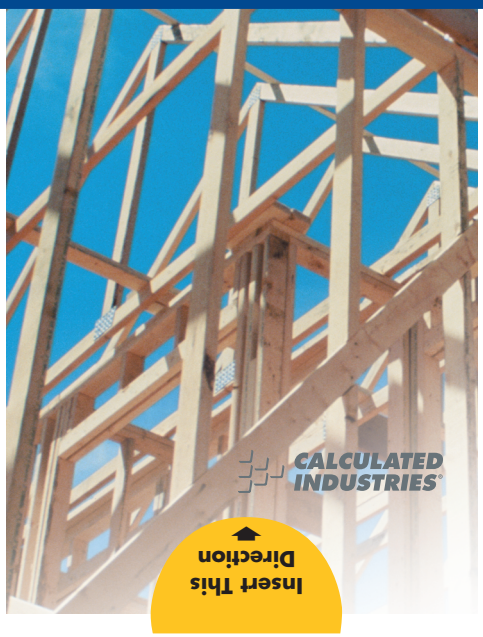
CONSTRUCTION MASTER® 5

ADVANCED FEET-INCH-FRACTION CALCULATOR

Model 4050

Pocket Reference Guide



CONSTRUCTION MASTER® 5

The *Construction Master 5* calculator helps you save time, cut costly errors and build *like a pro!*

Quickly Solve:

- *Feet-Inches-Fractions, Yards, Metric Dimensional Problems and Conversions*
- *Problems Involving All Fractions — 1/2-1/64ths!*
- *Areas, Volumes and Weights*
- *Circle/Arc Calculations*
- *Common, Hip/Valley, Jack Rafter Lengths (Regular and Irregular)*
- *Rake-Wall Solutions*
- *Concrete, Flooring Quantity*
- *Squaring-Up*
- *Stair Layout Solutions, and more!*

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GETTING STARTED

KEY DEFINITIONS / FUNCTIONS

Basic Function Keys

+ − × ÷ =	Arithmetic operation keys.
0 – 9 and •	Keys used for entering numbers.
%	***Percent Key*** — Four-function (+, –, x, ÷) percent key.
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.
√x	***Square Root Key*** — Used to find the Square Root of a non-dimensional or area value.

Rcl	***Recall Key*** — Used with other keys to *recall* stored values and settings.
M+	***Memory Key*** — Adds the displayed value to Memory. Clears when the calculator is shut off.
Conv M+	***Memory Minus (M–)*** — Subtracts the displayed value from Memory.
Conv Rcl	***Memory Clear*** — Clears Memory without changing current display.
Rcl Rcl	***Memory Clear*** — Clears Memory and displays Memory Total.

Dimension 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*.
cm	***Centimeters Key*** — Enters or converts to *Centimeters*.
mm	***Millimeters Key*** — Enters or converts to *Millimeters*.
Bd Ft	***Board Feet Key*** — Enters or converts Cubic values to Board Feet. One Board Foot is equal to 144 Cubic Inches.

Weight — ***Weight Key*** — Enters or converts (a volume value) to *Tons, Pounds, Metric Tons* or *Kilograms*. Repeated presses will cycle through these units.

Arc/Circle Keys

Circ — ***Circle Key*** — Calculates Circle Area and Circumference based on entered Diameter.

Conv Circ — ***Arc*** — Calculates Arc Length or Degree based on entered Diameter and Arc Degree or Length (e.g., if Arc Degree is entered, it will calculate Arc Length, and vice versa).

Right Triangle/Roof Framing Keys

Pitch — ***Pitch Key*** — This key is used to enter or calculate the Pitch (Slope) of a roof (or Right Triangle). Pitch is the amount of "Rise" over 12 Inches of "Run." Pitch may be entered as:

a Dimension 9 Inch Pitch
an Angle 3 0 Pitch
a Ratio 0 • 7 5 Conv Pitch
a Percentage 7 5 % Pitch

A Pitch entry will remain in permanent storage until revised or reset. A solution will be replaced by its entered value once the calculator is cleared.

Conv **Pitch** — Enters Pitch Ratio (e.g., • 5 8 3 Conv Pitch).

Rise — ***Rise Key*** — Enters or calculates the Rise or vertical leg (height) of a Right Triangle.

Run — ***Run Key*** — Enters or calculates the Run or horizontal leg (base) of a Right Triangle.

Diag — ***Diagonal Key*** — Enters or calculates the common or Diagonal leg (Hypotenuse) of a Right Triangle. Typical applications are "squaring" slabs or finding common rafter lengths.

