CONSTRUCTION MASTER®

HEAVYCALC™ PRO

ADVANCED FEET-INCH-FRACTION CALCULATOR

Model 4325

Pocket Reference Guide

CALCULATED INDUSTRIES®

HEAVYCALC™ PRO

Designed for today's excavation and heavy construction professional, the all-new *HeavyCalc Pro* adds even more power to the already powerful *Construction Master* line-up. Like earlier models, this calculator is so simple to use, even the novice user can easily solve dimension-related problems.

- *Solve Dimensional Math with Ease*
- *Dimensional Conversions*
- *Imperial/Metric Conversions*
- *Weight/Volume Conversions*
- *Rectangular Area/Volume Calculations*
- *Determine % Grade and Slope*
- *Solve Cut and Fill*
- *Find Bank, Loose and Compact Volumes*
- *Instant Square-Up (Diagonal) Solutions*
- *Drop Distance Calculations*
- *Calculating Averages*
- *Material Estimations*
- *Paperless Tape*

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GETTING STARTED

KEY DEFINITIONS

Basic Function Keys

➕ ➖ ✖ ➗ ➗	Arithmetic operation keys.
%	Four-function (+, −, x, ÷) percent key.
0 – **9** and **•**	Keys used for entering numbers.
Off	***Off Key*** — Turns all power off, clearing all non-permanent registers.
On/C	***On/Clear Key*** — Turns on power. Pressing once clears the display. Pressing twice clears all temporary values.
Conv	***Convert Key*** — Used with the dimensional keys to convert between dimensions or with other keys to access special functions.
Stor	***Store Key*** — Used for storing values.
Rcl	***Recall Key*** — Recalls stored values.

Unit Keys

Yds — *Yards Key* — Enters or converts to *Yards*.

Feet — *Feet Key* — Enters or converts to *Feet* as whole or decimal numbers. Also used with the **Inch** and **/** keys for entering Feet-Inch values (e.g., (6) **Feet** (9) **Inch** (1) **/** (2)). Repeated presses during conversions toggle between Fractional and Decimal Feet.

Inch — *Inch Key* — Enters or converts to *Inches*. Entry can be whole or decimal numbers. Also used with the **/** key for entering fractional Inch values (e.g., (9) **Inch** (1) **/** (2)). Repeated presses during conversions toggle between Fractional and Decimal Inches.

/ — *Fraction Bar Key* — Used to enter *Fractions*. Fractions can be entered as proper (1/2, 1/8, 1/16) or improper (3/2, 9/8). If the denominator (bottom) is not entered, the calculator's fractional accuracy setting is automatically used.

m — *Meters Key* — Enters or converts to *Meters*.

Conv 7	**Centimeters (cm)** — Enters or converts to *Centimeters*.
Conv 9	**Millimeters (mm)** — Enters or converts to *Millimeters*.
Conv 2	**Acres (Acre)** — Enters or converts to *Acres.*

Length, Width and Height Keys

Length	Enters Length for calculation of Area or Volume.
Width	Enters Width and calculates Area, Square-up and perimeter.
Height	Enters Height and calculates Volume, wall Area and total room Area. Calculates Height (Depth) based on entered Width and Slope or Percent Grade. This is a permanent entry; stored value holds when turned off.

Construction Project Keys

| Slope | **Slope** — Enters or calculates a slope ratio or slope angle. Calculates based on entered Width and Height (Depth). |
| Conv Slope | **Percent Grade (%Grade)** — Used to enter or solve Percent Grade. Calculates Percent Grade based on entered Width and Height (Depth) or Slope. |

| `Sq-Up` | **Square-Up Key** — Calculates the "Square-up" (diagonal) Length given entered Length and Width values. |

| `Drop` | **Drop Key** — Calculates total drop (or fall) over an entered Length given entered percentage drop, Inch per Foot drop, or degrees of drop. Continued presses will act as a "constant add," for displaying successive drops. |

Excavation/Volume Keys

| `Loads` | **Loads Key** — Calculates number of loads for a given Volume or Length, Width, and Height (Depth) values and stored load size. |

| `Stor` `Loads` | **Load Size** — Stores load size. Load size must be entered as a cubic value (e.g., `8` `Yds` `Yds` `Yds` `Stor` `Loads`). The default size is 8 cubic Yards. |

| `Cut/Fill` | **Cut/Fill Key** — Used to enter or calculate the cut or fill amount. Based on entries of proposed and existing benchmarks. A fill is displayed as a positive value; a cut as a negative value. |

Exist	***Existing Key*** — Used to enter or calculate an existing benchmark, Grade or value.
Prop	***Proposed Key*** — Used to enter or calculate a proposed benchmark, Grade or value.
Bank	***Bank Volume Key*** — Enters or calculates the Volume for bank fill material. Bank fill is material in an untouched, pristine state.
Comp	***Compacted Volume Key*** — Enters or calculates the Volume for compacted fill material. Compacted fill is material that has been compacted.
Conv Comp	***Percent Shrink (%Shrink)*** — Enters or recalls percent shrink factor for converting between bank and compacted fill Volumes. Default is 5%.
Loose	***Loose Volume Key*** — Enters or calculates the Volume for loose fill material. Loose fill is material that has been disturbed or excavated.
Conv Loose	***Percent Swell (%Swell)*** — Enters or recalls the percent swell factor used for converting between bank and loose Volumes. Default is 10%.

Miscellaneous Functions

⬅	Backspace Key.
Conv ⬅	($\sqrt{x}$) Square Root.
Rcl ▬	Paperless Tape.
Conv **Stor**	Preference Settings.
Conv ➗	*(1/x) Reciprocal* — Finds the reciprocal of a number (e.g., **8** **Conv** ➗ 0.125).
Conv ❌	*Clear All* — Returns all stored values to the default settings. (Does not affect Preference Settings.)
Conv ▬	(+/–) Toggle.
Conv ➕	Pi (π) 3.141593.
Conv •	Converts between D:M:S and decimal degrees.
Conv %	*x^2* — Squares the value in the display.
Conv /	Exponential Notation ($x10^y$).
Conv **0**	Total Cost (based on entry of per unit cost).
Stor **0**	*Weight per Volume* – Stores a new *Weight per Volume* value.

