Calculator Handbook

by

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<table>
<thead>
<tr>
<th>Topic</th>
<th>Sections</th>
<th>Page #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Buttons on the Calculator</td>
<td>&gt;Frac, Adjusting Window, Zooms, Entry, Resetting the Calculator, TblSet, Format, Split Screen, Ans</td>
<td>3</td>
</tr>
<tr>
<td>Checking inequalities with &quot;tests&quot;</td>
<td>2.7,9.1</td>
<td>4</td>
</tr>
<tr>
<td>Checking ordered pairs in equations</td>
<td>3.1</td>
<td>4-5</td>
</tr>
<tr>
<td>Checking simplify problems using the table</td>
<td>2.1,5.2,5.3,5.5,5.6,7.1,7.2,7.3,7.4,7.7,10.4,10.5</td>
<td>5-6</td>
</tr>
<tr>
<td>Checking solve problems on HomeScreen</td>
<td>2.2,2.3</td>
<td>6</td>
</tr>
<tr>
<td>Checking solve problems using the Intersection Method</td>
<td>2.2,2.3</td>
<td>7-8</td>
</tr>
<tr>
<td>Complex Numbers, Evaluate</td>
<td>10.7</td>
<td>8-9</td>
</tr>
<tr>
<td>Evaluate functions using the table</td>
<td>3.7,7.1,10.1</td>
<td>9-10</td>
</tr>
<tr>
<td>Evaluating Complex Numbers</td>
<td>10.7</td>
<td>8-9</td>
</tr>
<tr>
<td>Factoring with the box, finding the missing terms</td>
<td>6.2,6.3,6.4</td>
<td>22</td>
</tr>
<tr>
<td>Find the equation given 2 points</td>
<td>3.6,8.1</td>
<td>10-11</td>
</tr>
<tr>
<td>Find the slope given 2 points</td>
<td>3.4</td>
<td>11-12</td>
</tr>
<tr>
<td>Finding x- and y-intercepts</td>
<td>3.3</td>
<td>12-14</td>
</tr>
<tr>
<td>Functions, evaluate using the table</td>
<td>3.7,7.1,10.1</td>
<td>9-10</td>
</tr>
<tr>
<td>Graphing inequalities</td>
<td>9.4</td>
<td>15</td>
</tr>
<tr>
<td>Graphing lines</td>
<td>3.2,3.5,8.1</td>
<td>16</td>
</tr>
<tr>
<td>Graphing nonlinear functions</td>
<td>8.2</td>
<td>17</td>
</tr>
<tr>
<td>Higher order roots</td>
<td>10.1</td>
<td>18</td>
</tr>
<tr>
<td>Inequalities, checking with &quot;tests&quot;</td>
<td>2.7,9.1</td>
<td>3</td>
</tr>
<tr>
<td>Inequalities, graphing</td>
<td>9.4</td>
<td>15</td>
</tr>
<tr>
<td>Intersection, to find the solution to an equation</td>
<td>2.2,2.3,6.5,7.5,7.6,10.6,11.1,11.2,11.3</td>
<td>7-8</td>
</tr>
<tr>
<td>Lines, graphing</td>
<td>3.2,3.5,8.1</td>
<td>16</td>
</tr>
<tr>
<td>Nonlinear Functions, graphing</td>
<td>8.2</td>
<td>17</td>
</tr>
<tr>
<td>Ordered pairs, plotting</td>
<td>3.1,3.7</td>
<td>18-20</td>
</tr>
<tr>
<td>Plotting ordered pairs</td>
<td>3.1,3.7</td>
<td>18-20</td>
</tr>
<tr>
<td>Roots, Higher Order</td>
<td>10.1</td>
<td>19</td>
</tr>
<tr>
<td>Simplify, checking using the table</td>
<td>2.1,5.2,5.3,5.5,5.6,7.1,7.2,7.3,7.4,7.7,10.4,10.5</td>
<td>5-6</td>
</tr>
<tr>
<td>Slope, find given 2 points</td>
<td>3.4</td>
<td>11-12</td>
</tr>
<tr>
<td>Slope-Intercept Form given 2 points</td>
<td>3.6,8.1</td>
<td>10-11</td>
</tr>
<tr>
<td>Solve, checking problems on HomeScreen</td>
<td>2.2,2.3</td>
<td>6</td>
</tr>
<tr>
<td>Solving Solve problems with intersection</td>
<td>2.2,2.3,6.5,7.5,7.6,10.6,11.1,11.2,11.3</td>
<td>7-8</td>
</tr>
<tr>
<td>Solving Systems by graphing</td>
<td>4.1,4.5</td>
<td>21</td>
</tr>
<tr>
<td>Systems of Equations, solve by graphing</td>
<td>4.1,4.5</td>
<td>21</td>
</tr>
<tr>
<td>Using y= to help factor with the box</td>
<td>6.2,6.3,6.4</td>
<td>22</td>
</tr>
<tr>
<td>x-intercept, finding</td>
<td>3.3</td>
<td>12-13</td>
</tr>
<tr>
<td>y-intercept, finding</td>
<td>3.3</td>
<td>14</td>
</tr>
</tbody>
</table>
# Calculator Handbook