Hip/V — ***Hip/Valley Key*** — Calculates length of the Regular or Irregular Hip/Valley rafter.

Conv Hip/V	***Irregular Pitch*** — Enters *Irregular* Pitch used to calculate lengths of the Irregular Hip/Valley and Jack rafters.
Jack	***Jack Key*** — Calculates Jack rafter lengths on the *Regular*-pitched roof side.
Conv Jack	***Irregular Jack*** — Calculates Jack rafter lengths on the *Irregular*-pitched roof side.
R/Wall	***Rake-Wall Key*** — Finds the stud sizes based on entered Right Triangle values and the stored On-Center spacing. If a dimensional value is entered before pressing R/Wall, that value is considered the base and will be added to the stud lengths.

Stair Layout Key

Stair

Stair Key — Given Rise and/or Run and entered/stored variables, calculates or displays:

Press	Result
1	Riser Height
2	Number of Risers
3	Riser Overage/Underage
4	Tread Width
5	Number of Treads
6	Tread Overage/Underage
7	Stringer Length
8	Angle of Incline
9	Stored Run
10	Stored Rise
11	Stored Desired Riser Height
12	Stored Desired Tread Width

STAIR DEFAULT VALUES

- 7-1/2” Desired Riser Height
- 10” Desired Tread Width

Stair Settings

You may set “desired Riser height” and “desired Tread width” to any *value* by using the following keys:

Conv 7 — ***Riser Height*** — Stores a desired Riser height other than 7-1/2” *(default)*. For example, enter 8 Inches: 8 Inch Conv 7.

Conv 9 — ***Tread Width*** — Stores a desired Tread width other than 10” *(default)*. For example, enter 12 Inches: 1 2 Inch Conv 9.

Miscellaneous Functions

⬅ — ***Backspace Key*** — Used to delete entries one keystroke at a time (unlike the On/C function, which deletes the entire entry).

Conv ÷ — ***1/x*** — 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 √x — ***x²*** — Squares a linear or non-dimensional value.

Conv • — ***Total Cost*** — Based on entry of per unit cost.

Conv 0 — ***Store Weight per Volume*** — Stores a new *Weight per Volume* value as listed below:

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

- Ton Per CU YD
- LB Per CU YD
- LB Per CU FEET
- MET Ton Per CU M
- kG Per CU M

This value is stored until you change it or perform a *Clear All* (Conv ⊠).

Conv 5 — ***On-Center Spacing (o.c.)*** — Stores a new on-center spacing (e.g., 2 4 Inch Conv 5). The value is used for jack and rake wall stud calculations. Default is 16".

Rcl =

Paperless Tape – Useful for checking figures, as it scrolls through your past 20 entries or calculations. Press Rcl = to access Paperless Tape mode. Press + or – to scroll forward or backward. Press = to exit mode and continue with a new entry or calculation. *See example below.*

PAPERLESS TAPE EXAMPLE

Add 6 Feet, 5 Feet and 4 Feet, then access the paperless tape mode and scroll back through your entries. Then, back up one entry, exit the tape mode and add 10 Feet to the total.

KEYSTROKE	DISPLAY
On/C On/C	0.
6 Feet +	6 FEET 0 INCH
5 Feet +	11 FEET 0 INCH
4 Feet =	15 FEET 0 INCH
Rcl =	TTL= 15 FEET 0 INCH
+	01 6 FEET 0 INCH
+	02 + 5 FEET 0 INCH
+	03 + 4 FEET 0 INCH
–	02 + 5 FEET 0 INCH
=	TTL= 15 FEET 0 INCH
+ 1 0 Feet =	25 FEET 0 INCH

PREFERENCE SETTINGS

Press Conv, then %, then keep pressing % 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 %:	*Fractional Resolution:*
	--1/16
+	**--1/32**
+	**--1/64**
+	**--1/2**
+	**--1/4**
+	**--1/8**
+	**--1/16** *(repeats options)*
Second press of %:	*Area Displays:*
	--Std.
+	**--0.** SQ FEET
+	**--0.** SQ YD
+	**--0.** SQ M
+	**--Std.** *(repeats options)*
Third press of %:	*Volume Displays:*
	--Std.
+	**--0.** CU YD
+	**--0.** CU FEET
+	**--0.** CU M
+	**--Std.** *(repeats options)*

(Cont'd)

(Cont'd)

PRESS :	SETTING--FUNCTION
Fourth press of %:	*Meter Linear Displays:*
	--0.000 M
⊕	**--FLOAt** M *(floating point)*
⊕	**--0.000** M *(repeats options)*
Fifth press of %:	*Decimal Degree Displays:*
	--0.00º
⊕	**--FLOAt** *(floating point)*
⊕	**--0.00º** *(repeats options)*
Sixth press of %:	*Fractional Mode:*
	--Std.
⊕	**--COnSt**
⊕	**--Std.** *(repeats options)*

