10sII
SCIENTIFIC CALCULATOR

USER'S MANUAL

www.hpcalcs.com

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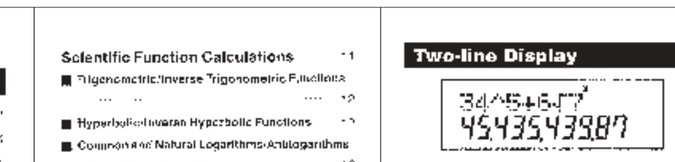
Two-line Display



The two-line display makes it possible to view both the calculation formula and its result at the same time.

- The upper line shows the calculation formula.
- The lower line shows the result.

A separator symbol is displayed every three digits when the integer part of the mantissa contains more than five digits.

Before getting started...

■ Modes

Before starting a calculation, you must first enter the appropriate mode as indicated in the table below.

To perform the type of calculation:	Perform this key operation:	To enter this mode:
Basic arithmetic calculations	MODE 1	COMP
Statistical calculations	MODE 2	SD
Regression calculations	MODE 3	REG

- Pressing the [MODE] key more than once displays a list of setup screens. Setup screens are described in the sections of this manual where they are actually used to change the calculator setup.
- In this manual, the name of the mode you need to enter in order to perform the calculations being described is indicated in the mode line at each section.

Example: **Statistical Calculations** SD REG

Note!

- To return the calculation mode and setup to the initial defaults shown below, press [SHIFT] [9] (Mode) [3].

Calculation Mode:	COMP
Angle Unit:	Deg
Exponential Display Format:	Norm 1
Fix, Sci, Display Format:	n/a
Decimal Point Character:	Dot

- Mode indicators appear in the upper part of the display.
- Be sure to check the current calculator mode (SD, REG, COMP) and angle unit setting (Deg, Rad, Gra) before beginning a calculation.

■ Input Capacity

- The input cycle is limited to a maximum total of 79 "steps." One step is taken up each time you press a number key or arithmetic operator key (+, −, ×, ÷). A set of [ ] key pairs on data does not take up a step, so long as [ ] is, for example, taken to only one step.
- You can input up to 79 steps for a single calculation. Whenever you input the 73rd step of a calculation, the cursor changes from "_" to "■" to let you know that only a few steps of input remain. If you need to input more than 79 steps, you should divide your calculation into two or more parts.
- Pressing the [=] key resets the step count and clears any previous answer memory value, so you will not be able to use a subsequent calculation. See "Answer Memory" for more information about using the [Ans] key.

■ Making Corrections During Input

- Use [◀] and [▶] to move the cursor to the location you want.
- Press [DEL] to delete the number or function at the current cursor position.
- Press [SHIFT] [INS] to change to an insert cursor ("_"). Inserting something with the insert cursor turns off the display. Inserts the input at the insert cursor location.
- Pressing [SHIFT] [INS], or [=], returns to the normal cursor from the insert cursor.

■ Replay Function

- Every time you perform a calculation, the reply function stores the calculation formula and its result in replay memory. Pressing the [▲] key displays the formula and result of the calculation you last performed. Pressing [▲] again backsteps successively through past calculations.
- Pressing the [▲] or [▼] key while a replay memory calculation is on the display changes to the editing screen.
- Pressing the [▲] or [▼] key in exactly that way, with a calculation backstepped to editing screen, recalls it.
- Pressing [AC] does not clear replay memory, so you can recall the last calculation even after you press [AC].
- Replay memory can store up to 99 pairs of the most recent expressions and results.
- Replay memory is cleared by any of the following operations.
  When you press the [ON] key.
  When you initialize modes and settings by pressing [SHIFT] [9] (Mode) [3].
  When you change how you calculate (other modes or the Fix or Sci specification).
  When you turn off the calculator.

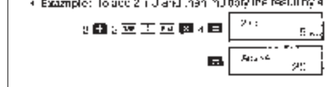
■ Error Locator

- Pressing [◀] or [▶] after an error occurs displays the calculation with the cursor positioned at the location where the error occurred.

■ Multi-statements

A multi-statement is an expression that is made up of two or more smaller expressions, which are joined using a colon (:).

