

Byte Works Calculator 1.2

from



Credits

Byte Works Calculator™

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About the Calculator

The Byte Works Calculator puts the power of a scientific, programmer logic calculator, and advanced unit conversion calculator in one stylish iPhone application. It features large, easy to press buttons, quick change between the screens that make more buttons available, and fast, accurate calculations with a full range of double-precision numbers.

Navigating the Screens

The Byte Works Calculator has several screens, allowing far more buttons than other calculators while keeping the size of the buttons large enough to use easily. The basic numeric entry buttons, clear and delete, parenthesis, store and recall and the four basic math functions appear on all of the screens. The remaining buttons change with the screen.



The buttons in the tab bar along the bottom of the screen switch between the various sets of calculator functions. For example,



press **Length** to switch to the screen that shows the length and temperature conversions.



Numeric Precision



All calculations are performed internally using IEEE double-precision numbers, except a few sensitive areas where long-double numbers are used. This gives almost 16 decimal digits of precision, except for numbers that are very close to zero—this case is discussed below. The calculator displays up to 14 significant digits.





The largest number that can be represented is $1.7976931348623157 \times 10^{308}$. If a number larger than this value is entered, or if a calculation results in a number larger than this value, the result is infinity, represented as **inf**. Mathematics is still performed correctly on this value; for example, taking the inverse of this value results in 0. The smallest number that can be represented is $-1.7976931348623157 \times 10^{308}$. The result of entering a numbers smaller than this number, or calculations that result in a number smaller than this number, is $-\text{infinity}$.


The smallest positive number greater than zero that can be represented is $4.94065645841247 \times 10^{-324}$. If a number is entered which is closer to zero than this value, or if a calculation results in a number closer to zero than this value, the result is 0. There is some loss of precision as numbers approach zero; the smallest positive non-zero number that retains the full precision of a double-precision number is $2.2250738585072020 \times 10^{-308}$. Similarly, the largest non-zero negative number that can be represented is $-4.94065645841247 \times 10^{-324}$, and the largest non-zero negative number that can be represented with full precision is $-2.2250738585072020 \times 10^{-308}$.

Number Entry








Entering numbers is split into two parts. The first is entering the mantissa, and the second is entering the exponent.









Enter the mantissa by pressing the number keys and, optionally, the decimal point. The decimal point key is ignored after being pressed the first time. At any time, pressing the  key changes the sign of the number. Use the  key to delete numbers or decimal points that have already been entered. If too many significant digits are entered, the unused digits are ignored.

If an exponent is needed, follow the mantissa by pressing the  key. The characters e+000 appear, indicating an exponent is being entered. Use any numeric key to enter up to a three-digit exponent. If a fourth or subsequent digit is entered, the first digit entered is lost. Use  to change the sign of the exponent. Use the  key to delete digits from the exponent. The  key will exit exponent entry mode if pressed with a zero exponent, allowing the mantissa to be edited, again.

If a number is too close to zero to represent, it is automatically converted to zero when the  key is pressed or when the number is used in a calculation. Similarly, if the number is too far from zero to represent, it is converted to -infinity or infinity. See *Numeric Precision* for details on the allowed range of numbers.

Algebraic Entry

Equations are entered in algebraic form, respecting common operator precedence as taught in algebra class. The  button always completes all pending calculations. For example,       displays 7, since the multiplication operation has precedence over addition.



Parenthesis are used to override the natural precedence of the mathematical operations. In the above example, parenthesis can be used to cause the addition to be performed first: the sequence         displays 9.






Unary operations (functions that take a single argument and return a single result, like sine or factorial) always operate immediately on the displayed value, replacing it with the result. This means the unary operations have the highest precedence. The precedence for the binary operations, from highest to lowest, is:






()	
x^y	$\sqrt[y]{x}$	
X	÷	
+	−	
AND	OR	XOR

Operations listed on the same line have the same precedence, and are evaluated in the order they are entered.




Store and Recall Numbers

The calculator has ten storage locations for numbers. The  and  buttons are used to store and recall numbers, respectively.