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

Linear Conversions

Convert 10 Feet 6 Inches:

KEYSTROKE	DISPLAY
On/C On/C	0.
1 0 Feet 6 Inch	10 FEET 6 INCH
Conv Yds	3.5 YD
Conv Inch	126 INCH
Conv m	3.200 M
Conv cm	320.04 CM
Conv mm	3200.4 MM

Convert 14 Feet 7-1/2 Inches to Decimal Feet:

KEYSTROKE	DISPLAY
On/C On/C	0.
1 4 Feet 7 Inch 1 / 2	14 FEET 7-1/2 INCH
Conv Feet	14.625 FEET

Convert 22.75 Feet to Feet-Inches:

KEYSTROKE	DISPLAY
On/C On/C	0.
2 2 • 7 5 Feet	22.75 FEET
Conv Feet	22 FEET 9 INCH

Square and Cubic Conversions

Convert 14 Square Feet to Square Yards:

KEYSTROKE	DISPLAY
On/C On/C	**0.**
1 4 Feet Feet	**14** SQ FEET
Conv Yds	**1.555556** SQ YD
	(1.6 square yards)

Convert 25 Square Yards to Square Feet:

KEYSTROKE	DISPLAY
On/C On/C	**0.**
2 5 Yds Yds	**25** SQ YD
Conv Feet	**225.** SQ FEET

Convert 12 Cubic Feet to Cubic Yards:

KEYSTROKE	DISPLAY
On/C On/C	**0.**
1 2 Feet Feet Feet	**12** CU FEET
Conv Yds	**0.444444** CU YD

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.

EXAMPLES

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:

KEYSTROKE	DISPLAY
On/C On/C	0.
6 Feet 2 Inch 1 / 2 +	6 FEET 2-1/2 INCH
1 1 Feet 5 Inch 1 / 4 +	17 FEET 7-3/4 INCH
1 8 • 2 5 Inch =	19 FEET 2 INCH
− 2 Inch 1 / 8 =	18 FEET 11-7/8 INCH

Multiplying Dimensions

What is the perimeter of a room with three walls which measure 15 Feet 3-3/4 Inches each?

KEYSTROKE	DISPLAY
3 × 1 5 Feet 3 Inch 3 / 4 =	45 FEET 11-1/4 INCH

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

KEYSTROKE	DISPLAY
5 Feet 3 Inch × 1 1 Feet 6 Inch 1 / 2 =	60.59375 SQ FEET

Dividing Dimensions

Divide 15 Feet 3-3/4 Inches into thirds (divide by 3):

KEYSTROKE	DISPLAY
On/C On/C	0.
1 5 Feet 3 Inch 3 / 4 ÷ 3 =	5 FEET 1-1/4 INCH

How many 3-Foot 6-Inch pieces can you cut from one 25-foot board?

KEYSTROKE	DISPLAY
On/C On/C	0.
2 5 Feet ÷ 3 Feet 6 Inch =	7.142857
	(or 7 whole pieces)

Percent Calculations

Add a 10% waste allowance to 2.78 Cubic Yards:

KEYSTROKE	DISPLAY
On/C On/C	0.
2 • 7 8 Yds Yds Yds + 1 0 %	3.058 CU YD

What is 25% of $1,575?

KEYSTROKE	DISPLAY
On/C On/C	0.
1 5 7 5 × 2 5 %	393.75

Square Area

Find the Area of a square room with sides measuring 15 Feet 8-1/2 Inches:

KEYSTROKE	DISPLAY
On/C On/C	0.
1 5 Feet 8 Inch 1 / 2 Conv √x (x²)	246.7517 SQ FEET

Rectangular Area and Volume

Find the Area and Volume:

- *Length: 20 Feet 6-1/2 Inches*
- *Width: 12 Feet 8-1/2 Inches*
- *Height: 10 Inches*

First, multiply the Length times the Width to find the Area. Then, multiply the Area times the Height to find the Volume:

KEYSTROKE	DISPLAY
On/C On/C	0.
2 0 Feet 6 Inch 1 / 2 ×	20 FEET 6-1/2 INCH
1 2 Feet 8 Inch 1 / 2 ×	261.0503 SQ FEET
1 0 Inch =	8.057109 CU YD

Convert to Feet:

