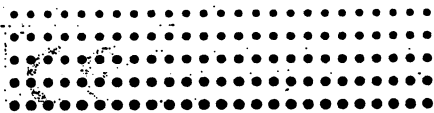
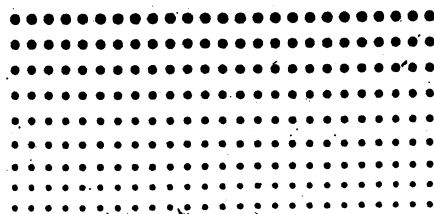


CASIO COMPUTER CO., LTD.  
6-2, Hon-machi 1-chome  
Shibuya-ku, Tokyo 151-8543, Japan

**CASIO.**

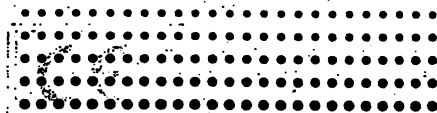


*fx-82TL*  
*fx-83WA*  
*fx-85W*  
*fx-85WA*  
*fx-270W PLUS*  
*fx-300W*  
*fx-350TL*  
*fx-911W*  
**User's Guide**

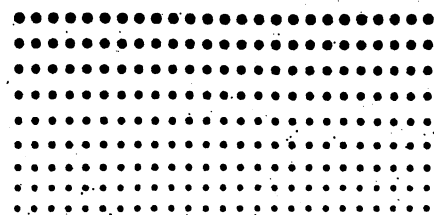


CASIO COMPUTER CO., LTD.  
6-2, Hon-machi 1-chome  
Shibuya-ku, Tokyo 151-8543, Japan

**CASIO.**



*fx-82TL*  
*fx-83WA*  
*fx-85W*  
*fx-85WA*  
*fx-270W PLUS*  
*fx-300W*  
*fx-350TL*  
*fx-911W*  
**User's Guide**



## Removing and Replacing the Calculator's Cover

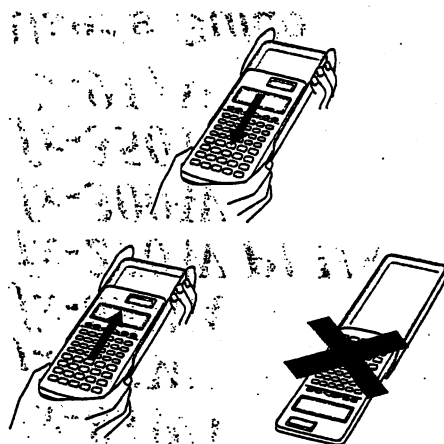
### • To Remove the cover

Grasp the top of the cover, and slide the unit out from the bottom.

### • To Replace the cover

Grasp the top of the cover, and slide the unit in from the bottom.

Always slide the unit into the cover with the unit's display end first. Never slide the keyboard end of the unit into the cover.



CE CASIO ELECTRONICS CO., LTD.  
Unit 6, 1000 North Circular Road,  
London NW2 7JD, U.K.

## Removing and Replacing the Calculator's Cover

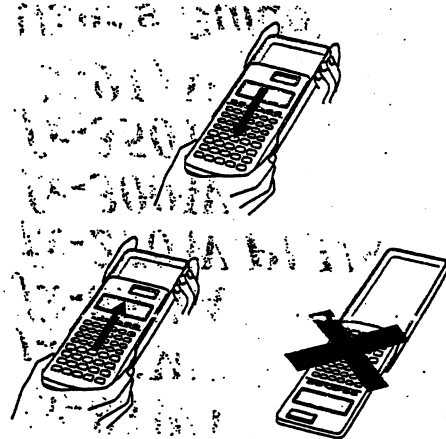
### • To Remove the cover

Grasp the top of the cover, and slide the unit out from the bottom.

### • To Replace the cover

Grasp the top of the cover, and slide the unit in from the bottom.

Always slide the unit into the cover with the unit's display end first. Never slide the keyboard end of the unit into the cover.



CE CASIO ELECTRONICS CO., LTD.  
Unit 6, 1000 North Circular Road,  
London NW2 7JD, U.K.

## Safety Precautions

Be sure to read the following safety precautions before using this calculator. Keep this manual handy for later reference.



### Caution

This symbol is used to indicate information that can result in personal injury or material damage if ignored.

### Batteries

- After removing the batteries from the calculator, put them in a safe place where there is no danger of them getting into the hands of small children and accidentally swallowed.
- Keep batteries out of the reach of small children. If accidentally swallowed, consult with a physician immediately.
- Never charge batteries, try to take batteries apart, or allow batteries to become shorted. Never expose batteries to direct heat or dispose of them by incineration.
- Misuse of batteries can cause them to leak acid that can cause damage to nearby items and creates the possibility of fire and personal injury.
- Always make sure that a battery's positive ⊕ and negative ⊖ sides are facing correctly when you load it into the calculator.
- Remove the batteries if you do not plan to use the calculator for a long time.
- Use only the type of batteries specified for this calculator in this manual.

### Disposing of the Calculator

- Never dispose of the calculator by burning it. Doing so can cause certain components to suddenly burst, creating the danger of fire and personal injury.

## Safety Precautions

Be sure to read the following safety precautions before using this calculator. Keep this manual handy for later reference.



### Caution

This symbol is used to indicate information that can result in personal injury or material damage if ignored.

### Batteries

- After removing the batteries from the calculator, put them in a safe place where there is no danger of them getting into the hands of small children and accidentally swallowed.
- Keep batteries out of the reach of small children. If accidentally swallowed, consult with a physician immediately.
- Never charge batteries, try to take batteries apart, or allow batteries to become shorted. Never expose batteries to direct heat or dispose of them by incineration.
- Misuse of batteries can cause them to leak acid that can cause damage to nearby items and creates the possibility of fire and personal injury.
- Always make sure that a battery's positive ⊕ and negative ⊖ sides are facing correctly when you load it into the calculator.
- Remove the batteries if you do not plan to use the calculator for a long time.
- Use only the type of batteries specified for this calculator in this manual.


### Disposing of the Calculator

- Never dispose of the calculator by burning it. Doing so can cause certain components to suddenly burst, creating the danger of fire and personal injury.

- The displays and illustrations (such as key markings) shown in this User's Guide are for illustrative purposes only, and may differ somewhat from the actual items they represent.
- The contents of this manual are subject to change without notice.
- In no event shall CASIO Computer Co., Ltd. be liable to anyone for special, collateral, incidental, or consequential damages in connection with or arising out of the purchase or use of these materials. Moreover, CASIO Computer Co., Ltd. shall not be liable for any claim of any kind whatsoever against the use of these materials by any other party.


- The displays and illustrations (such as key markings) shown in this User's Guide are for illustrative purposes only, and may differ somewhat from the actual items they represent.
- The contents of this manual are subject to change without notice.
- In no event shall CASIO Computer Co., Ltd. be liable to anyone for special, collateral, incidental, or consequential damages in connection with or arising out of the purchase or use of these materials. Moreover, CASIO Computer Co., Ltd. shall not be liable for any claim of any kind whatsoever against the use of these materials by any other party.

## Handling Precautions

- Be sure to press the P button on the back of the calculator (step ⑥ on page 29 or 30) before using it for the first time (fx-82TL/fx-83WA/fx-270W PLUS/fx-350TL).
- Be sure to press the  key before using the calculator for the first time (fx-85W/fx-85WA/fx-300W/fx-911W).
- Even if the calculator is operating normally, replace the battery at least once every three years for the fx-83WA/fx-85W/fx-85WA/fx-270W PLUS/fx-300W/fx-350TL/fx-911W, or at least once every two years for the fx-82TL.  
Dead battery can leak, causing damage to and malfunction of the calculator. Never leave the dead battery in the calculator.
- The battery that comes with the calculator when you purchase it is for testing only. It may not provide full service life.
- Low battery power can cause memory contents to become corrupted or lost completely. Always keep written records of all important data.

•2•

## Handling Precautions

- Be sure to press the P button on the back of the calculator (step ⑥ on page 29 or 30) before using it for the first time (fx-82TL/fx-83WA/fx-270W PLUS/fx-350TL).
- Be sure to press the  key before using the calculator for the first time (fx-85W/fx-85WA/fx-300W/fx-911W).
- Even if the calculator is operating normally, replace the battery at least once every three years for the fx-83WA/fx-85W/fx-85WA/fx-270W PLUS/fx-300W/fx-350TL/fx-911W, or at least once every two years for the fx-82TL.  
Dead battery can leak, causing damage to and malfunction of the calculator. Never leave the dead battery in the calculator.
- The battery that comes with the calculator when you purchase it is for testing only. It may not provide full service life.
- Low battery power can cause memory contents to become corrupted or lost completely. Always keep written records of all important data.

•2•

- Avoid use and storage in areas subjected to temperature extremes.  
Very low temperatures can cause slow display response, total failure of the display, and shortening of battery life. Also avoid leaving the calculator in direct sunlight, near a window, near a heater or anywhere else it might become exposed to very high temperatures. Heat can cause discoloration or deformation of the calculator's case, and damage to internal circuitry.
- Avoid use and storage in areas subjected to large amounts of humidity and dust.  
Take care never to leave the calculator where it might be splashed by water or exposed to large amounts of humidity or dust. Such elements can damage internal circuitry.
- Never drop the calculator or otherwise subject it to strong impact.
- Never twist or bend the calculator.  
Avoid carrying the calculator in the pocket of your trousers or other tight-fitting clothing where it might be subjected to twisting or bending.
- Never try to take the calculator apart.
- Never press the keys of the calculator with a ball-point pen or other pointed object.
- Use a soft, dry cloth to clean the exterior of the unit.  
If the calculator becomes very dirty, wipe it off with a cloth moistened in a weak solution of water and a mild neutral household detergent. Wring out all excess moisture before wiping the calculator. Never use thinner, benzine or other volatile agents to clean the calculator. Doing so can remove printed markings and damage the case.

•3•

- Avoid use and storage in areas subjected to temperature extremes.  
Very low temperatures can cause slow display response, total failure of the display, and shortening of battery life. Also avoid leaving the calculator in direct sunlight, near a window, near a heater or anywhere else it might become exposed to very high temperatures. Heat can cause discoloration or deformation of the calculator's case, and damage to internal circuitry.
- Avoid use and storage in areas subjected to large amounts of humidity and dust.  
Take care never to leave the calculator where it might be splashed by water or exposed to large amounts of humidity or dust. Such elements can damage internal circuitry.
- Never drop the calculator or otherwise subject it to strong impact.
- Never twist or bend the calculator.  
Avoid carrying the calculator in the pocket of your trousers or other tight-fitting clothing where it might be subjected to twisting or bending.
- Never try to take the calculator apart.
- Never press the keys of the calculator with a ball-point pen or other pointed object.
- Use a soft, dry cloth to clean the exterior of the unit.  
If the calculator becomes very dirty, wipe it off with a cloth moistened in a weak solution of water and a mild neutral household detergent. Wring out all excess moisture before wiping the calculator. Never use thinner, benzine or other volatile agents to clean the calculator. Doing so can remove printed markings and damage the case.