To store a number, enter the number in the display or calculate the value using any of the calculator functions. Once the number is visible, press . All of the buttons except the ten numeric digits,  and  are disabled. Press one of the numeric digits to store the value in that register. Use  to cancel the store operation, or  to cancel the store operation and clear the state of the calculator. Numbers can be stored while a calculation is in progress to save an intermediate result.


To recall a number, press . Again, all buttons except the ten numeric digits,  and  are disabled. Press one of the numeric buttons to recall a stored number. Use  to cancel the recall operation, or  to cancel the recall operation and clear the state of the calculator.





Clear


Pressing the All Clear button, , clears the state of the calculator. The current number is set to 0 and all partially complete calculations are canceled. If the 2nd button has been pressed, it is canceled. If a conversion has been started, it is canceled. If the  or  button has been pressed, the operation of storing or recalling a number is canceled.


Numbers stored in the ten number registers are not changed. The units for angles (degrees or radians) and the display format (scientific or float) are not changed. If the logic calculator is in use, the current base is not changed.

Delete

The delete button, , is usually used during numeric entry to delete the last digit entered or to exit exponent mode, but it can also be used in a few other situations.

If  or  has been pressed,  will cancel the operation without storing or recalling a number. Unlike , this does not disturb the operation in progress.


If any conversion operation has been started,  will cancel the conversion, again without disturbing the operation in progress.





In any other situation when a number is not being entered, pressing  will replace the current value with 0.



Scientific Functions

Scientific functions are accessed from the Scientific button on the tab bar.





The  button changes the meaning of several of the scientific functions. In each case, the button whose meaning changes also changes appearance, showing the new function right on the button whose meaning changed.

For example, if  has not been pressed, the first button on the second row is . When  has been pressed, it changes to .

The  button is highlighted when pressed. The buttons return to their original meaning and appearance when the function is used or the  button is pressed a second time.



Trigonometric functions, such as sine, cosine and tangent, can measure angles using radians or degrees. When the calculator is operating in degrees, the term Degrees appears directly below the current numeric value on the left side of the screen, and this button appears as . Pressing the button changes the way angles are measured to radians. When the calculator is operating in radians, the term Radians appears directly below the current numeric value on the left side of the screen, and this button appears as . Pressing the button changes the way angles are measured back to radians.





Numbers can be displayed using floating-point format or scientific notation. Either way, you can specify the number of digits displayed.



When numbers are displayed using scientific notation, the number always shows one digit to the left of the decimal point. If the number is not zero, the digit to the left of the decimal point is also non-zero. Any other non-zero significant digits are displayed to the right of the decimal point. The exponent follows, displayed as the letter e, the sign of the exponent, and a three-digit exponent.

For example, the number 300 appears as **3e+002** in scientific notation, and 1/8 displays as **1.25e-001**.






When numbers are displayed as floating-point numbers, no exponent is used. The number is displayed with a negative sign if the value is less than zero, followed by up to 14 significant digits, possibly with a decimal point. If the value is less than one, a leading zero will appear before the decimal point. Trailing zeros after the decimal point are not displayed.




For example, 1/8 displays as **0.125**.

Pressing the  button changes the display method to scientific notation. The term Scientific appears below the current numeric value on the right side of the screen, and this button changes to .

Pressing the  button changes the default display method to floating-point notation. The term Float appears below the current numeric value on the right side of the screen, and this button changes to . While most numbers are displayed using floating-point notation, numbers whose absolute value is larger than $1e10$ or smaller than 0.001 will still be displayed in scientific notation.









Use   followed by a digit key to set the number of digits to the right of the decimal place to a fixed value. For example, to always display 6 digits to the right of the decimal point, press   . Once this is done, $1/3$ displays as **0.333333** in floating-point format, and **3.333333e-001** in scientific notation.

Press    to return the calculator to the standard display mode, where the number of non-zero digits to the right of the decimal point are displayed.











Raises a number to an arbitrary power.

Enter the first number, press the  button, then enter the second number. The result is displayed when the  button is pressed or another operation begins. For example,     yields **8**.

Raising a negative value to a fractional exponent gives an imaginary result, which is not defined for the set of real numbers displayed by the calculator. The result is an error condition, displayed as **Error**.











Replaces the displayed number with its natural logarithm.