- Example: To add 2 + 3 and then multiply the result by 4



■ Exponential Display Formats

This calculator can display up to 10 digits. Larger values are automatically displayed using exponential notation. In the case of decimal values, you can select between two formats that determine at what point exponential notation is used.

- To change the exponential display format, press the [MODE] key a number of times until you reach the exponential display format setup screen shown below.

- Press [3]. On the screen, select Norm 1 (press [1]) or Norm 2 (press [2]).

■ Norm 1

With Norm 1, exponential notation is automatic for values with more than 10 digits and decimal values with more than two decimal places.

■ Norm 2

With Norm 2, exponential notation is automatic for integer values with more than 10 digits and decimal values with more than nine decimal places.

- All of the examples in this manual show calculation results using the Norm 1 format.

■ Decimal Point and Separator Symbols

You can use decimal display setup (Dot) screen to specify the symbols you want for the decimal point and 3-digit separator.

- To change the decimal point and separator symbol setting, press the [=] key a number of times until you reach the setup screen shown below.

- Display the selection screen.
  [SHIFT] [MODE] [3]
- Press the number key ([1] or [2]) that corresponds to the setting you want to use.
  [1] (Dot): Period = decimal point, comma = separator
  [2] (Comma): Comma = decimal point, period = separator

■ Initializing the Calculator

- Perform the following key operation when you want to initialize the calculation mode and setup, and clear replay memory and variables.
  [SHIFT] [9] (Mode) [2] (Clr) [=] (All) [=]

Basic Calculations (COMP)

■ Arithmetic Calculations

Use the [MODE] key to enter the COMP Mode when you want to perform basic calculations.
COMP ... [MODE] [1]

- Negative values must be enclosed within parentheses.
  5 + (−3) × 9 = [5] [+] [(−)] [3] [×] [9] [=] 22
- If you accidentally enter a negative value (−) within parentheses, the calculator will display an error message.
  Ex: 2.34 × 10^−4 × (−1.67) [(−)] 2.34 [EXP] [(−)] 4
- Example 1: 8 × (5 × 10^7) = 1.6 × 10^9
  8 [×] 5 [EXP] 7 [=] 1.6^09
- Example 2: 5 × (1.7)^2 = 14.45
  5 [×] [(] 1.7 [)] [x²] [=] 14.45
- You can also use [^] to raise values to a power.

■ Fraction Operations

• Fraction Calculations

- Values are displayed in decimal format automatically whenever the total number of digits of a fraction value (integer + numerator + denominator + separator marks) exceeds 10.

- Example 1: $\frac{2}{3} + \frac{19}{15} = 2\frac{1}{3}$
  2 [a b/c] 3 [+] 19 [a b/c] 15 [=] 2_1_3 (2 1/3)
- Example 2: $3\frac{1}{4} + \frac{2}{5} = 4\frac{13}{20}$
  3 [a b/c] 1 [a b/c] 4 [+] 2 [a b/c] 5 [=] 4_13_20 (4 13/20)
- Example 3: $\frac{2}{4} - \frac{1}{2}$
  2 [a b/c] 4 [−] 1 [a b/c] 2 [=] 1_2 (1/2)
- Example 4: $\frac{1}{2} + 1.6 = 2.1$
  1 [a b/c] 2 [+] 1.6 [=] 2.1
- Results of calculations that mix fraction and decimal values are always decimal.

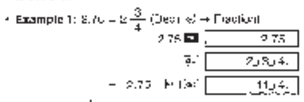
• Decimal ↔ Fraction Conversion

- Use the operation shown below to convert calculation results between decimal values and fraction values.
- Note that conversion can take as long as ten seconds to perform.
- Example 1: 5.75 = $5\frac{3}{4}$ (Decimal → Fraction)
  5.75 [=] 5_3_4 (5 3/4)
  [a b/c] (d/c) 23_4 (23/4)
  [SHIFT] [a b/c] 5.75 (Improper fraction)
- Example 2: $\frac{1}{2}$ = 0.5 (Fraction ↔ Decimal)
  1 [a b/c] 2 [=] 1_2 (1/2)
  [a b/c] 0.5
  [a b/c] 1_2 (1/2)