Conv Feet	217.542 CU FEET

Entering Square and Cubic and Adding a Waste Allowance

Add a 10% waste allowance to 55 Square Feet. Then add a 20% waste allowance to 150 Cubic Feet:

KEYSTROKE	DISPLAY
On/C On/C	0.
5 5 Feet Feet + 1 0 %	60.5 SQ FEET
1 5 0 Feet Feet Feet + 2 0 %	180. CU FEET

Weight Conversions

Convert 150 Pounds to other weights (Tons, Metric Tons, Kilograms):

KEYSTROKE	DISPLAY
On/C On/C	0.
1 5 0 Weight Weight*	150 LB
Conv Weight	0.068039 MET Ton
Weight	68.03886 kG
Weight	0.075 Ton

**Calculator may not display Pounds upon first press of Weight; it depends on which unit was accessed last. So press Weight until LB (or desired unit) is displayed, then convert.*

Weight per Volume

Convert 20 Cubic Yards of concrete to Tons, Pounds, Metric Tons and Kilograms, if concrete weighs 1.5 Tons per Cubic Yard (default value):

KEYSTROKE	DISPLAY
On/C On/C	0.
2 0 Yds Yds Yds	20 CU YD
Conv Weight	30. Ton*
Weight	60000. LB
Weight	27.21554 MET Ton
Weight	27215.54 kG

Now convert the above, if concrete weighs 2 Tons per Cubic Yard (store new Weight per Volume value):

KEYSTROKE		DISPLAY
2 Conv 0	STORED	2. Ton Per CU YD
2 0 Yds Yds Yds		20 CU YD
Conv Weight		36287.39 kG*
Weight		40. Ton
Weight		80000. LB
Weight		36.28739 MET Ton
Conv ⊠		ALL CLEARED
		(Clear stored Wt/Vol)

**Calculator will present values in a different order based on previous computation; simply continue to press Weight key until desired value is displayed.*

Using the Memory

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 ⊠ *(Clear All)*

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

Example:

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

Board Feet and Cost

Find the total Board Feet for the following boards: 2x4x16, 2x10x18 and 2x12x20. What is the total cost at $275 per MBM?*

**Per thousand Board Foot measure*

KEYSTROKE	DISPLAY
On/C On/C	0.
2 × 4 × 1 6 Bd Ft M+	BDFT 10.66667 M
2 × 1 0 × 1 8 Bd Ft M+	BDFT 30. M
2 × 1 2 × 2 0 Bd Ft M+	BDFT 40. M
Rcl Rcl	BDFT 80.66667
× 2 7 5 Conv •	$ 22.18

Carpentry — *Calculating Number of Studs*

Find the number of 16-Inch On-Center studs needed for an 18 Feet 7-1/2 Inch wall.

KEYSTROKE	DISPLAY
1. Divide Length by spacing:	
On/C On/C	0.
1 8 Feet 7 Inch 1 / 2	18 FEET 7-1/2 INCH
÷ 1 6 Inch =	13.96875 *(14 studs)*
2. Add one for the end:	
+ 1 =	14.96875 *(15 studs)*

Note: Also applies to trusses and joists.

Baluster Spacing

You are going to install a handrail at the top of a balcony. Your total span is 156 Inches and you would like the space between the balusters to be about 4 Inches. If each baluster is 1-1/2 Inches wide, what is the exact spacing between each baluster?

KEYSTROKE	DISPLAY
1. Estimate number of balusters in Span:	
On/C On/C	**0.**
1 5 6 Inch ÷	**156** INCH
5 Inch 1 / 2 =*	**28.36364**
	(28 balusters)

**Desired spacing plus baluster width (4 Inches plus 1-1/2 Inch)*

2. Find total space 'occupied' by the balusters by multiplying the width of each baluster by the rounded number of balusters (found above):	
1 Inch 1 / 2 ×	**1-1/2** INCH
2 8 =	**42** INCH
3. Find total space between all balusters:	
1 5 6 Inch −	**156** INCH
4 2 Inch =	**114** INCH
4. Find actual baluster spacing by dividing total space between all balusters by the number of spaces between the balusters (number of balusters plus one equals 29):	
1 1 4 Inch ÷	**114** INCH
2 9 =	**3-15/16** INCH

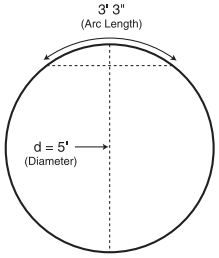
Circle Area and Circumference

Find the Area and Circumference of a Circle with a Diameter of 25 Inches:

KEYSTROKE	DISPLAY
On/C On/C	0.
2 5 Inch Circ	DIA 25 INCH
Circ	AREA 490.8739 SQ INCH
Circ	CIRC 78-9/16 INCH