Enter a number and press the  button. The number is immediately replaced with its natural logarithm. This does not disturb calculations in progress, so   yields **1.6094379124341**, and      yields **2.6094379124341**.

The natural logarithm is not defined for values less than or equal to zero, so taking the natural logarithm of zero or a negative number is an error, which is displayed as **Error**.











Euler's number, abbreviated as e , is raised to the power of the number in the display. Euler's number is approximately 2.71828182845905 . This operation is commonly known as the exponential function. It is occasionally called the anti-logarithm.

Enter a number and press the  button. The number is immediately replaced with its exponential. This does not disturb calculations in progress, so   yields **7.38905609893065**, and      yields **8.38905609893065**.

If the argument is large than about 709, the exponential is too large to represent. Numbers too large to represent display as **inf**.



Replaces the displayed number with its square root.









Enter a number and press the  button. The number is immediately replaced with its square root. This does not disturb calculations in progress, so   yields **1.4142135623731**, and      yields **2.4142135623731**.

The square root is not defined for values less than zero, so taking the square root of a negative number is an error, which is displayed as **Error**.



Takes the factorial of the displayed value. Fractional arguments are supported; they are evaluated using Sterling's approximation:

$$n! \approx \sqrt{2\pi n} \left(\frac{n}{e}\right)^n$$

Enter a number and press the  button. The number is immediately replaced with its factorial. This does not disturb calculations in progress, so   yields **120**, and      yields **121**.



If the argument is large than about 170, the factorial is too large to represent. Numbers too large to represent display as **inf**. The factorial function is not defined for arguments less than zero. Taking the factorial of a negative number is an error, which displays as **Error**.













Places the value for π in the display, replacing any value already displayed. The value displays as **3.14159265358979**, but is actually entered to full machine precision.





Replaces the displayed number with its trigonometric sine.











The displayed number can be entered in degrees or radians, but the calculator must be set to use the appropriate angular measurement before the  button is pressed. See the description of  to see how to change the units for angles.

Enter a number and press the  button. The number is immediately replaced with its sine. This does not disturb calculations in progress, so    yields **0.5** when angles are specified in degrees, and       yields **1.5**.





Replaces the displayed number with its trigonometric cosine.











The displayed number can be entered in degrees or radians, but the calculator must be set to use the appropriate angular measurement before the  button is pressed. See the description of  to see how to change the units for angles.

Enter a number and press the  button. The number is immediately replaced with its sine. This does not disturb calculations in progress, so    yields **0.5** when angles are specified in degrees, and       yields **1.5**.











Replaces the displayed number with its trigonometric tangent.

The displayed number can be entered in degrees or radians, but the calculator must be set to use the appropriate angular measurement before the  button is pressed. See the description of  to see how to change the units for angles.

Enter a number and press the  button. The number is immediately replaced with its tangent. This does not disturb calculations in progress, so    yields **1** when angles are specified in degrees, and       yields **2**.



Replaces the displayed number with its inverse.

Enter a number and press the  button. The number is immediately replaced with its inverse. This does not disturb calculations in progress, so   yields **0.2**, and      yields **1.2**.









The inverse is not defined for zero, so taking the inverse of zero is an error, which is displayed as **Error**.



Converts the displayed number to a percentage. This is equivalent to dividing the number by 100.











Replaces the displayed number with its hyperbolic sine.

Enter a number and press the  button. The number is immediately replaced with its hyperbolic sine. This does not disturb calculations in progress, so   yields **10.0178749274099** when angles are specified in degrees, and      yields **11.0178749274099**.











Replaces the displayed number with its hyperbolic cosine.

Enter a number and press the  button. The number is immediately replaced with its hyperbolic cosine. This does not disturb calculations in progress, so   yields **10.0676619957778** when angles are specified in degrees, and      yields **11.0676619957778**.











Replaces the displayed number with its hyperbolic tangent.

Enter a number and press the  button. The number is immediately replaced with its hyperbolic tangent. This does not disturb calculations in progress, so   yields **0.99505475368673** when angles are specified in degrees, and      yields **1.99505475368673**.



Takes an arbitrary root of a number.

This function is available once the  button is pressed.


