

POCKET REFERENCE GUIDE

TRADESMAN CALC™

TRADES MATH AND CONVERSION CALCULATOR



**CALCULATED
INDUSTRIES®**

Model 4400

7664



www.calcert.com

sales@

TRADESMAN CALC™

The *Tradesman Calc™* Trades Math and Conversion calculator is designed to be useful for both teaching technical trade math and for using on the job in a variety of settings requiring technical math. It is ideal for people working in math-oriented trades and for students and instructors needing an easy-to-use handheld calculator with applied math functions.

With the *Tradesman Calc™* you can –

- Work in Architectural (ruler) fractions (1/4 inch, 1/16 inch, etc.), proper fractions (2/3), mixed number fractions (1-2/3) and improper fractions (5/3)
- Solve dimensional math problems, and convert between U.S. and metric dimensional math units
- Solve angle and side problems with trigonometry
- Enter and solve circle, arc, radius, hexagonal and polygonal dimensions
- Convert between decimal and fraction
- Enter and solve ratios and proportions

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- Enter math equations using parentheses
- Work with exponents

Use it in the classroom or on the job for solving math and design problems in –

- Welding
- Metal Fabrication
- Engineering
- Automotive Service Technology
- Aviation
- Drafting

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GETTING STARTED

You may want to practice getting a feel for your calculator keys by reading through the key definitions and learning how to enter data, how to store values, etc., before proceeding to the examples.

KEY DEFINITIONS

Basic Function Keys

On/C **On/Clear Key** — Turns on power. Pressing once clears the last entry and the display. Pressing twice clears all non-permanent values.

Off **Off** — Turns all power off. Clears all non-permanent values.

Arithmetic operation keys.

Keys used for entering numbers.

% **Percentage** — Used to define a given percentage of a number.

Conv **Convert** — Used with the dimensional keys to convert between units or with other keys to access special functions.

Rcl

Recall — Used with other keys to recall stored values and settings.

Conv Rcl

Store — Used for storing values.

M+

Accumulative Memory

— Adds displayed value to Accumulative Memory.

Conv M+

M- — Subtracts displayed value from Accumulative Memory.

Dimensional Function Keys

Yds

Yards — Enters or converts to Yards.

Feet

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

Inch

Inch — Enters or converts to Inches. Also used with **/** for entering fractional Inch values (e.g., **9 Inch** **1 / 2**). Repeated presses during conversions toggle between fractional and decimal Inches.

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Fraction Bar – 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 for a fractional inch value, the calculator's fractional accuracy setting is automatically used for entered or calculated fractional inches.



Millimeters — Enters or converts to millimeters.



Centimeters — Enters or converts to centimeters.



Meters — Enters or converts to meters.



Board Feet (Bd Ft) — Enters or converts cubic values to Board Feet.

Weight and Volume Keys



Weight per Volume

(wt/vol) – Stores a new Weight per Volume as pounds per cubic foot or other format as shown below. Default value is 490 pounds per cubic foot of steel.

- Pounds per cubic foot
- Pounds per cubic inch
- Metric tons per cubic meter

Conv 4 **Pounds (lbs)** — Enters or converts a weight or volume value to Pounds.

Conv 5 **Dry Ounces (dry oz)** — Enters or converts a value to Dry Ounces.

Conv 6 **Tons** — Enters or converts a weight or volume value to Tons.

Conv 1 **Kilograms (kg)** — Enters or converts a weight or volume value to kilograms.

Conv 2 **Grams** — Enters or converts a weight or volume value to grams.

Conv 3 **Metric Tons** — Enters or converts a weight or volume value to metric tons.

Trigonometric Function Keys

Sine **Sine** — Calculates the Sine of an entered degree or unitless value.

Conv Sine **Arcsine** — Calculates the angle for the entered or calculated Sine value.

Cos **Cosine (Cos)** — Calculates the Cosine of an entered degree or unitless value.

(cont'd)

Conv Cos

Arccosine — Calculates the angle for the entered or calculated Cosine value.

Tan

Tangent (Tan) — Calculates the Tangent of an entered degree or unitless value.

Conv Tan

Arctangent — Calculates the angle for the entered or calculated Tangent value.

Miscellaneous Functions

Conv Angle

Open parenthesis key.

Conv dms

Close parenthesis key.

 x^2

Squares the value in the display.

 \sqrt{x}

Calculates the square root of the number in the display.

Conv x^2

x^y — Enters an exponential value other than x^2 or square root.

Conv \sqrt{x}

$x^{1/y}$ — Enters the exponential root value.