## Basic Buttons

<table>
<thead>
<tr>
<th>Function</th>
<th>Keystrokes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Answer Button:</strong></td>
<td>$2\text{nd}$ $(−)$</td>
</tr>
<tr>
<td>- The last answer displayed is stored in memory as “Ans.”</td>
<td>Push $2\text{nd}$ $(−)$</td>
</tr>
<tr>
<td><strong>Clear Memory:</strong></td>
<td>$2\text{nd}$ $+$ $7$</td>
</tr>
<tr>
<td>- Clears the calculator memory. It will erase all programs, applications, and anything stored in memory.</td>
<td>Push $2\text{nd}$ $+$ $7$</td>
</tr>
<tr>
<td><strong>Display as a Fraction:</strong></td>
<td>$\text{MATH}$ $\text{ENTER}$ $\text{ENTER}$</td>
</tr>
<tr>
<td>- The calculator will display any rational decimal as a fraction.</td>
<td>Push $\text{MATH}$ $\text{ENTER}$ $\text{ENTER}$</td>
</tr>
<tr>
<td><strong>Entry:</strong></td>
<td>$2\text{nd}$ $\text{ENTER}$</td>
</tr>
<tr>
<td>- Retypes the last line entered into calculator. Will return the last 30 entries if done repeatedly.</td>
<td>Push $2\text{nd}$ $\text{ENTER}$</td>
</tr>
<tr>
<td><strong>Graph/Table:</strong></td>
<td>$\text{MODE}$ $\text{ENTER}$</td>
</tr>
<tr>
<td>- Will split the screen vertically between the Graph and Table to display both.</td>
<td>Push $\text{MODE}$ $\text{ENTER}$</td>
</tr>
<tr>
<td>- Scroll down and push “G-T” on “G-T”</td>
<td>Push $\text{GRAPH}$</td>
</tr>
<tr>
<td><strong>Grid:</strong></td>
<td>$2\text{nd}$ $\text{ZOOM}$</td>
</tr>
<tr>
<td>- Will put a grid on the graphing window.</td>
<td>Push $2\text{nd}$ $\text{ZOOM}$</td>
</tr>
<tr>
<td>- Scroll down and push “GridOn” on “GridOn”</td>
<td>Push $\text{MODE}$ $\text{ENTER}$</td>
</tr>
<tr>
<td><strong>SplitScreen:</strong></td>
<td>$\text{MODE}$ $\text{ENTER}$</td>
</tr>
<tr>
<td>- Will split the screen horizontally between the Homescreen, Table, or Graph.</td>
<td>Push $\text{MODE}$ $\text{ENTER}$</td>
</tr>
<tr>
<td>- Scroll down and push “Horiz” on “Horiz”</td>
<td>Push $\text{MODE}$ $\text{ENTER}$</td>
</tr>
</tbody>
</table>
Checking Inequalities with “Tests”

Example Problem:
Solve: \( x - 2 \geq 7 \)

Solution:
\( x \geq 9 \)

Checking the solution:
\( 9 - 2 \geq 7 \)
\( 7 \geq 7 \)
True

Calculator Steps:

- Push \( 9 \), \( \text{STO} \), \( \text{X,T,\theta,n} \), \( \text{ENTER} \)
- Push \( \text{X,T,\theta,n} \), \( - \), \( 2 \), \( \text{2nd} \), \( \text{MATH} \), \( 4 \), \( 7 \), \( \text{ENTER} \)

- If the calculator displays “1,” then it is “true.”
- If the calculator displays “0,” then it is “false.”

Checking Ordered Pairs in Equations

Example Problem:
Determine if \((2, -3)\) is a solution of \( x - 4y = 14 \).

