



HP 10s+ Scientific Calculator

User Guide

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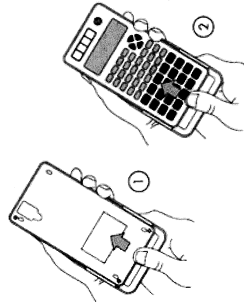
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Using the Protective Case

1. Before using the calculator, slide the unit out of the protective case as shown in step 1.
2. After using the calculator, slide the unit out of the cover as shown in step 2. To use the protective case, slide it over the keyboard side of the unit.



Safety Precautions

Before using the calculator, please read the following safety precautions carefully. Keep this manual handy so that you can refer to it when needed.

The representations of the display and the keys in this manual are for explanatory purposes only and may not exactly match what you see on the calculator.

Notice

This symbol indicates that there is a risk of injury or damage if the specified safety precautions are ignored.

Battery

- Keep battery out of reach of children. If a battery is swallowed, seek urgent medical advice.
- Do not charge, attempt to disable, short circuit, or apply heat to the battery.
- When installing a new battery, orient it such that the positive sign is facing upwards.
- Use only the battery specified in this manual.

Disposing of the Calculator

- Do not dispose of this calculator in an incinerator. It might explode and cause injury or fire.

Other Precautions

- Before using this calculator for the first time, press the **ON** key.
- The battery may lose some charge between the time the calculator leaves the factory and the time when it is purchased. Thus the original battery may not last as long as a new battery.
- When battery power is very low, the calculator's memory may become corrupted or be lost completely. To avoid loss of important information, keep a copy of it elsewhere.
- Avoid storing or using the calculator under extreme conditions.
Low temperature will slow the calculator's response time, cause the display to appear incomplete, and shorten the life of the battery. In addition, do not directly expose the calculator to the sun or place near a heater. High temperature

may cause the casing to fade, distort the casing, or damage the internal circuitry.

- Avoid storing or using the calculator in damp conditions or when there is high humidity or excessive dust. Doing so will damage the internal circuitry.
- Do not drop the calculator or allow it to be subjected to extreme force.
- Do not twist, bend or otherwise distort the calculator.
- Note: Carrying the calculator in a pocket could cause it to twist or bend.
- Do not use a pen or other pointed object to press the calculator's keys.
- Use a soft, dry cloth to clean the calculator.
- Opening the calculator casing voids the warranty.

If the calculator is very dirty, a neutral household cleanser diluted in water can be used to clean it. Dip a cloth in the solution and wring it out before applying it to the calculator. Do not use benzine, a diluting agent or any other volatile solvent to clean the calculator. Doing so may damage the casing and the keys.

Two-Line Display

The calculator shows both the expression being calculated and the result of the calculation. These appear in a two-line display.

- The expression being calculated is shown on the upper line.
- The result is shown on the lower line.

If the result has more than three digits, a separator appears before each group of three digits.

Preparing to Use the Calculator

Modes

Choose the appropriate mode before performing a calculation.

Type of Calculation	Operation	Calculation mode
Basic Calculation	$\boxed{\text{MODE}} \boxed{1}$	COMP
Standard Deviation	$\boxed{\text{MODE}} \boxed{2}$	SD
Calculation using Regression	$\boxed{\text{MODE}} \boxed{3}$	REG

- Press the $\boxed{\text{MODE}}$ key to display each settings screen in turn. Each settings screen is described later in this guide.
- Throughout this manual, the mode setting required for each type of calculation is given when the calculation is explained.

Notes:

- To return the calculator to its default settings, as indicated below press $\boxed{\text{SHIFT}} \boxed{\text{CLR}} \boxed{2} \boxed{=}$ (Mode) $\boxed{=}$ in that order. The default settings are:
Calculation mode: COMP
Angle unit: Deg
Exponent display format: Norm 2
Fraction display: a/b
Decimal point character: Dot
 - The mode indicator appears in the upper part of the display.
 - Before calculating, check the current mode setting (COMP, REG, or SD) and the angle unit (Deg, Rad, or Grad).
- ### Input Limit
- The memory of the calculator can accommodate 79 steps in any one calculation. When you press a number key or an arithmetic operator key ($\boxed{+}$, $\boxed{-}$, $\boxed{\times}$, $\boxed{\div}$, $\boxed{\pm}$), it occupies one step. Pressing $\boxed{\text{SHIFT}}$ or $\boxed{\text{MATH}}$ does not occupy a step. So pressing $\boxed{\text{SHIFT}} \boxed{\div}$, for example, takes up only one step.
 - When you input the 73rd set of any calculation, the cursor changes from " " to " " to alert you to the fact that the capacity of the memory is almost used up. If what you want to input contains more than 79 steps, separate the calculation into two or more smaller calculations and then combine them as you go.
 - Press $\boxed{\text{MATH}}$ to recall the previous result, which can then be used in the next calculation. Please see the section on *Key Memory* for more information about the $\boxed{\text{MATH}}$ key.

Error Correction When Entering

- Press $\boxed{\leftarrow}$ or $\boxed{\rightarrow}$ to move the cursor to the position needed.
- Press $\boxed{\text{DEL}}$ to delete the digit or function at the position of the cursor.
- Press the $\boxed{\text{SHIFT}} \boxed{\text{INS}}$ keys to activate the insertion cursor $\boxed{\text{I}}$. Whatever you insert now will appear at the cursor's current position.
- Press the $\boxed{\text{SHIFT}} \boxed{\text{INS}}$ key to return the cursor to its normal functioning.