Conv \div

Reciprocal (1/x) — Finds the reciprocal of a number (e.g., **8 Conv \div =** 0.125).

Conv  **Clear All** — Returns all stored values to the default settings. Does not affect Preference settings.

Conv  **Change Sign (+/-)** — Toggle displayed value between negative and positive value.

Conv  Preference settings

Conv  Paperless tape

Conv  **Pi** — Displays value of π (3.1415927).

Conv  **Decimal to Fractional**
(Dec ▶ Frac) — Converts value in display from decimal to fractional.

An additional press of  provides the Least Common Denominator (**LCD**) display, calculating the LCD for the displayed fraction.

Conv  **Fractional to Decimal**
(Frac ▶ Dec) — Converts value in display from fractional to decimal.

Conv  **Degrees Fahrenheit (°F)** — Enters or converts to degrees Fahrenheit.

(cont'd)

Conv 9

Degrees Celsius (°C) —

Enters or converts to degrees Celsius.

Trades Math Function Keys

Adj

Adjacent — Enters or calculates the Adjacent (horizontal) leg of a right triangle. Calculates Adjacent value given two other right-triangle values. Unitless entries assumed Inches in U.S. mode; millimeters in Metric mode.

Opp

Opposite — Enters or calculates the Opposite (vertical) leg or height of a right triangle. Calculates Opposite value given two other right-triangle values. Unitless entries assumed Inches in U.S. mode; millimeters in Metric mode.

Hyp

Hypotenuse — Enters or calculates the Hypotenuse (diagonal) of a right triangle. Calculates Hypotenuse value given two other right-triangle values. Unitless entries assumed Inches in U.S. mode; millimeters in Metric mode.

Angle

Angle — Enters or calculates an Angle, providing the Adjacent Angle for both instances.

Calculates an Angle given two other right-triangle values.

Conv Adj

X — Enters or calculates the x value of a ratio. Calculates x value given a Ratio and y value.

Conv Opp

Y — Enters or calculates the y value of a ratio. Calculates y value given a Ratio and x value.

Conv Hyp

X:Y — Enters or calculates a ratio. Calculates the Ratio given values for x and y.

Arc

Arc — Enters Arc Length or Arc Angle. Calculates Arc Length, Arc Angle, Chord Length, Arc Height, Radius and Arc Area given any two of the following values: Arc Angle/Length, Diameter/Radius, Chord Length and Arc Height. Arc solutions cannot be solved for the following cases: Arc Length and either Chord Length or Arc Height.

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Diam

Diameter — Enters a Diameter (Circle) or Outside Diameter (Polygon). Unitless entries assumed Inches in U.S. mode; millimeters in Metric mode. Calculates circle Area and Circumference given entered Diameter. Calculates Diameter given entered Radius.

**Hex/
Polygon**

Hex/Polygon — Enters number of Sides of a Polygon. A multifunction key that calculates Interior Angle, Exterior Angle, Side Length, Outside Diameter, Inside Diameter, Perimeter and Area of a Polygon, given the number of Sides, and either Side Length, Outside Diameter or Inside Diameter. Default number of Sides is 6.

Conv **Arc**

Radius — Enters or calculates a Radius. Unitless entries assumed Inches in U.S. mode; millimeters in Metric mode. Calculates Radius given entered Diameter.

Conv Diam **Inside Diameter** — Enters or calculates the Inside Diameter of a Polygon. Unitless entries assumed Inches in U.S. mode; millimeters in metric mode. Calculates Inside Diameter given number of Sides and either Side Length or Outside Diameter.

**Conv Hex/
Polygon** **Side Length** — Enters or calculates the Side Length of a Polygon. Unitless entries assumed Inches in U.S. mode; millimeters in metric mode. Calculates Side Length given number of Sides and either Inside or Outside Diameter.

SETTING FRACTIONAL RESOLUTIONS

The *Tradesman Calc* is set to display fractional Inch answers in 64ths of an Inch. All examples in this User's Guide are based on 1/64". However, you may select Fractional Resolution to be displayed in other formats (e.g., 1/16", 1/32", etc.). The methods for permanently and temporarily changing Fractional Resolution are shown in the following sections.