Solution:
\[
\begin{align*}
(2) - 4(-3) &= 14 \\
2 + 12 &= 14 \\
14 &= 14 \\
\text{True}
\end{align*}
\]
Checking “Simplify Problems” Using the Table

Example Problem:

Simplify $2(5x - 4) - 2$

Solution:

$10x - 10$

Calculator Steps:

• Push $2 \text{ STO } X$ on the calculator
• Type the problem in $Y_1$
• Type the answer in $Y_2$
• Push \( \text{2nd} \) \( \text{GRAPH} \) to see the Table.

<table>
<thead>
<tr>
<th>( x )</th>
<th>( Y_1 )</th>
<th>( Y_2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>6</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

• If the two \( Y \) columns are the same, then the answer is correct.

---

Checking “Solve Problems” using the HomeScreen

Example Problem:
Solve: \( 3x - 4 = 2x + 1 \)

Solution:
\[ x = 5 \]

Calculator Steps:
• Store 5 to the calculator memory

• Push \( \text{5} \) \( \text{STO} \) \( \text{X,T,\theta,n} \), \( \text{ENTER} \).

• Type the left side of the problem and push \( \text{ENTER} \).

• Type the right side of the problem and push \( \text{ENTER} \).

• If the two answers match, then the answer is correct.
Checking “Solve Problems” using the Intersection Method

Example Problem:

Solve: \( x^2 = 4x + 5 \)

Solution:

\[ x = -1, \ x = 5 \]

Calculator Steps:

- Push \( \text{Y=} \)
- Type the left side of the problem in \( Y_1 \)
- Type the right side of the problem in \( Y_2 \)

**You have to see the graphs cross to get the answer!**

- Push \( \text{ZOOM} \)
- Adjust Window if needed
• Push $\text{2nd}$ $\text{TRACE}$ $5$
  
  ENTER $\quad$ ENTER $\quad$ ENTER

• If there’s more than one answer repeat the last step, but before pressing the third time use the left/right arrow keys to move the cursor close to the other answer and then push ENTER the third time.

• The screen will say “Intersection” and below that it will say “X=” and the answer will be displayed.

---

Evaluating Complex Numbers

Sample Problem:

Write $\frac{3+5i}{1+i}$ in the form “$a + bi$”

Solution:

$4+i$
Calculator Steps:
Put calculator into Imaginary Mode

- Push \[ \text{MODE} \]
- Scroll down and push \[ \text{ENTER} \] on “a + bi”

Evaluate Functions using the Table

Example Problem:
Given \( f(x) = x^2 - 3x + 2 \), find \( f(-3) \).

Solution:
\[ f(-3) = 20 \]
Calculator Steps:

- Push, \( \text{Y}=, \text{X}, \Theta, n, \text{X}^2 \),
- Push \( 3 \), \( \text{X}, \Theta, n \),
- Push \( 2 \), \( \text{ENTER} \),

- Push \( \text{2nd}, \text{GRAPH} \),
- Scroll up or down until you find the appropriate x-value.

The value in the \( Y_1 \) column will be the answer.

---

### Finding the Equation Given Two Points

**Example Problem:**

Find the slope given the points \((1,5),(3,1)\)

**Solution:**

Equation: \( y = -2x + 7 \)
Calculator Steps:

- Push **STAT** ENTER
- Type in the ordered pairs (x’s in $L_1$, y’s in $L_2$)

```
<table>
<thead>
<tr>
<th>L1</th>
<th>L2</th>
<th>L3</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
```

- Push **STAT** 4 ENTER

“a” is the coefficient and “b” is the constant.

Finding the Slope Given Two Points

Example Problem:

Find the slope given the points (1,5), (3,1)

Solution:

Slope = -2
Calculator Steps:

- Push STAT ENTER
- Type in the ordered pairs ($x$’s in $L_1$, $y$’s in $L_2$)

```
<table>
<thead>
<tr>
<th>L1</th>
<th>L2</th>
<th>L3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
```

```
LinReg
y=ax+b
a=-2
b=7
```

“$a$” is the slope.

Finding x-intercepts

Example Problem:
Find the x-intercepts for $y = x^2 + 2x - 3$

Solution:
$(-3,0), (1,0)$

Calculator Steps:

- Push $Y=$ X,T,θ,n $+$ $2$ $-$ $3$ ENTER
- Push 0 ENTER
• Push **GRAPH**
• You need to see all the x-intercepts on the graph to be able to find them.
• (Adjusting the Window might be needed.)