Enter the first number, press the  button, then the  button, then enter the second number. The result is displayed when the  button is pressed or another operation begins. For example,      yields **2**, the cube root of 8.








Taking the root of a negative number is not defined. The result is an error condition, displayed as **Error**.



Takes the base 10 logarithm of a number. The base 10 logarithm of the argument y is the number x such that

$$10^x = y$$

This function is available once the  button is pressed.






Enter the argument, press the  button, then press the  button. For example,      yields **2**.

Taking the logarithm of zero or a negative number is not defined. The result is an error condition, displayed as **Error**.



Raises 10 to the power of the argument.






This function is available once the  button is pressed.

Enter the argument, press the  button, then press the  button. For example,    yields **1000**.



Returns the square of the argument.


This function is available once the  button is pressed.













Enter the argument, press the  button, then press the  button. For example,    yields **64**.



Replaces the displayed number with the inverse of the sine, also known as the arcsine.

This function is available once the  button is pressed.

The value returned can be in degrees or radians, depending on the current units for angles. See the description of  to see how to change the units for angles.


Enter a number and press the  button. The number is immediately replaced with its inverse sine. This does not disturb calculations in progress, so     yields **30** when angles are specified in degrees, and        yields **31**.




The argument must be in the range -1 to 1. It is an error to take the arcsine of a number outside of this range; this condition is displayed as **Error**. The result is always in the range -90 degrees to 90 degrees ($-\pi/2$ radians to $\pi/2$ radians).



Replaces the displayed number with the inverse of the cosine, also known as the arccosine.

This function is available once the  button is pressed.

The value returned can be in degrees or radians, depending on the current units for angles. See the description of  to see how to change the units for angles.


Enter a number and press the  button. The number is immediately replaced with its inverse cosine. This does not disturb calculations in progress, so  yields **60** when angles are specified in degrees, and  yields **60**.


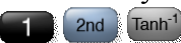

The argument must be in the range -1 to 1. It is an error to take the inverse cosine of a number outside of this range; this condition is displayed as **Error**. The result is always in the range 0 degrees to 180 degrees (0 radians to π radians).



Replaces the displayed number with the inverse of the tangent, also known as the arctangent.

This function is available once the  button is pressed.




The value returned can be in degrees or radians, depending on the current units for angles. See the description of  to see how to change the units for angles.

Enter a number and press the  button. The number is immediately replaced with its tangent. This does not disturb calculations in progress, so  yields **45** when angles are specified in degrees, and  yields **46**.

The result is always in the range -90 degrees to 90 degrees ($-\pi/2$ radians to $\pi/2$ radians).


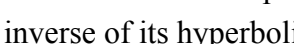
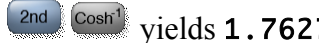


Replaces the displayed number with the inverse of its hyperbolic sine.

Enter a number and press the  button. The number is immediately replaced with the inverse of its hyperbolic sine. This does not disturb calculations in progress, so  yields **1.81844645923207**, and  yields **2.81844645923207**.




Replaces the displayed number with the inverse of its hyperbolic cosine.











Enter a number and press the  button. The number is immediately replaced with the inverse of its hyperbolic cosine. This does not disturb calculations in progress, so  yields **1.76274717403909** when angles are specified in degrees, and  yields **2.76274717403909**.

Taking the inverse hyperbolic cosine of a number less than 1 is not defined. The result is an error condition, displayed as **Error**.



Replaces the displayed number with the inverse of its hyperbolic tangent.


Enter a number and press the  button. The number is immediately replaced with the inverse of its hyperbolic tangent. This does not disturb calculations in progress, so

   yields **0.549306144334055**, and        yields **1.549306144334055**.

Taking the inverse hyperbolic tangent of a number whose absolute value is greater than or equal to 1 is not defined. The result is an error condition, displayed as **Error**.

Logic Functions






Press the  button on the tab bar to access the logic calculator. The logic calculator is used to view numbers in bases other than base 10, and to perform logical operations such as bitwise and on the numbers.

When a number is in the display and the logic calculator is used, the number is rounded to the nearest integer and displayed in the selected base. Calculations within the logic calculator always result in an integer; if division is used, the result is truncated to obtain an integer.



