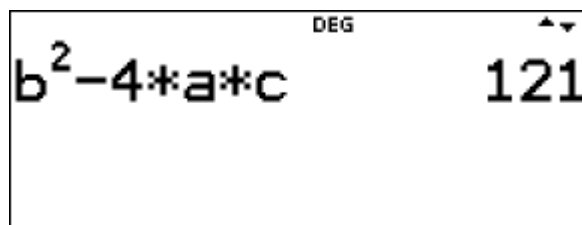
Substituting $a = 2, b = 9$ and $c = -5$ into $b^2 - 4ac$ gives $9^2 - 4(2)(-5) = 121$.

The discriminant is 121.

Since the discriminant is 11^2 , there are two rational x -intercepts, $(x = -5, \frac{1}{2})$.



DEG
Expr = $b^2 - 4 * a * c$

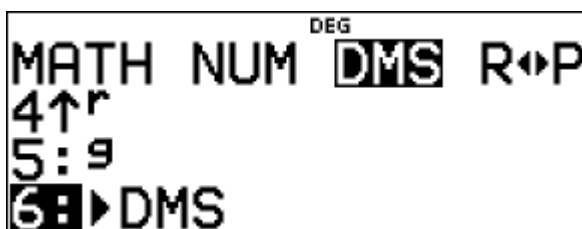
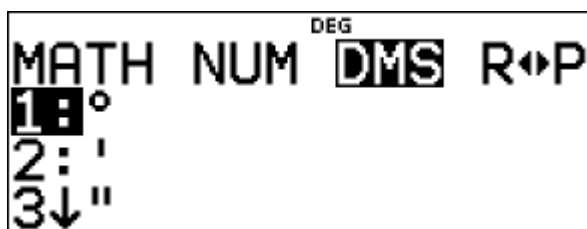


DEG
 $b^2 - 4 * a * c$ 121

6 Trigonometry

Press **[mode]** to choose an angle mode from the mode screen. Note that **DEG** is the default.

Press **[math]** **[>]** **[>]** to display the **DMS** menu.



Example

Use the TI-30X Plus MathPrint™ in radian mode to convert 45° to radians.

<p><i>Keystrokes and solution:</i></p> <p>Press [mode] [>] [enter] to be in radian mode.</p> <p>Enter 45 and press [math] [>] [>] [1] [enter].</p> <p>$45^\circ = \frac{\pi}{4}$</p>	<p>The calculator screen displays '45°' on the left, 'RAD' in the center, and $\frac{\pi}{4}$ on the right. The 'RAD' mode indicator is active.</p>
---	--

Example

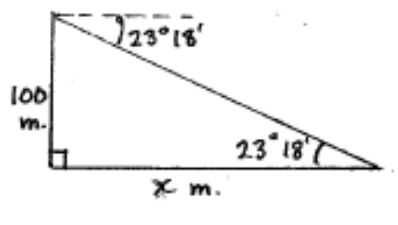
Use the TI-30X Plus MathPrint™ to convert 62.4° to an angle expressed in degrees, minutes and seconds. (Here angle mode is set to **DEG**.)

<p><i>Keystrokes and solution:</i></p> <p>Enter 62.4 and press [math] [>] [>] [6] [enter].</p> <p>$62.4^\circ = 62^\circ 24'$</p> <p>Note: The default calculation mode is decimal degrees.</p>	<p>The calculator screen displays '62.4 ▶DMS' on the left and '62°24'0"' on the right. The 'DEG' mode indicator is active.</p>
---	--

Example

The trigonometry keys, $\frac{\sin}{\sin^{-1}}$, $\frac{\cos}{\cos^{-1}}$ and $\frac{\tan}{\tan^{-1}}$, are multi-tap keys.

The angle of depression from a drone flying 100 metres above the water to a buoy at sea is $23^\circ 18'$. Find the horizontal distance from the drone to the buoy. Give your answer correct to one decimal place.