•3•

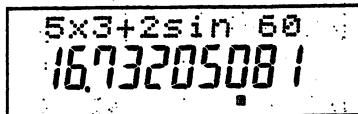
## Contents

Safety Precautions .....	1
Handling Precautions .....	2
Two-line Display .....	5
Key Layout .....	6
Before Starting Calculations.....	8
■ Modes .....	8
■ Input Capacity .....	9
■ Making Corrections During Input .....	9
■ Replay Function .....	9
■ Error Locator .....	9
■ Exponential Display Formats .....	10
■ Answer Memory .....	10
Basic Calculations .....	11
Memory Calculations .....	11
■ Independent Memory .....	11
■ Variables .....	11
Fraction Calculations .....	12
■ Fraction Calculations .....	12
■ Decimal-to-Fraction Conversion .....	12
■ Fraction-to-Decimal Conversion .....	12
Percentage Calculations .....	13
Scientific Function Calculations .....	14
■ Trigonometric/Inverse Trigonometric Functions ....	14
■ Hyperbolic/Inverse Hyperbolic Functions .....	15
■ Angle Unit Conversion .....	15
■ Common and Natural Logarithms/ Antilogarithms .....	15
■ Square Roots, Cube Roots, Roots, Squares, Cubes, Reciprocals, Factorials, Random Numbers and $\pi$ .....	16
■ FIX, SCI, RND .....	16
■ ENG Calculations .....	17
■ Coordinate Conversion (Pol(x, y), Rec (r, $\theta$ )) .....	18

•4•

■ Permutation .....	18
■ Combination .....	18
Statistical Calculations .....	19
■ Standard Deviation (SD Mode) .....	19
■ Regression Calculations (REG Mode) .....	20
Formula Memory (fx-85W) .....	23
Base-n Calculations (fx-85W) .....	23
Degrees, Minutes, Seconds Calculations ....	25
Technical Information .....	25
■ When you have a problem.....	25
■ Error Messages .....	26
■ Order of Operations .....	27
■ Stacks .....	27
■ Power Supply .....	28
■ Input Ranges .....	31
Specifications .....	33

## Two-line Display



5x3+2sin 60  
16.73205081

You can simultaneously check the calculation formula and its answer.

The first line displays the calculation formula.  
The second line displays the answer.

•5•

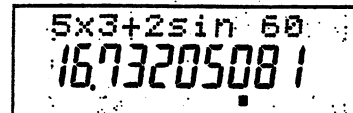
## Contents

Safety Precautions .....	1
Handling Precautions .....	2
Two-line Display .....	5
Key Layout .....	6
Before Starting Calculations.....	8
■ Modes .....	8
■ Input Capacity .....	9
■ Making Corrections During Input .....	9
■ Replay Function .....	9
■ Error Locator .....	9
■ Exponential Display Formats .....	10
■ Answer Memory .....	10
Basic Calculations .....	11
Memory Calculations .....	11
■ Independent Memory .....	11
■ Variables .....	11
Fraction Calculations .....	12
■ Fraction Calculations .....	12
■ Decimal-to-Fraction Conversion .....	12
■ Fraction-to-Decimal Conversion .....	12
Percentage Calculations .....	13
Scientific Function Calculations .....	14
■ Trigonometric/Inverse Trigonometric Functions ....	14
■ Hyperbolic/Inverse Hyperbolic Functions .....	15
■ Angle Unit Conversion .....	15
■ Common and Natural Logarithms/ Antilogarithms .....	15
■ Square Roots, Cube Roots, Roots, Squares, Cubes, Reciprocals, Factorials, Random Numbers and $\pi$ .....	16
■ FIX, SCI, RND .....	16
■ ENG Calculations .....	17
■ Coordinate Conversion (Pol(x, y), Rec (r, $\theta$ )) .....	18

•4•

■ Permutation .....	18
■ Combination .....	18
Statistical Calculations .....	19
■ Standard Deviation (SD Mode) .....	19
■ Regression Calculations (REG Mode) .....	20
Formula Memory (fx-85W) .....	23
Base-n Calculations (fx-85W) .....	23
Degrees, Minutes, Seconds Calculations ....	25
Technical Information .....	25
■ When you have a problem.....	25
■ Error Messages .....	26
■ Order of Operations .....	27
■ Stacks .....	27
■ Power Supply .....	28
■ Input Ranges .....	31
Specifications .....	33

## Two-line Display



5x3+2sin 60  
16.73205081

You can simultaneously check the calculation formula and its answer.

The first line displays the calculation formula.  
The second line displays the answer.

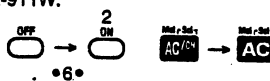
•5•

## Key Layout

<fx-82TL/fx-83WA/fx-270W PLUS/fx-350TL>

Page	SHIFT	12 ALPHA	9 REPLAY	MODE	OFF
Page	16	18	18	16	16
Page	16	18	18	16	15
Page	16	12	15	15	15
Page	17	12	16	15	15
Page	11	25, 11	11	14 11	14 11
Page	11	25	15	14	14
Page	11	20	11	20 11	11 11
Page	11	11	11	11	19-20, 11
Page	20	20	20	9 INS	11 19
Page	20	20	20	9	11 19
Page	20	20	20	9	11 19
Page	19	19	19	20	20
Page	17	16	16	15	13
Page	11	11	11	10	11

fx-85WA/fx-300W/fx-911W:

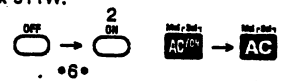


## Key Layout

<fx-82TL/fx-83WA/fx-270W PLUS/fx-350TL>

Page	SHIFT	12 ALPHA	9 REPLAY	MODE	OFF
Page	16	18	18	16	16
Page	16	18	18	16	15
Page	16	12	15	15	15
Page	17	12	16	15	15
Page	11	25, 11	11	14 11	14 11
Page	11	25	15	14	14
Page	11	20	11	20 11	11 11
Page	11	11	11	11	19-20, 11
Page	20	20	20	9 INS	11 19
Page	20	20	20	9	11 19
Page	20	20	20	9	11 19
Page	19	19	19	20	20
Page	17	16	16	15	13
Page	11	11	11	10	11

fx-85WA/fx-300W/fx-911W:



<fx-85W>

Page	SHIFT	12 ALPHA	9 REPLAY	MODE	2 ON
Page	23	18 24	18	16	16
Page	23	16	18	16	15
Page	23	12	24	15 24	15 24
Page	17	12	16	15	15
Page	11	25, 11	11	14 11	14 11
Page	11	25	15	14	14
Page	11	20	11	20 11	11 11
Page	11	11	11	11	19-20, 11
Page	20	20	20	9 INS	11 19
Page	20	20	20	9	11 19
Page	20	20	20	9	11 19
Page	19	19	19	20	20
Page	17	16	16	15	13
Page	11	11	11	10	11

<fx-85W>

Page	SHIFT	12 ALPHA	9 REPLAY	MODE	2 ON
Page	23	18 24	18	16	16
Page	23	16	18	16	15
Page	23	12	24	15 24	15 24
Page	17	12	16	15	15
Page	11	25, 11	11	14 11	14 11
Page	11	25	15	14	14
Page	11	20	11	20 11	11 11
Page	11	11	11	11	19-20, 11
Page	20	20	20	9 INS	11 19
Page	20	20	20	9	11 19
Page	20	20	20	9	11 19
Page	19	19	19	20	20
Page	17	16	16	15	13
Page	11	11	11	10	11

## Before Starting Calculations...

### ■ Modes

Application	Mode Name	Mode Indicator
<b>Calculation Modes</b>		
Normal calculations	COMP	—
Standard deviation calculations	SD	SD
Regression calculations	REG	REG
Base- <i>n</i> calculations (fx-85W only)	BASE-N	b (binary) o (octal) d (decimal) H (hexadecimal)
<b>Angle Unit Modes</b>		
Degrees	DEG	D
Radians	RAD	R
Grads	GRA	G
<b>Display Modes</b>		
Exponential notation (Canceling FIX and SCI specification)	NORM1 NORM2	— —
Number of decimal place specification	FIX	Fix
Number of significant digit specification	SCI	Sci

#### Note!

- Mode indicators appear in the lower part of the display, except for the Base-*n* indicators which appear in the exponent part of the display.
- You cannot set the angle unit or the display mode while the calculator is in the BASE-N mode (fx-85W).
- The COMP, SD, and REG modes can be used in combination with the angle unit modes.
- Be sure to check the current calculation mode (SD, REG, COMP) and angle unit mode (DEG, RAD, GRA) before beginning a calculation.

• 8 •

### ■ Input Capacity

- The memory area used for calculation input can hold 79 "steps." Whenever you input the 73rd step of any calculation, the cursor changes from "—" to "■" to let you know memory is running low. If you still need to input more, you should divide your calculation into two or more parts.

### ■ Making Corrections During Input

- Use  $\leftarrow$  and  $\rightarrow$  to move the cursor to the location you want.
- Press  $\square$  to delete the number or function at the current cursor position.
- Press  $\square$   $\square$  to change to an insert cursor  $\square$ . Inputting something while the insert cursor is on the display inserts the input at the insert cursor position.
- Press  $\square$ ,  $\square$ ,  $\square$   $\square$ , or  $\square$  returns to the normal cursor from the insert cursor.

### ■ Replay Function

- Pressing  $\square$  or  $\square$  recalls the last calculation you performed. You can then make any changes you want in the calculation and re-execute it.
- Pressing  $\square$  does not clear Replay memory, so you can recall the last calculation even after you press  $\square$ .
- Replay memory is cleared whenever you start a new calculation, change to another mode, or turn off power.

### ■ Error Locator

- Pressing  $\square$  or  $\square$  after an error occurs displays the calculation with the cursor positioned at the location where the error occurred.

## Before Starting Calculations...

### ■ Modes

Application	Mode Name	Mode Indicator
<b>Calculation Modes</b>		
Normal calculations	COMP	—
Standard deviation calculations	SD	SD
Regression calculations	REG	REG
Base- <i>n</i> calculations (fx-85W only)	BASE-N	b (binary) o (octal) d (decimal) H (hexadecimal)
<b>Angle Unit Modes</b>		
Degrees	DEG	D
Radians	RAD	R
Grads	GRA	G
<b>Display Modes</b>		
Exponential notation (Canceling FIX and SCI specification)	NORM1 NORM2	— —
Number of decimal place specification	FIX	Fix
Number of significant digit specification	SCI	Sci

#### Note!

- Mode indicators appear in the lower part of the display, except for the Base-*n* indicators which appear in the exponent part of the display.
- You cannot set the angle unit or the display mode while the calculator is in the BASE-N mode (fx-85W).
- The COMP, SD, and REG modes can be used in combination with the angle unit modes.
- Be sure to check the current calculation mode (SD, REG, COMP) and angle unit mode (DEG, RAD, GRA) before beginning a calculation.

• 8 •

### ■ Input Capacity

- The memory area used for calculation input can hold 79 "steps." Whenever you input the 73rd step of any calculation, the cursor changes from "—" to "■" to let you know memory is running low. If you still need to input more, you should divide your calculation into two or more parts.

### ■ Making Corrections During Input

- Use  $\leftarrow$  and  $\rightarrow$  to move the cursor to the location you want.
- Press  $\square$  to delete the number or function at the current cursor position.
- Press  $\square$   $\square$  to change to an insert cursor  $\square$ . Inputting something while the insert cursor is on the display inserts the input at the insert cursor position.
- Press  $\square$ ,  $\square$ ,  $\square$   $\square$ , or  $\square$  returns to the normal cursor from the insert cursor.