• Mixed Fraction ↔ Improper Fraction Conversion

- Example: $1\frac{2}{3} \leftrightarrow \frac{5}{3}$
  1 [a b/c] 2 [a b/c] 3 [=] 1_2_3 (1 2/3)
  [SHIFT] [a b/c] 5_3 (5/3)
  [SHIFT] [a b/c] 1_2_3 (1 2/3)

- You can use the display setup (Disp) screen to specify the display format when a fraction calculation result is greater than one.
- To change the fraction display format, press the [=] key a number of times until you reach the setup screen shown below.



- Display the selection screen.
  [SHIFT] [MODE] [3]
- Press the number key ([1] or [2]) that corresponds to the setting you want to use.
  [1] (Mixed): Mixed fraction
  [2] (Improper): Improper fraction
- Mixed fractions cannot be input if the total number of digits of the whole value, numerator, and denominator exceeds 10. Type in improper fraction when the display format is set to [1].

■ Percentage Calculations

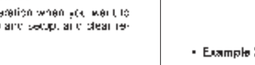
- Example 1: To calculate 12% of 1500 *(180)*
  1500 [×] 12 [%]
- Example 2: To calculate what percentage 660 is of 880 *(75%)*
  660 [÷] 880 [%]
- Example 3: To add 10% onto 2500 *(2750)*
  2500 [×] 10 [%] [+]
- Example 4: To discount 3500 by 25% *(2625)*
  3500 [×] 25 [%] [−]
- Example 5: To find out the sum of 168, 20, and 734 if 23% is added to the total *(1000)*
  168 [+] 20 [+] 734 [=] [×] 123 [%]
  [AC] [(] [Ans] [÷] 20 [)] [×] 100 [=]
- As shown above, if you want to use the current Answer Memory value for calculations or operations after you need to assign the Answer Memory value to another variable and then use the variable in the calculation. This is because the value is overwritten when [=] is pressed, since a result is stored in Answer Memory each time the [=] key is pressed.
- Example 6: If 300 grams are added to a test sample originally weighing 500 grams, what is the percentage increase in weight? *(160%)*
  300 [+] 500 [=] [÷]
  500 [=] [×] 100 [=]
- Example 7: What is the percentage change when a value is increased from 40 to 46? How about to 48? *(15%, 20%)*
  46 [−] 40 [=] [÷] 40 [=] [×] 100 [=]
  48 [−] 40 [=] [÷] 40 [=] [×] 100 [=]

■ 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 2.35 to a sexagesimal value and then back to a decimal value
  2.35 [=] 2°21'0"
  [SHIFT] [=] 2.35
- Example 2: 2 hours 30 minutes + 45 minutes
  2 [°'"] 30 [°'"] [+] 45 [°'"] [=] 3°15'0"
- Example 3: 2.5 hours − 1 hour 45 minutes 30 seconds
  2.5 [°'"] [−] 1 [°'"] 45 [°'"] 30 [°'"] [=] 0°44'30"

■ FIX, SCI, RND

- To change the settings for the number of decimal places, the number of significant digits of the exponential display format, press the [=] key a number of times until you reach the setup screen shown below.



- Press the number key ([1], [2], or [3]) that corresponds to the setup item you want to change.
  [1] (Fix): Number of decimal places
  [2] (Sci): Number of significant digits
  [3] (Norm): Exponential display format
- Example 1: 200 ÷ 7 × 14 =
  200 [÷] 7 [×] 14 [=] 400
  Specifying the number of decimal places: [SHIFT] [=] (Fix) 5 [=] 400.00000
  Rounding off the 6th decimal place: 200 [÷] 7 [=] 28.57143
  [×] 14 [=] 400.00000
  The following performs the same calculation after specifying two decimal places.
  200 [÷] 7 [=] 28.57
  [×] 14 [=] 399.98
- Press [SHIFT] [=] (Norm) [1] or [2] to clear the Fix specification.
- Example 2: 1 ÷ 3, displaying result with two significant digits (Sci 2)
  [SHIFT] [=] (Sci) [2] 1 [÷] 3 [=] 3.3^-01
- Press [SHIFT] [=] (Norm) [1] or [2] to clear the Sci specification.