Arc Angle or Degree

Find the Arc Angle (or Degree of Arc), given a 5-Foot Diameter and an Arc Length of 3 Feet 3 Inches:



Dgm-ARC-102

KEYSTROKE	DISPLAY
1. Enter Circle Diameter and Arc Length:	
On/C On/C	0.
5 Feet Circ	DIA 5 FEET 0 INCH
3 Feet 3 Inch	3 FEET 3 INCH
2. Find Degree of Arc:	
Conv Circ	ARC 74.48°

Concrete Volume for Driveway

Calculate the Cubic Yards of concrete required to pour a driveway that measures: 45 Feet 5 Inches long x 13 Feet 6 Inches wide x 5 Inches deep. If concrete is $65 per Cubic Yard, what will it cost?

KEYSTROKE	DISPLAY
On/C On/C	0.
4 5 Feet 5 Inch	45 FEET 5 INCH
× 1 3 Feet 6 Inch	13 FEET 6 INCH
× 5 Inch =	9.461806 CU YD
× 6 5 Conv •	$ 615.^{02}
	(total cost)

Concrete Columns

You're going to pour five Columns, each of which has a Diameter of 3 Feet 4-1/2 Inches and a height of 11 Feet 6 Inches. How many Cubic Yards of concrete will you need for all five Columns?

KEYSTROKE	DISPLAY
On/C On/C	0.

1. Enter the Diameter of a Circle:
3 Feet 4 Inch 1 / 2 Circ
DIA 3 FEET 4-1/2 INCH

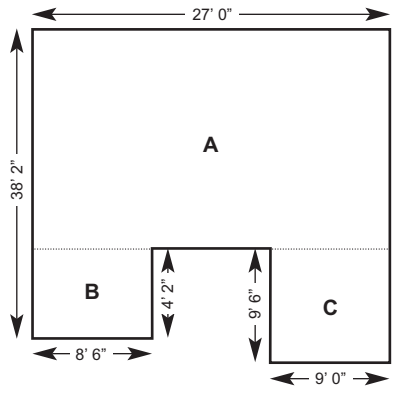
2. Find the Surface Area of a Circle:
Circ AREA 8.946176 SQ FEET

3. Find Total Volume:

× 1 1 Feet 6 Inch =	102.881 CU FEET
Conv Yds	3.810408 CU YD
× 5 =	19.05204 CU YD

Complex Concrete Volume

You're going to pour an odd-shaped patio 4-1/2 Inches deep with the dimensions shown below. First, calculate the total Area (by dividing the drawing into three individual rectangles) and then determine the total Yards of concrete required for this job.



Dgm-CGV-103

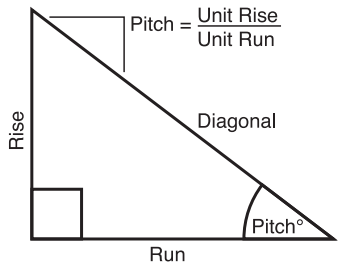
KEYSTROKE	DISPLAY
On/C On/C	0.
1. Find Area of Part "A" and add to Memory:	
3 8 Feet 2 Inch −	
4 Feet 2 Inch =	34 FEET 0 INCH
× 2 7 Feet =	918. SQ FEET
M+	M+ 918. SQ FEET M
2. Find Area of Part "B" and add to Memory:	
4 Feet 2 Inch	4 FEET 2 INCH M
× 8 Feet 6 Inch =	
	35.41667 SQ FEET M
M+	M+ 35.41667 SQ FEET M
3. Find Area of Part "C" and add to Memory:	
9 Feet	9 FEET M
× 9 Feet 6 Inch =	85.5 SQ FEET M
M+	M+ 85.5 SQ FEET M
4. Recall and Clear Total Area Stored in Memory:	
Rcl Rcl	M+ 1038.917 SQ FEET
5. Find Total Cubic Yards:	
× 4 Inch 1 / 2 =	14.4294 CU YD

RIGHT ANGLE / FRAMING

The top row of keys provide you with built-in solutions to Right Triangles. The solutions are available in any of the linear dimensions offered on the calculator. Thus, you can solve Right Triangles directly in Feet and Inches, Decimal Feet, Meters, etc.

Any value of a Right Triangle can be found given two of the four variables:

1) Rise, 2) Run, 3) Diagonal or 4) Pitch.