Recalling a Previous Calculation

- Each calculation and its result is kept in memory. Press $\boxed{\text{RCL}}$ to recall the previous calculation and its results. Press the $\boxed{\text{RCL}}$ key again to recall the next previous calculation, and so on.
- When a previous calculation is recalled, you can activate editing mode by pressing $\boxed{\leftarrow}$ or $\boxed{\rightarrow}$.
- After any calculation, the calculation can be edited by pressing $\boxed{\leftarrow}$ or $\boxed{\rightarrow}$ immediately.
- Pressing $\boxed{\text{AC}}$ does not clear the calculation memory. Therefore, when you press $\boxed{\text{RCL}}$ again, the previous calculations are still available.
- The capacity of the calculation memory to store expressions and calculation results is 128 bytes.
- The calculation memory is cleared if the:
 - $\boxed{\text{ON}} \boxed{\text{key}}$ is pressed.
 - $\boxed{\text{SHIFT}} \boxed{\text{CLR}} \boxed{2} \boxed{=}$ (or $\boxed{3} \boxed{=}$) are pressed (which initializes the calculator)
 - calculation mode is changed
 - power supply is turned off

Error Indicator

If an error occurs, press $\boxed{\leftarrow}$ or $\boxed{\rightarrow}$. The calculation reappears and the cursor is located where the error is.

Multi-statement

A multi-statement is an expression consisting of two or more smaller expressions. The expressions are separated by a colon (:).

Exponent Display Format

The calculator can display up to 10 digits. Values needing more than 10 digits will automatically be displayed in exponent notation. Two exponent formats are available.

- To change the display format, press $\boxed{\text{MODE}}$ repeatedly until the appropriate settings screen appears.

Fix	Sci	Norm
1	2	3

- For an exponent setting, press $\boxed{3}$. In the settings screen that appears, press $\boxed{1}$ to choose Norm 1 or $\boxed{2}$ to choose Norm 2.
- Norm 1
Exponent notation is applied automatically to any number whose absolute value is greater than or equal to 10^{-10} or less than 10^{-2} .
- Norm 2
Exponent notation is applied automatically to any number whose absolute value is greater than or equal to 10^9 or less than 10^{-9} .
- In this manual, results are expressed in Norm 1 format.

Decimal Point and Separator

The display setting (Disp) screen is used to specify the required decimal mark and the character to use before groups of three digits.

- To change these settings, press $\boxed{\text{MODE}}$ repeatedly until the settings screen appears.

Disp
1

- Press $\boxed{1}$ $\boxed{\rightarrow}$ to display the settings screen.
- Press the number key $\boxed{1}$ or $\boxed{2}$ corresponding to the setting you want:
 $\boxed{1}$ (Dot): Decimal point and comma separator
 $\boxed{2}$ (Comma): Decimal comma and point separator

Initializing the Calculator

- To initialize the calculator (which clears the memory and all variables, and resets all modes to their default settings) press: $\boxed{\text{SHIFT}} \boxed{\text{CLR}} \boxed{3} \boxed{=}$ (ALL) $\boxed{=}$

Basic Calculations

Arithmetic Operations

To perform a basic calculation, select COMP mode by pressing $\boxed{\text{MODE}}$.
COMP

- When raising negative values to powers, make sure that the negative sign is inside the parentheses around the value. Please see the section "Sequence of Operations" on page 33 for more information.

- A negative exponent does not need to be in parentheses.

$$\sin 4.56 \times 10^{-5} \rightarrow \boxed{\sin} \boxed{4.56} \boxed{EXP} \boxed{(-)} \boxed{5} \boxed{=}$$

- Example 1: $3 \times (4 \times 10^7) = 1.2 \times 10^8$
 $3 \boxed{\times} \boxed{4} \boxed{EXP} \boxed{(+) } \boxed{7} \boxed{=}$
- Example 2: $2 \times (3 \times 4) = 14$
 $2 \boxed{\times} \boxed{(} \boxed{3} \boxed{\times} \boxed{4} \boxed{)} \boxed{=}$

- You can omit the $\boxed{)}$ at the end of an expression if the next key you press is $\boxed{=}$.

Calculations with Fractions

- A value is automatically displayed in decimal format if the total number of digits of the fraction (integer + numerator + denominator + semicolon) is greater than 10.

- Example 1: $1\frac{2}{3} + \frac{5}{6} = \frac{11}{6}$
 $1 \boxed{\div} \boxed{3} \boxed{+} 2 \boxed{\div} \boxed{6} \boxed{5} \boxed{=}$ $11.1\overline{5}$

- Example 2: $2\frac{1}{2} + 2\frac{3}{4} = 6\frac{1}{4}$
 $3 \boxed{\div} \boxed{2} 1 \boxed{\div} \boxed{2} 2 \boxed{+} 2 \boxed{\div} \boxed{4} 3 \boxed{=}$ $6.1\overline{4}$

- Example 3: $\frac{6}{9} = \frac{2}{3}$

- Example 4: $\frac{1}{4} + 1.8 = 2.05$

$$1 \boxed{\div} \boxed{4} \boxed{+} 1.8 \boxed{=}$$

- A calculation involving a fraction and a decimal generally yields a decimal result.