Memory Calculations (COMP)

Use the [MODE] key to enter the COMP Mode after you want to perform a calculation using memory.
COMP ... [MODE] [1]

■ Answer Memory

- Whenever you press [=] after inputting values or executing an expression, the calculated result automatically updates Answer Memory contents by storing the result.
- In addition to [=], Answer Memory contents are also updated with result whenever you press [M+], [M−], [SHIFT] [STO] (followed by a letter of the alphabet), or [M+] or [M−] in the SD or REG Mode.
- You can recall Answer Memory contents by pressing [Ans].
- Answer Memory can store up to 15 digits for the mantissa and two digits for the exponent.
- Answer Memory contents are not updated if the operation performed by any of the above key operations results in an error.

■ Consecutive Calculations

- You can use the calculation result currently on the display (and also stored in Answer Memory) as the first value of your next calculation. Note that pressing an operator key with a result displayed causes the displayed value to change to Ans, indicating that the value just is currently stored in Answer Memory.
- The result of a calculation can also be used with a subsequent Type A function (x², x³, x⁻¹, n!, DRG▶, +, −, ×, ÷, ^, x√, nPr, nCr).

■ Independent Memory

- Values can be input directly into memory, added to memory, or subtracted from memory. Independent memory is convenient for calculating cumulative totals.
- Independent memory uses the same memory area as variable M.
- To clear independent memory (M), press [0] [SHIFT] [STO] (M−).

- Example:
  55 − 4 = 32 → 23 [+] 9 [STO] (M+)
  65 − 6 = 47 → 50 [+] 8 [M+]
  −) 40 × 2 − 50 (Total) = 17 → 40 [×] 2 [−] 50 [M+] [RCL] (M)

■ Variables

- There are nine variables (A through F, M, X and Y) which can be used to store data, constants, results, and other values.
- Use the following operation to delete data assigned to a particular variable: [0] [STO] [(] [A] [)]. This operation deletes the data assigned to variable A.
- Perform the following key operation when you want to clear the values assigned to all of the variables.
  [SHIFT] [9] [3] (Mcl) [=]
- Example: 1 [STO] A + 2 = 3
  A + 3 = 6
  [RCL] (A) [+] 3 [=] 6
  [RCL] (A) [×] 9 [=] 54

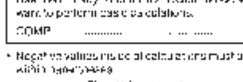
Scientific Function Calculations (COMP)

Use the [MODE] key to enter the COMP Mode when you want to perform basic arithmetic calculations.
COMP ... [MODE] [1]

- Certain types of calculations may take a long time to complete.
- Wait for the result to appear on the display before starting the next calculation.
- π = 3.14159265359

■ Trigonometric/Inverse Trigonometric Functions

- To change the default angle unit (deg, rad, gra), press the [MODE] key a number of times until you reach the angle unit setup screen shown below.



- Press the number key ([1], [2], or [3]) that corresponds to the angle unit you want to use.
  (90° = π/2 radians = 100 grads)
- Example 1: sin 63.5937° = 0.897859012
  [SHIFT] [sin] [(] 63.5937 [)] [=] 0.897859012
  [MODE] [2] (Rad) [SHIFT] [sin] [(] 1 [÷] 2 [)] [=] 0.5
- Example 2: cos $\left(\frac{\pi}{4}\right)$ rad = 0.5
  [SHIFT] [cos] [(] [π] [÷] 4 [)] [=] 0.5
- Example 3: tan⁻¹ $\frac{\sqrt{2}}{2}$ = 0.615479709 rad $\left(= \frac{\pi}{5}\right)$ rad
  [SHIFT] [tan] [(] [√] 2 [÷] 2 [)] [=] 0.615479709
  [MODE] [3] (Gra) [=] 70.30158739
- Example 4: tan⁻¹ 0.741 = 36.53844577°
  [MODE] [1] (Deg) [SHIFT] [tan] 0.741 [=] 36.53844577