<p><i>Keystrokes and solution:</i></p> <p>The angle mode is DEG.</p> $\tan 23^\circ 18' = \frac{100}{x} \text{ and so } x = \frac{100}{\tan 23^\circ 18'}$ <p>Enter 100 and press $\frac{\square}{\square}$.</p> <p>Press $\frac{\tan}{\tan^{-1}}$ and enter 23.</p> <p>Press $\frac{\text{math}}{\text{math}}$ \rightarrow \rightarrow $\frac{1}{1}$ and enter 18.</p> <p>Press $\frac{\text{math}}{\text{math}}$ \rightarrow \rightarrow $\frac{2}{2}$ \rightarrow $\frac{\text{enter}}{\text{enter}}$.</p> <p>The horizontal distance is 332.2 metres, correct to one decimal place.</p> <p>Note: Press $\frac{\text{mode}}{\text{mode}}$ \rightarrow \rightarrow \rightarrow \rightarrow $\frac{\text{enter}}{\text{enter}}$ to set the decimal notation mode to a one decimal place output. FIX is displayed as an indicator at the top of the screen.</p>	 <div style="border: 1px solid black; padding: 5px; margin: 5px;"> <p style="text-align: right;">DEG</p> $\frac{100}{\tan(23^\circ 18')}$ <p style="text-align: right; font-size: 1.2em;">232.1974022</p> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> <p style="text-align: center;">FIX DEG</p> $\frac{100}{\tan(23^\circ 18')}$ <p style="text-align: right; font-size: 1.2em;">232.2</p> </div>
---	--

Example

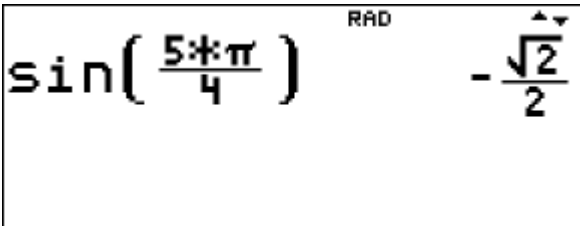
Use the TI-30X Plus MathPrint™ to convert $35^\circ 25'$ to radians. Give your answer

- (a) in terms of π .
- (b) correct to four decimal places.

<p><i>Keystrokes and solution:</i></p> <p>The angle mode is RAD.</p> <p>[Press $\frac{\text{mode}}{\text{mode}}$ \rightarrow $\frac{\text{enter}}{\text{enter}}$ to be in radian mode.]</p> <p>(a)</p> <p>Enter 35 and press $\frac{\text{math}}{\text{math}}$ \rightarrow \rightarrow $\frac{1}{1}$.</p> <p>Enter 25 and press $\frac{\text{math}}{\text{math}}$ \rightarrow \rightarrow $\frac{2}{2}$ \rightarrow $\frac{\text{enter}}{\text{enter}}$.</p> $35^\circ 25' = \frac{85\pi}{432}$ <p>(b)</p> <p>Press $\frac{\leftrightarrow}{\leftrightarrow}$ and so $35^\circ 25' = 0.6181$ (4 dp).</p>	<div style="border: 1px solid black; padding: 5px; margin: 5px;"> <p style="text-align: right;">RAD</p> $35^\circ 25' \quad \frac{85\pi}{432}$ </div> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> <p style="text-align: right;">RAD</p> $35^\circ 25' \quad \frac{85\pi}{432}$ $\frac{85\pi}{432} \leftrightarrow$ <p style="text-align: right; font-size: 1.2em;">0.618137443</p> </div>
--	--

Example



Use the TI-30X Plus MathPrint™ to find the exact value of $\sin \frac{5\pi}{4}$.

<p><i>Keystrokes and solution:</i></p> <p>The angle mode is RAD.</p> <p>Press $\left[\frac{\sin}{\sin} \right]$ $\left[\frac{\pi}{\pi} \right]$ and enter 5.</p> <p>Press $\left[\times \right]$ $\left[\frac{\pi}{\pi} \right]$ $\left[\div \right]$ and enter 4.</p> <p>Press $\left[\downarrow \right]$ $\left[\right]$ $\left[\text{enter} \right]$.</p> $\sin \frac{5\pi}{4} = -\frac{\sqrt{2}}{2}.$	
--	--

7 Statistics and probability

Press $\left[\text{data} \right]$ to enter and edit lists (see data editor and list formulas feature).