Converting Between Decimal and Fractional Display

- Example 1: $3.25 \leftrightarrow 3\frac{1}{4}$
 (Decimal $\leftrightarrow$ Fraction)
 $3.25 \boxed{=}$ $3\frac{1}{4}$
 $\boxed{\div} \boxed{4} \boxed{=}$ 13.4

- Example 2: $\frac{1}{5} \leftrightarrow 0.2$
 (Fraction $\leftrightarrow$ Decimal)
 $1 \boxed{\div} \boxed{5} \boxed{=}$ 1.5
 $\boxed{\div} \boxed{2} \boxed{=}$ 0.2
 $\boxed{\div} \boxed{5} \boxed{=}$ 1.5

Converting Between Mixed and Improper Fractions

- Example: $2\frac{3}{4} \leftrightarrow 4$
 $2 \boxed{\div} \boxed{4} 3 \boxed{\div} \boxed{4} 4 \boxed{=}$ $2.3\overline{4}$
 $\boxed{\div} \boxed{4} \boxed{=}$ 11.4
 $\boxed{\div} \boxed{4} \boxed{=}$ $2.3\overline{4}$

- To change the fraction display format, press $\boxed{\div} \boxed{=}$ repeatedly until the following screen appears.



- Press $\boxed{1}$ to display the settings screen.

Calculations Involving Degrees, Minutes, and Seconds

You can convert between sexagesimal and decimal numbers.

- Example 1: Convert the decimal number 1.234 to its sexagesimal equivalent and then back to a decimal number again.

$$1.234 \boxed{=}$$

$$\boxed{\div} \boxed{60} \boxed{=}$$

$$1^\circ 14' 2.4''$$

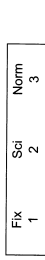
$$\boxed{\div} \boxed{60} \boxed{=}$$

$$1.234$$

- Example 2: Calculate $12^\circ 34' 56'' \times 7.89$
 $12 \boxed{\div} \boxed{60} 34 \boxed{\div} \boxed{60} 56 \boxed{\times} \boxed{7.89} \boxed{=}$ $99^\circ 16' 25.44''$

FIX, SCI, RND

- To change the display format settings, press $\boxed{\div} \boxed{=}$ repeatedly until the screen below appears.



- Press the number key $\boxed{1}$, $\boxed{2}$, or $\boxed{3}$ corresponding to the setting you want to change.
 $\boxed{1}$ (Fix): To set the number of decimal places
 $\boxed{2}$ (Sci): To set the number of significant digits
 $\boxed{3}$ (Norm): To set the display format to normal

- Example 1: $100 \div 3 \times 15$

$$100 \boxed{\div} \boxed{3} \boxed{\times} \boxed{15} \boxed{=}$$

$$500.$$

(Now specify that you want numbers displayed with 3 decimal places.)

$$\boxed{\div} \boxed{=}$$

$$500.000$$

Calculations Involving the Memory

To perform a calculation involving the memory, press $\boxed{\div} \boxed{=}$ to enter COMP mode.
 COMP:.....

Ans Memory

- The Ans memory is updated with each new calculation when you press $\boxed{=}$.
- It is also updated when you press $\boxed{\div} \boxed{=}$, $\boxed{\div} \boxed{=}$, $\boxed{\div} \boxed{=}$, $\boxed{\div} \boxed{=}$, or $\boxed{\div} \boxed{=}$ after a letter (A to F, or M, X, or Y).
- Pressing $\boxed{\div} \boxed{=}$ recalls the contents of the Ans memory.
- The Ans memory can only store one value at a time.
- The Ans memory is not updated if an error occurs when you use any of the above mentioned keys for a calculation.