### ■ Replay Function

- Pressing  $\square$  or  $\square$  recalls the last calculation you performed. You can then make any changes you want in the calculation and re-execute it.
- Pressing  $\square$  does not clear Replay memory, so you can recall the last calculation even after you press  $\square$ .
- Replay memory is cleared whenever you start a new calculation, change to another mode, or turn off power.

### ■ Error Locator

- Pressing  $\square$  or  $\square$  after an error occurs displays the calculation with the cursor positioned at the location where the error occurred.









## Scientific Function Calculations

- Use the COMP mode for scientific function calculations.
- $\pi = 3.14159265359$

### Trigonometric/Inverse Trigonometric Functions

- Example 1:  $\sin 63^\circ 52' 41''$

fx-85W:  $\sin 63 \div 52 \div 41 \rightarrow 0.897859012$   
 Other models:  $\sin 63 \div 52 \div 41 \rightarrow 0.897859012$

- Example 2:  $\cos \left( \frac{\pi}{3} \text{ rad} \right)$

fx-85W:  $\cos \pi \div 3 \rightarrow 0.5$   
 Other models:  $\cos \pi \div 3 \rightarrow 0.5$

- Example 3:  $\cos^{-1} \frac{\sqrt{2}}{2} = \frac{\pi}{4} \text{ rad}$

fx-85W:  $\cos^{-1} \sqrt{2} \div 2 \rightarrow \pi \div 4 \rightarrow 0.785398163$   
 Other models:  $\cos^{-1} \sqrt{2} \div 2 \rightarrow 0.785398163$   
 Ans  $\div \pi \rightarrow 0.25$

- Example 4:  $\tan^{-1} 0.741$

fx-85W:  $\tan^{-1} 0.741 \rightarrow 36.53844577$   
 Other models:  $\tan^{-1} 0.741 \rightarrow 36.53844577$

• 14 •

### Hyperbolic/Inverse Hyperbolic Functions

- Example 1:  $\sinh 3.6$

$\sinh 3.6 \rightarrow 18.28545536$

- Example 2:  $\sinh^{-1} 30$

$\sinh^{-1} 30 \rightarrow 4.094622224$

### Angle Unit Conversion

- Press  $\text{MODE}$  to display the following menu.

D	R	G
1	2	3

- Pressing  $\text{1}$ ,  $\text{2}$ , or  $\text{3}$  converts the displayed value to the corresponding angle unit.

- Example: To convert 4.25 radians to degrees

fx-85W:  $4.25 \text{ (R)} \rightarrow 243.5070629$   
 Other models:  $4.25 \text{ (R)} \rightarrow 243.5070629$

### Common and Natural Logarithms/Antilogarithms

- Example 1:  $\log 1.23$

$\log 1.23 \rightarrow 0.089905111$

- Example 2:  $\ln 90 (= \log_e 90)$

$\ln 90 \rightarrow 4.49980967$

- Example 3:  $e^{10}$

$e^{10} \rightarrow 22026.46579$

- Example 4:  $10^{1.5}$

$10^{1.5} \rightarrow 31.6227766$

- Example 5:  $2^4$

$2^4 \rightarrow 16$

• 15 •

## Scientific Function Calculations

- Use the COMP mode for scientific function calculations.
- $\pi = 3.14159265359$

### Trigonometric/Inverse Trigonometric Functions

- Example 1:  $\sin 63^\circ 52' 41''$

fx-85W:  $\sin 63 \div 52 \div 41 \rightarrow 0.897859012$   
 Other models:  $\sin 63 \div 52 \div 41 \rightarrow 0.897859012$

- Example 2:  $\cos \left( \frac{\pi}{3} \text{ rad} \right)$

fx-85W:  $\cos \pi \div 3 \rightarrow 0.5$   
 Other models:  $\cos \pi \div 3 \rightarrow 0.5$

- Example 3:  $\cos^{-1} \frac{\sqrt{2}}{2} = \frac{\pi}{4} \text{ rad}$

fx-85W:  $\cos^{-1} \sqrt{2} \div 2 \rightarrow \pi \div 4 \rightarrow 0.785398163$   
 Other models:  $\cos^{-1} \sqrt{2} \div 2 \rightarrow 0.785398163$   
 Ans  $\div \pi \rightarrow 0.25$

- Example 4:  $\tan^{-1} 0.741$

fx-85W:  $\tan^{-1} 0.741 \rightarrow 36.53844577$   
 Other models:  $\tan^{-1} 0.741 \rightarrow 36.53844577$

• 14 •

### Hyperbolic/Inverse Hyperbolic Functions

- Example 1:  $\sinh 3.6$

$\sinh 3.6 \rightarrow 18.28545536$

- Example 2:  $\sinh^{-1} 30$

$\sinh^{-1} 30 \rightarrow 4.094622224$

### Angle Unit Conversion

- Press  $\text{MODE}$  to display the following menu.

D	R	G
1	2	3

- Pressing  $\text{1}$ ,  $\text{2}$ , or  $\text{3}$  converts the displayed value to the corresponding angle unit.

- Example: To convert 4.25 radians to degrees

fx-85W:  $4.25 \text{ (R)} \rightarrow 243.5070629$   
 Other models:  $4.25 \text{ (R)} \rightarrow 243.5070629$

### Common and Natural Logarithms/Antilogarithms

- Example 1:  $\log 1.23$

$\log 1.23 \rightarrow 0.089905111$

- Example 2:  $\ln 90 (= \log_e 90)$

$\ln 90 \rightarrow 4.49980967$

- Example 3:  $e^{10}$

$e^{10} \rightarrow 22026.46579$

- Example 4:  $10^{1.5}$

$10^{1.5} \rightarrow 31.6227766$

- Example 5:  $2^4$

$2^4 \rightarrow 16$

• 15 •

## ■ Square Roots, Cube Roots, Roots, Squares, Cubes, Reciprocals, Factorials, Random Numbers and $\pi$

- Example 1:  $\sqrt{2} + \sqrt{3} \times \sqrt{5}$   
 $\sqrt{2} + \sqrt{3} \times \sqrt{5} = 5.287196909$
- Example 2:  $\sqrt[3]{5} + \sqrt[3]{-27}$   
 $\sqrt[3]{5} + \sqrt[3]{-27} = -1.290024053$
- Example 3:  $\sqrt[7]{123} (= 123^{\frac{1}{7}})$   
 $\sqrt[7]{123} = 1.988647795$
- Example 4:  $123 + 30^2$   
 $123 + 30^2 = 1023.$
- Example 5:  $12^3$   
 $12^3 = 1728.$
- Example 6:  $\frac{1}{\frac{1}{3} - \frac{1}{4}}$   
 $\frac{1}{\frac{1}{3} - \frac{1}{4}} = 12.$
- Example 7:  $8!$   
 $8! = 40320.$
- Example 8: To generate a random number between 0.000 and 0.999  
 $\text{RND} = 0.664$   
Example (results differ each time)
- Example 9:  $3\pi$   
 $3\pi = 9.424777961$

## ■ FIX, SCI, RND

- Example 1:  $200 \div 7 \times 14 = 400$   
 $200 \div 7 \times 14 = 400.$
- 16•
- (Specifies three decimal places.)  
 fx-85W:  $\text{FIX} \text{ 3} = 400.000$   
 Other models:  $\text{FIX} \text{ 3} = 400.000$
- (Calculation continues using 10 display digits)  
 $200 \div 7 = 28.571$   
 $\times 14 = 400.000$

Performing the same calculation using the specified number of decimal places

$$200 \div 7 = 28.571$$

(Internal rounding)  $\text{RND} = 28.571$

$$\times 14 = 399.994$$

- Press  $\text{FIX} \text{ 3}$  (fx-85W) to clear FIX specification. For other models, press  $\text{FIX} \text{ 3}$ .

- Example 2:  $1 \div 3$ , displaying result with two significant digits (SCI 2)

fx-85W:  $\text{SCI} \text{ 2} = 3.3 \times 10^{-1}$   
 Other models:  $\text{SCI} \text{ 2} = 3.3 \times 10^{-1}$

$$1 \div 3 = 3.3 \times 10^{-1}$$

- Press  $\text{SCI} \text{ 2}$  (fx-85W) to clear SCI specification. For other models, press  $\text{SCI} \text{ 2}$ .

## ■ ENG Calculations

- Example 1: To convert 56,088 meters to kilometers  
 $56088 \text{ ENG} = 56.088 \text{ km}$
- Example 2: To convert 0.08125 grams to milligrams  
 $0.08125 \text{ ENG} = 81.25 \text{ mg}$

## ■ Square Roots, Cube Roots, Roots, Squares, Cubes, Reciprocals, Factorials, Random Numbers and $\pi$

- Example 1:  $\sqrt{2} + \sqrt{3} \times \sqrt{5}$   
 $\sqrt{2} + \sqrt{3} \times \sqrt{5} = 5.287196909$
- Example 2:  $\sqrt[3]{5} + \sqrt[3]{-27}$   
 $\sqrt[3]{5} + \sqrt[3]{-27} = -1.290024053$
- Example 3:  $\sqrt[7]{123} (= 123^{\frac{1}{7}})$   
 $\sqrt[7]{123} = 1.988647795$
- Example 4:  $123 + 30^2$   
 $123 + 30^2 = 1023.$
- Example 5:  $12^3$   
 $12^3 = 1728.$
- Example 6:  $\frac{1}{\frac{1}{3} - \frac{1}{4}}$   
 $\frac{1}{\frac{1}{3} - \frac{1}{4}} = 12.$
- Example 7:  $8!$   
 $8! = 40320.$
- Example 8: To generate a random number between 0.000 and 0.999  
 $\text{RND} = 0.664$   
Example (results differ each time)
- Example 9:  $3\pi$   
 $3\pi = 9.424777961$

## ■ FIX, SCI, RND

- Example 1:  $200 \div 7 \times 14 = 400$   
 $200 \div 7 \times 14 = 400.$
- 16•
- (Specifies three decimal places.)  
 fx-85W:  $\text{FIX} \text{ 3} = 400.000$   
 Other models:  $\text{FIX} \text{ 3} = 400.000$
- (Calculation continues using 10 display digits)  
 $200 \div 7 = 28.571$   
 $\times 14 = 400.000$

Performing the same calculation using the specified number of decimal places

$$200 \div 7 = 28.571$$

(Internal rounding)  $\text{RND} = 28.571$

$$\times 14 = 399.994$$

- Press  $\text{FIX} \text{ 3}$  (fx-85W) to clear FIX specification. For other models, press  $\text{FIX} \text{ 3}$ .

- Example 2:  $1 \div 3$ , displaying result with two significant digits (SCI 2)

fx-85W:  $\text{SCI} \text{ 2} = 3.3 \times 10^{-1}$   
 Other models:  $\text{SCI} \text{ 2} = 3.3 \times 10^{-1}$

$$1 \div 3 = 3.3 \times 10^{-1}$$

- Press  $\text{SCI} \text{ 2}$  (fx-85W) to clear SCI specification. For other models, press  $\text{SCI} \text{ 2}$ .