Note: After entering a value and pressing **Stor** **0***, continue pressing the* **0** *digit key until you've reached the desired Weight per Volume format. To recall your setting, press* **Rcl** **0***.*

Conv **8**	**Degrees** — Enters or converts to degrees.
Conv **6**	**Tons (tons)** — Enters or converts to Tons.
Conv **4**	**Pounds (lbs)** — Enters or converts to Pounds.
Conv **3**	**Metric Tons (met tons)** — Enters or converts to Metric Tons.
Conv **1**	**Kilograms (kg)** — Enters or converts to Kilograms.
M+	Memory +.
Conv **M+**	(M–) Memory Minus.
Stor **1**	(M1) Storage Register.
Stor **2**	(M2) Storage Register.
Stor **3**	(M3) Storage Register.
Conv **Rcl**	Clear M+.
Rcl **Rcl**	Recall and Clear M+.
Rcl **M+**, **1**, **2** or **3**	Recall M+, M1, M2 or M3.

PREFERENCE SETTINGS

Press **Conv**, then **Stor**, then keep pressing **Stor** to toggle through the main settings. Press the **+** key to advance within sub-setting. Use the **−** key to back up. Press **On/C** key to exit Preferences.

PRESS **Conv** AND:	SETTING--FUNCTION
First press of **Stor**:	Fractional Resolution:
	--**1/16**
+	--**1/32**
+	--**1/64**
+	--**1/2**
+	--**1/4**
+	--**1/8**
+	--**1/16** *(repeats options)*
Second press of **Stor**:	Area Displays:
	--**Std.**
+	--**0.** SQ FEET
+	--**0.** SQ YD
+	--**0.** SQ M
+	--**Std.** *(repeats options)*
Third press of **Stor**:	Volume Displays:
	--**Std.**
+	--**0.** CU YD
+	--**0.** CU FEET
+	--**0.** CU M
+	--**Std.** *(repeats options)*
Fourth press of **Stor**:	Exponential Mode:
	--**OFF**
+	--**On**
+	--**OFF** *(repeats options)*

Fifth press	*Meter Linear Displays:*
of **Stor** *:*	--**0.000 м**
+	--**FLOAt м** *(floating point)*
+	--**0.000 м** *(repeats options)*

Sixth press	*Decimal Degree Displays:*
of **Stor** *:*	--**0.00°**
+	--**FLOAt** *(floating point)*
+	--**0.00°** *(repeats options)*

Seventh press	*Fractional Mode:*
of **Stor** *:*	--**Std.**
+	--**COnSt**
+	--**Std.** *(repeats options)*

Note: Press **On/C** *at anytime to exit the Preference Settings.*

ENTERING DIMENSIONS

Linear Dimensions

When entering Feet-Inch values, enter dimensions from largest to smallest — Feet before Inches, Inches before Fractions. Enter Fractions by entering the numerator (top number), pressing █/█ (Fraction Bar key) and then the denominator (bottom number).

Note: If a denominator is not entered, the fractional setting value is used.

Examples of how linear dimensions are entered (press **On/C** *after each entry):*

DIMENSION	KEYSTROKES
5 Yards	**5** **Yds**
5 Feet 1-1/2 Inch	**5** **Feet** **1** **Inch** **1** **/** **2**
17.5 Meters	**1** **7** **•** **5** **m**

Square and Cubic Dimensions

Examples of how Square and Cubic dimensions are entered (press **On/C** *after each entry):*

DIMENSION	KEYSTROKES
5 Cubic Yards	**5** **Yds** **Yds** **Yds**
130 Square Feet	**1** **3** **0** **Feet** **Feet**
33 Square Meters	**3** **3** **m** **m**

CONVERSIONS

Linear Conversions

Convert 10 Feet 6 Inches to other dimensions, including Metric:

KEYSTROKES	DISPLAY
1 **0** **Feet** **6** **Inch**	**10 FEET 6 INCH**
Conv **Feet***	**10.5 FEET**
Conv **Inch***	**126. INCH**
Conv **Yds**	**3.5 YD**
Conv **m**	**3.200 M**
Conv **9** *(mm)*	**3200.4 MM**
Conv **7** *(cm)*	**320.04 CM**

*Repeated presses of **Feet** or **Inch** will toggle between Feet-Inch-Fractions and Decimal Feet or Inches.

Square and Cubic Conversions

Convert 14 Square Feet to Square Yards:

KEYSTROKES	DISPLAY
1 **4** **Feet** **Feet**	**14 SQ FEET**
Conv **Yds**	**1.555556 SQ YD**

Convert 12 Cubic Feet to Cubic Yards:

KEYSTROKES	DISPLAY
1 **2** **Feet** **Feet** **Feet**	**12 CU FEET**
Conv **Yds**	**0.444444 CU YD**

Weight Conversions

Convert 25 Tons to other Weights:

KEYSTROKES	DISPLAY
2 5 **Conv** 6 *(tons)*	**25 Ton**
Conv 4 *(lbs)*	**50000. LB**
Conv 1 *(kg)*	**22679.62 KG**
Conv 3 *(met tons)*	**22.67962 MET Ton**

Weight per Volume Conversions

Your calculator has the capability of converting between Weight and Volume. The Weight/Volume ratio is permanently stored by entering the value and pressing **Stor** 0. The default value is 1.5 Tons per Cubic Yard.

Find the Weight of 15 Cubic Yards at 1.75 Tons per Cubic Yard, then convert to other Weights:

KEYSTROKES	DISPLAY
1 • 7 5 **Stor** 0 *(wt/vol)*	
	STORED 1.75 Ton Per CU YD
1 5 **Yds** **Yds** **Yds**	**15 CU YD**
Conv 6 *(tons)*	**26.25 Ton**
Conv 4 *(lbs)*	**52500. LB**
Conv 1 *(kg)*	**23813.6 KG**
Conv 3 *(met tons)*	**23.8136 MET Ton**

Converting D:M:S

Convert 23° 42' 39" to decimal degrees:

KEYSTROKES	DISPLAY
On/C **On/C**	**0.**
2 3 • 4 2 • 3 9	**DMS 23.42.39**
Conv • *(dms◀▶deg)*	**23.71°**

BASIC MATH OPERATIONS

Your calculator uses standard chaining logic, which simply means that you enter your first value, the operator (➕, ➖, ✖, ➗), the second value and then the Equals sign (🟰).