Continuous Calculation

- The result currently displayed can be used as the first value in the next calculation. Simply press an operator key. Ans appears on the screen, indicating that the last answer obtained is to be used in the calculation.
- The previous result can also be used by the following functions: $(x^2, x^3, x^4, x^5, x^6, x^7, x^8, x^9, x^{10}, x^{11}, x^{12}, x^{13}, x^{14}, x^{15}, x^{16}, x^{17}, x^{18}, x^{19}, x^{20}, x^{21}, x^{22}, x^{23}, x^{24}, x^{25}, x^{26}, x^{27}, x^{28}, x^{29}, x^{30}, x^{31}, x^{32}, x^{33}, x^{34}, x^{35}, x^{36}, x^{37}, x^{38}, x^{39}, x^{40}, x^{41}, x^{42}, x^{43}, x^{44}, x^{45}, x^{46}, x^{47}, x^{48}, x^{49}, x^{50}, x^{51}, x^{52}, x^{53}, x^{54}, x^{55}, x^{56}, x^{57}, x^{58}, x^{59}, x^{60}, x^{61}, x^{62}, x^{63}, x^{64}, x^{65}, x^{66}, x^{67}, x^{68}, x^{69}, x^{70}, x^{71}, x^{72}, x^{73}, x^{74}, x^{75}, x^{76}, x^{77}, x^{78}, x^{79}, x^{80}, x^{81}, x^{82}, x^{83}, x^{84}, x^{85}, x^{86}, x^{87}, x^{88}, x^{89}, x^{90}, x^{91}, x^{92}, x^{93}, x^{94}, x^{95}, x^{96}, x^{97}, x^{98}, x^{99}, x^{100}, x^{101}, x^{102}, x^{103}, x^{104}, x^{105}, x^{106}, x^{107}, x^{108}, x^{109}, x^{110}, x^{111}, x^{112}, x^{113}, x^{114}, x^{115}, x^{116}, x^{117}, x^{118}, 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x^{785}, x^{786}, x^{787}, x^{788}, x^{789}, x^{790}, x^{791}, x^{792}, x^{793}, x^{794}, x^{795}, x^{796}, x^{797}, x^{798}, x^{799}, x^{800}, x^{801}, x^{802}, x^{803}, x^{804}, x^{805}, x^{806}, x^{807}, x^{808}, x^{809}, x^{810}, x^{811}, x^{812}, x^{813}, x^{814}, x^{815}, x^{816}, x^{817}, x^{818}, x^{819}, x^{820}, x^{821}, x^{822}, x^{823}, x^{824}, x^{825}, x^{826}, x^{827}, x^{828}, x^{829}, x^{830}, x^{831}, x^{832}, x^{833}, x^{834}, x^{835}, x^{836}, x^{837}, x^{838}, x^{839}, x^{840}, x^{841}, x^{842}, x^{843}, x^{844}, x^{845}, x^{846}, x^{847}, x^{848}, x^{849}, x^{850}, x^{851}, x^{852}, x^{853}, x^{854}, x^{855}, x^{856}, x^{857}, x^{858}, x^{859}, x^{860}, x^{861}, x^{862}, x^{863}, x^{864}, x^{865}, x^{866}, x^{867}, x^{868}, x^{869}, x^{870}, x^{871}, x^{872}, x^{873}, x^{874}, x^{875}, x^{876}, x^{877}, x^{878}, x^{879}, x^{880}, x^{881}, x^{882}, x^{883}, x^{884}, x^{885}, x^{886}, x^{887}, x^{888}, x^{889}, x^{890}, x^{891}, x^{892}, x^{893}, x^{894}, x^{895}, x^{896}, x^{897}, x^{898}, x^{899}, x^{900}, x^{901}, x^{902}, x^{903}, x^{904}, x^{905}, x^{906}, x^{907}, x^{908}, x^{909}, x^{910}, x^{911}, x^{912}, x^{913}, x^{914}, x^{915}, x^{916}, x^{917}, x^{918}, x^{919}, x^{920}, x^{921}, x^{922}, x^{923}, x^{924}, x^{925}, x^{926}, x^{927}, x^{928}, x^{929}, x^{930}, x^{931}, x^{932}, x^{933}, x^{934}, x^{935}, x^{936}, x^{937}, x^{938}, x^{939}, x^{940}, x^{941}, x^{942}, x^{943}, x^{944}, x^{945}, x^{946}, x^{947}, x^{948}, x^{949}, x^{950}, x^{951}, x^{952}, x^{953}, x^{954}, x^{955}, x^{956}, x^{957}, x^{958}, x^{959}, x^{960}, x^{961}, x^{962}, x^{963}, x^{964}, x^{965}, x^{966}, x^{967}, x^{968}, x^{969}, x^{970}, x^{971}, x^{972}, x^{973}, x^{974}, x^{975}, x^{976}, x^{977}, x^{978}, x^{979}, x^{980}, x^{981}, x^{982}, x^{983}, x^{984}, x^{985}, x^{986}, x^{987}, x^{988}, x^{989}, x^{990}, x^{991}, x^{992}, x^{993}, x^{994}, x^{995}, x^{996}, x^{997}, x^{998}, x^{999}, x^{1000}, x^{1001}, x^{1002}, x^{1003}, x^{1004}, x^{1005}, x^{1006}, x^{1007}, x^{1008}, x^{1009}, x^{1010}, x^{1011}, x^{1012}, x^{1013}, x^{1014}, x^{1015}, x^{1016}, x^{1017}, x^{1018}, x^{1019}, x^{1020}, x^{1021}, x^{1022}, x^{1023}, x^{1024}, x^{1025}, x^{1026}, x^{1027}, x^{1028}, x^{1029}, x^{1030}, x^{1031}, x^{1032}, x^{1033}, x^{1034}, x^{1035}, x^{1036}, x^{1037}, x^{1038}, x^{1039}, x^{1040}, x^{1041}, x^{1042}, x^{1043}, x^{1044}, x^{1045}, x^{1046}, x^{1047}, x^{1048}, x^{1049}, x^{1050}, x^{1051}, x^{1052}, x^{1053}, x^{1054}, x^{1055}, x^{1056}, x^{1057}, x^{1058}, x^{1059}, x^{1060}, x^{1061}, x^{1062}, x^{1063}, x^{1064}, x^{1065}, x^{1066}, x^{1067}, x^{1068}, x^{1069}, x^{1070}, x^{1071}, x^{1072}, x^{1073}, x^{1074}, x^{1075}, x^{1076}, x^{1077}, x^{1078}, x^{1079}, x^{1080}, x^{1081}, x^{1082}, x^{1083}, x^{1084}, x^{1085}, x^{1086}, x^{1087}, x^{1088}, x^{1089}, x^{1090}, x^{1091}, x^{1092}, x^{1093}, x^{1094}, x^{1095}, x^{1096}, x^{1097}, x^{1098}, x^{1099}, x^{1100}, x^{1101}, x^{1102}, x^{1103}, x^{1104}, x^{1105}, x^{1106}, x^{1107}, x^{1108}, x^{1109}, x^{1110}, x^{1111}, x^{1112}, x^{1113}, x^{1114}, x^{1115}, x^{1116}, x^{1117}, x^{1118}, x^{1119}, x^{1120}, x^{1121}, x^{1122}, x^{1123}, x^{1124}, x^{1125}, x^{1126}, x^{1127}, x^{1128}, x^{1129}, x^{1130}, x^{1131}, x^{1132}, x^{1133}, x^{1134}, x^{1135}, x^{1136}, x^{1137}, x^{1138}, x^{1139}, x^{1140}, x^{1141}, x^{1142}, x^{1143}, x^{1144}, x^{1145}, x^{1146}, x^{1147}, x^{1148}, x^{1149}, x^{1150}, x^{1151}, x^{1152}, x^{1153}, x^{1154}, x^{1155}, x^{1156}, x^{1157}, x^{1158}, x^{1159}, x^{1160}, x^{1161}, x^{1162}, x^{1163}, x^{1164}, x^{1165}, x^{1166}, x^{1167}, x^{1168}, x^{1169}, x^{1170}, x^{1171}, x^{1172}, x^{1173}, x^{1174}, x^{1175}, x^{1176}, x^{1177}, x^{1178}, x^{1179}, x^{1180}, x^{1181}, x^{1182}, x^{1183}, x^{1184}, x^{1185}, x^{1186}, x^{1187}, x^{1188}, x^{1189}, x^{1190}, x^{1191}, x^{1192}, x^{1193}, x^{1194}, x^{1195}, x^{1196}, x^{1197}, x^{1198}, x^{1199}, x^{1200}, x^{1201}, x^{1202}, x^{1203}, x^{1204}, x^{1205}, x^{1206}, x^{1207}, x^{1208}, x^{1209}, x^{1210}, x^{1211}, x^{1212}, x^{1213}, x^{1214}, x^{1215}, x^{1216}, x^{1217}, x^{1218}, x^{1219}, x^{1220}, x^{1221}, x^{1222}, x^{1223}, x^{1224}, x^{1225}, x^{1226}, x^{1227}, x^{1228}, x^{1229}, x^{1230}, x^{1231}, x^{1232}, x^{1233}, x^{1234}, x^{1235}, x^{1236}, x^{1237}, x^{1238}, x^{1239}, x^{1240}, x^{1241}, x^{1242}, x^{1243}, x^{1244}, x^{1245}, x^{1246}, x^{1247}, x^{1248}, x^{1249}, x^{1250}, x^{1251}, x^{1252}, x^{1253}, x^{1254}, x^{1255}, x^{1256}, x^{1257}, x^{1258}, x^{1259}, x^{1260}, x^{1261}, x^{1262}, x^{1263}, x^{1264}, x^{1265}, x^{1266}, x^{1267}, x^{1268}, x^{1269}, x^{1270}, x^{1271}, x^{1272}, x^{1273}, x^{1274}, x^{1275}, x^{1276}, x^{1277}, x^{1278}, x^{1279}, x^{1280}, x^{1281}, x^{1282}, x^{1283}, x^{1284}, x^{1285}, x^{1286}, x^{1287}, x^{1288}, x^{1289}, x^{1290}, x^{1291}, x^{1292}, x^{1293}, x^{1294}, x^{1295}, x^{1296}, x^{1297}, x^{1298}, x^{1299}, x^{1300}, x^{1301}, x^{1302}, x^{1303}, x^{1304}, x^{1305}, x^{1306}, x^{1307}, x^{1308}, x^{1309}, x^{1310}, x^{1311}, x^{1312}, x^{1313}, x^{1314}, x^{1315}, x^{1316}, x^{1317}, x^{1318}, x^{1319}, x^{1320}, x^{1321}, x^{1322}, x^{1323}, x^{1324}, x^{1325}, x^{1326}, x^{1327}, x^{1328}, x^{1329}, x^{1330}, x^{1331}, x^{1332}, x^{1333}, x^{1334}, x^{1335}, x^{1336}, x^{1337}, x^{1338}, x^{1339}, x^{1340}, x^{1341}, x^{1342}, x^{1343}, x^{1344}, x^{1345}, x^{1346}, x^{1347}, x^{1348}, x^{1349}, x^{1350}, x^{1351}, x^{1352}, x^{1353}, x^{1354}, x^{1355}, x^{1356}, x^{1357}, x^{1358}, x^{1359}, x^{1360}, x^{1361}, x^{1362}, x^{1363}, x^{1364}, x^{1365}, x^{1366}, x^{1367}, x^{1368}, x^{1369}, x^{1370}, x^{1371}, x^{1372}, x^{1373}, x^{1374}, x^{1375}, x^{1376}, x^{1377}, x^{1378}, x^{1379}, x^{1380}, x^{1381}, x^{1382}, x^{1383}, x^{1384}, x^{1385}, x^{1386}, x^{1387}, x^{1388}, x^{1389}, x^{1390}, x^{1391}, x^{1392}, x^{1393}, x^{1394}, x^{1395}, x^{1396}, x^{1397}, x^{1398}, x^{1399}, x^{1400}, x^{1401$