![Graph showing an x-intercept at x=1]

• Push, **2nd** **TRACE**, 5

![Graph with the cursor at the x-intercept at x=1]

• To find the second x-intercept Push

![Graph with the cursor at the x-intercept at x=-3]

• Before pushing a 3rd time push the arrows to the left or right to move the cursor close to the other x-intercept and then push the third time.

The screen will say Intersection and display the x- and y-coordinates.
Finding y-intercepts

Sample Problem:
Find the y-intercept for \( y = x^2 + 2x - 3 \)

Solution:
\((0, -3)\)

Calculator Steps:

- Push \( Y= \)
- \( 2 \)
- \( X,T,\Theta,n \)
- \(-3\)
- ENTER

- Push \( 2nd \)
- GRAPH

- Scroll up/down using the arrows to the y-intercept
Graphing Inequalities

Sample Problem:
Graph the solution of the system of linear inequalities:
\[ y < 3x - 4 \]
\[ y \leq x + 2 \]

Solution:

Calculator Steps:

- Push \( \boxed{Y=} \) 3 3,
  \( \boxed{-} \) 4 ENTER
- Push \( \boxed{X,T,\theta,n} \) 2 2,
  ENTER
- Move the cursor to the left of \( Y_1 \)
  and push ENTER 3 times.
- Move the cursor to the left of \( Y_2 \)
  and push ENTER 3 times.
- Push \( \boxed{GRAPH} \)
Graphing Lines

Example Problem:
Graph \( y = 3x - 2 \)

Solution:

Calculator Steps:
- Push \( Y= \)
  \[
  3 \\
  \text{X,T,\theta,n}
  \]
- Push \( -2 \)
- ENTER
- Push GRAPH
Graphing Non-Linear Equations

- Graph $y = x^2 - 3$
  - Push $\text{Y}= \ x^2 \ - \ 3 \ \text{ENTER}$
  - Push $\text{GRAPH}$

- Graph $y = |x - 2|$
  - Push $\text{Y}= \ 2\text{nd} \ 0 \ \text{ENTER} \ x, \theta, n \ - \ 2 \ ) \ \text{ENTER}$
  - Push $\text{GRAPH}$

- Graph $y = x^3$
  - Push $\text{Y}= \ x, \theta, n \ ^3 \ \text{ENTER}$
  - Push $\text{GRAPH}$
Higher Order Roots

Sample Problem:

Evaluate \( \sqrt[3]{\frac{27}{64}} \)

Solution:

\[ \frac{3}{4} \]

Calculator Steps:

- Push
  
  \( \begin{array}{c}
  3 \\
  \text{MATH} \\
  5 \\
  ( \\
  2 \\
  7 \\
  \div \\
  6 \\
  4 \\
  ) \\
  \text{ENTER}
  \end{array} \)

- Push

Plotting Ordered Pairs

Example Problem:

Plot: \((1,5), (3,1)\)

Solution:
Calculator Steps:

- Push STAT ENTER

- Type in the ordered pairs (x’s in $L_1$ and y’s in $L_2$)

- Push
- Select the options as pictured by using the arrows and the button.

- Push WINDOW
- Select a Window that will display the ordered pairs.
Scientific Notation

Sample Problem:
Write 45,000,000,000 in scientific notation.

Solution:
$4.5 \times 10^{10}$

Calculator Steps:
Put calculator in Scientific Mode

- Push \text{MODE}
- Scroll right and push on \text{“Sci”}
- Push \text{2nd} \text{MODE}
- Push 45000000000,
Solving Systems by Graphing

Example Problem:
Given \( y = x + 1 \) and \( y = 2x - 1 \), find the solution to the system of equations.

Solution:
\((2,3)\)

Calculator Steps:

- Push \( Y= \)
  - 1 \( \text{ENTER} \)
  - 2 \( \text{ENTER} \)
- Push \( \text{GRAPH} \)
- You have to see the intersection on the graph to get the answer.
- Push \( \text{2nd TRACE} \)
  - 5 \( \text{ENTER} \text{ ENTER} \text{ ENTER} \)

The ordered pair will be stated on the screen.
Using Y= to Help with Factoring using Grouping or the Box

Sample Problem:
Factor $3x^2 + 13x - 10$

Solution:
$$(3x - 2)(x + 5)$$

Calculator Steps:
Goal: To find 2 numbers that have a product of -30 and a sum of 13.

- Push, $\boxed{Y=}$, $\boxed{(−)}$, 3
- Push $\boxed{0}$, $\boxed{=}$/X,T,Ω,n
- Scroll up and down the table until you find 2 numbers that total 13.

These are the numbers needed to factor by grouping or to use the box.