## ■ ENG Calculations

- Example 1: To convert 56,088 meters to kilometers  
 $56088 \text{ ENG} = 56.088 \text{ km}$
- Example 2: To convert 0.08125 grams to milligrams  
 $0.08125 \text{ ENG} = 81.25 \text{ mg}$

### ■ Coordinate Conversion (Pol(x, y), Rec (r, θ))

- Calculation results are automatically assigned to variables E and F.
- **Example 1:** To convert polar coordinates ( $r=2$ ,  $\theta=60^\circ$ ) to rectangular coordinates ( $x$ ,  $y$ ) (DEG mode)

$x$   $\Rightarrow$   $\boxed{1.}$   
 $y$   $\Rightarrow$   $\boxed{1.732050808}$

- $\boxed{\text{REL}}$   $\boxed{\text{E}}$ ,  $\boxed{\text{REL}}$   $\boxed{\text{F}}$  swaps displayed value with value in memory.

- **Example 2:** To convert rectangular coordinates ( $1$ ,  $\sqrt{3}$ ) to polar coordinates ( $r$ ,  $\theta$ ) (RAD mode)

$r$   $\Rightarrow$   $\boxed{2.}$   
 $\theta$   $\Rightarrow$   $\boxed{1.047197551}$

- $\boxed{\text{REL}}$   $\boxed{\text{E}}$ ,  $\boxed{\text{REL}}$   $\boxed{\text{F}}$  swaps displayed value with value in memory.

### ■ Permutation

- **Example:** To determine how many different 4-digit values can be produced using the numbers 1 through 7
- Numbers cannot be duplicated within the same 4-digit value (1234 is allowed, but 1123 is not).

$7$   $\Rightarrow$   $\boxed{840.}$

### ■ Combination

- **Example:** To determine how many different 4-member groups can be organized in a group of 10 individuals

$10$   $\Rightarrow$   $\boxed{210.}$   
 (fx-85W:  $\Rightarrow$   $\boxed{\text{C}} \Rightarrow$   $\boxed{210.}$ )

• 18 •

## Statistical Calculations

### ■ Standard Deviation (SD Mode)

- Press  $\Rightarrow$   $\boxed{1}$  (fx-85W) to enter the SD Mode for statistical calculations using standard deviation. For other models, press  $\Rightarrow$   $\boxed{2}$ .
- Data input always starts with  $\Rightarrow$   $\boxed{\text{C}} \Rightarrow$  to clear statistical memory.
- Input data is used to calculate values for  $n$ ,  $\Sigma x$ ,  $\Sigma x^2$ ,  $\bar{x}$ ,  $\sigma_n$  and  $\sigma_{n-1}$  which you can recall using the key operations noted nearby.

$\boxed{\text{REL}}$ $\boxed{\text{A}}$	$\Sigma x^2$
$\boxed{\text{REL}}$ $\boxed{\text{B}}$	$\Sigma x$
$\boxed{\text{REL}}$ $\boxed{\text{C}}$	$n$
$\Rightarrow$ $\boxed{\bar{x}}$	$\bar{x}$
$\Rightarrow$ $\boxed{\sigma_n}$	$\sigma_n$
$\Rightarrow$ $\boxed{\sigma_{n-1}}$	$\sigma_{n-1}$

- **Example:** To calculate  $\sigma_{n-1}$ ,  $\sigma_n$ ,  $\bar{x}$ ,  $n$ ,  $\Sigma x$ , and  $\Sigma x^2$  for the following data: 55, 54, 51, 55, 53, 53, 54, 52

Enter SD Mode

fx-85W:  $\Rightarrow$   $\boxed{1}$

Other models:  $\Rightarrow$   $\boxed{2}$

$\Rightarrow$   $\boxed{\text{C}} \Rightarrow$  (Memory Clear)

55  $\Rightarrow$   $\boxed{\text{DT}}$  54  $\Rightarrow$   $\boxed{\text{DT}}$  51  $\Rightarrow$   $\boxed{\text{DT}}$  55  $\Rightarrow$   $\boxed{\text{DT}}$   
 53  $\Rightarrow$   $\boxed{\text{DT}}$  54  $\Rightarrow$   $\boxed{\text{DT}}$  52  $\Rightarrow$   $\boxed{\text{DT}}$   $\Rightarrow$   $\boxed{52.}$

(Sample Standard Deviation  $\sigma_{n-1}$ )  $\Rightarrow$   $\boxed{1.407885953}$

(Population Standard Deviation  $\sigma_n$ )  $\Rightarrow$   $\boxed{1.316956719}$

(Arithmetic Mean  $\bar{x}$ )  $\Rightarrow$   $\boxed{53.375}$

(Number of Data  $n$ )  $\Rightarrow$   $\boxed{8.}$

(Sum of Values  $\Sigma x$ )  $\Rightarrow$   $\boxed{427.}$

(Sum of Squares of Values  $\Sigma x^2$ )  $\Rightarrow$   $\boxed{22805.}$

### ■ Coordinate Conversion (Pol(x, y), Rec (r, θ))

- Calculation results are automatically assigned to variables E and F.
- **Example 1:** To convert polar coordinates ( $r=2$ ,  $\theta=60^\circ$ ) to rectangular coordinates ( $x$ ,  $y$ ) (DEG mode)

$x$   $\Rightarrow$   $\boxed{1.}$   
 $y$   $\Rightarrow$   $\boxed{1.732050808}$

- $\boxed{\text{REL}}$   $\boxed{\text{E}}$ ,  $\boxed{\text{REL}}$   $\boxed{\text{F}}$  swaps displayed value with value in memory.

- **Example 2:** To convert rectangular coordinates ( $1$ ,  $\sqrt{3}$ ) to polar coordinates ( $r$ ,  $\theta$ ) (RAD mode)

$r$   $\Rightarrow$   $\boxed{2.}$   
 $\theta$   $\Rightarrow$   $\boxed{1.047197551}$

- $\boxed{\text{REL}}$   $\boxed{\text{E}}$ ,  $\boxed{\text{REL}}$   $\boxed{\text{F}}$  swaps displayed value with value in memory.

### ■ Permutation

- **Example:** To determine how many different 4-digit values can be produced using the numbers 1 through 7
- Numbers cannot be duplicated within the same 4-digit value (1234 is allowed, but 1123 is not).

$7$   $\Rightarrow$   $\boxed{840.}$

### ■ Combination

- **Example:** To determine how many different 4-member groups can be organized in a group of 10 individuals

$10$   $\Rightarrow$   $\boxed{210.}$   
 (fx-85W:  $\Rightarrow$   $\boxed{\text{C}} \Rightarrow$   $\boxed{210.}$ )

• 18 •

## Statistical Calculations

### ■ Standard Deviation (SD Mode)

- Press  $\Rightarrow$   $\boxed{1}$  (fx-85W) to enter the SD Mode for statistical calculations using standard deviation. For other models, press  $\Rightarrow$   $\boxed{2}$ .
- Data input always starts with  $\Rightarrow$   $\boxed{\text{C}} \Rightarrow$  to clear statistical memory.
- Input data is used to calculate values for  $n$ ,  $\Sigma x$ ,  $\Sigma x^2$ ,  $\bar{x}$ ,  $\sigma_n$  and  $\sigma_{n-1}$  which you can recall using the key operations noted nearby.

$\boxed{\text{REL}}$ $\boxed{\text{A}}$	$\Sigma x^2$
$\boxed{\text{REL}}$ $\boxed{\text{B}}$	$\Sigma x$
$\boxed{\text{REL}}$ $\boxed{\text{C}}$	$n$
$\Rightarrow$ $\boxed{\bar{x}}$	$\bar{x}$
$\Rightarrow$ $\boxed{\sigma_n}$	$\sigma_n$
$\Rightarrow$ $\boxed{\sigma_{n-1}}$	$\sigma_{n-1}$

- **Example:** To calculate  $\sigma_{n-1}$ ,  $\sigma_n$ ,  $\bar{x}$ ,  $n$ ,  $\Sigma x$ , and  $\Sigma x^2$  for the following data: 55, 54, 51, 55, 53, 53, 54, 52

Enter SD Mode

fx-85W:  $\Rightarrow$   $\boxed{1}$

Other models:  $\Rightarrow$   $\boxed{2}$

$\Rightarrow$   $\boxed{\text{C}} \Rightarrow$  (Memory Clear)

55  $\Rightarrow$   $\boxed{\text{DT}}$  54  $\Rightarrow$   $\boxed{\text{DT}}$  51  $\Rightarrow$   $\boxed{\text{DT}}$  55  $\Rightarrow$   $\boxed{\text{DT}}$   
 53  $\Rightarrow$   $\boxed{\text{DT}}$  54  $\Rightarrow$   $\boxed{\text{DT}}$  52  $\Rightarrow$   $\boxed{\text{DT}}$   $\Rightarrow$   $\boxed{52.}$

(Sample Standard Deviation  $\sigma_{n-1}$ )  $\Rightarrow$   $\boxed{1.407885953}$

(Population Standard Deviation  $\sigma_n$ )  $\Rightarrow$   $\boxed{1.316956719}$

(Arithmetic Mean  $\bar{x}$ )  $\Rightarrow$   $\boxed{53.375}$

(Number of Data  $n$ )  $\Rightarrow$   $\boxed{8.}$

(Sum of Values  $\Sigma x$ )  $\Rightarrow$   $\boxed{427.}$

(Sum of Squares of Values  $\Sigma x^2$ )  $\Rightarrow$   $\boxed{22805.}$

## Data Input Precautions

- **DT** **DT** inputs the same data twice.
- You can also input multiple entries of the same data using **DT** **1**. To input the data 110 ten times, for example, press 110 **DT** **1** **DT**.
- The above results can be obtained in any order, and not necessarily that shown above.
- To delete data you have just input, press **DEL** **CL**.

## Regression Calculations (REG Mode)

- Press **fx-85W** **2** (fx-85W) to enter the REG mode and then select one of the following regression types. For other models, press **3**.

- 1**: Linear regression
- 2**: Logarithmic regression
- 3**: Exponential regression
- 1**: Power regression
- 2**: Inverse regression
- 3**: Quadratic regression

- Data input always starts with **DEL** **SEL** **DEL** to clear statistical memory.
- The values produced by a regression calculation depend on the values input, and results can be recalled using the key operations shown in the table below.

<b>DEL</b> <b>A</b>	$\Sigma x^2$	<b>DEL</b> <b>100</b>	$x\sigma_{n-1}$
<b>DEL</b> <b>B</b>	$\Sigma x$	<b>DEL</b> <b>Y</b>	$\bar{y}$
<b>DEL</b> <b>C</b>	$n$	<b>DEL</b> <b>Y</b>	$y\sigma_n$
<b>DEL</b> <b>D</b>	$\Sigma y^2$	<b>DEL</b> <b>Y</b>	$y\sigma_{n-1}$
<b>DEL</b> <b>E</b>	$\Sigma y$	<b>DEL</b> <b>A</b>	Regression coefficient A
<b>DEL</b> <b>F</b>	$\Sigma xy$	<b>DEL</b> <b>B</b>	Regression coefficient B
<b>DEL</b> <b>M</b>	$\Sigma x^3$	<b>DEL</b> <b>C</b>	Regression coefficient C
<b>DEL</b> <b>X</b>	$\Sigma x^2y$	<b>DEL</b> <b>F</b>	Correlation coefficient $r$
<b>DEL</b> <b>Y</b>	$\Sigma x^4$	<b>DEL</b> <b>X</b>	$\bar{x}$
<b>DEL</b> <b>X</b>	$\bar{x}$	<b>DEL</b> <b>Y</b>	$\bar{y}$
<b>DEL</b> <b>Y</b>	$x\sigma_n$		

•20•

## Linear Regression

The regression formula for linear regression is:  $y = A + Bx$ .