Press $\left[2\text{nd} \right]$ $\left[\text{stat-reg/distr} \right]$ to access the **STAT-REG** menu or the **DISTR** menu.

	
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Example

Two companies, A and B, produce packets of chips which are labelled as having a weight of 50 grams. A random sample of 10 packets is taken from each company. Each packet is weighed and the results, in grams, are as follows.

Company A: 50.0, 50.6, 50.0, 50.4, 49.2, 49.0, 51.4, 50.1, 47.4, 51.9

Company B: 51.0, 50.9, 51.1, 51.5, 51.3, 50.2, 50.6, 50.0, 50.5, 50.9

- (a) For each company's data, use the TI-30X Plus MathPrint™ to calculate the
- mean weight.
 - five-number summary.
 - interquartile range.
- (b) What, if anything, can be concluded about the manufacturing processes of the two companies?

Keystrokes and solution:

Using the data editor and list formulas feature:

Press **[data]**.

Press **[data]** **[4]** to clear all lists.

Enter the Company A data in **L1**. Start by entering **50.0** and pressing **[down]** (or **[enter]**).

Press **[right]** to scroll across to the top of **L2**.

Enter the Company B data in **L2**. Start by entering **51.0** and pressing **[down]** (or **[enter]**).

Press **[2nd]** **[stat-reg/distr]** to access the statistics menu.

Press **[2]** to access **1-Var Stats**.

Select **L1** and press **[down]** **[down]** **[enter]** (**CALC**) to calculate the results for Company A.

(a) (i) Company A

$$\bar{x} = 50 \text{ (grams)}$$

(a) (ii) Company A

The five-number summary is $[47.4, 49.2, 50.05, 50.6, 51.9]$.

L1	L2	DEG	LE
50	51		-----
50.6	50.9		
50	51.1		
50.4	51.5		
L1(1)=50			

L1	L2	DEG	LE
51.4	50.6		
50.1	50		
47.4	50.5		
51.9	50.9		
L2(10)=50.9			

DEG			
1-Var Stats			↑
DATA:	L1	L2	L3
FREQ:	ONE	L1	L2 L3
CALC			

DEG			
1-Var: L1, 1			
1: n=10			
2: \bar{x} =50			
3: s_x =1.269295518			

DEG			
1-Var: L1, 1			
7: minX=47.4			
8: Q1=49.2			
9: Med=50.05			

DEG			
1-Var: L1, 1			
9: Med=50.05			
: Q3=50.6			
: maxX=51.9			

Press $\boxed{2nd}$ [stat-reg/distr] to access the statistics menu.

Press $\boxed{2}$ to access **1-Var Stats**.

Press $\boxed{\rightarrow}$ \boxed{enter} to select **L2** and press \boxed{enter} .

Press $\boxed{\odot}$ \boxed{enter} (**CALC**) to calculate the results for Company B.

(a) (i) Company B

$$\bar{x} = 50.8 \text{ (grams)}$$

(a) (ii) Company B

The five-number summary is [50,50.5,50.9,51.1,51.5].

Using **StatVars**:

Press $\boxed{2nd}$ [stat-reg/distr] to return to the statistics menu.

Press $\boxed{2}$ to access **1-Var Stats**.

Ensure **L1** is selected and press \boxed{enter} .

Press $\boxed{\odot}$ $\boxed{\odot}$ \boxed{enter} to again calculate the results for Company A.

Press $\boxed{\leftarrow}$ $\boxed{\leftarrow}$, select **Q3** and press \boxed{enter} $\boxed{=}$.

Press $\boxed{2nd}$ [stat-reg/distr] $\boxed{1}$ to return to **StatVars**.

Press $\boxed{8}$ (or scroll up or down until **Q1** is selected) and press \boxed{enter} .