Change the display to binary. The current value is displayed as a 16-bit twos-complement binary value. All numeric entry buttons except those for 0 and 1 are disabled, since they cannot be used to enter a binary value.

While only 16 bits are displayed in base 2, all calculations are still performed on the internal 32-bit number used for logic calculations. Remember to take these extra bits into account when performing logic calculations. For example,    should result in a zero in the most significant bit, but the display shows **1111111111111111**. In fact, the most significant bit is 0, but the most significant bit is the 31st bit. To see the full result, switch to base 16, where the full result **7FFFFFFF** shows that the most significant bit is, indeed 0.



Change the display to octal. The current value is displayed as a 32-bit twos-complement octal value. The display shows an 11-digit number, yielding 33 bits. The extra bit is ignored for calculations. All numeric entry buttons except those for 0 through 7 are disabled, since the cannot be used to enter an octal value.



Change the display to decimal. The current value is displayed as a 32-bit value. Any extra bits entered for a number are ignored for calculations. The numeric entry buttons for hexadecimal digits are disabled.

Base 16

Change the display to hexadecimal. The current value is displayed as a 32-bit two's-complement hexadecimal value. The display shows an 8-digit number. All numeric entry buttons, including those for the hexadecimal digits A through F, are enabled.

AND

The AND operation performs a bitwise and with the number in the display and the next number entered. Like addition, it is a binary operation, so the operation is not completed until the equals button is pressed or another operation with a higher precedence forces the operation to complete.

For example, in base 2, press **0** **0** **1** **1** **AND** **0** **1** **0** **1** **=**. The result of **0000000000000001** appears in the display.

OR

The OR operation performs a bitwise or with the number in the display and the next number entered. Like addition, it is a binary operation, so the operation is not completed until the equals button is pressed or another operation with a higher precedence forces the operation to complete.

For example, in base 2, press **0** **0** **1** **1** **OR** **0** **1** **0** **1** **=**. The result of **0000000000000111** appears in the display.

XOR

The XOR operation performs a bitwise exclusive or with the number in the display and the next number entered. Like addition, it is a binary operation, so the operation is not completed until the equals button is pressed or another operation with a higher precedence forces the operation to complete.

For example, in base 2, press **0** **0** **1** **1** **XOR** **0** **1** **0** **1** **=**. The result of **0000000000000110** appears in the display.

NOT

The NOT operation reverses all of the bits in the display. Like addition, it is a binary operation, so the operation is not completed until the equals button is pressed or another operation with a higher precedence forces the operation to complete.

For example, in base 2, press **1** **1** **NOT**. The result of **1111111111111100** appears in the display.

LSL

The LSL operation shifts all of the bits in the displayed number left by one bit. If the leftmost bit of the 32-bit value is 1, it is lost.

For example, in base 16, press   . The result of **0000015E** appears in the display.







The LSR operation shifts all of the bits in the displayed number right by one bit. The leftmost bit is replaced by a zero.



For example, in base 16, press         . The result of **7F6E5D4C** appears in the display.

Length Conversions



Press the  button on the tab bar to access the length and temperature conversion functions. Temperature conversions are described in *Temperature Conversions*, below.

Length conversions are used to convert a length from one set of units to another. For example, to find out how many centimeters are in an inch, press   . The result of **2.54** centimeters appears in the display.

This common theme holds for all conversion functions. Start a conversion by pressing the button indicating the units for the number in the display. All of the units this value can be converted too—in this case, all of the length buttons—are highlighted. All other buttons except  are dimmed, and cannot be used. Use  to cancel the operation and all other pending operations, or press the same unit button to cancel the conversion. For example, if a conversion from inches is started, press inches again to cancel the conversion without changing the number in the display.



Convert to or from angstroms. One angstrom is 10^{-10} meters.



Convert to or from nanometers. One nanometer is 10^{-9} meters.



Convert to or from micrometers. One micrometer is 10^{-6} meters.



Convert to or from millimeters. One millimeter is 10^{-3} meters.



Convert to or from centimeters. One centimeter is 10^{-2} meters.



Convert to or from decimeters. One decimeter is 0.1 meters.