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Permanently Set Fractional Resolution

To permanently set the Fractional Resolution, you must be in Preference Setting mode.

| KEYSTROKE | DISPLAY |
|---|--------------------------|
| 1. Access Preference Settings:   | FRAC 0-1/64 INCH* |
| 2. Toggle through available Fractional Resolutions:                      <br | |

Temporarily Set Fractional Resolution

You can also convert a fractional value to a different resolution temporarily while solving a problem. In the example below, add 1/64th to 44/64th of an Inch and then convert the answer to other Fractional Resolutions:

| KEYSTROKE | DISPLAY |
|------------------|--------------|
| On/C On/C | 0. |
| 4 4 / 6 4 Inch | 0-44/64 INCH |
| + 1 / 6 4 Inch = | 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. |

** Changing the Fractional Resolution on a displayed value does not alter your Permanent Fractional Resolution Setting (set in Preference Settings).*

Note: This setting is temporary; it will revert back to your Permanent Fractional Setting upon press of **On/C** or when you turn the calculator off.

PREFERENCE SETTINGS

Press **Conv**, then **%** to access the Preferences menu. Continue pressing **%** to toggle through different Preferences. Press **+** or **-** keys to toggle between options of the different Preferences. Press **On/C** to exit Preferences. Your calculator will keep your Preference Settings until a Full Reset alters your settings to the default values (see **Appendix** for more information).

| KEYSTROKE | DISPLAY |
|--|-------------------------|
| Conv % <i>(Fractional Resolution)</i> | FRAC 0-1/64 INCH |
| + | FRAC 0-1/2 INCH |
| + | FRAC 0-1/4 INCH |
| + | FRAC 0-1/8 INCH |
| + | FRAC 0-1/16 INCH |
| + | FRAC 0-1/32 INCH |
| + <i>(repeats options)</i> | FRAC 0-1/64 INCH |
| Second press of % <i>(Functional Result Rounding):</i> | FUNC 0.0000 |
| + | FUNC 0.000 |
| + | FUNC FLOAt |
| + <i>(repeats options)</i> | FUNC 0.0000 |

Third press of %

(Default Unit Format):



US UnItS

+ *(repeats options)*

METR UnItS

US UnItS

Fourth press of %

(Area Answer Format):



AREA Std.



AREA 0. SQ FEET



AREA 0. SQ INCH



AREA 0. SQ M



AREA 0. SQ YD

+ *(repeats options)*

AREA Std.

Fifth press of %

(Volume Answer Format):



VOL Std.



VOL 0. CU YD



VOL 0. CU FEET



VOL 0. CU INCH



VOL 0. CU M

+ *(repeats options)*

VOL Std.

Sixth press of %

(Fractional Mode):



FRAC Std.

+ *(repeats options)*

FRAC COnSt.

FRAC Std.

Seventh press of %

(Mathematical Operation):



MATH OrdEr



MATH CHAIn

+ *(repeats options)*

MATH OrdEr

CALCULATING PERCENTAGES

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).

Find 18% of 50 square feet:

| KEYSTROKE | DISPLAY |
|---|-------------------|
| On/C On/C | 0. |
| 5 0 Feet Feet X 1 8 % | 9. SQ FEET |

Take 20% from 17 Feet 6 Inches:

| | |
|--|-----------------------|
| 1 7 Feet 6 Inch | |
| - 2 0 % | 14 FEET 0 INCH |

MEMORY OPERATION

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

| FUNCTION | KEYSTROKE |
|---|-----------------------|
| Add to Memory | M+ |
| Subtract from Memory | Conv M+ |
| Recall total in Memory | Rcl M+ |
| Display/Clear Memory | Rcl Rcl |
| Clear Memory and replace with displayed value | Stor M+ |

Memory is semi-permanent, clearing only when you do one of the following:

- turn off the calculator
- press **Rcl Rcl**
- 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+

| KEYSTROKE | DISPLAY |
|-------------------------|------------------------|
| 4 5 M+ | M+ 45. □ |
| 2 5 M+ | M+ 25. □ |
| 1 5 Conv M+ (M-) | M- 15. □ |
| Rcl M+ | TTL 55. □ |
| M+ | AVG 18.333333 □ |
| M+ | CNT 3. □ |
| Rcl Rcl | M+ 55. |

Using Memory Storage Keys (M1-M9)

In addition to the standard cumulative Memory (as previously described), your calculator has nine independent Storage Registers – M1 through M9 – that can be used to permanently store single, noncumulative values. The following example shows the use of M1 (**Conv Rcl 1**). To use M2 - M9, replace the presses of the **1** key with presses of the corresponding number key (**2-9**).

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

| FUNCTION | KEYSTROKE |
|--------------------------|---------------------|
| Store single value in M1 | Conv Rcl 1 |
| Clear M1 | 0 Conv Rcl 1 |
| Recall M1 | Rcl 1 |

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

| KEYSTROKE | DISPLAY |
|-------------------------|-----------------|
| 1 7 5 Conv Rcl 1 | M-1 175. |
| Off On/C | 0. |
| Rcl 1 | M-1 175. |
| 0 Conv Rcl 1 | M-1 0. |

PAPERLESS TAPE OPERATION

The Paperless Tape function is useful for checking figures. You can review your entries by scrolling through your past 20 entries or calculations. Press **Conv =** to access Paperless Tape mode. Press **+** or **-** to scroll forward or backward.