■ Hyperbolic/Inverse Hyperbolic Functions

- Example 1: sinh 3.6 = 18.28545536
  [hyp] [sin] 3.6 [=] 18.28545536
- Example 2: sinh⁻¹ 30 = 4.094622224
  [SHIFT] [hyp] [sin] 30 [=] 4.094622224

■ Common and Natural Logarithms/Antilogarithms

- Example 1: log 1.23 = 0.089905111
  [log] 1.23 [=] 0.089905111
- Example 2: 10^−3.4 = log_10 0.0003981071
  [SHIFT] [10^x] 3.4 [+/−] [=] 0.0003981071
  In e^1 = 1
  [SHIFT] [ln] [e^x] [1] [=] 1
- Example 3: e^4.5 = 90.01713130
  [SHIFT] [e^x] 4.5 [=] 90.01713130
- Example 4: 10^1.7 = 50.11872336
  [SHIFT] [10^x] 1.7 [=] 50.11872336
- Example 5: e^4 = 54.59815003
  [SHIFT] [e^x] 4 [=] 54.59815003

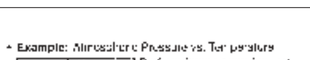
■ Square Roots, Cube Roots, Roots, Squares, Cubes, Reciprocals, Factorials, Random Numbers, π, and Permutation/Combination

- Example 1: $\sqrt{3} + \sqrt{3} \times \sqrt{3} = 5.267949009$
  [√] 3 [+] [√] 3 [×] [√] 3 [=] 5.267949009
- Example 2: $\sqrt[3]{5} + \sqrt[4]{-27} = -1.290024053$
  [SHIFT] [∛] 5 [+] [SHIFT] [∜] (−) 27 [=] −1.290024053
- Example 3: $\sqrt[3]{123} - 12^3 \times 1 = -1.998817765$
  [SHIFT] [∛] 123 [−] 12 [x³] [×] 1 [=] −1.998817765
- Example 4: 15! − 30! ÷ 28! = 1023
  15 [x!] [−] 30 [x!] [÷] 28 [x!] [=] 1023
- Example 5: 12³ = 1728
  12 [x³] [=] 1728
- Example 6: $\frac{5!}{3! \times 4!} = 12$
  5 [x!] [÷] [(] 3 [x!] [×] 4 [x!] [)] [=] 12
- Example 7: 8! = 40320
  8 [x!] [=] 40320
- Example 8: To generate a random number between 0.000 and 0.999
  [Ran#] [=] 0.314
  (The above number is a sample only. Results will vary.)

- Example 9: 5nPr = 6.421777981
  3 [nPr] 5 [=] 6.421777981
- Example 10: To determine how many different 4-digit values can be produced using the numbers 1 through 7. Numbers cannot be duplicated within a single 4-digit value (1234 is allowed, but 1122 is not). *(840)*
  7 [nPr] 4 [=] 840
- Example 11: To determine how many different 4-member groups can be organized from a group of 10 individuals. *(210)*
  10 [nCr] 4 [=] 210

■ Angle Unit Conversion

- Press [SHIFT] [DRG▶] to display the following menu.



- Pressing [1], [2], or [3] converts the displayed value to the corresponding angle unit.
- Example: To convert 4.25 radians to degrees
  [MODE] [1] (Deg)
  4.25 [SHIFT] [DRG▶] [1] (R) 243.5070629

■ 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, θ=60°) to rectangular coordinates (x, y) (Deg)
  x = 1
  [MODE] [1] (Deg) [2] (Rec) 2 [,] 60 [)] [=] x = 1
  y = 1.732050808
  [RCL] (F) [=] y = 1.732050808
- Press [RCL] [E] to display the value of x, or [RCL] [F] to display the value of y.

- Example 2: To convert rectangular coordinates (1, √3) to polar coordinates (r, θ) (Rad)
  x = 2
  [MODE] [2] (Rad) [2] (Pol) 1 [,] [√] 3 [)] [=] r = 2
  θ = 60
  [RCL] (F) [=] θ = 1.047197551
- Press [RCL] [E] to display the value of r, or [RCL] [F] to display the value of θ.

