FX 300 MS Training guide

Tools
FX 300 MS Calculator
Overhead OH 300 MS

Handouts
Applicable activities
Activities for the Classroom FX-300 Scientific Calculator

Other materials
Quick Reference Guide (inside the calculator cover)

Key Points/ Overview
- Two line display
- VPAM to show formulas as in textbooks (Visually Perfect Algebraic Method)
- Fraction key; Mixed number vs. improper fractions
- Recall and edit function
- Statistics mode including standard deviation and regression

Content

BASIC ARITHMETIC CALCULATIONS Mode 1 (Comp) Computation
Making Corrections During Input
Replay Function
Order of Operations
Display Format (FIX, SCI, Norm)
Fraction Display
Decimal-Fraction Conversion
Angle Display
Initial Defaults
Percentage Calculations
Degrees/Minutes/Seconds
Memory Calculations
Answer Memory
Consecutive Calculations
Independent Memory
Variables
Clearing Memory
Powers/Square Roots/Cube Root, nth roots
Probability Calculations/Random Number/Factorials
Trigonometry
Trigonometric/Inverse Trigonometric Functions
Hyperbolic/ Inverse Hyperbolic Functions
Convert Radians to Degrees
Coordinate Conversion
Logarithms/Natural Logarithms

STATISTICAL CALCULATIONS
Standard Deviation Mode 2 (SD) Standard Deviation
Regression Mode 3 (Reg) Regression

References the Casio FX-300 MS User’s Guide Casio FX-300MS Scientific calculator
FX 300 MS Training guide

Basic Arithmetic Calculations

Making Corrections During Input
- Use the left and right arrows on the REPLAY function to move the cursor to the location you want to correct.
- Press [DEL] to delete at the current cursor position
- Press [SHIFT] [INS] to change the cursor to an insert cursor [ ].

Replay Function
Every time you perform a calculation, the replay function stores the calculation formula and its result in replay memory. Pressing the up arrow displays the formula and result of the calculation you last performed. If you continue to press the up arrow, you will scroll sequentially through your last calculations (most recent to oldest).

Notes:
Replay memory capacity is 128 bytes.
Pressing AC will not clear the replay memory.
If you want to clear the replay memory, press the ON key or reset the modes/settings:
Press [SHIFT] [CLR] [2] [=] or [SHIFT] [CLR] [3] [=] .

Order of Operations
The calculator uses “order of operations”.
Examples:  
2 + 3 \times 4 = 14  \quad \text{You do not need parentheses around 3 \times 4.}  
(2 + 3) \times 4 = 20  \quad \text{Use Replay and [SHIFT] [INS] to add parentheses.}  
\begin{align*}  
- 2^2 &= -4  
\text{Blinking [ ] is the insert cursor.}  
(-2)^2 &= 4
\end{align*}

Display Format
To change the exponential display format, press the [MODE] key 3 times.

Fixed number of decimal places:  Press 1: FIX  
You will then be prompted for the number of decimal places (0 – 9).

Scientific Notation:  Press 2: SCI  
You will then be prompted for the number of significant digits (0 – 9).

Normal Notation:  Press 3: NORM  
You will then be prompted for NORM 1 or NORM 2.

NORM 1 uses exponential notation for integers with more than 10 digits and decimal values with more than 2 decimal places.  \text{Ex/ } 1 \div 1000 = 1 \times 10^3

NORM 2 uses exponential notation for integers with more than 10 digits and decimal values with more than 9 decimal places.  \text{Ex/ } 1 \div 1000 = .001
FX 300 MS Training guide

Fraction Display
You can use the display set up screen to specify the display format when a fraction calculation result is greater than one. To set the fraction display, press the [MODE] key 4 times and press “1” for Display (DISP).

Example

Mixed Fraction: Press 1: a b/c
\[ \frac{3}{2} + \frac{4}{3} = \frac{5}{6} \]

Improper Fraction: Press 2: d/c
\[ \frac{3}{2} + \frac{4}{3} = \frac{17}{6} \]

Decimal-Fraction Conversion
Examples:

<table>
<thead>
<tr>
<th>Keystrokes</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enter [2.75] [=]</td>
<td>2.75</td>
</tr>
<tr>
<td>Press [a b/c]</td>
<td>2 ( \frac{3}{4} )</td>
</tr>
<tr>
<td>[SHIFT] [d/c]</td>
<td>( \frac{11}{4} )</td>
</tr>
</tbody>
</table>

Angle Display
To set the angle unit at degrees, radians, or grads, press the [MODE] key 2 times.