A.	3	➕	2	🟰	5.
B.	3	➖	2	🟰	1.
C.	3	✖	2	🟰	6.
D.	3	➗	2	🟰	1.5

This feature also makes the calculator simple to use for dimensional applications:

Adding and Subtracting Strings of Dimensions

Add the following measurements:

• 6 Feet 2-1/2 Inches
• 11 Feet 5-1/4 Inches
• 18.25 Inches

Then subtract 2-1/8 Inches.

KEYSTROKES	DISPLAY
6 **Feet** 2 **Inch** 1 ∕ 2 ➕	
1 1 **Feet** 5 **Inch** 1 ∕ 4 ➕	
1 8 • 2 5 **Inch** 🟰	**19 FEET 2 INCH**
➖ 2 **Inch** 1 ∕ 8 🟰	**18 FEET 11-7/8 INCH**

Multiplying Dimensions

Multiply 5 Feet 3 Inches by 11 Feet 6-1/2 Inches:

KEYSTROKES	DISPLAY
5 **Feet** 3 **Inch** ✖ 1 1 **Feet**	
6 **Inch** 1 ∕ 2 🟰	**60.59375 SQ FEET**

Dividing Dimensions

Divide 30 Feet 4 Inches by 7 Inches:

KEYSTROKES   **DISPLAY**

3 0 **Feet** 4 **Inch** ➗ 7 **Inch** 🟰   **52.**

Divide 20 Feet 3 Inches by 9:

KEYSTROKES   **DISPLAY**

2 0 **Feet** 3 **Inch** ➗ 9 🟰   **2 FEET 3 INCH**

PERCENTAGE CALCULATIONS

The **%** key can be used for finding a given percent of a number or for working add-on, discount or division percentage calculations. It can be used with any type of number, in any dimension (Feet, Inch, Millimeter, etc) and any type of convention (non-dimensioned, Linear, Square or Cubic).

Calculating Percentages

Find 18% of 500 Feet:

KEYSTROKES   **DISPLAY**

5 0 0 **Feet** ✖ 1 8 **%**   **90 FEET 0 INCH**

Add 10% to 137 Square Feet:

KEYSTROKES   **DISPLAY**

1 3 7 **Feet** **Feet** ➕ 1 0 **%**   **150.7 SQ FEET**

Take 20% from 552 Feet 6 Inches:

KEYSTROKES   **DISPLAY**

5 5 2 **Feet** 6 **Inch** ➖ 2 0 **%**
          442 FEET 0 INCH

Divide 350 Cubic Yards by 80%:

KEYSTROKES   **DISPLAY**

3 5 0 **Yds** **Yds** **Yds** ➗ 8 0 **%**
          437.5 CU YD

MEMORY OPERATION

Whenever the **M+** key is pressed, the displayed value will be added to the Memory. Other memory functions:

FUNCTION	KEYSTROKES
Add to Memory	**M+**
Subtract from Memory	**Conv** **M+**
Recall total in Memory	**Rcl** **M+**
Display/Clear Memory	**Rcl** **Rcl**
Clear Memory	**Conv** **Rcl**

Memory is semi-permanent, clearing only when you:

1) turn off the calculator;
2) press **Rcl** **Rcl**;
3) press **Conv** **Rcl**;
4) press **Conv** **X** *(Clear All)*.

When Memory is recalled (**Rcl** **M+**), consecutive presses of **M+** will display the calculated average and total count of the accumulated values.

Using M+

KEYSTROKES	DISPLAY
3 5 5 M+	M+ 355. M
2 5 5 M+	M+ 255. M
7 4 5 Conv M+ *(M-)*	M- 745. M
Rcl M+	TTL STORED – 135. M
M+	AVG – 45. M
M+	CNT 3. M
Rcl Rcl	M+ – 135.

Using Memory Storage Keys (M1 - M3)

In addition to the standard cumulative Memory (as previously described), your calculator has three independent Storage Registers – M1 through M3 – that can be used to permanently store single, noncumulative values. The following example shows the use of M1 (**Stor** **1**). To use M2 or M3, replace the presses of the **1** key with presses of the corresponding number key (**2** or **3**).

Your can replace a value in one of these Memory registers by storing a new value in place of the stored value.

FUNCTION	KEYSTROKES
Store single value in M1	**Stor** **1**
Clear M1	**0** **Stor** **1**
Recall M1	**Rcl** **1**

Example:

Store 175 into M1, recall the value, and then clear the value.

KEYSTROKES	DISPLAY
1 **7** **5** **Stor** **1**	M-1 STORED 175.
Off **On/C**	0.
Rcl **1**	M-1 STORED 175.
0 **Stor** **1**	M-1 STORED 0.

PAPERLESS TAPE

The Paperless Tape allows you to display and review the last 20 entries of a calculation. **Rcl =** accesses the tape mode and **+** or **−** scrolls forward or backward through the entries.

*Note: The Paperless Tape is cleared each time **On/C** is pressed twice, the unit is shut off, or a Clear All is performed.*

Previewing Paperless Tape

KEYSTROKES	DISPLAY
1. Enter a string of numbers:	
4 **Feet** **+**	**4 FEET 0 INCH**
5 **Feet** **+**	**9 FEET 0 INCH**
6 **Feet** **+**	**15 FEET 0 INCH**
7 **Feet** **=**	**22 FEET 0 INCH**
2. Access the Tape function:	
Rcl =	**TTL= 22 FEET 0 INCH**
3. Scroll from first value to total:	
+	**01 4 FEET 0 INCH**
+	**02+ 5 FEET 0 INCH**
+	**03+ 6 FEET 0 INCH**
+	**04+ 7 FEET 0 INCH**
+	**TTL= 22 FEET 0 INCH**
4. Scroll to last two values:	
−	**04+ 7 FEET 0 INCH**
−	**03+ 6 FEET 0 INCH**
5. Exit Tape function and continue:	
=*	**TTL= 22 FEET 0 INCH**
+	**22 FEET 0 INCH**
2 **Feet** **=**	**24 FEET 0 INCH**

*Displays total before exiting.