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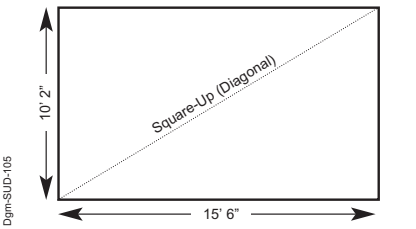
Squaring-Up a Foundation



Square-Up 15 Feet 6 Inch (Run) x 10 Feet 2 Inch (Rise):

KEYSTROKE	DISPLAY
On/C On/C	0.
1 5 Feet 6 Inch Run	
	RUN 15 FEET 6 INCH
1 0 Feet 2 Inch Rise	
	RISE 10 FEET 2 INCH
Diag	DIAG 18 FEET 6-7/16 INCH

Pitch — *Converting Roof Angle*

Find the % Grade, Pitch Ratio/Slope and Pitch in Inches if the roof angle is 30.25°:

KEYSTROKE	DISPLAY
On/C On/C	0.
3 0 • 2 5 Pitch	PTCH 30.25°
Pitch	%GRD 58.31828
Pitch	SLP 0.583183
Pitch	PTCH 7 INCH

Converting Slope

Find the Pitch in Inches, Pitch Degrees, and Percent Grade if the Pitch Ratio/Slope is 0.625:

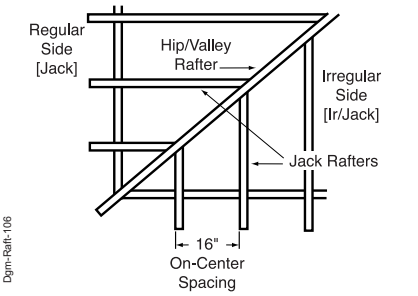
KEYSTROKE	DISPLAY
On/C On/C	0.
• 6 2 5 Conv Pitch	SLP 0.625
Pitch	PTCH 7-1/2 INCH
Pitch	PTCH 32.01°
Pitch	%GRD 62.5

Common Rafter Length

Find the Point-to-Point Length of the Common rafter on a 7/12-Pitched roof with a Span of 28 Feet:

KEYSTROKE	DISPLAY
On/C On/C	0.
1. Enter Pitch:	
7 Inch Pitch	PTCH 7 INCH
2. Enter half the Span as the Run:	
2 8 Feet ÷ 2 =	14 FEET 0 INCH
Run	RUN 14 FEET 0 INCH
3. Find the Rise:	
Rise	RISE 8 FEET 2 INCH
4. Find the Length of the Common rafter:	
Diag	DIAG 16 FEET 2-1/2 INCH

Regular Hip/Valley and Jack Rafters



A roof's Pitch is 9/12 and half the total Span is 6 Feet. Find the lengths of the Common, Hip/Valley and Jack rafters (Jack rafters at 16 Inch On-Center spacing):

KEYSTROKE	DISPLAY
1. Find the Common rafter length:	
On/C On/C	0.
6 Feet Run	RUN 6 FEET 0 INCH
9 Inch Pitch	PTCH 9 INCH
Diag *(Common)*	DIAG 7 FEET 6 INCH

(Cont'd)

(Cont'd)

KEYSTROKE	DISPLAY
2. Find the Hip/Valley rafter and Jack rafter lengths:	
Hip/V	H/V 9 FEET 7-1/4 INCH
Jack	JKOC STORED 16 INCH*
Jack	JK 1 5 FEET 10 INCH
Jack	JK 2 4 FEET 2 INCH
Jack	JK 3 2 FEET 6 INCH
Jack	JK 4 0 FEET 10 INCH
Jack	JK 5 0 FEET 0 INCH

**Uses standard (default) 16-Inch On-Center. To enter a new On-Center (e.g., 18 Inches) press 1 8 Inch Conv 5. Press Rcl 5 to review stored value. This value will remain stored until you re-enter a new value or perform a Clear All (Conv ×).*

Irregular Hip/Valley

You're working with a 7/12 Pitch and half of your overall Span is 15 Feet 7 Inches. The Irregular Pitch is 8/12. Find the Common rafter length, Irregular Hip/Valley and Jack rafter lengths.

KEYSTROKE	DISPLAY
On/C On/C	0.
1. Find Common Rafter Length:	
7 Inch Pitch	PTCH 7 INCH
1 5 Feet 7 Inch Run	RUN 15 FEET 7 INCH
Diag	DIAG 18 FEET 0-1/2 INCH
2. Find Irregular Hip Rafter Length:	
8 Inch Conv Hip/V	IPCH 8 INCH
Hip/V	IH/V 22 FEET 7-3/8 INCH
3. Find Irregular Jack Lengths:	
Conv Jack	IJOC STORED 16 INCH
Jack*	IJ 1 14 FEET 11-13/16 INCH
Jack	IJ 2 13 FEET 7 INCH
Jack	IJ 3 12 FEET 2-3/16 INCH
Jack	IJ 4 10 FEET 9-3/8 INCH
Jack	IJ 5 9 FEET 4-1/2 INCH

Etc... Continue pressing Jack until last regular Jack or "0." is reached.