■ Engineering Notation Calculations

- Example 1: To convert 56,088 meters to kilometers
  56,088 [ENG] [=] 56.088^03 (km)
- Example 2: To convert 0.06125 grams to milligrams
  0.06125 [ENG] [=] 61.25^-03 (mg)

Statistical Calculations (SD, REG)

Standard Deviation (SD)

Use the [MODE] key to enter the SD Mode when you want to perform statistical calculations using standard deviation.
SD ... [MODE] [2]

- Always start data input with the [SHIFT] [CLR] [1] (Scl) [=] (clear statistical memory) operation.
- Input data using the key sequence shown below.
  x-data [DT] y-data [DT]
- Input data is used in calculations as follows: Ex. Σx², n, σx and so on, which you can recall using the key operations noted nearby.

Data Input Precautions

- [M+] [M−] inputs the same data twice.
- You can also input multiple entries of the same data using [×]. To input the same 20 and 30 five times, for example, press 20 [,] 30 [,] 5 [)] [M+].
- The above results can be obtained in any order, and not necessarily that shown above.
- Pressing [=] when adding data input for standard deviation also applies for regression calculations.

Technical Information

■ When you have a problem...

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

1. Press [SHIFT] [9] (Mode) [3] to initialize all modes and settings.
2. Check the formula you are working with to confirm its syntax.
3. Enter General mode and try performing the calculation again.

If the above steps do not correct the problem, press the [On] key. This action performs a self-test operation and deletes all data stored in memory. If the above step is successful, 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" for details.

Math ERROR

- Causes
  - Calculation result is outside the allowable calculation range.
  - An attempt to perform a mathematical calculation using a value that exceeds the allowable input range.
  - An attempt to perform an illegal 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.

Stack ERROR

- Cause
  - The 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.

Syntax ERROR

- Cause
  - An attempt to perform an illegal mathematical operation.
- Action
  - Press [◀] or [▶] to display the calculation with the cursor located at the location of the error and make required corrections.

Arg ERROR

- Cause
  - Improper use of an 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, θ)
② Type A functions:
  With these functions, the value is entered and then the function key is pressed.
  x², x³, x⁻¹, n!, °'"
  ^, x√, nPr, nCr
  Angle unit conversion (DRG▶)

③ Powers and roots: ^, x√
④ ×, ÷
⑤ Abbreviated multiplication format in front of π, Ran#, variable names, and left parenthesis: 2π, 5A, πA, (A + 1)(B − 1), 3(5 + 4)
⑥ Type B functions:
  With these functions, the function key is pressed and then the value is entered.
  √, ∛, 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 sin 30, A log 2, etc.
⑧ Permutation and combination: nPr, nCr
⑨ ×, ÷
⑩ +, −

- Operations with the same precedence are performed from left to right.
- Operations in parentheses are performed first.
- When a calculation contains a negative value that is the first number (the value is preceded by (−)), the negative value must be enclosed within parentheses. The negative sign (−) is treated as a Type B function, so certain calculations may not work when the calculation includes a Type B function, or power or root operations.
  Example: (−)2^4 = 16
  −2^4 = −16

- Example:
  55 − 4 = 32 → 23 [+] 9 [STO] (M+)
  65 − 6 = 47 → 50 [+] 8 [M+]
  −) 40 × 2 − 50 (Total) = 17 → 40 [×] 2 [−] 50 [M+] [RCL] (M)

■ Variables

- There are nine variables (A through F, M, X and Y) which can be used to store data, constants, results, and other values.
- Use the following operation to delete data assigned to a particular variable: [0] [STO] [(] [A] [)]. This operation deletes the data assigned to variable A.
- Perform the following key operation when you want to clear the values assigned to all of the variables.
  [SHIFT] [9] [3] (Mcl) [=]
- Example: 1 [STO] A + 2 = 3
  A + 3 = 6
  [RCL] (A) [+] 3 [=] 6
  [RCL] (A) [×] 9 [=] 54

Regression Calculations (REG)

Use the [MODE] key to enter the REG Mode when you want to perform statistical calculations using regression.
REG ... [MODE] [3]

- Entering the REG Mode displays screens like the one shown below.