USING THE HEAVYCALC PRO

LENGTH, WIDTH, AND HEIGHT KEYS

Using the Multi-Function **Width** Key to find Area, Square-Up, and Perimeter

Find the Area, Square-up and perimeter of a room measuring 15' x 20'.

KEYSTROKES	DISPLAY
On/C **On/C**	**0.**
1 5 **Feet** **Length**	**LNTH 15 FEET 0 INCH**
2 0 **Feet** **Width**	**WDTH 20 FEET 0 INCH**
Width	**AREA 300. SQ FEET**
Width	**SQUP 25 FEET 0 INCH**
Width	**PER 70 FEET 0 INCH**

Using the Multi-Function **Height** Key to find Volume, Wall Area and Room Area

Find the Volume, wall Area and total surface/room Area* if you have a Length of 15 Feet, Width of 20 Feet and Height of 12 Feet.

*Room Area includes four walls plus ceiling Area.

KEYSTROKES	DISPLAY
On/C **On/C**	**0.**
1 5 **Feet** **Length**	**LNTH 15 FEET 0 INCH**
2 0 **Feet** **Width**	**WDTH 20 FEET 0 INCH**
1 2 **Feet** **Height**	**HGHT 12 FEET 0 INCH**
Height	**VOL 3600. CU FEET**
Height	**WALL 840. SQ FEET**
Height	**ROOM 1140. SQ FEET**

VOLUME CALCULATIONS

Simple Concrete Volume

You need to calculate the Cubic Yards of concrete required for pouring a driveway. The measurements are as follows: 36 Feet 3 Inches by 11 Feet 6 Inches by 4 Inches deep. What's the Volume of the driveway? If concrete costs $47 per Cubic Yard, how much will the concrete cost?

KEYSTROKES	DISPLAY

1. Clear calculator:

On/C **On/C**   **0.**

2. Enter Length, Width and Depth, then find Volume in Cubic Yards:

3 **6** *Feet* **3** *Inch* *Length*

   LNTH 36 FEET 3 INCH

1 **1** *Feet* **6** *Inch* *Width*

   WDTH 11 FEET 6 INCH

4 *Inch* *Height*   **HGHT 4 INCH**

Height   **VOL 5.146605 CU YD**

3. Multiply by price per Cubic Yard to find total cost:

X **4** **7** *Conv* **0** *(Cost)* $**241.**⁸⁹

Topsoil Volume

You are measuring a building perimeter for calculating topsoil excavation. If the building measurements are 45 Feet by 23 Feet, and the Depth of topsoil to be removed is 8 Inches, what is the building Area and Volume of topsoil to be removed?
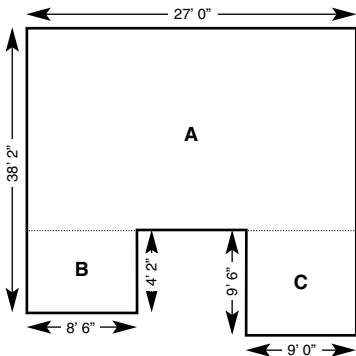
KEYSTROKES   **DISPLAY**

1. *Clear calculator:*
   On/C **On/C**   **0.**

2. *Enter Length and Width of the building:*
   4 **5** **Feet** **Length**
                            LNTH 45 FEET 0 INCH
   2 **3** **Feet** **Width**
                            WDTH 23 FEET 0 INCH

3. *Find building Area:*
   Width   **AREA 1035. SQ FEET**

4. *Enter Depth to be removed:*
   8 **Inch** **Height**   **HGHT 8 INCH**

5. *Find Volume of topsoil:*
   Height   **VOL 25.55556 CU YD**

Complex Concrete Volume

You're going to pour an odd-shaped patio 4-1/2 Inches deep with the dimensions as shown. First, calculate the total Area (by dividing the drawing into three individual rectangles) and then determine the total cubic Yards of concrete required for this job. What is the total cost of the concrete if it is selling for $55 per Cubic Yard?

KEYSTROKES **DISPLAY**

1. Clear calculator:
On/C **On/C**   **0.**

(Cont'd)

KEYSTROKES	**DISPLAY**

2. Find Area "A" and add to Memory:

   3 **8** `Feet` **2** `Inch`
   – **4** `Feet` **2** `Inch` **=** `Length`

              LNTH 34 FEET 0 INCH

   2 **7** `Feet` `Width` **WDTH 27 FEET 0 INCH**

   `Width`   **AREA 918. SQ FEET**

   `M+`   **M+ 918. SQ FEET** **M**

3. Find Area "B" and add to Memory:

   4 `Feet` **2** `Inch` `Length`

              LNTH 4 FEET 2 INCH **M**

   8 `Feet` **6** `Inch` `Width`

              WDTH 8 FEET 6 INCH **M**

   `Width`   **AREA 35.41667 SQ FEET** **M**

   `M+`   **M+ 35.41667 SQ FEET** **M**

4. Find Area "C" and add to Memory:

   9 `Feet` `Length` **LNTH 9 FEET 0 INCH** **M**

   9 `Feet` **6** `Inch` `Width`

              WDTH 9 FEET 6 INCH **M**

   `Width`   **AREA 85.5 SQ FEET** **M**

   `M+`   **M+ 85.5 SQ FEET** **M**

5. Find Total Area/Volume and cost:

   `Rcl` `Rcl` **M+ 1038.917 SQ FEET**

   × **4** `Inch` **1** **/** **2** **=** **14.4294 CU YD**

   × **5** **5** `Conv` **0** *(Cost)* **$793.⁶²**

Trench Volume

You're digging a trench that is 345 Feet long, 24 Inches wide and 6 Feet deep. Find the Volume of soil removed.