Convert to or from meters. One meter is defined as the length of the path of light traveled in a vacuum during a time interval of $1/299,972,458$ of a second. All other length units used in this calculator are ultimately derived from the meter.



Convert to or from kilometers. One kilometer is 1,000 meters.



Convert to or from yards. One yard is three feet.



Convert to or from nautical miles. One nautical mile is 1852 meters.



Convert to or from inches. One inch is defined as 2.54 centimeters, exactly.




Convert to or from feet. One foot is 12 inches.








Convert to or from miles. One mile is 5280 feet.

Area Conversions



Press the  button on the tab bar to access the area conversion functions.

Area conversions are used to convert an area from one set of units to another. For example, to find out how many square feet are in an acre, press   . The result of **43560** square feet appears in the display.

This common theme holds for all conversion functions. Start a conversion by pressing the button indicating the units for the number in the display. All of the units this value can be converted too—in this case, all of the area buttons—are highlighted. All other buttons except  are dimmed, and cannot be used. Use  to cancel the operation and all other pending operations, or press the same unit button to cancel the conversion. For example, if a conversion from square inches is started, press square inches again to cancel the conversion without changing the number in the display.



Convert to or from square angstroms. One square angstrom is 10^{-20} square meters.



Convert to or from square nanometers. One square nanometer is 10^{-18} square meters.



Convert to or from square micrometers. One square micrometer is 10^{-12} square meters.



Convert to or from square millimeters. One square millimeter is 10^{-6} square meters.



Convert to or from square centimeters. One square centimeter is 10^{-4} square meters.



Convert to or from square decimeters. One square decimeter is 10^{-2} square meters.



Convert to or from square meters. One meter is defined as the length of the path of light traveled in a vacuum during a time interval of $1/299,972,458$ of a second. All other area units used in this calculator are ultimately derived from the square meter.



Convert to or from square kilometers. One square kilometer is 10^6 square meters.



Convert to or from hectares. One square millimeter is 10^4 square meters. Hectares are commonly used to measure land area in countries that use the metric system.



Convert to or from square inches. One square inch is 6.4516×10^{-6} square meters.



Convert to or from square feet. One square foot is 144 square inches.



Convert to or from square yards. One square yard is nine square feet.



Convert to or from square mile. One square mile is 27878400 square feet.



Convert to or from square rods. One square rod is 272.25 square feet.









Convert to or from square chains. One square chain is 4356 square feet.





Convert to or from acres. One acre is 43560 square feet. Acres are commonly used to measure land area in countries that use the imperial system.

Volume Conversions

Press the  button on the tab bar to access the volume conversion functions.

Volume conversions are used to convert a volume from one set of units to another. For example, to convert 250 milliliters to fluid ounces, press     . The result of **8.45350567546075** fluid ounces appears in the display.

This common theme holds for all conversion functions. Start a conversion by pressing the button indicating the units for the number in the display. All of the units this value can be converted too—in this case, all of the volume buttons—are highlighted. All other buttons except  are dimmed, and cannot be used. Use  to cancel the operation and all other pending operations, or press the same unit button to cancel the conversion. For example, if a conversion from liters is started, press liters again to cancel the conversion without changing the number in the display.



Convert to or from micro liters. One micro liter is 10^{-6} liters.



Convert to or from milliliters. One milliliter is 10^{-3} liters. A milliliter is also one cubic centimeter.



Convert to or from centiliters. One centiliter is 10^{-2} liters.



Convert to or from liters. The liter is a unit of volume defined as one cubic deciliter, or 0.001 cubic meters.

kl→

Convert to or from kiloliters. One kiloliter is 1000 liters, or one cubic meter.

tsp→

Convert to or from teaspoons. One teaspoon is five milliliters.

→tbsp

Convert to or from tablespoons. One tablespoon is three teaspoons, or 15 milliliters.

fl oz→

Convert to or from U.S. customary fluid ounces. There are 128 fluid ounces in a gallon.

cup→

Convert to or from cups. There are 16 cups in a gallon.

pint→

Convert to or from pints. There are eight pints in a gallon.

qt→

Convert to or from quarts. There are four quarts in a gallon.

gal→

Convert to or from U.S. liquid gallons. One gallon is defined as 231 cubic inches.

in³→

Convert to or from cubic inches. One cubic inch is 0.016387064 liters.

ft³→

Convert to or from cubic feet. One cubic foot is 1728 cubic inches.


yd³→






Convert to or from cubic yards. One cubic yard is 27 cubic feet.



af→

Convert to or from acre feet. One acre foot covers an area of one acre to a depth of one foot; it is commonly used as a measure of water in agriculture. One acre foot is 43560 cubic feet.