• **Example:** Atmospheric Pressure vs. Temperature

Temperature	Atmospheric Pressure
10°C	1003 hPa
15°C	1005 hPa
20°C	1010 hPa
25°C	1011 hPa
30°C	1014 hPa

Perform linear regression to determine the regression formula terms and correlation coefficient for the data nearby. Next, use the regression formula to estimate atmospheric pressure at 18°C and temperature at 1000 hPa.

Enter REG Mode (Linear Regression)

fx-85W: **fx-85W** **2** **1**

Other models: **3** **1**

**DEL** **SEL** **DEL** (Memory Clear)

10 **DT** 1003 **DT** 15 **DT** 1005 **DT**  
20 **DT** 1010 **DT** 25 **DT** 1011 **DT**  
30 **DT** 1014 **DT**

(Regression Coefficient A)	<b>DEL</b> <b>A</b> <b>=</b>	997.4
(Regression Coefficient B)	<b>DEL</b> <b>B</b> <b>=</b>	0.56
(Correlation Coefficient $r$ )	<b>DEL</b> <b>F</b> <b>=</b>	0.982607368
(Atmospheric Pressure at 18°C)	18 <b>DEL</b> <b>Y</b>	1007.48
(Temperature at 1000 hPa)	1000 <b>DEL</b> <b>X</b>	4.642857143

## Quadratic Regression

- The regression formula for quadratic regression is:  
 $y = A + Bx + Cx^2$ .
- Input data using the following key sequence.  
<x-data> **DT** <y-data> **DT**

## Data Input Precautions

- **DT** **DT** inputs the same data twice.
- You can also input multiple entries of the same data using **DT** **1**. To input the data 110 ten times, for example, press 110 **DT** **1** **DT**.
- The above results can be obtained in any order, and not necessarily that shown above.
- To delete data you have just input, press **DEL** **CL**.

## Regression Calculations (REG Mode)

- Press **fx-85W** **2** (fx-85W) to enter the REG mode and then select one of the following regression types. For other models, press **3**.

- 1**: Linear regression
- 2**: Logarithmic regression
- 3**: Exponential regression
- 1**: Power regression
- 2**: Inverse regression
- 3**: Quadratic regression

- Data input always starts with **DEL** **SEL** **DEL** to clear statistical memory.
- The values produced by a regression calculation depend on the values input, and results can be recalled using the key operations shown in the table below.

<b>DEL</b> <b>A</b>	$\Sigma x^2$	<b>DEL</b> <b>100</b>	$x\sigma_{n-1}$
<b>DEL</b> <b>B</b>	$\Sigma x$	<b>DEL</b> <b>Y</b>	$\bar{y}$
<b>DEL</b> <b>C</b>	$n$	<b>DEL</b> <b>Y</b>	$y\sigma_n$
<b>DEL</b> <b>D</b>	$\Sigma y^2$	<b>DEL</b> <b>Y</b>	$y\sigma_{n-1}$
<b>DEL</b> <b>E</b>	$\Sigma y$	<b>DEL</b> <b>A</b>	Regression coefficient A
<b>DEL</b> <b>F</b>	$\Sigma xy$	<b>DEL</b> <b>B</b>	Regression coefficient B
<b>DEL</b> <b>M</b>	$\Sigma x^3$	<b>DEL</b> <b>C</b>	Regression coefficient C
<b>DEL</b> <b>X</b>	$\Sigma x^2y$	<b>DEL</b> <b>F</b>	Correlation coefficient $r$
<b>DEL</b> <b>Y</b>	$\Sigma x^4$	<b>DEL</b> <b>X</b>	$\bar{x}$
<b>DEL</b> <b>X</b>	$\bar{x}$	<b>DEL</b> <b>Y</b>	$\bar{y}$
<b>DEL</b> <b>Y</b>	$x\sigma_n$		

•20•

## Linear Regression

The regression formula for linear regression is:  $y = A + Bx$ .

• **Example:** Atmospheric Pressure vs. Temperature

Temperature	Atmospheric Pressure
10°C	1003 hPa
15°C	1005 hPa
20°C	1010 hPa
25°C	1011 hPa
30°C	1014 hPa

Perform linear regression to determine the regression formula terms and correlation coefficient for the data nearby. Next, use the regression formula to estimate atmospheric pressure at 18°C and temperature at 1000 hPa.

Enter REG Mode (Linear Regression)

fx-85W: **fx-85W** **2** **1**

Other models: **3** **1**

**DEL** **SEL** **DEL** (Memory Clear)

10 **DT** 1003 **DT** 15 **DT** 1005 **DT**  
20 **DT** 1010 **DT** 25 **DT** 1011 **DT**  
30 **DT** 1014 **DT**

(Regression Coefficient A)	<b>DEL</b> <b>A</b> <b>=</b>	997.4
(Regression Coefficient B)	<b>DEL</b> <b>B</b> <b>=</b>	0.56
(Correlation Coefficient $r$ )	<b>DEL</b> <b>F</b> <b>=</b>	0.982607368
(Atmospheric Pressure at 18°C)	18 <b>DEL</b> <b>Y</b>	1007.48
(Temperature at 1000 hPa)	1000 <b>DEL</b> <b>X</b>	4.642857143

## Quadratic Regression

- The regression formula for quadratic regression is:  
 $y = A + Bx + Cx^2$ .
- Input data using the following key sequence.  
<x-data> **DT** <y-data> **DT**

• Example:

$X_i$	$Y_i$
29	1.6
50	23.5
74	38.0
103	46.4
118	48.0

Perform quadratic regression to determine the regression formula terms and correlation coefficient for the data nearby. Next, use the regression formula to estimate the values for  $\hat{y}$  (estimated value of  $y$ ) for  $x_i = 16$  and  $\hat{x}$  (estimated value of  $x$ ) for  $y_i = 20$ .

Enter REG mode (Quadratic regression)

fx-85W:  $\text{MODE}$   $\text{MODE}$   $\text{2}$   $\text{3}$

Other models:  $\text{MODE}$   $\text{3}$   $\text{2}$   $\text{3}$

$\text{SHIFT}$   $\text{Gd}$   $\text{=}$

29  $\text{1}$  1.6  $\text{DT}$  50  $\text{1}$  23.5  $\text{DT}$

74  $\text{1}$  38.0  $\text{DT}$  103  $\text{1}$  46.4  $\text{DT}$

118  $\text{1}$  48.0  $\text{DT}$

118.

REG

(Regression Coefficient A)

$\text{SHIFT}$   $\text{A}$   $\text{=}$

-35.59856934

(Regression Coefficient B)

$\text{SHIFT}$   $\text{B}$   $\text{=}$

1.495939413

(Regression Coefficient C)

$\text{SHIFT}$   $\text{C}$   $\text{=}$

-6.71629667<sup>-03</sup>

( $\hat{y}$  when  $x_i = 16$ )

16  $\text{SHIFT}$   $\text{Y}$   $\text{=}$

-13.38291067

( $\hat{x}$ , when  $y_i = 20$ )

20  $\text{SHIFT}$   $\text{X}$   $\text{=}$

47.14556728

( $\hat{x}$ , when  $y_i = 20$ )

$\text{SHIFT}$   $\text{X}$   $\text{=}$

175.5872105

### Data Input Precautions

- $\text{DT}$   $\text{DT}$  inputs the same data twice.
- You can also input multiple entries of the same data using  $\text{SHIFT}$   $\text{1}$ . To input the data "20 and 30" five times, for example, press 20  $\text{1}$  30  $\text{SHIFT}$   $\text{1}$  5  $\text{DT}$ .
- The above results can be obtained in any order, and not necessarily that shown above.
- To delete data you have just input, press  $\text{SHIFT}$   $\text{CL}$ .

• 22 •

### Formula Memory (fx-85W)

- Formula memory lets you input a single formula in memory, and then input values for the formula's variables to calculate results.
- Memory can hold a single formula, up to 79 steps long. This function can be used in the COMP mode only.
- Note that the formula is actually stored in memory when you press the  $\text{MEM}$  key in the sequence below.
- Example: To save the following formula, recall it, and then use it to calculate a result:  $Y = X^2 + 3X - 12$

Input the formula.

$\text{MEM}$   $\text{Y}$   $\text{MEM}$   $\text{=}$   $\text{MEM}$   $\text{X}$   $\text{1}$   $\text{+}$   $\text{MEM}$   $\text{X}$   $\text{3}$   $\text{MEM}$   $\text{X}$   $\text{=}$  12  $\text{Y} = \text{X}^2 + 3\text{X} - 12$

0.

Store it in memory.

$\text{MEM}$   $\text{X}^?$  0.

Input a value for its variable.

7  $\text{=}$  58.

$\text{=}$   $\text{X}^?$  7.

8  $\text{=}$  76.

- Formula memory is cleared whenever you start a new calculation, change to another mode, or turn off power.

### Base-n Calculations (fx-85W)

- In addition to decimal values, calculations can be performed using binary, octal and hexadecimal values.
- You can specify the default number system to be applied to all input and displayed values, and the number system for individual values you input.
- You cannot use scientific functions in binary, octal, decimal, and hexadecimal calculations. You cannot input values that include decimal part and an exponent.
- If you input a value that includes a decimal part, the unit automatically cuts off the decimal part.
- Negative binary, octal, and hexadecimal values are produced by taking the two's complement.

• Example:

$X_i$	$Y_i$
29	1.6
50	23.5
74	38.0
103	46.4
118	48.0

Perform quadratic regression to determine the regression formula terms and correlation coefficient for the data nearby. Next, use the regression formula to estimate the values for  $\hat{y}$  (estimated value of  $y$ ) for  $x_i = 16$  and  $\hat{x}$  (estimated value of  $x$ ) for  $y_i = 20$ .

Enter REG mode (Quadratic regression)

fx-85W:  $\text{MODE}$   $\text{MODE}$   $\text{2}$   $\text{3}$

Other models:  $\text{MODE}$   $\text{3}$   $\text{2}$   $\text{3}$

$\text{SHIFT}$   $\text{Gd}$   $\text{=}$

29  $\text{1}$  1.6  $\text{DT}$  50  $\text{1}$  23.5  $\text{DT}$

74  $\text{1}$  38.0  $\text{DT}$  103  $\text{1}$  46.4  $\text{DT}$

118  $\text{1}$  48.0  $\text{DT}$

118.