KEYSTROKES	DISPLAY

1. Clear calculator:

On/C **On/C**   **0.**

2. Enter Length, Width and Depth (Height) of trench:

3 **4** **5** **Feet** **Length**

            LNTH 345 FEET 0 INCH

2 **4** **Inch** **Width**   **WDTH 24 INCH**

6 **Feet** **Height**   **HGHT 6 FEET 0 INCH**

3. Find removed dirt Volume:

Height   **VOL 153.3333 CU YD**

RIGHT TRIANGLE PROBLEMS

The calculator's top two rows of keys include built-in solutions to Square-up, Drop, Percent Grade and Slope problems.

Square-up is calculated from the values entered as Length and Width.

Slope and Percent Grade are calculated using the values for Width and Height (Depth).
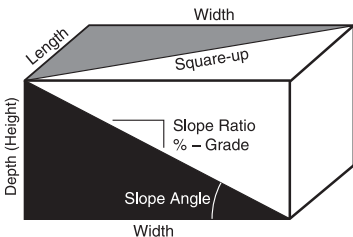
$$\text{Slope} = \frac{\text{Depth}}{\text{Width}}$$

A slope can be entered as:

- A Slope Ratio: $\boxed{\bullet}$ $\boxed{2}$ $\boxed{5}$ $\boxed{\text{Slope}}$*
- A percent grade: $\boxed{2}$ $\boxed{5}$ $\boxed{\text{Conv}}$ $\boxed{\text{Slope}}$
- A slope angle: $\boxed{5}$ $\boxed{\text{Conv}}$ $\boxed{8}$ $\boxed{\text{Slope}}$

*This represents a 4:1 slope ratio (e.g., $\boxed{4}$ $\boxed{\text{Conv}}$ $\boxed{\div}$ $\boxed{\text{Slope}}$).

Squaring-up a Concrete Slab

Assume you want to "Square-up" the forms for a concrete foundation measuring 45 Feet 6 Inches by 24 Feet 4 Inches. To Square the forms, find the Square-up (Diagonal) Length. If the slab is 4 Inches thick, find the Area and Volume.
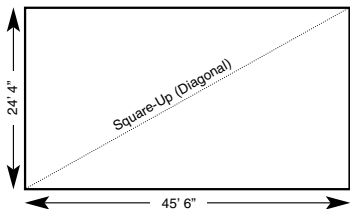
KEYSTROKES   **DISPLAY**

1. Clear calculator:
  On/C **On/C**   **0.**

2. Enter Length, Width and Height (Depth) and solve for Area and Volume:
  4 **5** **Feet** **6** **Inch** **Length**
                   LNTH 45 FEET 6 INCH
  2 **4** **Feet** **4** **Inch** **Width**
                   WDTH 24 FEET 4 INCH
  Width   **AREA 1107.167 SQ FEET**
  4 **Inch** **Height**   **HGHT 4 INCH**
  Height   **VOL 13.66872 CU YD**

3. Solve for Square-up:
  Sq-Up   **SQUP 51 FEET 7-3/16 INCH**

Finding Lot Width

What is the Width of a lot that has a 5 Degree Slope and a total Drop of 2 Feet?

KEYSTROKES	DISPLAY

1. Clear calculator:
   On/C **On/C**   **0.**

2. Enter Slope and Drop:
   5 **Conv** **8** *Slope*   **SLP 5.00°**
   2 *Feet* *Height*   **HGHT 2 FEET 0 INCH**

3. Solve for Width:
   Width   **WDTH 22 FEET 10-5/16 INCH**

Note: Slope and Percent Grade work with Width and Height, not Length. Make sure to clear your calculator (On/C On/C) before performing a Length, Width and Height calculation.

Finding Drop or Fall

What is the total Drop over 25 Feet for a 5 Degree Slope? For a 5% Grade? For a 4:1 Slope?

KEYSTROKES	DISPLAY

1. Clear calculator:
   On/C **On/C**   **0.**

Solve Drop Using Slope degree

2. Enter 5° Slope and Width:
   5 **Conv** **8** *Slope*   **SLP 5.00°**
   2 **5** *Feet* *Width*

                          WDTH 25 FEET 0 INCH

3. Solve for Drop:
    Height   **HGHT 2 FEET 2-1/4 INCH**

Solve Drop Using Percent Grade

4. Enter 5% Grade:
    5 **Conv** **Slope** *(%Grade)*   **%GRD 5.**

5. Solve for Drop:
    Height   **HGHT 1 FEET 3 INCH**

Solve Drop Using Slope ratio

6. Enter 4:1 Slope:
    4 **Conv** **÷** *(1/x)*   **0.25**
    Slope   **SLP 0.25**

7. Solve for Drop:
    Height *(Depth)*   **HGHT 6 FEET 3 INCH**

Finding Slope Ratio/Percent Grade

What is the Slope Ratio and Percent Grade of a lot that drops 3 Feet 6 Inches over 20 Feet?

KEYSTROKES	DISPLAY

1. Clear calculator:
   On/C **On/C**   **0.**

Solve for Slope ratio

2. Enter Drop (as Height):
   3 **Feet** **6** **Inch** **Height**
                                    HGHT 3 FEET 6 INCH

3. Enter Distance (as Width):
   2 **0** **Feet** **Width**
                                    WDTH 20 FEET 0 INCH

4. Find Slope Ratio:
   Slope   **SLP 0.175**

Solve for degree of Slope

5. Find Degree of Slope:
   Slope   **SLP 9.93°**

Solve for Percent Grade

6. Find Percent Grade:
   Slope   **%GRD 17.5**

Drop of Sloped Slab

You're pouring a sloped concrete slab with a Length of 14 Feet. If the standard drop or fall is 1/8 Inch per Foot, what is the total drop or fall? What if the drop is 1/4 Inch per Foot or .375 Inch per Foot?