Variable M

- You can use the variable M to compute accumulated totals which can be put into the variable M directly, or they can also be added to, subtracted from the number stored in variable M.
- To clear all the numerical values in the separate variable M, press $\boxed{0} \boxed{\text{SHIFT}} \boxed{\text{STD}} \boxed{M} \boxed{=}$ (M=)
 $12 \div 3 = 15$
 $45 - 6 = 39$
 $-38 \times 2 = 76$
(Total) -22
 $\boxed{\text{RCL}} \boxed{M} \boxed{+}$ (M+)
- Variables**
 - There are 9 variables, A to F, M, X, and Y. These are used for storing data, constants, calculation results, and other numerical values.
 - To clear a single variable, store zero into it. For example, $\boxed{0} \boxed{\text{SHIFT}} \boxed{\text{STD}} \boxed{A} \boxed{=}$. This clears variable A.
 - To clear the values of all variables, press $\boxed{\text{SHIFT}} \boxed{\text{C}} \boxed{=}$ (MC) [=].
 - Example:
 $1234 \div 20 = 61.7$
 $1234 \div 25 = 49.36$
 $1234 \boxed{\text{SHIFT}} \boxed{\text{STD}} \boxed{A} \boxed{+} \boxed{20} \boxed{=}$
 $\boxed{\text{RND}} \boxed{A} \boxed{+} \boxed{25} \boxed{=}$