- Press the number key ([1], [2], or [3]) that corresponds to the type of regression you want to use.
  [1] (Lin): Linear regression
  [2] (Log): Logarithmic regression
  [3] (Exp): Exponential regression
  [SHIFT] [1] (Pwr): Power regression
  [SHIFT] [2] (Inv): Inverse regression
  [SHIFT] [3] (Quad): Quadratic regression

- Always start data input with the [SHIFT] [CLR] [1] (Scl) [=] operation to clear statistical memory.
- Input data using the key sequence shown below.
  x-data [DT] y-data [DT]
- Input data is used in calculations as follows: Ex. Σx², n, σx and so on, which you can recall using the key operations noted nearby.

- Example: Atmospheric Pressure vs. Temperature

Temperature	Atmospheric Pressure
12°C	1000 hPa
15°C	1005 hPa
22°C	1013 hPa
25°C	1017 hPa
30°C	1012 hPa

Perform linear regression to determine the regression formula and correlation coefficient for the data above. Next, use the regression formula to estimate atmospheric pressure at 18°C and temperature at 1030 hPa. Finally, calculate the coefficient of determination (r²) and sample covariance.
$\left(\text{Sample covariance} = \frac{\text{Sum of products of deviations}}{n-1}\right)$

In the Hard Mode:
[SHIFT] [9] (Mode) [3] (Hard)
[MODE] [3] (Reg) [1] (Lin) [=] (Statistical clear)
12 [,] 1000 [DT] 15 [,] 1005 [DT] 22 [,] 1013 [DT] 25 [,] 1017 [DT] 30 [,] 1012 [DT]
[SHIFT] [1] (S-VAR) [2] (n) [=] 5
[AC] [SHIFT] [2] (S-SUM) [1] (Σx) [=] 104
[SHIFT] [2] (S-SUM) [2] (Σx²) [=] 2158
[SHIFT] [2] (S-SUM) [3] (Σy) [=] 5047
[SHIFT] [2] (S-SUM) [4] (Σy²) [=] 2548107
[SHIFT] [2] (S-SUM) [5] (Σxy) [=] 43777
[SHIFT] [1] (S-VAR) [3] (x̄) [=] 20.8
[SHIFT] [1] (S-VAR) [4] (ȳ) [=] 1009.4
[SHIFT] [1] (S-VAR) [5] (xσn) [=] 6.4
[SHIFT] [1] (S-VAR) [6] (yσn) [=] 5.2
Regression Coefficient A = 993.4
[SHIFT] [1] (S-VAR) [7] (A) [=] 993.4
Regression Coefficient B = 0.83
[SHIFT] [1] (S-VAR) [8] (B) [=] 0.83
Correlation Coefficient r = 0.8223332302
[SHIFT] [1] (S-VAR) [9] (r) [=] 0.8223332302
Atmospheric Pressure at 18°C = 1008.34
18 [SHIFT] [1] (S-VAR) [1] (x) [=] 1008.34
Temperature at 1030 hPa = 32.74193548
1030 [SHIFT] [1] (S-VAR) [2] (y) [=] 32.74193548
Coefficient of Determination r² = 0.6762666667
[SHIFT] [1] (S-VAR) [9] (r) [x²] [=] 0.6762666667
Sample Covariance = 32.5

■ Logarithmic, Exponential, Power, and Inverse Regression

- Use the same key operations as for linear regression to find results for these types of regression.
- The following shows the regression formulas for each type of regression.

Logarithmic Regression	y = A + B ln x
Exponential Regression	y = Ae^(Bx) (ln y = ln A + Bx)
Power Regression	y = Ax^B (ln y = ln A + B ln x)
Inverse Regression	y = A + B/x

■ Quadratic Regression

- The regression formula for quadratic regression is y = A + Bx + Cx².
- Example:

x	y
29	74
50	26.3
74	9.8
100	46.4
118	46.0

Perform quadratic regression to determine the regression formula terms for the data nearby. Next, use the regression formula to estimate the values for ŷ (estimated value of y) for x = 18 and x̂ (estimated value of x) for y = 20.