KEYSTROKES	DISPLAY

1. Clear calculator:
On/C **On/C**   **0.**

2. Enter total Length of slab:
1 **4** **Feet** **Length**
                            LNTH 14 FEET 0 INCH

3. Enter 1/8 Inch drop per Foot and find amount of drop:
1 **/** **8** **Drop** **Drop**
                            DROP 0 FEET 1-3/4 INCH

4. Enter 1/4 Inch drop per Foot and find amount of drop:
1 **/** **4** **Drop** **Drop**
                            DROP 0 FEET 3-1/2 INCH

5. Enter .375 Inch drop per Foot and find amount of drop:
• **3** **7** **5** **Inch** **Drop** **Drop**
                            DROP 0 FEET 5-1/4 INCH

6. Convert to decimal Inches:
Conv **Inch**   **5.25 INCH**

7. Convert to decimal Feet:
Conv **Feet**   **0.4375 FEET**

Drop of Retaining Wall

You're building a 61 Feet 8 Inch retaining wall along a driveway that slopes away at 1/4 Inch per Foot. There are 4 sections, each measuring 15 Feet 5 Inches in Length. What is the proper drop amount for each section? What is the total (accumulated) drop Depth at the end of all four sections?

KEYSTROKES   **DISPLAY**

1. Clear calculator:
  On/C **On/C**   **0.**

2. Enter wall section Length:
  1 **5** **Feet** **5** **Inch** **Length**
        LNTH 15 FEET 5 INCH

3. Enter drop per Foot to find the drop per section and the total drop Depth at 1st wall section:
  1 **/** **4** **Drop** **Drop**
        DROP 0 FEET 3-7/8 INCH

4. Find total drop Depth of 2nd through 4th wall sections:

Drop	**DROP 0 FEET 7-11/16 INCH**
Drop	**DROP 0 FEET 11-9/16 INCH**
Drop	**DROP 1 FEET 3-7/16 INCH**

Note: Successive presses of **Drop** *will continue to add the drop amount of 3-7/8 Inches to the prior wall section's drop, for an accumulated drop total.*

CALCULATING LOADS

How many 8 Cubic Yard truck loads would be needed to haul the dirt from an excavation measuring 108 Feet x 48 Feet and 1 Foot deep?

KEYSTROKES   **DISPLAY**

1. *Clear calculator:*
   On/C **On/C**   **0.**

2. *Enter load size:*
   8 **Yds** **Yds** **Yds** **Stor** **Loads**
                                L-SZ STORED **8. CU YD**

3. *Enter site Length:*
   1 **0** **8** **Feet** **Length**
                                LNTH 108 FEET 0 INCH

4. *Enter site Width:*
   4 **8** **Feet** **Width**
                                WDTH 48 FEET 0 INCH

5. *Enter site Depth:*
   1 **Feet** **Height**   **HGHT 1 FEET 0 INCH**

6. *Find number of loads:*
   Loads   **LOAD 24.**

BASIC CUT / FILL SOLUTIONS

Finding Cut or Fill — *Exercise 1*

Find the Cut/Fill marks or changes of elevations for a lot with a proposed elevation of 4.0 Feet and existing elevations of 3.0 Feet, 4.5 Feet and 6.0 Feet.

KEYSTROKES	DISPLAY

1. Clear calculator:
   On/C **On/C**   **0.**

Solve for First Cut/Fill mark

2. Enter proposed elevation:
   4 **Feet** **Prop**   PROP 4 FEET 0 INCH

3. Enter first existing elevation:
   3 **Feet** **Exist**   EXST 3 FEET 0 INCH

4. Find first Cut/Fill:
   Cut/Fill   FILL 1 FEET 0 INCH

Solve for Second Cut/Fill mark

5. Enter second existing elevation:
   4 **•** **5** **Feet** **Exist**   EXST 4.5 FEET

6. Find second Cut/Fill:
   Cut/Fill   CUT – 0 FEET 6 INCH

Solve for Third Cut/Fill mark

7. Enter third existing elevation:
   6 **Feet** **Exist**   EXST 6 FEET 0 INCH

8. Find third Cut/Fill:
   Cut/Fill   CUT – 2 FEET 0 INCH

Finding Cut or Fill — *Exercise 2*

Find the Cut/Fill marks for a lot that has a proposed elevation of 15.5 Feet, and the following existing elevations: 17.3 Feet, 20.7 Feet, 25.5 Feet and 11.8 Feet.

KEYSTROKES	DISPLAY
1. Clear calculator:	
On/C On/C	0.

Solve for First Cut/Fill mark
2. Enter proposed elevation:
1 5 • 5 Feet Prop **PROP 15.5 FEET**

3. Enter first existing elevation:
1 7 • 3 Feet Exist **EXST 17.3 FEET**

4. Find First Cut/Fill:
Cut/Fill **CUT – 1.8 FEET**

Solve for Second Cut/Fill mark
5. Enter second existing elevation:
2 0 • 7 Feet Exist **EXST 20.7 FEET**

6. Find second Cut/Fill:
Cut/Fill **CUT – 5.2 FEET**

Solve for Third Cut/Fill mark
7. Enter third existing elevation:
2 5 • 5 Feet Exist **EXST 25.5 FEET**

8. Find third Cut/Fill:
Cut/Fill **CUT – 10. FEET**

Solve for Fourth Cut/Fill mark
9. Enter fourth existing elevation:
1 1 • 8 Feet Exist **EXST 11.8 FEET**

10. Find fourth Cut/Fill:
Cut/Fill **FILL 3.7 FEET**

Cubic Yards of Cut/Fill
— *Grid Cell Method*

The four corner elevations of a Grid cell are 75.4 Feet, 77.5 Feet, 74.6 Feet, and 80.5 Feet. If the proposed elevation is 83 Feet, and the Area of the Grid is 2,000 Square Feet, what is the Volume (in Cubic Yards) of cut or fill required for this Grid cell?