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- Example 2: $\sqrt[3]{4} + \sqrt[3]{5} = -0.122574984$
 $\boxed{\text{SHIFT}} \boxed{\sqrt[3]{x}} \boxed{4} \boxed{+} \boxed{\text{SHIFT}} \boxed{\sqrt[3]{x}} \boxed{5} \boxed{=}$
- Example 3: $4/123 (=123^{1/4}) = 3.330245713$
 $4 \boxed{\text{SHIFT}} \boxed{\sqrt[4]{x}} \boxed{123} \boxed{=}$
- Example 4: $123 + 45^2 = 2148$
 $123 \boxed{+} \boxed{45} \boxed{\text{X}^2} \boxed{=}$
- Example 5: $54^3 = 157464$
 $54 \boxed{\text{X}^3} \boxed{=}$
- Example 6: $\frac{1}{2} - \frac{1}{3} = 6$
 $\boxed{1} \boxed{2} \boxed{\text{X}^1} \boxed{-} \boxed{3} \boxed{\text{X}^1} \boxed{1} \boxed{=}$
- Example 7: $6! = 720$
 $6 \boxed{\text{SHIFT}} \boxed{\text{X}!} \boxed{=}$
- Example 8: Generate a random number between 0.000 and 0.999
 $\boxed{\text{SHIFT}} \boxed{\text{RND}} \boxed{=}$ 0.654

(The value shown above is just an example. A different random number is likely to be produced each time)

- Example 9: $27! = 6.283185307$
 $2 \boxed{\text{SHIFT}} \boxed{\text{X}!} \boxed{=}$
- Example 10: How many different 5-digit numbers can be produced with the digits 1 to 6 if no digit can be repeated (12345 allowed, 11234 not allowed)? (720)
 $6 \boxed{\text{SHIFT}} \boxed{\text{nPr}} \boxed{5} \boxed{=}$
- Example 11: How many different groups of three people can be organized with 10 people? (120)
 $10 \boxed{\text{RCL}} \boxed{3} \boxed{=}$

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Scientific Functions

To perform a scientific calculation, press $\boxed{\text{MODE}}$ to enter COMP mode.

- COMP..... $\boxed{\text{MODE}} \boxed{1}$
- Some scientific calculations may take longer than other types of calculations.
- You can start the next calculation after the after the calculation result displays on screen.
- $\pi = 3.14159265359$

Trigonometric and Inverse Trigonometric Functions

- To change the current angle units (degrees, radians, or grads), press $\boxed{\text{MODE}}$ repeatedly until the following screen appears.

Deg	Rad	Gra
1	2	3

- Now press the number key $\boxed{1}$, $\boxed{2}$, or $\boxed{3}$ corresponding to the angle unit you want to use. (Note that $90^\circ = \frac{\pi}{2}$ radians = 100 grads)
- Example 1: $\sin 12^\circ 34' 56'' = 0.217840422$
 $\boxed{\text{MODE}} \dots \dots \boxed{1} \boxed{(\text{Deg})} \boxed{\sin} \boxed{12} \boxed{\text{MIN}} \boxed{34} \dots \boxed{56} \dots \boxed{=}$
- Example 2: $\cos(\frac{\pi}{3} \text{ rad}) = 0.5$
 $\boxed{\text{MODE}} \dots \dots \boxed{2} \boxed{(\text{Rad})} \boxed{\cos} \boxed{1} \boxed{\text{SHIFT}} \boxed{\pi} \boxed{+} \boxed{3} \boxed{1} \boxed{=}$
- Example 3: $\cos^{-1} \sqrt[2]{2} = 0.25\pi(\text{rad})(= \frac{\pi}{4} \text{ rad})$
 $\boxed{\text{MODE}} \dots \dots \boxed{2} \boxed{(\text{Rad})} \boxed{\text{SHIFT}} \boxed{\cos^{-1}} \boxed{1} \boxed{\sqrt{x}} \boxed{2} \boxed{+} \boxed{2} \boxed{1} \boxed{=}$
- Example 4: $\tan^{-1} 0.789 = 38.27343992$
 $\boxed{\text{MODE}} \dots \dots \boxed{1} \boxed{(\text{Deg})} \boxed{\text{SHIFT}} \boxed{\tan^{-1}} \boxed{0.789} \boxed{=}$

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Converting Angular Measurements

- Press the $\boxed{\text{SHIFT}} \boxed{\text{DEG}}$ keys to display the following screen.

D	R	G
1	2	3

- Press $\boxed{1}$, $\boxed{2}$, or $\boxed{3}$ to change the displayed value to the corresponding angle unit.
- Example: Change 2.34 radians to degrees.

$\boxed{\text{MODE}} \dots \dots \boxed{1} \boxed{(\text{Deg})}$
 $2.34 \boxed{\text{SHIFT}} \boxed{\text{DEG}} \boxed{2} \boxed{(\text{R})} \boxed{=}$ 2.34r
134.0721241

Coordinate Systems (Pol (x,y), Rec (r, θ))