REG

(Regression Coefficient A)

$\text{SHIFT}$   $\text{A}$   $\text{=}$

-35.59856934

(Regression Coefficient B)

$\text{SHIFT}$   $\text{B}$   $\text{=}$

1.495939413

(Regression Coefficient C)

$\text{SHIFT}$   $\text{C}$   $\text{=}$

-6.71629667<sup>-03</sup>

( $\hat{y}$  when  $x_i = 16$ )

16  $\text{SHIFT}$   $\text{Y}$   $\text{=}$

-13.38291067

( $\hat{x}$ , when  $y_i = 20$ )

20  $\text{SHIFT}$   $\text{X}$   $\text{=}$

47.14556728

( $\hat{x}$ , when  $y_i = 20$ )

$\text{SHIFT}$   $\text{X}$   $\text{=}$

175.5872105

### Data Input Precautions

- $\text{DT}$   $\text{DT}$  inputs the same data twice.
- You can also input multiple entries of the same data using  $\text{SHIFT}$   $\text{1}$ . To input the data "20 and 30" five times, for example, press 20  $\text{1}$  30  $\text{SHIFT}$   $\text{1}$  5  $\text{DT}$ .
- The above results can be obtained in any order, and not necessarily that shown above.
- To delete data you have just input, press  $\text{SHIFT}$   $\text{CL}$ .

• 22 •

### Formula Memory (fx-85W)

- Formula memory lets you input a single formula in memory, and then input values for the formula's variables to calculate results.
- Memory can hold a single formula, up to 79 steps long. This function can be used in the COMP mode only.
- Note that the formula is actually stored in memory when you press the  $\text{MEM}$  key in the sequence below.
- Example: To save the following formula, recall it, and then use it to calculate a result:  $Y = X^2 + 3X - 12$

Input the formula.

$\text{MEM}$   $\text{Y}$   $\text{MEM}$   $\text{=}$   $\text{MEM}$   $\text{X}$   $\text{1}$   $\text{+}$   $\text{MEM}$   $\text{X}$   $\text{3}$   $\text{MEM}$   $\text{X}$   $\text{=}$  12  $\text{Y} = \text{X}^2 + 3\text{X} - 12$

0.

Store it in memory.

$\text{MEM}$   $\text{X}^?$  0.

Input a value for its variable.

7  $\text{=}$  58.

$\text{=}$   $\text{X}^?$  7.

8  $\text{=}$  76.

- Formula memory is cleared whenever you start a new calculation, change to another mode, or turn off power.

### Base-n Calculations (fx-85W)






- In addition to decimal values, calculations can be performed using binary, octal and hexadecimal values.
- You can specify the default number system to be applied to all input and displayed values, and the number system for individual values you input.
- You cannot use scientific functions in binary, octal, decimal, and hexadecimal calculations. You cannot input values that include decimal part and an exponent.
- If you input a value that includes a decimal part, the unit automatically cuts off the decimal part.
- Negative binary, octal, and hexadecimal values are produced by taking the two's complement.

• 23 •












- You can use the following logical operators between values in Base-*n* calculations: and (logical product), or (logical sum), xor (exclusive logical sum), xnor (exclusive logical sum negation), Not (negation), and Neg (minus).
- The following are the allowable ranges for each of the available number systems.

Binary	$1000000000 \leq x \leq 1111111111$ $0 \leq x \leq 0111111111$
Octal	$4000000000 \leq x \leq 7777777777$ $0 \leq x \leq 3777777777$
Decimal	$-2147483648 \leq x \leq 2147483647$
Hexadecimal	$80000000 \leq x \leq FFFFFFFF$ $0 \leq x \leq 7FFFFFFF$









- Example 1:** To perform the following calculation and produce a binary result:

10111<sub>2</sub> + 11010<sub>2</sub>  
Binary mode  2  0.  
10111<sub>2</sub>  11010<sub>2</sub>  0.  
 110001.<sub>2</sub>

- Example 2:** To perform the following calculation and produce an octal result:

7654<sub>8</sub> + 12<sub>10</sub>  
Octal mode  2  0.  
 LOGIC  LOGIC  4 (a) 7654<sub>8</sub>  0.  
 LOGIC  LOGIC  1 (d) 12<sub>10</sub>  0.  
 516.<sub>8</sub>

- Example 3:** To perform the following calculation and produce a hexadecimal result:



120<sub>16</sub> or 1101<sub>2</sub>  
Hexadecimal mode  2  0.  
120<sub>16</sub>  2 (or)  
 LOGIC  LOGIC  3 (b) 1101<sub>2</sub>  0.  
 12d.<sub>16</sub>

•24•

## Degrees, Minutes, Seconds Calculations

- You can perform sexagesimal calculations using degrees (hours), minutes, and seconds, and convert between sexagesimal and decimal values.

- Example 1:** To convert the decimal value 2.258 to a sexagesimal value

2.258  2.258  
 2°15'28.8








- Example 2:** To perform the following calculation:

12°34'56" × 3.45  
12  34  56  × 3.45  0.  
 43°24'31.2

## Technical Information

### ■ When you have a problem.....

If calculation results are not what you expect or if an error occurs, perform the following steps.

-  1 (COMP mode)
- fx-85W:  1 (DEG mode)  
Other models:  1
- fx-85W:  3  1 (NORM 1 mode)  
Other models:  3  1
- Check the formula you are working with to confirm it is correct.
- Enter the correct modes to perform the calculation and try again.

<fx-82TL/fx-83WA/fx-270W PLUS/fx-350TL>

If the above steps do not correct your problem, press the P button (see page 29 or 30) on the back of the calculator to reset it. Pressing the P button deletes all data stored in calculator memory. Make sure you always keep written copies of all important data.






•25•

- You can use the following logical operators between values in Base-*n* calculations: and (logical product), or (logical sum), xor (exclusive logical sum), xnor (exclusive logical sum negation), Not (negation), and Neg (minus).












- The following are the allowable ranges for each of the available number systems.

Binary	$1000000000 \leq x \leq 1111111111$ $0 \leq x \leq 0111111111$
Octal	$4000000000 \leq x \leq 7777777777$ $0 \leq x \leq 3777777777$
Decimal	$-2147483648 \leq x \leq 2147483647$
Hexadecimal	$80000000 \leq x \leq FFFFFFFF$ $0 \leq x \leq 7FFFFFFF$









- Example 1:** To perform the following calculation and produce a binary result:

10111<sub>2</sub> + 11010<sub>2</sub>  
Binary mode  2  0.  
10111<sub>2</sub>  11010<sub>2</sub>  0.  
 110001.<sub>2</sub>

- Example 2:** To perform the following calculation and produce an octal result:

7654<sub>8</sub> + 12<sub>10</sub>  
Octal mode  2  0.  
 LOGIC  LOGIC  4 (a) 7654<sub>8</sub>  0.  
 LOGIC  LOGIC  1 (d) 12<sub>10</sub>  0.  
 516.<sub>8</sub>

- Example 3:** To perform the following calculation and produce a hexadecimal result:



120<sub>16</sub> or 1101<sub>2</sub>  
Hexadecimal mode  2  0.  
120<sub>16</sub>  2 (or)  
 LOGIC  LOGIC  3 (b) 1101<sub>2</sub>  0.  
 12d.<sub>16</sub>

•24•






## Degrees, Minutes, Seconds Calculations

- You can perform sexagesimal calculations using degrees (hours), minutes, and seconds, and convert between sexagesimal and decimal values.

- Example 1:** To convert the decimal value 2.258 to a sexagesimal value

2.258  2.258  
 2°15'28.8








- Example 2:** To perform the following calculation:

12°34'56" × 3.45  
12  34  56  × 3.45  0.  
 43°24'31.2

## Technical Information

### ■ When you have a problem.....

If calculation results are not what you expect or if an error occurs, perform the following steps.

-  1 (COMP mode)
- fx-85W:  1 (DEG mode)  
Other models:  1
- fx-85W:  3  1 (NORM 1 mode)  
Other models:  3  1
- Check the formula you are working with to confirm it is correct.
- Enter the correct modes to perform the calculation and try again.

<fx-82TL/fx-83WA/fx-270W PLUS/fx-350TL>

If the above steps do not correct your problem, press the P button (see page 29 or 30) on the back of the calculator to reset it. Pressing the P button deletes all data stored in calculator memory. Make sure you always keep written copies of all important data.

•25•

#### <fx-85W/fx-85WA/fx-300W/fx-911W>

If the above steps do not correct the problem, press the **ON** key. The calculator performs a self-check operation and deletes all data stored in memory if any abnormality is detected. Make sure you always keep written copies of all important data.

### ■ Error Messages

The calculator is locked up while an error message is on the display. Press **AC** to clear the error, or press **◀** or **▶** to display the calculation and correct the problem. See "Error Locator" on page 9 for details.

#### Ma ERROR

- **Cause**
  - Calculation result is outside the allowable calculation range.
  - Attempt to perform a function calculation using a value that exceeds the allowable input range.
  - Attempt to perform an illogical operation (division by zero, etc.).
- **Action**
  - Check your input values and make sure they are all within the allowable ranges. Pay special attention to values in any memory areas you are using.

#### Stk ERROR

- **Cause**
  - Capacity of the numeric stack or operator stack is exceeded.
- **Action**
  - Simplify the calculation. The numeric stack has 10 levels and the operator stack has 24 levels.
  - Divide your calculation into two or more separate parts.

#### Syn ERROR

- **Cause**
  - Attempt to perform an illegal mathematical operation.
- **Action**
  - Press **◀** or **▶** to display the calculation with the cursor located at the location of the error. Make necessary corrections.

•26•

#### Arg ERROR

- **Cause**
  - Improper use of argument
- **Action**
  - Press **◀** or **▶** to display the location of the cause of the error and make required corrections.

### ■ Order of Operations

Calculations are performed in the following order of precedence.

- ① Coordinate transformation: Pol (x, y), Rec (r,  $\theta$ )
  - ② Type A functions:  
With these functions, the value is entered and then the function key is pressed.  
 $x^2, x^{-1}, x!, \dots$
  - ③ Powers and roots:  $x^y, \sqrt[n]{\phantom{x}}$
  - ④  $a^b/c$
  - ⑤ Abbreviated multiplication format in front of  $\pi$ , memory name, or variable name:  $2\pi, 5A, \pi A$  etc.
  - ⑥ Type B functions:  
With these functions, the function key is pressed and then the value is entered.  
 $\sqrt{\phantom{x}}, \sqrt[3]{\phantom{x}}, \log, \ln, e^x, 10^x, \sin, \cos, \tan, \sin^{-1}, \cos^{-1}, \tan^{-1}, \sinh, \cosh, \tanh, \sinh^{-1}, \cosh^{-1}, \tanh^{-1}, (-)$
  - ⑦ Abbreviated multiplication format in front of Type B functions:  $2\sqrt{3}, A\log 2$  etc.
  - ⑧ Permutation and combination:  $nPr, nCr$
  - ⑨  $\times, +$
  - ⑩  $+, -$
- Operations of the same precedence are performed from right to left.  $e^{\ln \sqrt{120}} \rightarrow e^{\ln(\sqrt{120})}$
  - Other operations are performed from left to right.
  - Operations enclosed in parentheses are performed first.

### ■ Stacks

This calculator uses memory areas, called "stacks," to temporarily store values (numeric stack) and commands (command stack) according to their precedence during calculations. The numeric stack has 10 levels and the command stack has 24 levels. A stack error (Stk ERROR) occurs whenever you try to perform a calculation that is so complex that the capacity of a stack is exceeded.

•27•

#### <fx-85W/fx-85WA/fx-300W/fx-911W>

If the above steps do not correct the problem, press the **ON** key. The calculator performs a self-check operation and deletes all data stored in memory if any abnormality is detected. Make sure you always keep written copies of all important data.