KEYSTROKES	DISPLAY

1. Clear calculator:

On/C **On/C**   **0.**

Find average Existing Grid Elevation

2. Enter first through fourth elevation (in Memory):

7 **5** **•** **4** **Feet** **M+**

M+ **75.4 FEET** **M**

7 **7** **•** **5** **Feet** **M+**

M+ **77.5 FEET** **M**

7 **4** **•** **6** **Feet** **M+**

M+ **74.6 FEET** **M**

8 **0** **•** **5** **Feet** **M+**

M+ **80.5 FEET** **M**

3. Find total:

Rcl **M+**   TTL **STORED** **308. FEET** **M**

4. Find average:

M+   AVG **77. FEET** **M**

Solve for Cut or Fill

5. Enter average as existing elevation:
   `=` `Exist`   **EXST 77. FEET** `M`

6. Enter proposed elevation:
   `8` `3` `Feet` `Prop`
                       PROP 83 FEET 0 INCH `M`

7. Find Cut or Fill:
   `Cut/Fill`   **FILL 6 FEET 0 INCH** `M`

Solve for Grid Volume

8. Enter Grid Area and find Volume:
   `x` `2` `0` `0` `0` `Feet` `Feet` `=`
                       12000. CU FEET `M`

9. Convert to Cubic Yards:
   `Conv` `Yds`   **444.4444 CU YD** `M`

10. Clear M+:
    `On/C` `Conv` `Rcl`   **0.**

SHRINK AND SWELL SOLUTIONS — *MATERIAL VOLUME*

The *HeavyCalc* is able to convert among Bank Fill, Compacted Fill and Loose (or trucked) Fill soil Cubic Yard Volumes. With values entered for %-Shrink and %-Swell, converting among these Volumes is done with the press of a single key. Entered values for Percent Shrink and Percent Swell will remain in Memory until they are revised or reset to their default values by using `Conv` `x`.

Finding Loose Volume

How much dry gravel will be trucked out of a hole to be dug that measures 10 Feet long by 35 Feet wide by 15 Feet deep? Assume dry gravel has a swell factor of 15%.

KEYSTROKES	DISPLAY

1. Clear calculator:

   On/C **On/C**   **0.**

Solve Bank Fill Volume

2. Enter Length, Width and Depth:

   1 **0** **Feet** **Length**

                LNTH 10 FEET 0 INCH

   3 **5** **Feet** **Width**

                WDTH 35 FEET 0 INCH

   1 **5** **Feet** **Height**

                HGHT 15 FEET 0 INCH

3. Solve for Volume:

   Height   **VOL 5250. CU FEET**

   Conv **Yds**   **194.4444 CU YD**

4. Enter as Bank Volume:

   ⊟ **Bank**   **BANK 194.4444 CU YD**

Solve Loose Fill Volume

5. Enter 15% swell factor:

   1 **5** **Conv** **Loose** (%Swell)

              %SWL STORED **15.**

6. Find Loose Volume:

   Loose   **LOOS 223.6111 CU YD**

Finding Trucked Volume/Weight
— *Both Swell and Shrink Factors*

You need to move wet sand from one location to another that requires a 4-Inch fully compacted fill under a 125 Feet Long by 75 Feet Wide slab. What is the trucked (loose fill) Volume? Assume a Swell Factor of 5% and a Shrink Factor of 10%. What is the total Weight, in Tons, of the sand if it Weighs 1.55 Tons per Cubic Yard?

KEYSTROKES	DISPLAY
1. Clear calculator:	
On/C **On/C**	**0.**
2. Enter Shrink/Swell Factors:	
5 **Conv** **Loose** (%Swell)	
	%SWL STORED **5.**
1 **0** **Conv** **Comp** (%Shrink)	
	%SHR STORED **10.**
3. Enter Length, Width and Depth (Height):	
1 **2** **5** **Feet** **Length**	
	LNTH 125 FEET 0 INCH
7 **5** **Feet** **Width**	
	WDTH 75 FEET 0 INCH
4 **Inch** **Height**	**HGHT 4 INCH**
4. Find Compacted Fill Volume and enter into Compacted Volume:	
Height **=** **Comp**	**COMP 115.7407 CU YD**
5. Find Loose Volume:	
Loose	**LOOS 135.0309 CU YD**

(Cont'd)

(Cont'd)

KEYSTROKES	DISPLAY

6. Enter Unit Weight:
   1 $\bullet$ 5 5 **Stor** 0 *(wt/vol)*

   STORED **1.55 Ton Per CU YD**

7. Recall Bank Volume:
   Bank   **BANK 128.6008 CU YD**

8. Find Weight in Tons:
   Conv 6 *(tons)*   **199.3313 Ton**

9. Clear calculator and restore default values:
   Conv $\times$ *(Clear All)*   **0.**

APPENDIX

Setting Fractional Resolution

Fractional resolution is pemanently set via the Preference Settings (see **Preference Settings** section for instructions). To select other formats temporarily (e.g., 1/64, 1/32, etc.), see the example below:

Add 44/64 to 1/64 of an Inch and then convert the answer to other fractional resolutions:

KEYSTROKES	DISPLAY
On/C **On/C**	**0.**
4 **4** **/** **6** **4**	**0-44/64 INCH**
+ **1** **/** **6** **4** **=**	**0-45/64 INCH**
Conv **1** *(1/16)*	**0-11/16 INCH**
Conv **2** *(1/2)*	**0-1/2 INCH**
Conv **3** *(1/32)*	**0-23/32 INCH**
Conv **4** *(1/4)*	**0-3/4 INCH**
Conv **6** *(1/64)*	**0-45/64 INCH**
Conv **8** *(1/8)*	**0-3/4 INCH**
On/C **On/C**	**0.**

Note: Changing the Fractional Resolution on a displayed value does not alter your Permanent Fractional Resolution Setting. Pressing **On/C** *will return your calculator to the permanently set Fractional Resolution.*

Default Settings

After a *Clear All* (**Conv** **X**), your calculator will return to the following settings:

STORED VALUES	DEFAULT VALUE
Load Size	**8 CU YD**
Percent Shrink	**5%**
Percent Swell	**10%**
Weight per Volume	**1.5 Ton Per CU YD**

If you replace your battery or perform a *Full Reset** (press **Off**, hold down **X**, and press **On/C**), your calculator will return to the following settings (in addition to those listed above):

PREFERENCE SETTINGS	DEFAULT VALUE
Fractional Resolution	**1/16**
Area Display	**Standard**
Volume Display	**Standard**
Exponent	**Off**
Meter Linear Display	**0.000**
Decimal Degree Display	**0.00°**
Fractional Mode	**Standard**

*Depressing the Reset button located above the **Length** key will also perform a Full Reset.

Auto Shut-Off

Your calculator will shut itself off after about 8-12 minutes of non-use.

Accuracy/Errors

Accuracy/Display Capacity – Your calculator has a twelve digit display. This is made up of eight digits (normal display) and four fractional digits. You may enter or calculate values up to 19,999,999.99. Each calculation is carried out internally to twelve digits.