- The result will be stored in variables E and F automatically.
- Example 1: Express the point defined by the polar coordinates ($r = 4$, $\theta = 30^\circ$) in rectangular coordinates (x, y).
(Deg)
 $x = 3.464101615$
 $y = 2$
 $\boxed{\text{SHIFT}} \boxed{\text{RCL}} \boxed{4} \boxed{+} \boxed{30} \boxed{1} \boxed{=}$
 $\boxed{\text{RCL}} \boxed{F}$
- Press $\boxed{\text{RCL}} \boxed{E}$ to display the value of x or press $\boxed{\text{RCL}} \boxed{F}$ to display the value of y .
- Example 2: Express the point defined by the rectangular coordinates ($2, \sqrt{5}$) in polar coordinates (r, θ).
(Rad)
 $r = 3$
 $\theta = 0.84106867$
 $\boxed{\text{RCL}} \boxed{2} \boxed{+} \boxed{\sqrt{x}} \boxed{5} \boxed{1} \boxed{=}$
 $\boxed{\text{RCL}} \boxed{F}$

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Hyperbolic and Inverse Hyperbolic Functions

- Example 1: $\sinh 4.5 = 45.00301115$
 $\boxed{\text{hyp}} \boxed{\sinh} \boxed{4.5} \boxed{=}$
- Example 2: $\cosh^{-1} 60 = 4.787422291$
 $\boxed{\text{hyp}} \boxed{\text{SHIFT}} \boxed{\cosh} \boxed{60} \boxed{=}$
- Common Logarithms, Natural Logarithms and Antilogarithms**
 - Example 1: $\log 1.2 = 0.079181246$
 $\boxed{\text{log}} \boxed{1.2} \boxed{=}$
 - Example 2: $\ln 90 (= \log_e 90) = 4.49880967$
 $\boxed{\text{ln}} \boxed{90} \boxed{=}$

- $\ln e = 1$
 $\boxed{\text{ln}} \boxed{\text{RND}} \boxed{e} \boxed{=}$
- Example 3: $e^{10} = 22026.46579$
 $\boxed{\text{SHIFT}} \boxed{e^x} \boxed{10} \boxed{=}$
- Example 4: $10^{2.5} = 316.227766$
 $\boxed{\text{SHIFT}} \boxed{10^x} \boxed{2.5} \boxed{=}$
- Example 5: $2^{2^5} = 0.03125$
 $2 \boxed{\text{X}^2} \boxed{5} \boxed{=}$
- Example 6: $(2^5)^5 = 64$
 $\boxed{1} \boxed{C} \boxed{2} \boxed{1} \boxed{\text{X}^2} \boxed{5} \boxed{=}$
- Note that the negative value is the previous example had to be placed in parentheses. Please see "Sequence of Operations" on page 337 for details.

Square Root, Cube Root, Root, Square Cube, Reciprocal, Factorial, Random Number, Circumference Ratio (π), Permutation and Combination

- Example 1: $\sqrt{2} + \sqrt[3]{3} \times \sqrt[4]{4} = 4.878315178$
 $\boxed{\sqrt{x}} \boxed{2} \boxed{+} \boxed{\sqrt[3]{x}} \boxed{3} \boxed{\text{X}} \boxed{\sqrt[4]{x}} \boxed{4} \boxed{=}$

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- Press $\boxed{\text{RCL}} \boxed{E}$ to display the value of r or press $\boxed{\text{RCL}} \boxed{F}$ to display the value of θ .

Expressing Numbers in Engineering Format

- Example 1: Change 54321 meters to kilometers
 $\rightarrow 54.321 \times 10^3$ (km)
 $\boxed{54321} \boxed{\text{ENG}} \boxed{=}$
- Example 2: Change 0.01234 grams to milligrams
 $\rightarrow 12.34 \times 10^{-3}$ (mg)
 $\boxed{0.01234} \boxed{\text{ENG}} \boxed{=}$

Statistics

Standard Deviation-SD

Press $\boxed{\text{MODE}}$ to select SD mode for statistical calculations with standard deviations.

SD..... $\boxed{\text{MODE}} \boxed{2}$

In SD and REG modes, the $\boxed{\text{M+}}$ key acts as the $\boxed{\text{DT}}$ key.

Press the $\boxed{\text{SHIFT}} \boxed{\text{C}} \boxed{1}$ (Clr) $\boxed{\text{SHIFT}} \boxed{1}$ (Sci) $\boxed{=}$ keys to erase the statistics memory before you enter data.

Press the following key to input data.

< x data > $\boxed{\text{DT}}$

Input data to calculate $n, \sum x, \sum x^2, \bar{x}, s\sigma_n, s\sigma_{n-1}$.

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To display this result	Press these keys
Σx^2	$\text{SHIFT} \text{SQR} \text{1}$
Σx	$\text{SHIFT} \text{SUM} \text{2}$
n	$\text{SHIFT} \text{SQR} \text{3}$
$\bar{x}$	$\text{SHIFT} \text{SUM} \text{1}$
$x\sigma_n$	$\text{SHIFT} \text{SQR} \text{2}$
$x\sigma_{n-1}$	$\text{SHIFT} \text{SUM} \text{3}$

Example: Calculate $x\sigma_{n-1}$, $x\sigma_n$, $\bar{x}$, n , Σx , Σx^2 given the following data:

15, 14, 11, 15, 13, 14, 12

In SD mode:

$\text{SHIFT} \text{CIB} \text{1} \text{ (Sci)} \text{=}$ (Stat clear)

Each time you press DT , the data you have just entered is stored. The n = value shown on the screen indicates the number of data pairs you have entered.