Degrees Press 1
Radians Press 2
Grads Press 3

Initial Defaults
To return the calculation mode and setup to the initial defaults, press [SHIFT] [CLR] [2] [\=]. This will return the calculator to the following settings:

Calculation mode COMP
Angle unit Deg
Exponential display format Norm 1
Fraction display format a b/c
Decimal point character Dot

Percentage Calculations
Examples:

<table>
<thead>
<tr>
<th>Keystrokes</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>To find percentage of a number. 12% of 15</td>
<td>[15] [( \times )] [12] [SHIFT] [%]</td>
</tr>
<tr>
<td>To calculate percentage of one number to another. What percentage of 80 is 40?</td>
<td>[40] [( \div )] [80] [SHIFT] [%]</td>
</tr>
</tbody>
</table>
FX 300 MS Training guide

To add a percentage.
15% to 1000

[1000] [x] [15] [SHIFT] [%] [+]

1150

To discount a percentage.
85 by 10%

[85] [x] [10] [SHIFT] [%] [-]

76.5

% change, when a value is increased.
From 30 to 36

[36] [-] [30] [SHIFT] [%]

20

Degrees/Minutes/Seconds
You can perform calculations using degrees, minutes, and seconds, and convert between sexagesimal and decimal values.

Examples:
Keystrokes
[2.5] [=] 2.5
Press [°, ′, ″] 2° 30′ 0″
[10] [°, ′, ″] [15] [°, ′, ″] [12] [°, ′, ″] [x] [4] [=] 41° 0′ 48″

Memory Calculations
There are different types of memory available:
Answer Memory, Consecutive Calculations, Independent Memory, and Variables.

Answer Memory
Whenever you press [=] after inputting values or an expression, the calculated result automatically updates the Answer Memory contents by storing the result. You can recall it by pressing [ANS].

Consecutive Calculations
You can use the calculation result that is currently on display (and also stored in Answer Memory) as the first value of your next calculation.

Independent Memory
Independent Memory uses the memory area in variable M and is convenient for calculating cumulative totals.
To add a value to M, press [M+].
To subtract a value from M, press [SHIFT] [M-].
To recall the value of M, press [RCL] [M].

Variables
There are 9 variables available (including M) to store data (A through F, M, X, and Y).
To add a value to memory letter A, enter the value and press [SHIFT] [STO] [A].
To recall the value of A, press [RCL] [A]. Note: Do NOT use the ALPHA key.

Clearing Memory
To clear independent memory, press [0] [SHIFT] [STO] [M] (this stores 0 in M).
To delete data assigned to a specific variable, press [0] [SHIFT] [STO] <> (enter the letter you want to clear, without pressing the ALPHA key).
To clear the values assigned to all of the variables, press [SHIFT] [CLR] [1] [=].
Powers/Square Roots/Cube Root, nth roots

To square a number: Use the \([x^2]\) key
Example: \([5][x^2][=]\ 25\)

To cube a number: Use the \([x^3]\) key
Example: \([3][x^3][=]\ 27\)

To raise a number to a power
(other than 2 or 3): Use the \([\lambda]\) key
Example: \([2][\lambda][4]=16\)

To find a square root: Use the \([\sqrt{ }]\) key
Example: \([\sqrt{ }][25][=]\ 5\)

To find a cube root: Use the \([3\sqrt{ }]\) key
Example: \([\text{SHIFT}][3\sqrt{ }][27][=]\ 3\)

To find a root
(other than square or cube root): Example: \([4][\text{SHIFT}][x^{\frac{1}{3}}][81]=3\)

To find a reciprocal: Use the \([x^{-1}]\) key
Example: \([5][x^{-1}][=]\ .2\)
Note: Press [a b/c] and the display will change to 1/5.

Probability Calculations/ Random Number/ Factorials

Permutations A permutation is a selection of objects in which the order of the objects matters. Example: To determine the possible number of different arrangements using 4 items selected from 10 items.
\([10][\text{SHIFT}][nPr][4][=]\ 5040\)

Combinations A combination is a selection of objects from a collection and order is irrelevant. Example: To determine the number of different combinations of 4 items selected from 10 items
\([10][nCr][4][=]\ 210\)

Factorials To calculate a factorial, use [SHIFT] [x!]

Random Number To generate a random number between 0 and 1, press [SHIFT] [Ran#] [=]
FX 300 MS Training guide

Trigonometry

Trigonometric/Inverse Trigonometric Functions
You can use sin, cos and tan to calculate and solve trigonometric equations.

Examples (in degree mode):
Keystrokes               Display
[sin] [30] [=]                0.5
[SHIFT] [sin] [.5] [=]            30

Hyperbolic/Inverse Hyperbolic Functions

Examples (in degree mode):
Keystrokes               Display
[hyp] [sin] [3.6] [=]       18.28545536
[SHIFT] [hyp] [sin] [30] [=]   4.094622224
Or
[hyp] [SHIFT] [sin] [30] [=]

Convert Radians to Degrees
To convert Radians to Degrees, put the calculator in Degree mode.
Example:  \( \pi \) radians to degrees

To convert Degrees to Radians, put the calculator in Radian mode.
Example:  180 degrees to radians
Press [180] [SHIFT] [DRG] and press [1] for Degrees [=] 3.141592654

Coordinate Conversion
You can convert from polar to rectangular and from rectangular to polar. The calculation results are automatically assigned to variables E and F. Note: For both examples, be sure you are in degree mode.