*Press **=** to exit mode and continue with a new entry or calculation.*

| KEYSTROKE | DISPLAY |
|------------------|-----------------|
| On/C On/C | 0. |
| 6 Feet + | 6. FEET |
| 5 Feet + | 11. FEET |
| 4 Feet = | 15. FEET |

| | | |
|-----|------------|---------------|
| Rcl | = | TTL= 15. FEET |
| + | | 01 6. FEET |
| + | | 02 + 5. FEET |
| + | | 03 + 4. FEET |
| - | | 02 + 5. FEET |
| = | | TTL= 15. FEET |
| + | 1 0 Feet = | 25. FEET |

ENTERING DIMENSIONS AND UNITS

Linear Dimensions

The following examples show how linear dimensions are entered.

Note: The **On/C** key should be pressed after each of the entries to clear the display.

| DIMENSION | KEYSTROKE |
|------------------------|---------------------|
| 5 Feet | 5 Feet |
| 1/2 Inch | 1 / 2 Inch |
| 5 Feet 1-1/2 Inches | 5 Feet 1 Inch 1 / 2 |
| 10 Yards | 1 0 Yds |
| 17.5 meters | 1 7 • 5 m |

Square and Cubic Dimensions

For square dimensions, enter the value and press the unit key twice.
 For cubic dimensions, press the unit key three times.

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| DIMENSION | KEYSTROKE |
|------------------|-----------------|
| 130 square Feet | 1 3 0 Feet Feet |
| 5.5 cubic meters | 5 • 5 m m m |
| 44 square Inches | 4 4 Inch Inch |

CONVERSIONS

Linear Conversions

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

| KEYSTROKE | DISPLAY |
|-----------------|----------------|
| On/C On/C | 0. |
| 1 0 Feet 6 Inch | 10 FEET 6 INCH |
| Conv Inch | 126. INCH |
| Conv Feet | 10.5 FEET |
| Conv mm | 3200.4 MM |
| Conv m | 3.2004 M |

Square and Cubic Conversions

Convert 6 square Feet to other square dimensions:

| KEYSTROKE | DISPLAY |
|-------------|-----------------|
| On/C On/C | 0. |
| 6 Feet Feet | 6 SQ FEET |
| Conv mm | 557418.24 SQ MM |
| Conv m | 0.5574182 SQ M |

Convert 0.05 cubic meters to other cubic dimensions:

| KEYSTROKE | DISPLAY |
|-----------|---------|
| On/C On/C | 0. |

• 0 5 m m m

0.05 CU M

Conv cm

50000. CU CM

Conv Inch

3051.1872 CU INCH

Conv Feet

1.7657333 CU FEET

Weight Conversions

Convert 1.5 Tons to Pounds
and kilograms:

KEYSTROKE

DISPLAY

On/C On/C

0.

1 • 5 Conv 6 (tons)

1.5 TON

Conv 4 (lbs)

3000. LBS

Conv 1 (kg)

1360.7771 KG

Weight per Volume Conversions

Convert a cubic meter of concrete
to pounds. The concrete weighs 111
pounds per cubic foot.

Note: The default weight conversion is 490
pounds per cubic foot.

KEYSTROKE

DISPLAY

On/C On/C

0.

1 1 1

Conv 0 (wt/vol)

111. LB Per CU FEET

1 m m m

1 CU M

Conv 4 (lbs)

3919.928 LBS

Conv X*

ALL CLEArEd

*Restores default weight conversion to
default setting of 490 pounds per cubic foot.

Temperature Conversions

Convert 46 °Fahrenheit to °Celsius:

| KEYSTROKE | DISPLAY |
|-----------------|--------------|
| On/C On/C | 0. |
| 4 6 Conv 8 (°F) | 46 °F |
| Conv 9 (°C) | 7.7777778 °C |

BASIC MATH OPERATIONS

Adding and Subtracting 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

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

KEYSTROKE**DISPLAY****5 Feet 3 Inch X****5 FEET 3 INCH****1 1 Feet 6****Inch 1 / 2 =****60.59375 SQ FEET**

Multiply 2 Feet 7 Inches by 10:

2 Feet 7 Inch**X 10 =****25 FEET 10 INCH**

Dividing Dimensions

Divide 30 Feet 4 Inches by 7 Inches:

KEYSTROKE**DISPLAY****3 0 Feet 4 Inch ÷ 7 Inch =****52.**

Divide 20 Feet 3 Inches by 9:

2 0 Feet 3 Inch**÷ 9 =****2 FEET 3 INCH**

USING THE TRADESMAN CALC

With the *Tradesman Calc* you can work in architectural, or ruler fractions (1/2, 1/4, 1/16, etc.), proper fractions (2/3), mixed number fractions (1-2/3) and improper fractions (5/3).