14 DT 11 DT 15 DT 12 DT

13 DT 11 DT 14 DT 12 DT

Standard deviation of the sample

$x\sigma_{n-1} = 1.40785953$

Standard deviation of the population

$x\sigma_n = 1.316956719$

Mean ($\bar{x}$) = 13.375

Number of data points (n) = 8

Sum of the data values (Σx) = 107

Sum of the squares of the data values

(Σx^2) = 1445

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Data Entry Hints

- Press DT DT to enter the same data twice.
- Press SHIFT DT to repeat the same data item several times. For example, press 100 SHIFT DT 15 DT to enter the data value 100 15 times.
- You can perform these operations in any sequence, not necessarily in the same order as in the example above.
- Press DT or DT to scroll through the entered data.
- Edit the data displayed as desired. The new data replace the old data after inputting new data and pressing the key = . Therefore, if you want to perform some other operations (calculation, display calculation result and so on), you must first press the key ZC to exit from the data displaying screen.
- To change a data value, scroll to it, enter the new value and press = . (However, you must press DT if you want to add the value as a new data item.)
- To delete a data value displayed by pressing DT and DT press, SHIFT CIB .
- The values are stored in the memory. If "Data Full" appears on the screen, there is no more memory available to store new data. In this case, press = to display the following menu:

Edit OFF	ESC
1	2

- Press DT to quit the data input operation without storing the entered data values. Alternatively, press 1 to clear the values but remain in data input mode.

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- Press SHIFT CIB to cancel data input.
- In SD or REG mode, you cannot display or edit data items once you change 10 another mode or choose a different regression type (Lin, Log, Exp, Pwr, Inv, Quad).

Regression-REG

Calculations involving regression require REG mode. Press the MODE key to select REG mode. REG.....

- In SD mode and REG mode, the MC key acts as the DT key.
- When you select REG mode, the following screen appears.

Lin	Log	Exp	$\rightarrow$
1	2	3	

$\leftarrow$ Pwr	Inv	Quad
1	2	3

- Press the number key (1 , 2 , or 3) corresponding to the regression type you want to use.

- 1 (Lin) : Linear regression
- 2 (Log) : Logarithmic regression
- 3 (Exp) : Exponential regression
- DT 1 (Pwr) : Mathematical power regression
- DT 2 (Inv) : Inverse regression
- DT 3 (Quad) : Quadratic regression

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- Before entering data, press the SHIFT $\text{CIB} \text{1} \text{ (Sci)}$ = keys to clear the statistics memory.
- Press the following key to input data.
 $< x \text{ data} > \text{1} < y \text{ data} > \text{DT}$

- The regression calculation result is determined by the data input. The result can be displayed using the following syntax and keys.

To display this result	Press these keys
Σx^2	$\text{SHIFT} \text{SQR} \text{1}$
Σx	$\text{SHIFT} \text{SUM} \text{2}$
n	$\text{SHIFT} \text{SQR} \text{3}$
Σy^2	$\text{SHIFT} \text{SQR} \text{1}$
Σy	$\text{SHIFT} \text{SUM} \text{2}$
Σxy	$\text{SHIFT} \text{SUM} \text{3}$
$\bar{x}$	$\text{SHIFT} \text{SUM} \text{1}$
$x\sigma_n$	$\text{SHIFT} \text{SQR} \text{2}$
$x\sigma_{n-1}$	$\text{SHIFT} \text{SUM} \text{3}$
$\bar{y}$	$\text{SHIFT} \text{SUM} \text{1}$
$y\sigma_n$	$\text{SHIFT} \text{SQR} \text{2}$
$y\sigma_{n-1}$	$\text{SHIFT} \text{SUM} \text{3}$
Regression coefficient A	$\text{SHIFT} \text{SUM} \text{1}$
Regression coefficient B	$\text{SHIFT} \text{SUM} \text{2}$
With non quadratic regression types:	
Regression coefficient r	$\text{SHIFT} \text{SUM} \text{3}$
$\bar{x}$	$\text{SHIFT} \text{SUM} \text{1}$
$\bar{y}$	$\text{SHIFT} \text{SUM} \text{2}$

- To display quadratic regression calculation results, use the following syntax and keys.

In regression (REG) mode:
(mode 3) 1 (Lin)
 $\text{SHIFT} \text{CIB} \text{1} \text{ (Sci)} \text{=}$ (Stat clear)

10 DT 1003 DT $n \text{=}$ REG 1.

Each time you press DT , the data you have just entered is stored. The n = value shown on the screen indicates the number of data pairs you have entered.

15 DT 1005 DT

20 DT 1010 DT 25 DT 1011 DT

30 DT 1014 DT

Regression coefficient A=997.4

Regression coefficient B=0.56

Regression coefficient

$r=0.982607388$

The atmospheric pressure when the air temperature is -5°C

= 994.6

The air temperature when atmospheric pressure is 1000hPa

=4.64285743

1000 $\text{SHIFT} \text{SUM} \text{1}$

Coefficient of determination

=0.965517241

Sample covariance=35

$\text{SHIFT} \text{SUM} \text{3}$ X $\text{SHIFT} \text{SUM} \text{1}$ X

$\text{SHIFT} \text{SUM} \text{3}$ X $\text{SHIFT} \text{SUM} \text{2}$ X

$\text{SHIFT} \text{SUM} \text{3}$ X $\text{SHIFT} \text{SUM} \text{3}$ X

Logarithmic, Exponential, Mathematical Power and Inverse Regression

- Use these regression types in the same way that you use linear regression (see above).

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- The statistics values calculated can be stored in variables and used in expressions.

Linear Regression

- The formula for linear regression is $y=A+B \cdot x$
- Example: The relationship between atmospheric pressure and air temperature is given in the following table:

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

The following explains how to calculate the coefficients of the regression formula and how the formula can then be used to determine air temperature at a particular pressure (1000hPa) and the air pressure at a particular temperature (-5°C). In the process, we also determine the coefficient of determination (r^2) and the sample covariance.

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