To convert polar coordinates \((r, \theta)\) to rectangular coordinates \((x, y)\).
Example: To convert \((r = 2, \theta = 60)\) to rectangular coordinates:
Press [SHIFT] [REC] [2] [,] [60] () [=] 1 (x value)
[RCL] [F]                   1.732050808 (y value)

To convert rectangular coordinates \((x, y)\) to polar coordinates \((r, \theta)\).
Example: To convert \((x = 1, y = \sqrt{3})\) to rectangular coordinates:
[RCL] [F]                   60 (\(\theta\) value)
Logarithms/Natural Logarithms

You can find logarithms, natural logarithms, and antilogarithms.

Examples:

<table>
<thead>
<tr>
<th>Keystrokes</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>[log] [100] [=]</td>
<td>2</td>
</tr>
<tr>
<td>[ln] [90] [=]</td>
<td>4.49980967</td>
</tr>
<tr>
<td>[ln] [ALPHA] [e]</td>
<td>1</td>
</tr>
<tr>
<td>[SHIFT] [e^x] [1] [=]</td>
<td>2.718281828</td>
</tr>
<tr>
<td>[SHIFT] [10^x] [2] [=]</td>
<td>100</td>
</tr>
</tbody>
</table>
FX 300 MS Training guide

Standard Deviation

Use the [MODE] key to enter the Standard Deviation (SD) mode when you want to perform statistical calculations using standard deviation. [MODE] [2]

- To clear statistical memory, press [SHIFT] [CLR] [1] [=].
- To enter data, use the following key sequence: <value> [DT]
- Input data is used to calculate the following values:

  Sum of the squares ($\sum x^2$) [SHIFT] [S-SUM] [1]
  Sum of data ($\sum x$) [SHIFT] [S-SUM] [2]
  Number of data items (n) [SHIFT] [S-SUM] [3]
  Mean of the data [SHIFT] [S-VAR] [1]
  Population standard deviation $\sigma n$ [SHIFT] [S-VAR] [2]
  Sample standard deviation $\sigma n^{\frac{1}{2}}$ [SHIFT] [S-VAR] [3]

Key points to note:
- [DT] [DT] inputs the same data twice
- You can input multiple entries of the same data using [SHIFT] [:]. To input 100 ten times, press [100] [SHIFT] [:] [10] [DT]
- You can scroll through the data you entered using the up and down arrows on the REPLAY button.
- You can edit the displayed data by inputting a new value and then pressing the [=] key to replace it. If you use the [DT] key (and not the [=] key), this will register the value you input as a new data item and will leave the old value as is.
- If you want to perform statistical calculations, always press the [AC] key first to exit the data display.
- To delete a data value that is displayed, press [SHIFT] [CL].
- If you switch to another MODE, you will no longer be able to display or edit your data.
Regression

Use the [MODE] key to enter the Regression (REG) mode when you want to perform statistical calculations using regression. [MODE] [3]

When you enter Regression mode, you can select from 6 types of regression:

- Linear regression → [1] (Lin)
- Logarithmic regression → [2] (Log)
- Exponential regression → [3] (Exp)
- Power regression → [1] (Pwr)
- Inverse regression → [2] (Inv)
- Quadratic regression → [3] (Quad)

- To clear statistical memory, press [SHIFT] [CLR] [1] [=].
- To enter data, use the following key sequence: <x data>, <y data> [DT]
- The values produced by a regression calculation depend on the values input. Results can be recalled using the following:

  - $\sum x^2$ [SHIFT] [S-SUM] [1]
  - $\sum x$ [SHIFT] [S-SUM] [2]
  - $n$ [SHIFT] [S-SUM] [3]
  - $\sum y^2$ [SHIFT] [S-SUM] → [1]
  - $\sum y$ [SHIFT] [S-SUM] → [2]
  - $\sum xy$ [SHIFT] [S-SUM] → [3]
  - Mean of the x data [SHIFT] [S-VAR] [1]
  - Population standard deviation (x) [SHIFT] [S-VAR] [2]
  - Sample standard deviation (x) [SHIFT] [S-VAR] [3]
  - Mean of the y data [SHIFT] [S-VAR] → [1]
  - Population standard deviation (y) [SHIFT] [S-VAR] → [2]
  - Sample standard deviation (y) [SHIFT] [S-VAR] → [3]
  - Regression coefficient A [SHIFT] [S-VAR] → → [1]
  - Regression coefficient B [SHIFT] [S-VAR] → → [2]

For regression calculations other than quadratic regression:

  - Correlation coefficient r [SHIFT] [S-VAR] → → [3]
  - Estimate x [SHIFT] [S-VAR] → → [1]
  - Estimate y [SHIFT] [S-VAR] → → [2]

For quadratic regression:

  - $\sum x^3$ [SHIFT] [S-SUM] → → [1]
  - $\sum x^2 y$ [SHIFT] [S-SUM] → → [2]
  - $\sum x^4$ [SHIFT] [S-SUM] → → [3]
  - Regression coefficient C [SHIFT] [S-VAR] → → [3]
  - Estimate $x_1$ [SHIFT] [S-VAR] → → [1]
  - Estimate $x_2$ [SHIFT] [S-VAR] → → [2]
  - Estimate y [SHIFT] [S-VAR] → → [3]

References the Casio FX-300 MS User's Guide