### ■ Error Messages

The calculator is locked up while an error message is on the display. Press **AC** to clear the error, or press **◀** or **▶** to display the calculation and correct the problem. See "Error Locator" on page 9 for details.

#### Ma ERROR

- **Cause**
  - Calculation result is outside the allowable calculation range.
  - Attempt to perform a function calculation using a value that exceeds the allowable input range.
  - Attempt to perform an illogical operation (division by zero, etc.).
- **Action**
  - Check your input values and make sure they are all within the allowable ranges. Pay special attention to values in any memory areas you are using.

#### Stk ERROR

- **Cause**
  - Capacity of the numeric stack or operator stack is exceeded.
- **Action**
  - Simplify the calculation. The numeric stack has 10 levels and the operator stack has 24 levels.
  - Divide your calculation into two or more separate parts.

#### Syn ERROR

- **Cause**
  - Attempt to perform an illegal mathematical operation.
- **Action**
  - Press **◀** or **▶** to display the calculation with the cursor located at the location of the error. Make necessary corrections.

•26•

#### Arg ERROR

- **Cause**
  - Improper use of argument
- **Action**
  - Press **◀** or **▶** to display the location of the cause of the error and make required corrections.

### ■ Order of Operations

Calculations are performed in the following order of precedence.

- ① Coordinate transformation: Pol (x, y), Rec (r,  $\theta$ )
  - ② Type A functions:  
With these functions, the value is entered and then the function key is pressed.  
 $x^2, x^{-1}, x!, \dots$
  - ③ Powers and roots:  $x^y, \sqrt[n]{\phantom{x}}$
  - ④  $a^b/c$
  - ⑤ Abbreviated multiplication format in front of  $\pi$ , memory name, or variable name:  $2\pi, 5A, \pi A$  etc.
  - ⑥ Type B functions:  
With these functions, the function key is pressed and then the value is entered.  
 $\sqrt{\phantom{x}}, \sqrt[3]{\phantom{x}}, \log, \ln, e^x, 10^x, \sin, \cos, \tan, \sin^{-1}, \cos^{-1}, \tan^{-1}, \sinh, \cosh, \tanh, \sinh^{-1}, \cosh^{-1}, \tanh^{-1}, (-)$
  - ⑦ Abbreviated multiplication format in front of Type B functions:  $2\sqrt{3}, A\log 2$  etc.
  - ⑧ Permutation and combination:  $nPr, nCr$
  - ⑨  $\times, +$
  - ⑩  $+, -$
- Operations of the same precedence are performed from right to left.  $e^{\ln \sqrt{120}} \rightarrow e^{\ln(\sqrt{120})}$
  - Other operations are performed from left to right.
  - Operations enclosed in parentheses are performed first.

### ■ Stacks

This calculator uses memory areas, called "stacks," to temporarily store values (numeric stack) and commands (command stack) according to their precedence during calculations. The numeric stack has 10 levels and the command stack has 24 levels. A stack error (Stk ERROR) occurs whenever you try to perform a calculation that is so complex that the capacity of a stack is exceeded.

•27•



## ■ Power Supply

The type of battery you should use depends on the model number of your calculator.

### <fx-85W/fx-85WA/fx-300W/fx-911W>

The TWO WAY POWER system actually has two power supplies: a solar cell and a G13 Type (LR44) button battery. Normally, calculators equipped with a solar cell alone can operate only when relatively bright light is present. The TWO WAY POWER system, however, lets you continue to use the calculator as long as there is enough light to read the display.

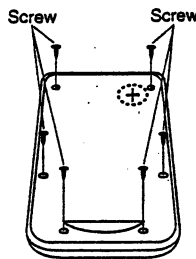
#### • Replacing the Battery

Either of the following symptoms indicates battery power is low, and that the battery should be replaced.

- Display figures are dim and difficult to read in areas where there is little light available.
- Nothing appears on the display when you press the **ON** key.

#### • To replace the battery

- ① Remove the six screws that hold the back cover in place and then remove the back cover.
- ② Remove the old battery.
- ③ Wipe off the sides of new battery with a dry, soft cloth. Load it into the unit with the positive  $\oplus$  side facing up (so you can see it).
- ④ Replace the back cover and secure it in place with the six screws.
- ⑤ Press **ON** to turn power on. Be sure not to skip this step.



•28•

### <fx-82TL>

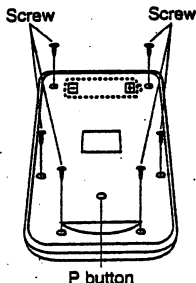
This calculator is powered by single AA-size battery.

#### • Replacing the Battery

Dim figures on the display of the calculator indicate that battery power is low. Continued use of the calculator when the battery is low can result in improper operation. Replace the battery as soon as possible when display figures become dim.

#### • To replace the battery

- ① Press **OFF** to turn power off.
- ② Remove the six screws that hold the back cover in place and then remove the back cover.
- ③ Remove the old battery.
- ④ Load a new battery into the unit so its positive  $\oplus$  and negative  $\ominus$  sides are facing correctly.
- ⑤ Replace the back cover and secure it in place with the six screws.
- ⑥ Use a thin, pointed object to press the P button. Be sure not to skip this step.
- ⑦ Press **ON** to turn power on.



•29•

## ■ Power Supply

The type of battery you should use depends on the model number of your calculator.

### <fx-85W/fx-85WA/fx-300W/fx-911W>

The TWO WAY POWER system actually has two power supplies: a solar cell and a G13 Type (LR44) button battery. Normally, calculators equipped with a solar cell alone can operate only when relatively bright light is present. The TWO WAY POWER system, however, lets you continue to use the calculator as long as there is enough light to read the display.

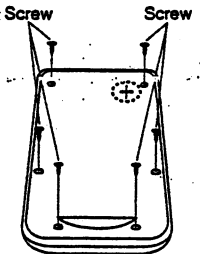
#### • Replacing the Battery

Either of the following symptoms indicates battery power is low, and that the battery should be replaced.

- Display figures are dim and difficult to read in areas where there is little light available.
- Nothing appears on the display when you press the **ON** key.

#### • To replace the battery

- ① Remove the six screws that hold the back cover in place and then remove the back cover.
- ② Remove the old battery.
- ③ Wipe off the sides of new battery with a dry, soft cloth. Load it into the unit with the positive  $\oplus$  side facing up (so you can see it).
- ④ Replace the back cover and secure it in place with the six screws.
- ⑤ Press **ON** to turn power on. Be sure not to skip this step.



•28•

### <fx-82TL>

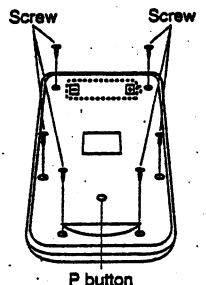
This calculator is powered by single AA-size battery.

#### • Replacing the Battery

Dim figures on the display of the calculator indicate that battery power is low. Continued use of the calculator when the battery is low can result in improper operation. Replace the battery as soon as possible when display figures become dim.

#### • To replace the battery

- ① Press **OFF** to turn power off.
- ② Remove the six screws that hold the back cover in place and then remove the back cover.
- ③ Remove the old battery.
- ④ Load a new battery into the unit so its positive  $\oplus$  and negative  $\ominus$  sides are facing correctly.
- ⑤ Replace the back cover and secure it in place with the six screws.
- ⑥ Use a thin, pointed object to press the P button. Be sure not to skip this step.
- ⑦ Press **ON** to turn power on.



•29•

# <fx-83WA/fx-270W PLUS/fx-350TL>

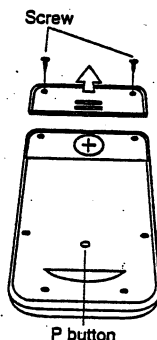
This calculator is powered by single G13 Type (LR44) button battery.

## • Replacing the Battery

Dim figures on the display of the calculator indicate that battery power is low. Continued use of the calculator when the battery is low can result in improper operation. Replace the battery as soon as possible when display figures become dim.

### • To replace the battery

- 1 Press  $\text{OFF}$  to turn power off.
- 2 Remove the two screws that hold the battery cover in place and then remove the battery cover.
- 3 Remove the old battery.
- 4 Wipe off the side of new battery with a dry, soft cloth. Load it into the unit with the positive (+) side facing up (so you can see it).
- 5 Replace the battery cover and secure it in place with the two screws.
- 6 Use a thin, pointed object to press the P button. Be sure not to skip this step.
- 7 Press  $\text{ON}$  to turn power on.



### • Auto Power Off

Calculator power automatically turns off if you do not perform any operation for about six minutes. When this happens, press  $\text{ON}$  (fx-85W/fx-85WA/fx-300W/fx-911W:  $\text{ON}$ ) to turn power back on.

# <fx-83WA/fx-270W PLUS/fx-350TL>

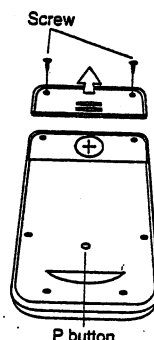
This calculator is powered by single G13 Type (LR44) button battery.

## • Replacing the Battery

Dim figures on the display of the calculator indicate that battery power is low. Continued use of the calculator when the battery is low can result in improper operation. Replace the battery as soon as possible when display figures become dim.

### • To replace the battery

- 1 Press  $\text{OFF}$  to turn power off.
- 2 Remove the two screws that hold the battery cover in place and then remove the battery cover.
- 3 Remove the old battery.
- 4 Wipe off the side of new battery with a dry, soft cloth. Load it into the unit with the positive (+) side facing up (so you can see it).
- 5 Replace the battery cover and secure it in place with the two screws.
- 6 Use a thin, pointed object to press the P button. Be sure not to skip this step.
- 7 Press  $\text{ON}$  to turn power on.



### • Auto Power Off

Calculator power automatically turns off if you do not perform any operation for about six minutes. When this happens, press  $\text{ON}$  (fx-85W/fx-85WA/fx-300W/fx-911W:  $\text{ON}$ ) to turn power back on.

•30•

•30•

## ■ Input Ranges

Internal digits: 12

Accuracy: As a rule, accuracy is  $\pm 1$  at the 10th digit.

Functions	Input Range
$\sin x$	DEG $0 \leq  x  \leq 4.499999999 \times 10^{10}$
	RAD $0 \leq  x  \leq 785398163.3$
	GRA $0 \leq  x  \leq 4.499999999 \times 10^{10}$
$\cos x$	DEG $0 \leq  x  \leq 4.500000008 \times 10^{10}$
	RAD $0 \leq  x  \leq 785398164.9$
	GRA $0 \leq  x  \leq 5.000000009 \times 10^{10}$
$\tan x$	DEG Same as $\sin x$ , except when $ x  = (2n-1) \times 90$ .
	RAD Same as $\sin x$ , except when $ x  = (2n-1) \times \pi/2$ .
	GRA Same as $\sin x$ , except when $ x  = (2n-1) \times 100$ .
$\sin^{-1} x$	$0 \leq  x  \leq 1$
$\cos^{-1} x$	
$\tan^{-1} x$	$0 \leq  x  \leq 9.999999999 \times 10^{99}$
$\sinh x$	$0 \leq  x  \leq 230.2585092$
$\cosh x$	
$\sinh^{-1} x$	$0 \leq  x  \leq 4.999999999 \times 10^{99}$
$\cosh^{-1} x$	
$\tanh x$	$0 \leq  x  \leq 9.999999999 \times 10^{-1}$
$\tanh^{-1} x$	
$\log x / \ln x$	$0 < x$
$10^x$	$-9.999999999 \times 10^{99} \leq x \leq 99.99999999$
$e^x$	$-9.999999999 \times 10^{99} \leq x \leq 230.2585092$
$\sqrt{x}$	$0 \leq x < 1 \times 10^{100}$
$x^2$	$ x  < 1 \times 10^{100}$
$1/x$	$ x  < 1 \times 10^{100}; x \neq 0$
$\sqrt[3]{x}$	$ x  < 1 \times 10^{100}$
$x!$	$0 \leq x \leq 69$ (x is an integer)

•31•

## ■ Input Ranges

Internal digits: 12

Accuracy: As a rule, accuracy is  $\pm 1$  at the 10th digit.