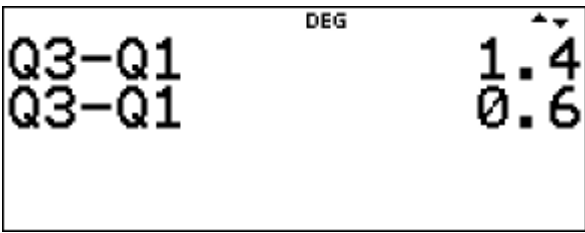
The Home screen should show **Q3-Q1**.

Press \boxed{enter} .

```
DEG
1-Var:L2,1
1:n=10
2:x=50.8
3:σx=0.47375568
```

```
DEG
1-Var:L2,1
7↑minX=50
8:Q1=50.5
9↓Med=50.9
```

```
DEG
1-Var:L2,1
9↑Med=50.9
:Q3=51.1
:maxX=51.5
```

<p>(a) (iii) Company A</p> $\text{IQR} = Q_3 - Q_1 = 1.4 \text{ (grams)}$ <p>(a) (iii) Company B</p> <p>Repeat the above instructions ensuring that L2 is selected.</p> $\text{IQR} = Q_3 - Q_1 = 0.6 \text{ (grams)}$ <p>(b)</p> <p>Company A produces packets of chips with a weight centred closer to 50 grams than Company B, but with greater variation (using the IQR) in the weights. Company B produces packets of chips centred slightly greater than 50 grams whereas some of the packets produced by Company A are less than 50 grams.</p>	 <p>The image shows a TI-30X Plus calculator display. At the top, it says 'DEG'. Below that, the first line shows 'Q3-Q1' followed by '1.4'. The second line shows 'Q3-Q1' followed by '0.6'. There are small arrow icons to the right of the numbers.</p>
--	--

Example

The length measurements (correct to the nearest cm) of the femur bone and humerus bone of a particular species of fossil are shown in the following table.

Femur length (x)	60	57	65	39	75
Humerus length (y)	71	64	73	42	85

- (a) Use the TI-30X Plus MathPrint™ to determine the least-squares regression line. Give your answer in the form $y = ax + b$ where a, b are expressed correct to two decimal places.
- (b) Use the least-squares regression line found in part (a) to estimate the length of a humerus bone of this species of fossil whose femur length is 48 cm. Give your answer correct to the nearest centimetre.

<p><i>Keystrokes and solution:</i></p> <p>Using the data editor and list formulas feature:</p> <p>Press data.</p> <p>Press data 4 to clear all lists.</p> <p>Enter the femur bone lengths in L1. Start by entering 60 and pressing ↵ (enter).</p>	
--	--

Press \leftarrow to scroll across to the top of **L2**.

Enter the humerus bone lengths in **L2**.
Start by entering **71** and pressing \rightarrow (or **enter**).

L1	L2	DEG	L3
60	71		-----
57	64		
65	73		
39	42		
L1(1)=60			

Press **2nd** [stat-reg/distr] to access the statistics menu.

METHOD 1:

Press **3** to access **2-Var Stats**.

Select **L1** for **xDATA** and select **L2** for **yDATA**.

2-VAR STATS				DEG	
xDATA:	L1	L2	L3		↑
yDATA:	L1	L2	L3		
FREQ:	ONE	L1	L2	L3	
					CALC

Press \rightarrow to highlight **CALC** and press **enter**.

(a)

Scrolling up or down we obtain:

$a = 1.196\dots$ and $b = -3.856\dots$

2-Var:L1,L2,1		DEG
↑	$a = 1.1969001148$	
:	$b = -3.856486797$	
↓	$r^2 = 0.988331382$	

The least-squares regression line is
 $y = 1.20x - 3.86$ (2 dp).

(b)

In **StatVars**, scroll up or down to locate **y'(** and press **enter**.

2-Var:L1,L2,1		DEG
↑	y'(
:	$\text{min}X = 39$	
↓	$\text{max}X = 75$	

Enter **48** and press **)** **enter**.