** It is not necessary to keep pressing Conv when displaying the Irregular Jack sizes.*

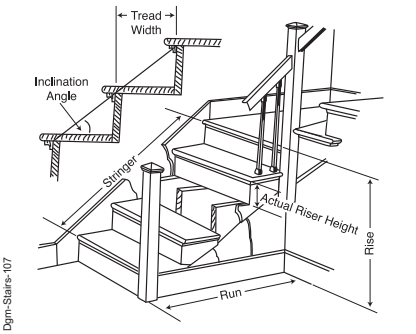
Rake-Wall — *No Base*

Find each stud size in a Rake-Wall with a peak of 3 Feet 6 Inches and a length of 6 Feet. Use 16 Inches as your spacing (default):

KEYSTROKE	DISPLAY
1. Enter Rise and Run:	
On/C On/C	0.
3 Feet 6 Inch Rise	RISE 3 FEET 6 INCH
6 Feet Run	RUN 6 FEET 0 INCH
2. Find Stud Lengths:	
R/Wall	RWOC STORED 16 INCH
R/Wall	RW 1 2 FEET 8-11/16 INCH
R/Wall	RW 2 1 FEET 11-5/16 INCH
R/Wall	RW 3 1 FEET 2 INCH
R/Wall	RW 4 0 FEET 4-11/16 INCH
R/Wall	BASE 0 FEET 0 INCH
3. Find Rake-Wall Angle of Incline:	
R/Wall	RW 30.26°

Note: To enter a base, enter the base height prior to pressing the R/Wall key (e.g., 5 Feet R/Wall).

STAIRS



Stairs — *Given Rise and Run*

You're going to build a stairway that has a Floor-to-Floor height of 10 Feet 1 Inch, a Run of 12 Feet 5 Inches, and a desired Riser Height of 7-1/2 Inches (default). Find the stair values:

KEYSTROKE	DISPLAY
1. Enter Rise and Run:	
On/C On/C	**0.**
1 0 Feet 1 Inch Rise	**RISE 10 FEET 1 INCH**
1 2 Feet 5 Inch Run	**RUN 12 FEET 5 INCH**

(Cont'd)

(Cont'd)

KEYSTROKE	DISPLAY
2. Recall stored 7-1/2 Inch desired Riser Height and find stair values:	
Rcl Stair	R-HT STORED 7-1/2 INCH
Stair	R-HT ⚠ 7-9/16 INCH*
Stair	RSRS 16.
Stair	R+/– 0 INCH
Stair	T-WD ⚠ 9-15/16 INCH*
Stair	TRDS 15.
Stair	T+/– 0-1/16 INCH
Stair	STRG 15 FEET 7-5/16 INCH
Stair	INCL 37.27°

**A ⚠ in the display means the calculated Riser Height or Tread Width is greater than the stored desired Riser Height or Tread Width.*

Stairs — *Given Only the Floor-to-Floor Rise; Entering Other Than 7-1/2 Inch Desired Riser Height*

Find stair values if the Floor-to-Floor Rise is 12 Feet 6 Inches, and the desired Riser Height is 8 Inches:

KEYSTROKE	DISPLAY
1. Enter desired Riser Height and Floor-to-Floor Rise:	
On/C On/C	0.
8 Inch Conv 7	R-HT STORED 8 INCH
1 2 Feet 6 Inch Rise	RISE 12 FEET 6 INCH
2. Calculate stair values:	
Stair	R-HT 7-7/8 INCH
Stair	RSRS 19.
Stair	R+/– – 0-3/8 INCH
Stair	T-WD STORED 10 INCH
Stair	TRDS 18.
Stair	T+/– 0 INCH
Stair	STRG 19 FEET 1-1/8 INCH
Stair	INCL 38.22°
Stair	RUN 15 FEET 0 INCH*
Stair	RISE STORED 12 FEET 6 INCH
Stair	R-HT STORED 8 INCH
Stair	T-WD STORED 10 INCH

**Note*: Run is calculated based on Tread values, as it was not entered. The Total Run of a stairway is equal to the width of each Tread multiplied by the number of Treads.*

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., 1/64ths, 1/32nds, etc.), see the example below:

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

KEYSTROKE	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 ✕), your calculator will return to the following settings:

STORED VALUES	DEFAULT VALUE
Stair Riser Height	7-1/2 Inch
Stair Tread Width	10 Inch
On-Center Spacing	16 Inch
Weight per Volume	1.5 Tons/Cu Yd

If you replace your battery or perform a *Full Reset** (press Off, hold down ✕, 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
Meter Linear Display	0.000
Decimal Degree Display	0.00°
Fractional Mode	Standard

**Depressing the Reset button located above the Pitch 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 — 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 hit 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
0FL0	Overflow (too large to display)
DIV Error	Divide by 0
DIM Error	Dimension error
ENT Error	Entry error
None	Attempt to calculate stairs without entering Rise and Run

Auto-Range — If an "overflow" is created because of an input and calculation with small units that are out of the standard 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.

Battery

This model uses one (1) CR2016 battery (included). Should your calculator display become very dim or erratic, replace the battery.

Note: Please use caution when disposing of your old battery, as it contains hazardous chemicals.

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

Replacing the Battery

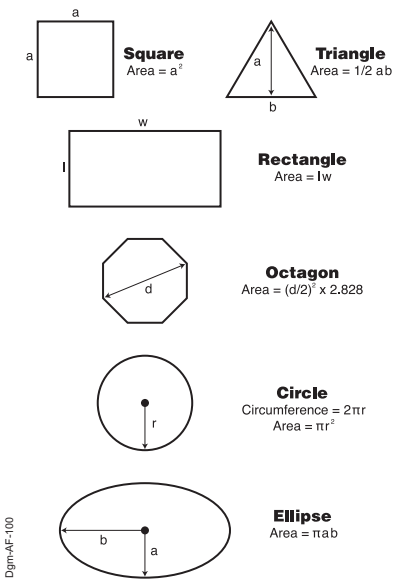
While the calculator is off, turn the calculator over and use a #1 Phillips screwdriver to remove the battery holder screw located near the center at the top. With the screw removed, pull battery holder out, remove old battery, and slide new battery into holder. The negative side of the battery should be facing you as you insert the battery holder into the calculator. Replace screw using a #1 Phillips screwdriver.

Reset

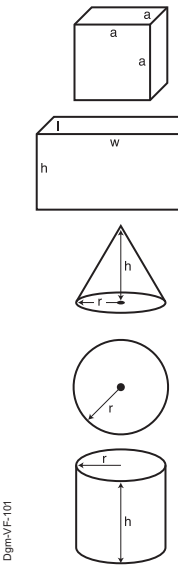
If your calculator should ever "lock up," press Reset — a small hole located above the Pitch key — to perform a total reset.

AREA AND VOLUME FORMULAS

Area Formulas



Volume Formulas



Cube
Surface Area = $6a^2$
Volume = a^3

Rectangle
Surface Area =
$2hw + 2hl + 2lw$
Volume = l x w x h

Cone
Surface Area = $\pi r \sqrt{r^2 + h^2}$
($+ \pi r^2$ if you add the base)
Volume = $\frac{\pi r^2 h}{3}$

Sphere
Surface Area = $4\pi r^2$
Volume = $4/3\pi r^3$

Cylinder
Surface Area = $2\pi rh + 2\pi r^2$
Volume = $\pi r^2 h$

Dgm-VF-101

REPAIR 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 to 4:00pm Pacific Time for additional information and a Return Merchandise Authorization (RMA).

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 on the back cover 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

CI MAKES NO WARRANTY OR REPRESENTATION, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO THE PRODUCT'S QUALITY, PERFORMANCE, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE. AS A RESULT, THIS PRODUCT, INCLUDING BUT NOT LIMITED TO, KEYSTROKE PROCEDURES, MATHEMATICAL ACCURACY AND PREPROGRAMMED MATERIAL, IS SOLD "AS IS," AND YOU THE PURCHASER ASSUME THE ENTIRE RISK AS TO ITS QUALITY AND PERFORMANCE.

IN NO EVENT WILL CI BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY DEFECT IN THE PRODUCT OR ITS DOCUMENTATION.

The warranty, disclaimer, and remedies set forth above are exclusive and replace all others, oral or written, expressed or implied. No CI dealer, agent, or employee is authorized to make any modification, extension, or addition to this warranty.

Some states do not allow the exclusion or limitation of implied warranties or liability for incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific rights, and you may also have other rights, which vary from state to state.

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 interested in new product ideas in these areas.

CALCULATED INDUSTRIES®

Putting answers at your fingertips since 1978

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.

Designed in the U.S.A.
Printed in China

10/09

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