Functions	Input Range
$\sin x$	DEG $0 \leq  x  \leq 4.499999999 \times 10^{10}$
	RAD $0 \leq  x  \leq 785398163.3$
	GRA $0 \leq  x  \leq 4.499999999 \times 10^{10}$
$\cos x$	DEG $0 \leq  x  \leq 4.500000008 \times 10^{10}$
	RAD $0 \leq  x  \leq 785398164.9$
	GRA $0 \leq  x  \leq 5.000000009 \times 10^{10}$
$\tan x$	DEG Same as $\sin x$ , except when $ x  = (2n-1) \times 90$ .
	RAD Same as $\sin x$ , except when $ x  = (2n-1) \times \pi/2$ .
	GRA Same as $\sin x$ , except when $ x  = (2n-1) \times 100$ .
$\sin^{-1} x$	$0 \leq  x  \leq 1$
$\cos^{-1} x$	
$\tan^{-1} x$	$0 \leq  x  \leq 9.999999999 \times 10^{99}$
$\sinh x$	$0 \leq  x  \leq 230.2585092$
$\cosh x$	
$\sinh^{-1} x$	$0 \leq  x  \leq 4.999999999 \times 10^{99}$
$\cosh^{-1} x$	
$\tanh x$	$0 \leq  x  \leq 9.999999999 \times 10^{-1}$
$\tanh^{-1} x$	
$\log x / \ln x$	$0 < x$
$10^x$	$-9.999999999 \times 10^{99} \leq x \leq 99.99999999$
$e^x$	$-9.999999999 \times 10^{99} \leq x \leq 230.2585092$
$\sqrt{x}$	$0 \leq x < 1 \times 10^{100}$
$x^2$	$ x  < 1 \times 10^{100}$
$1/x$	$ x  < 1 \times 10^{100}; x \neq 0$
$\sqrt[3]{x}$	$ x  < 1 \times 10^{100}$
$x!$	$0 \leq x \leq 69$ (x is an integer)

•31•

Functions	Input Range
$nPr$	$0 \leq n \leq 99, r \leq n$ ( $n, r$ is an integer) $1 \leq (n!/(n-r)!) \leq 9.999999999 \times 10^{99}$
$nCr$	$0 \leq n \leq 99, r \leq n$ ( $n, r$ is an integer)
$\text{Pol}(x, y)$	$ x ,  y  \leq 9.999999999 \times 10^{99}$ $(x^2 + y^2) \leq 9.999999999 \times 10^{99}$
$\text{Rec}(r, \theta)$	$0 \leq r \leq 9.999999999 \times 10^{99}$ $\theta$ : Same as $\sin x, \cos x$
$a^b \cdot c$	$ a , b, c < 1 \times 10^{100}$ $0 \leq b, c$
$\frac{a}{b}$	$ x  < 1 \times 10^{100}$ Decimal $\leftrightarrow$ Sexagesimal Conversions $0^\circ 0' 0'' \leq  x  \leq 9999999959^\circ$
$x^y$	$x > 0: -1 \times 10^{100} < y \log x < 100$ $x = 0: y > 0$ $x < 0: y = n, \frac{1}{2n+1}$ ( $n$ is an integer) However: $-1 \times 10^{100} < y \log  x  < 100$
$\sqrt[y]{x}$	$y > 0: x \neq 0$ $-1 \times 10^{100} < 1/x \log y < 100$ $y = 0: x > 0$ $y < 0: x = 2n+1, \frac{1}{n}$ ( $n \neq 0; n$ is an integer) However: $-1 \times 10^{100} < 1/x \log  y  < 100$
$a^b/c$	Total of integer, numerator, and denominator must be 10 digits or less (including division marks).
SD (REG)	$ x  < 1 \times 10^{99}$ $ y  < 1 \times 10^{99}$ $ n  < 1 \times 10^{100}$ $x\sigma n, y\sigma n, \bar{x}, \bar{y}$ $A, B, r: n \neq 0$ $x\sigma n-1, y\sigma n-1: n \neq 0, 1$

\* Errors are cumulative with such internal continuous calculations as  $x^y$ ,  $\sqrt[y]{x}$ ,  $x!$ , and  $\sqrt[3]{x}$ , so accuracy may be adversely affected.

• 32 •

## Specifications

### Power Supply:

**fx-82TL:** Single AA-size battery (R6P (SUM-3))  
**fx-85W/fx-85WA/fx-300W/fx-911W:**  
Solar cell and a single G13 Type button battery (LR44)  
**fx-83WA/fx-270W PLUS/fx-350TL:**  
Single G13 Type button battery (LR44)

### Battery Life:

**fx-82TL:** Approximately 17,000 hours continuous display of flashing cursor.  
Approximately 2 years when left with power turned off.  
**fx-85W/fx-85WA/fx-300W/fx-911W:**  
Approximately 3 years (1 hour use per day).  
**fx-83WA/fx-270W PLUS/fx-350TL:**  
Approximately 12,000 hours continuous display of flashing cursor.  
Approximately 3 years when left with power turned off.

### Dimensions:

**fx-82TL:** 19.3(H) × 76(W) × 164(D) mm  
 $\frac{3}{4}$ "(H) × 3"(W) ×  $6\frac{7}{16}$ "(D)  
**fx-83WA/fx-85W/fx-85WA/fx-270W PLUS/fx-300W/fx-350TL/fx-911W:**  
10(H) × 76(W) × 150(D) mm  
 $\frac{3}{8}$ "(H) × 3"(W) ×  $5\frac{7}{8}$ "(D)

### Weight:

**fx-82TL:** 115 g (4.1 oz) including battery  
**fx-85W/fx-85WA/fx-300W/fx-911W:**  
80 g (2.8 oz) including battery  
**fx-83WA/fx-270W PLUS/fx-350TL:**  
90 g (3.2 oz) including battery

Power Consumption: 0.0001W

Operating Temperature: 0°C - 40°C (32°F - 104°F)

• 33 •

Functions	Input Range
$nPr$	$0 \leq n \leq 99, r \leq n$ ( $n, r$ is an integer) $1 \leq (n!/(n-r)!) \leq 9.999999999 \times 10^{99}$
$nCr$	$0 \leq n \leq 99, r \leq n$ ( $n, r$ is an integer)
$\text{Pol}(x, y)$	$ x ,  y  \leq 9.999999999 \times 10^{99}$ $(x^2 + y^2) \leq 9.999999999 \times 10^{99}$
$\text{Rec}(r, \theta)$	$0 \leq r \leq 9.999999999 \times 10^{99}$ $\theta$ : Same as $\sin x, \cos x$
$a^b \cdot c$	$ a , b, c < 1 \times 10^{100}$ $0 \leq b, c$
$\frac{a}{b}$	$ x  < 1 \times 10^{100}$ Decimal $\leftrightarrow$ Sexagesimal Conversions $0^\circ 0' 0'' \leq  x  \leq 9999999959^\circ$
$x^y$	$x > 0: -1 \times 10^{100} < y \log x < 100$ $x = 0: y > 0$ $x < 0: y = n, \frac{1}{2n+1}$ ( $n$ is an integer) However: $-1 \times 10^{100} < y \log  x  < 100$
$\sqrt[y]{x}$	$y > 0: x \neq 0$ $-1 \times 10^{100} < 1/x \log y < 100$ $y = 0: x > 0$ $y < 0: x = 2n+1, \frac{1}{n}$ ( $n \neq 0; n$ is an integer) However: $-1 \times 10^{100} < 1/x \log  y  < 100$
$a^b/c$	Total of integer, numerator, and denominator must be 10 digits or less (including division marks).
SD (REG)	$ x  < 1 \times 10^{99}$ $ y  < 1 \times 10^{99}$ $ n  < 1 \times 10^{100}$ $x\sigma n, y\sigma n, \bar{x}, \bar{y}$ $A, B, r: n \neq 0$ $x\sigma n-1, y\sigma n-1: n \neq 0, 1$

\* Errors are cumulative with such internal continuous calculations as  $x^y$ ,  $\sqrt[y]{x}$ ,  $x!$ , and  $\sqrt[3]{x}$ , so accuracy may be adversely affected.

• 32 •

## Specifications

### Power Supply:

**fx-82TL:** Single AA-size battery (R6P (SUM-3))  
**fx-85W/fx-85WA/fx-300W/fx-911W:**  
Solar cell and a single G13 Type button battery (LR44)  
**fx-83WA/fx-270W PLUS/fx-350TL:**  
Single G13 Type button battery (LR44)

### Battery Life:

**fx-82TL:** Approximately 17,000 hours continuous display of flashing cursor.  
Approximately 2 years when left with power turned off.  
**fx-85W/fx-85WA/fx-300W/fx-911W:**  
Approximately 3 years (1 hour use per day).  
**fx-83WA/fx-270W PLUS/fx-350TL:**  
Approximately 12,000 hours continuous display of flashing cursor.  
Approximately 3 years when left with power turned off.

### Dimensions:

**fx-82TL:** 19.3(H) × 76(W) × 164(D) mm  
 $\frac{3}{4}$ "(H) × 3"(W) ×  $6\frac{7}{16}$ "(D)  
**fx-83WA/fx-85W/fx-85WA/fx-270W PLUS/fx-300W/fx-350TL/fx-911W:**  
10(H) × 76(W) × 150(D) mm  
 $\frac{3}{8}$ "(H) × 3"(W) ×  $5\frac{7}{8}$ "(D)

### Weight:

**fx-82TL:** 115 g (4.1 oz) including battery  
**fx-85W/fx-85WA/fx-300W/fx-911W:**  
80 g (2.8 oz) including battery  
**fx-83WA/fx-270W PLUS/fx-350TL:**  
90 g (3.2 oz) including battery

Power Consumption: 0.0001W

Operating Temperature: 0°C - 40°C (32°F - 104°F)

• 33 •

**This file has been downloaded from:**

[www.UsersManualGuide.com](http://www.UsersManualGuide.com)

User Manual and User Guide for many equipments like mobile phones, photo cameras, mother board, monitors, software, tv, dvd, and others..

Manual users, user manuals, user guide manual, owners manual, instruction manual, manual owner, manual owner's, manual guide, manual operation, operating manual, user's manual, operating instructions, manual operators, manual operator, manual product, documentation manual, user maintenance, brochure, user reference, pdf manual