If you are working with dimensional units, be sure to enter the dimensional unit with the fractions, as shown below. Fractional Inch values will be displayed as architectural fractions – 1/2, 1/4, 1/8, 1/16, 1/32 and 1/64.

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Note: See pages 15-17 for instructions on setting the default fractional resolution on your calculator.

Note: When entering mixed fractions, the whole number must be less than four digits – i.e., 1 through 999.

The examples below show how to enter fractions and toggle between different formats, such as entering an improper fraction and toggling to a mixed number.

Enter 10-13/16:

| KEYSTROKE | DISPLAY |
|-----------------|----------|
| On/C On/C | 0. |
| 1 0 / 1 3 / 1 6 | 10 13/16 |

Enter 119-98/99:

| | |
|-------------------|-----------|
| On/C On/C | 0. |
| 1 1 9 / 9 8 / 9 9 | 119 98/99 |

Enter 33/13, convert to mixed number and toggle back to improper fraction:

| | |
|-----------|-------------|
| On/C On/C | 0. |
| 3 3 / 1 3 | 0 33/13 |
| = | 2 7/13 |
| / | LCD 0 33/13 |

Enter 1.4578 and convert to a fraction and back to a decimal:

| KEYSTROKE | DISPLAY |
|-----------|---------|
| On/C On/C | 0. |

1 • 4 5 7 8

1.4578

Conv /

1 179/391

Conv •

1.4578

In this example, add a string of fractions, change to an improper fraction and to a decimal fraction.

Add $1\frac{1}{3} + \frac{1}{4} + \frac{1}{6}$:

KEYSTROKE

DISPLAY

On/C On/C

0.

1 / 1 / 3 +

1 / 4 +

1 / 6 =

1 3/4

Toggle to improper fraction:

/ *

LCD 0 21/12

* Shows Least Common Denominator for entered or calculated fraction.

Toggle to decimal:

Conv •

1.75

Toggle back to proper fraction:

/

1 3/4

If you have a large fraction, you can easily simplify it or convert it to its lowest terms.

Change $30/48$ to its lowest terms:

On/C On/C

0.

3 0 / 4 8

0 30/48

(cont'd)

(cont'd)

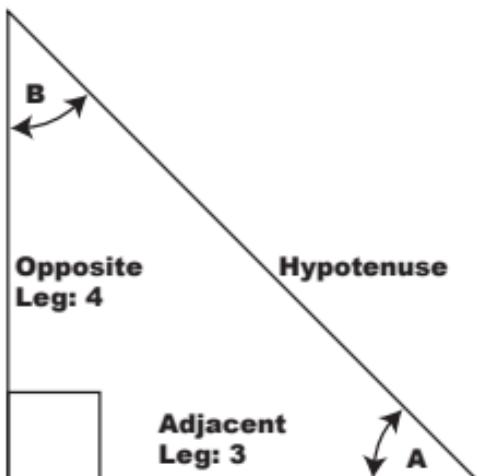
| KEYSTROKE | DISPLAY |
|-----------------|---------|
| Conv / / | 0 5/8 |
| Simplify 25/65: | |
| 2 5 / 6 5 | 25/65 |
| Conv / / | 0 5/13 |

RIGHT TRIANGLE FUNCTIONS

With the *Tradesman Calc*, you can easily solve Right Triangle problems by simply entering two of four variables: Adjacent, Opposite, Hypotenuse or Angle.

Right Triangle – Based on Adjacent and Opposite Legs

Calculate the Hypotenuse, Angle and Adjacent Angle of a right triangle with an Adjacent Leg of 3 Inches and an Opposite Leg of 4 Inches:



| KEYSTROKE | DISPLAY |
|-----------|---------|
| On/C On/C | 0. |

3 **Inch** **Adj**

ADJ 3. INCH

2. Enter the Opposite Leg length:

4 **Inch** **Opp**

OPP 4. INCH

3. Solve for the Hypotenuse:

Hyp

HYP 5.0000 INCH

4. Solve for the Angle:

Angle

ANGL 53.1301°

5. Solve for the Adjacent Angle:

Angle

ADJ 36.8699°

Right Triangle – Based on Hypotenuse and Angle

Calculate the Adjacent Angle, Adjacent Leg and Opposite Leg of a right triangle with a Hypotenuse of 12 Inches and a known Angle of 35.34°:

KEYSTROKE

DISPLAY

On/C **On/C**

0.