In the Hard Mode:
[MODE] [3] (Quad)
[SHIFT] [9] (Mode) [3] (Hard)
29 [,] 74 [DT] 50 [,] 26.3 [DT] 74 [,] 9.8 [DT] 100 [,] 46.4 [DT] 118 [,] 46.0 [DT]
[SHIFT] [1] (S-VAR) [2] (n) [=] 5
[AC] [SHIFT] [2] (S-SUM) [1] (Σx) [=] 371
[SHIFT] [2] (S-SUM) [2] (Σx²) [=] 16817
[SHIFT] [2] (S-SUM) [3] (Σy) [=] 232.5
[SHIFT] [2] (S-SUM) [4] (Σy²) [=] 12328.65
[SHIFT] [2] (S-SUM) [5] (Σxy) [=] 15555.8
Regression Coefficient A = 123.0555556
[SHIFT] [1] (S-VAR) [7] (A) [=] 123.0555556
Regression Coefficient B = −2.055555556
[SHIFT] [1] (S-VAR) [8] (B) [=] −2.055555556
Regression Coefficient C = 0.0222222222
[SHIFT] [1] (S-VAR) [9] (r) [=] 0.0222222222
Estimated Value of y when x = 18: 20 [SHIFT] [1] (S-VAR) [1] (x) [=] 87.61111111
Estimated Value of x when y = 20: 20 [SHIFT] [1] (S-VAR) [2] (y) [=] 46.01

Data Input Precautions

- [M+] [M−] inputs the same data twice.
- You can also input multiple entries of the same data using [×]. To input the same 20 and 30 five times, for example, press 20 [,] 30 [,] 5 [)] [M+].
- The above results can be obtained in any order, and not necessarily that shown above.
- Pressing [=] when adding data input for standard deviation also applies for regression calculations.

Technical Information

■ When you have a problem.....

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

1. Press [SHIFT] [9] (Mode) [3] to initialize all modes and settings.
2. Check the formula you are working with to confirm its syntax.
3. Enter General mode and try performing the calculation again.

If the above steps do not correct the problem, press the [On] key. This action performs a self-test operation and deletes all data stored in memory. If the above step is successful, 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" for details.

Math ERROR

- Causes
  - Calculation result is outside the allowable calculation range.
  - An attempt to perform a mathematical calculation using a value that exceeds the allowable input range.
  - An attempt to perform an illegal 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.

Stack ERROR

- Cause
  - The 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.

Syntax ERROR

- Cause
  - An attempt to perform an illegal mathematical operation.
- Action
  - Press [◀] or [▶] to display the calculation with the cursor located at the location of the error and make required corrections.

Arg ERROR

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

■ Order of Operations

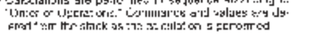
Calculations are performed in the following order of precedence.

① Coordinate transformation: Pol (x, y), Rec (r, θ)
② Type A functions:
  With these functions, the value is entered and then the function key is pressed.
  x², x³, x⁻¹, n!, °'"
  ^, x√, nPr, nCr
  Angle unit conversion (DRG▶)

③ Powers and roots: ^, x√
④ ×, ÷
⑤ Abbreviated multiplication format in front of π, Ran#, variable names, and left parenthesis: 2π, 5A, πA, (A + 1)(B − 1), 3(5 + 4)
⑥ Type B functions:
  With these functions, the function key is pressed and then the value is entered.
  √, ∛, 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 sin 30, A log 2, etc.
⑧ Permutation and combination: nPr, nCr
⑨ ×, ÷
⑩ +, −

- Operations with the same precedence are performed from left to right.
- Operations in parentheses are performed first.
- When a calculation contains a negative value that is the first number (the value is preceded by (−)), the negative value must be enclosed within parentheses. The negative sign (−) is treated as a Type B function, so certain calculations may not work when the calculation includes a Type B function, or power or root operations.
  Example: (−)2^4 = 16
  −2^4 = −16

■ Stacks

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

- Example:
  2 × (3 − 4 × (5 + 6) − 7) + 8 − 9