Hence, correct to the nearest centimetre, the humerus bone length is estimated to be 54 cm.

y'(48)		DEG
		↕
		53.59471871

METHOD 2:

Press $\boxed{2\text{nd}}$ [stat-reg/distr] to access the statistics menu.

Press $\boxed{4}$ to access LinReg $ax+b$.

Select the options as shown at right.

Press \odot to highlight **CALC** and press $\boxed{\text{enter}}$.

(a)

$$a = 1.196\dots \text{ and } b = -3.856\dots$$

The least-squares regression line is $y = 1.20x - 3.86$ (2 dp).

(b)

Press $\boxed{\text{table}}$ $\boxed{2}$ and enter 48.

Press $\boxed{)} \boxed{\text{enter}}$.

Hence, correct to the nearest centimetre, the humerus bone length is estimated to be 54 cm.

```
DEG
STAT-REG DISTR
2↑1-VAR STATS
3:2-VAR STATS
4↓LinReg ax+b
```

```
DEG
xDATA: L1 L2 L3 ↑
yDATA: L1 L2 L3
FREQ: ONE L1 L2 L3
Re9EQ→: NO  $\boxed{\text{F(0)}} \text{g}(x)$ 
y=a.x+b CALC
```

```
DEG
ax+b: L1, L2, 1
1: a=1.1969001148
2: b=-3.856486797
3↓r2=0.988331382
```

```
DEG
FUNCTION TABLE
1: Add/Edit Func
2: f(
3: g(
```

```
DEG
f(48)
53.59471871
```

Example

A Mathematics test consists of 10 multiple choice questions each of which has five possible answers. A student makes a random guess at each of the questions.

Use the TI-30X Plus MathPrint™ to find the probability that they guess five correct answers.

Give your answer correct to four decimal places.

Keystrokes and solution:

Let X represent the number of correct answers and $X \sim \text{Bin}(10, 0.2)$.

We need to find $P(X = 5)$.

Press $\boxed{2\text{nd}}$ [stat-reg/distr] \odot to access the probability distributions menu.

Press $\boxed{4}$ (or scroll down) to select **Binomialpdf**.

Select **SINGLE** and press \ominus .

Enter the required values for n , p and x as shown at right.

Press \ominus to highlight **CALC** and press $\boxed{\text{enter}}$.

So $P(X = 5) = 0.0264$ (4 dp).

Note: If you need to use **Binomialpdf** again, press \ominus to highlight **SOLVE AGAIN** and press $\boxed{\text{enter}}$. Otherwise highlight **QUIT** and press $\boxed{\text{enter}}$. If your probability is required in a further calculation, it can be stored to a variable.

```
STAT-REG DISTR
2↑Normalcdf
3:invNormal
4↓Binomialpdf
```

```
Binomialpdf SINGLE ↑
TRIALS=n=10
p(SUCCESS)=0.2
x=5
CALC
```

```
Binomialpdf SINGLE ↑
VALUE=0.0264241152
STORE:  $\boxed{N}$  y z t a b c d
SOLVE AGAIN QUIT
```

Example

If X has a normal distribution with mean $\mu = 28$ and standard deviation $\sigma = 1.7$, find $P(X \leq 32)$. Give your answer correct to four decimal places.

Keystrokes and solution:

$$X \sim N(28, 1.7^2)$$

Press $\boxed{2\text{nd}}$ [stat-reg/distr] \odot to access the probability distributions menu.

Press $\boxed{2}$ to select **Normalcdf**.

Enter the required values for μ and σ .

Ensure that the lower bound is a large negative number, for example **-1E99**, and enter **32** for the upper bound.

Press \ominus to highlight **CALC** and press $\boxed{\text{enter}}$.

```
STAT-REG DISTR
1:Normalpdf
2:Normalcdf
3↓invNormal
```

```
Normalcdf ↑
VALUE=0.9906872273366
STORE:  $\boxed{N}$  x y z t a b c d
SOLVE AGAIN QUIT
```

So $P(X \leq 32) = 0.9907$ (4 dp).	
------------------------------------	--