1. Enter the Hypotenuse:

1 **2** **Inch** **Hyp**

HYP 12. INCH

2. Enter the Known Angle:

3 **5** **•** **3** **4** **Angle**

ANGL 35.34 °

3. Solve for the Adjacent Angle:

Angle

ADJ 54.6600 °

4. Solve for the Adjacent Leg:

Adj

ADJ 9.7888 INCH

(cont'd)

(cont'd)

| KEYSTROKE | DISPLAY |
|--|------------------------|
| 5. Solve for the Opposite Leg: Opp | OPP 6.9411 INCH |

HEX/POLYGON FUNCTIONS

The Hex/Polygon function lets you find the Interior Angle and Exterior Angle of a Polygon, given the number of Sides. The default number of Sides is 6. If a Side Length, Inside Diameter or Outside Diameter, is also entered you can calculate the Polygon's Side Length, Outside Diameter, Inside Diameter, Perimeter and Area.

Find the Interior and Exterior Angles of a 6-sided Polygon:

| KEYSTROKE | DISPLAY |
|-------------------------|-----------------------|
| On/C On/C | 0. |
| Hex/ Polygon | SIDE 6. |
| Hex/ Polygon | INT 120.0000 ° |
| Hex/ Polygon | EXT 60.0000 ° |

Find the Interior and Exterior Angles of an 8-sided Polygon:

| KEYSTROKE | DISPLAY |
|----------------------------------|-----------------------|
| On/C On/C | 0. |
| 8 Hex/ Polygon | SIDE 8. |
| Hex/ Polygon | INT 135.0000 ° |
| Hex/ Polygon | EXT 45.0000 ° |

Find the Interior and Exterior Angles, Side Length, Inner Diameter, Perimeter and Area of an 8-sided Polygon with a 10-Inch Outer Diameter:

KEYSTROKE

DISPLAY

On/C **On/C**

0.

1. Enter the Outer Diameter:

1 **0** **Diam**

DIA 10. INCH

2. Enter the Number of Sides:

8 **Hex/
Polygon**

SIDE 8.

3. Find the Interior Angle:

**Hex/
Polygon**

INT 135.0000 °

4. Find the Exterior Angle:

**Hex/
Polygon**

EXT 45.0000 °

5. Find the Side Length:

**Hex/
Polygon**

LNTH 3.8268 INCH

6. Show the Outside Diameter:

**Hex/
Polygon**

OD 10. INCH

7. Find the Inner Diameter:

**Hex/
Polygon**

ID 9.2388 INCH

8. Find the Perimeter:

**Hex/
Polygon**

PER 30.6147 INCH

9. Find the Area:

**Hex/
Polygon**

AREA 70.7107 SQ INCH

(cont'd)

(cont'd)

*Find the Interior and Exterior Angles,
Inner Diameter, Outer Diameter,
Perimeter and Area of a 6-sided
Polygon with an 8-Inch Side Length:*

KEYSTROKE

DISPLAY

On/C **On/C**

0.

1. Enter the Side Length:

8 **Inch** **Conv** **Hex/
Polygon**

LNTH 8. INCH

*2. Select Hex/Polygon function
(default is 6 Sides):*

**Hex/
Polygon**

SIDE 6.

3. Find the Interior Angle:

**Hex/
Polygon**

INT 120.0000 °

4. Find the Exterior Angle:

**Hex/
Polygon**

EXT 60.0000 °

5. Show the Side Length:

**Hex/
Polygon**

LNTH 8. INCH

6. Find the Outside Diameter:

**Hex/
Polygon**

OD 16.0000 INCH

7. Find the Inner Diameter:

**Hex/
Polygon**

ID 13.8564 INCH

8. Find the Perimeter:

**Hex/
Polygon**

PER 48.0000 INCH

9. Find the Area:

**Hex/
Polygon**

AREA 166.2769 SQ INCH

ARC AND CIRCLE FUNCTIONS

With the *Tradesman Calc*, you can easily solve Circle and Arc calculations.