Errors – When an incorrect entry is made, or the answer is beyond the range of the calculator, it will display the word "**ERROR**." To clear an error condition you must press the **On/C** button once. At this point you must determine what caused the error and re-key the problem.

Error Codes

DISPLAY	ERROR TYPE
OFLO	Overflow (too large)
MATH Error	Divide by 0
DIM Error	Dimension error
ENT Error	Invalid entry error

Auto-Range – If an "overflow" is created because of a calculation with small units that are out of the standard digit range of the display, the answer will be automatically expressed in the next larger units (instead of showing "**ERROR**") – e.g., 20,000,000 mm is shown as 20,000 m. Also applies to Inches, Feet and Yards.

Note: If Exponential Notation is activated through the Preference Setting, the value will be shown in scientific notation (e.g., 20 million mm – 2.00000^{07} mm).

Battery

This model uses one (1) CR-2016 battery (included). This should last approximately 800 hours of actual use (1 year plus for most people). Should your calculator display become very dim or erratic, replace the battery.

Note: Please use caution when disposing of your old batteries as they contain hazardous chemicals.

Note: Values in memory or shown on the display will be cleared.

Replacement batteries are available at most discount or electronics stores. You may also call Calculated Industries at 1-775-885-4900.

Replacing the Battery

Turn the calculator over and open user guide door located at the top. Pull battery holder out (top left corner) and turn over. Remove old battery and slide new battery under tabs. Turn holder over (negative side facing you) and insert into calculator.

Reset

If your calculator should ever "lock up," press Reset – a small hole located above the `Length` key – to perform a total reset.

AREA AND VOLUME FORMULAS

Area Formulas
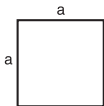
Square
Area = a^2
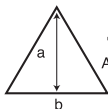
Triangle
Area = 1/2 ab

Rectangle
Area = lw
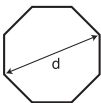
Octagon
Area = $(d/2)^2$ x 2.828
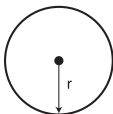
Circle
Circumference = $2\pi r$
Area = πr^2
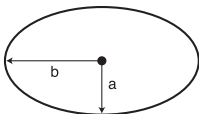
Ellipse
Area = πab

Surface Area and Volume Formulas
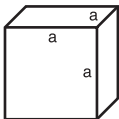
Cube
Surface Area = $6a^2$
Volume = a^3
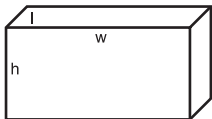
Rectangle
Surface Area =
$2hw + 2hl + 2lw$
Volume = $l \times w \times h$
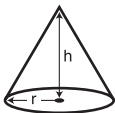
Cone
Surface Area = $\pi r \sqrt{r^2 + h^2}$
(+ πr^2 if you add the base)
Volume = $\dfrac{\pi r^2 h}{3}$
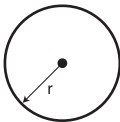
Sphere
Surface Area = $4\pi r^2$
Volume = $4/3 \pi r^3$
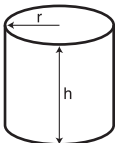
Cylinder
Surface Area = $2\pi rh + 2\pi r^2$
Volume = $\pi r^2 h$

REPAID AND RETURN

Warranty, Repair and Return Information

Return Guidelines

1. Please read the ***Warranty*** in this User's Guide to determine if your Calculated Industries product remains under warranty **before** calling or returning any device for evaluation or repairs.

2. If your product won't turn on, check the battery as outlined in the User's Guide.

3. If you need more assistance, please go to the website listed below.

4. If you believe you need to return your product, please call a Calculated Industries representative between the hours of 8:00am and 4:00pm Pacific Time for additional information and a Return Merchandise Authorization (RMA).

Call Toll Free: 1-800-854-8075

Outside USA: 1-775-885-4900

www.calculated.com/warranty

WARRANTY

Warranty Repair Service – U.S.A.

Calculated Industries ("CI") warrants this product against defects in materials and workmanship for a period of one (1) year from the date of original consumer purchase in the U.S. If a defect exists during the warranty period, CI, at its option, will either repair (using new or remanufactured parts) or replace (with a new or remanufactured calculator) the product at no charge.

THE WARRANTY WILL NOT APPLY TO THE PRODUCT IF IT HAS BEEN DAMAGED BY MISUSE, ALTERATION, ACCIDENT, IMPROPER HANDLING OR OPERATION, OR IF UNAUTHORIZED REPAIRS ARE ATTEMPTED OR MADE. SOME EXAMPLES OF DAMAGES NOT COVERED BY WARRANTY INCLUDE, BUT ARE NOT LIMITED TO, BATTERY LEAKAGE, BENDING, A "BLACK INK SPOT" OR VISIBLE CRACKING OF THE LCD, WHICH ARE PRESUMED TO BE DAMAGES RESULTING FROM MISUSE OR ABUSE.

To obtain warranty service in the U.S., please go to the website.

A repaired or replacement product assumes the remaining warranty of the original product or 90 days, whichever is longer.

Non-Warranty Repair Service – U.S.A.

Non-warranty repair covers service beyond the warranty period, or service requested due to damage resulting from misuse or abuse.

Contact Calculated Industries at the number listed above to obtain current product repair information and charges. Repairs are guaranteed for 90 days.

Repair Service – *Outside the U.S.A.*

To obtain warranty or non-warranty repair service for goods purchased outside the U.S., contact the dealer through which you initially purchased the product. If you cannot reasonably have the product repaired in your area, you may contact CI to obtain current product repair information and charges, including freight and duties.

Disclaimer

FCC CLASS B

This equipment has been certified to comply with the limits for a Class B computing device, pursuant to Subpart J of Part 15 of FCC rules.

LOOKING FOR NEW IDEAS

Calculated Industries, a leading manufacturer of special-function calculators and digital measuring instruments, is always looking for new product ideas in these areas.

If you have an idea, or a suggestion for improving this product or User's Guide, please submit your comments online at www.calculated.com under "Contact Us", "Product Idea Submittal Agreement". Thank you.