Circumference and Area of a Circle

Find the Area and Circumference of a circle with a Diameter of 11 Inches:

| KEYSTROKE | DISPLAY |
|---|-----------------------------|
| On/C On/C | 0. |
| 1 1 Inch Diam | DIA 11. INCH |
| Diam | AREA 95.0332 SQ INCH |
| Diam | |
| (Circumference) | CIRC 34.5575 SQ INCH |

Arc Calculation –

Radius and Angle Known

Find the Arc Length, Chord Length, Arc Height and Area of a circle with a Radius of 4 Inches and an Arc Angle of 180°:

| KEYSTROKE | DISPLAY |
|---|-----------------------------|
| On/C On/C | 0. |
| 4 Conv Arc (Radius) | RAD 4. INCH |
| 1 8 0 Arc (Arc Angle) | ARC 180.° |
| Arc (Arc Length) | ARC 12.5664 INCH |
| Arc (Chord Length) | CORD 8.0000 INCH |
| Arc (Arc Height) | HGHT 4.0000 INCH |
| Arc (Radius) | RAD 4. INCH |
| Arc (Area) | AREA 25.1327 SQ INCH |

(cont'd)

RATIO AND PROPORTION FUNCTIONS

With the Ratio and Proportion keys you can find:

- an x value, given a Ratio and y value
- a y value, given a Ratio and x value
- a Ratio, given values for x and y

Ratios and Proportions can be calculated with or without dimensional units.

If the Ratio of nitrogen to hydrogen is 1:3, and a sample of ammonia has 1,563 nitrogen atoms, how many hydrogen atoms are present?

KEYSTROKE

DISPLAY

On/C **On/C**

0.

1. Enter the Ratio:

1 **Conv** **Adj** (x value)

X 1.

3 **Conv** **Opp** (y value)

Y 3.

2. Show the Ratio:

Conv **Hyp** (X:Y)

1 = 3.0000

3. Enter the known number of nitrogen atoms:

1 **5** **6** **3** **Conv** **Adj** (X)

X 1563.

4. Solve for the unknown number of hydrogen atoms:

Conv **Opp** (Y)

Y 4689.0000

You can also enter x, y values, find proportion values and inverse proportional values.

Find the ratio if $x = 1$ and $y = 4$. Using the resulting ratio, find the value of Y if $X = 5$. Then, find the value of X if $Y = 8$.

KEYSTROKE

DISPLAY

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

1. Enter the Ratio:

1 **Conv Adj** (x value) **X 1.**

4 **Conv Opp** (y value) **Y 4.**

2. Show the Ratio:

Conv Hyp (X:Y) **1 = 4.0000**

3. Enter the first Proportion value (X):

5 **Conv Adj** (X) **X 5.**

4. Show resulting Y value:

Conv Opp (Y) **Y 20.0000**

5. Change the Y value to 8:

8 **Conv Opp** (Y) **Y 8.**

6. Show resulting X:

Conv Adj (X) **X 2.0000**

You can also enter x, y values in dimensional units to find Ratio values.

Find the ratio if $x = 1$ Inch and $y = 4$ Feet. Using the resulting Ratio, find the value of Y if $X = 2.5$ Inches

(cont'd)

(cont'd)

| KEYSTROKE | DISPLAY |
|--|------------------------|
| On/C On/C | 0. |
| 1. Enter the Ratio: | |
| 1 Inch Conv Adj (x value) | X 1. INCH |
| 4 Feet Conv Opp (y value) | Y 4. FEET |
| 2. Show the Ratio: | |
| Conv Hyp (X:Y) | 1 = 48.0000 |
| 3. Enter the first proportional value: | |
| 2 • 5 Inch Conv Adj (X) | X 2.5 INCH |
| 4. Show resulting Y value: | |
| Conv Opp (Y) | Y 120.0000 INCH |
| You can also enter fractional values for x and y to find Ratio values. | |
| <i>Find the ratio if x = 3/4 and y = 1. Using the resulting Ratio, find the value of Y if X = 5. Then, find the value of X if Y = 4.</i> | |
| KEYSTROKE | DISPLAY |
| On/C On/C | 0. |
| 1. Enter the Ratio: | |
| 3 / 4 Conv Adj (x value) | X 0 3/4 |
| 1 Conv Opp (y value) | Y 1. |
| 2. Show the Ratio: | |
| Conv Hyp (X:Y) | 1 = 1.3333 |
| 3. Enter the proportional X value | |
| 5 Conv Adj (X) | X 5. |

4. Show resulting Y value:

Conv Opp (Y) **Y 6.6667**

5. Change the proportional Y value to 4:

4 Conv Opp (Y) **Y 4.**

6. Show resulting X value:

Conv Adj (X) **X 3.0000**

BASIC D:M:S AND TRIGONOMETRY EXAMPLES

Converting Degrees:Minutes:Seconds

Convert $23^{\circ} 42' 39''$ to decimal degrees:

| KEYSTROKE | DISPLAY |
|-----------|---------|
|-----------|---------|

| | |
|-------------------------|----|
| On/C On/C | 0. |
|-------------------------|----|

| | |
|--|--|
| 2 3 • 4 2 | |
|--|--|

| | |
|----------------------------|---------------------|
| • 3 9 | DMS 23.42.39 |
|----------------------------|---------------------|

| | |
|------------|-------------------|
| dms | 23.710833° |
|------------|-------------------|

Convert 44.29° to
degrees:minutes:seconds format:

| KEYSTROKE | DISPLAY |
|-----------|---------|
|-----------|---------|

| | |
|-------------------------|----|
| On/C On/C | 0. |
|-------------------------|----|

| | |
|--|--------------|
| 4 4 • 2 9 | 44.29 |
|--|--------------|

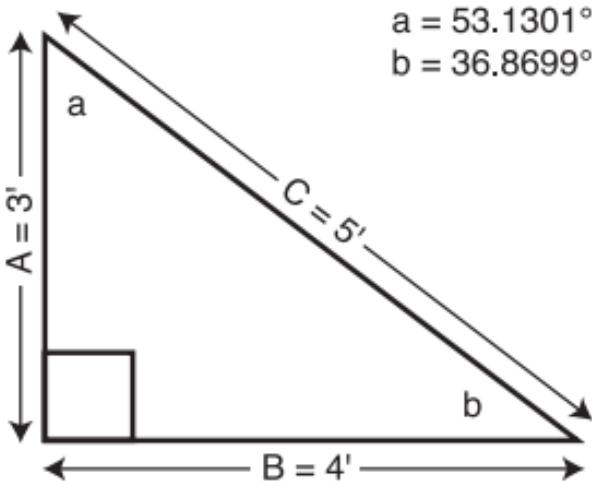
| | |
|------------|----------------------|
| dms | DMS 44.17.24° |
|------------|----------------------|

Note: Improperly formatted entries will be redisplayed in the correct convention after any operator key is pressed. For example, $30^{\circ} 89' 0''$ entered will be corrected and displayed as $31^{\circ} 29' 0''$ or 31.483333°

Trigonometric Functions

Trigonometric functions are available on the *Tradesman Calc* calculator.

The drawing and formulas below list basic trigonometric formulas, for your reference:



$$a = 53.1301^\circ$$

$$b = 36.8699^\circ$$

Given side A and angle a, find:

Side C

$$A \div a \cos =$$

(e.g., 3 **Feet** \div 5 3 \cdot 1 3 **cos** =)

Side B

$$A \times a \tan =$$

Angle b

$$90^\circ - a =$$

Given side A and angle b, find:

Side B

$$A \div b \tan =$$

Side C

$$A \div b \sin =$$

Angle a

$$90^\circ - b =$$

Given side B and angle a, find:

Side A

$$B \div a \tan =$$

Side C

$$B \div a \sin =$$

Given side C and angle a, find:

Side A

$$C \times a \cos =$$

Side B

C \times a **Sine** =

Given side A and side C, find:

Angle a

A \div C **Conv** **Cos**

Angle b

A \div C **Conv** **Sine**

Given side B and angle b, find:

Side C

B \div b **Cos** =

Side A

B \times b **Tan** =

APPENDIX

DEFAULT SETTINGS

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

| STORED VALUES | DEFAULT VALUE |
|-------------------------|---------------------|
| Polygon Number of Sides | 6 |
| Weight per Volume | 490. LB Per CU FEET |

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

| PREFERENCE SETTINGS | DEFAULT VALUE |
|----------------------------|---------------|
| Fractional Resolution | 1/64 |
| Functional Result Rounding | 0.0000 |
| Default Unit Format | US |
| Area Display | Standard |

(cont'd)

| PREFERENCE SETTINGS | DEFAULT VALUE |
|------------------------|---------------|
| Volume Display | Standard |
| Fractional Mode | Standard |
| Mathematical Operation | Order |

* Pressing *Reset* – a small hole located below the **Off** 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 99,999,999.99. 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, an error message will display. 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

| | |
|-------------------|----------------------|
| 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 “**OFLO**”) – e.g., 100,000,000 mm is shown as 100,000 m.

(cont'd)

BATTERY

This model uses one (1) CR2016 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.

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

RESET

If your calculator should ever “lock up,” press Reset – a small hole located below the **Off** key – to perform a total reset.

REPAIR AND RETURN

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

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 1-775-885-4900 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.

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FCC CLASS B

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



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INDUSTRIES®**

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