Temperature Conversions

Press the  button on the tab bar to access the length and temperature conversion functions. Length conversions are described in *Length Conversions*, above.

Temperature conversions are used to convert a temperature from one set of units to another. For example, to convert 451 degrees Fahrenheit to Celsius, press     . The result of **232.77777777778** degrees Celsius appears in the display.

This common theme holds for all conversion functions. Start a conversion by pressing the button indicating the units for the number in the display. All of the units this value can be converted too—in this case, all of the temperature buttons—are highlighted. All other buttons except  are dimmed, and cannot be used. Use  to cancel the operation and all other pending operations, or press the same unit button to cancel the conversion. For example, if a conversion from degrees Fahrenheit is started, press degrees Fahrenheit again to cancel the conversion without changing the number in the display.



Convert to or from degrees Fahrenheit. This temperature scale is fixed by the freezing point and boiling point of water, which are 32 degrees and 212 degrees respectively.




Convert to or from degrees Celsius. This temperature scale is fixed by the freezing and boiling point of water, which are 0 degrees and 100 degrees, respectively.










Convert to or from degrees Kelvin. Zero degrees Kelvin is absolute zero, while 273.15 degrees Kelvin is zero degrees Celsius.

Mass Conversions

Press the  button on the tab bar to access the mass and speed conversion functions. Speed conversions are described in *Speed Conversions*, below.

Strictly speaking, the conversion functions labeled mass convert between units of both mass and force, making the common assumption that force measurements are the weight in one standard gravity. The kilogram, for example, is a unit of mass—it describes the resistance an object has to a change in velocity. Pounds, on the other hand, are actually a unit of force. In common use, the pound is the force exerted by a one pound object on a scale in the Earth's gravitational field. The metric units for force are Newtons, and the Imperial units for mass are Slugs, neither of which are commonly used by people outside of physics or engineering. Assuming forces are the weight in one gravity, the conversions listed here are all consistent. For simplicity, all conversions are discussed as mass conversions.

Mass conversions are used to convert a mass or force from one set of units to another. For example, to convert 185 pounds to kilograms, press     . The result of **83.91458845** kilograms appears in the display.

This common theme holds for all conversion functions. Start a conversion by pressing the button indicating the units for the number in the display. All of the units this value can be converted too—in this case, all of the mass buttons—are highlighted. All other buttons except  are dimmed, and cannot be used. Use  to cancel the operation and all other pending operations, or press the same unit button to cancel the conversion. For example, if a conversion from ounces is started, press ounces again to cancel the conversion without changing the number in the display.



Convert to or from grains. There are 7000 grains in a pound.



Convert to or from ounces. There are 16 ounces in a pound.



Convert to or from pounds. One pound is equivalent to 453.59237 grams.



Convert to or from stones. There are 14 pounds in one stone.



Convert to or from tons. There are 2000 pounds in one ton.



Convert to or from milligrams. One milligram is 10^{-6} kilograms.



Convert to or from carats. One carat is 200 milligrams.



Convert to or from grams. One gram is 10^{-3} kilograms.



Convert to or from kilograms. One gram is a mass equivalent to the International Prototype Kilogram, a cylinder of 90% platinum and 10% iridium with a height and diameter of 39.17mm.




Convert to or from tonnes. One tonne (also called a metric ton) is 1000 kilograms.









Convert to or from kilotonnes. One kilotonnes is 1000 tonnes.

Speed Conversions



Press the  button on the tab bar to access the mass and speed conversion functions. Mass conversions are described in *Mass Conversions*, above.

Speed conversions are used to convert a speed from one set of units to another. For example, to convert 65 miles per hour to kilometers per hour, press    . The result of **104.60736** kilometers per hour appears in the display.

This common theme holds for all conversion functions. Start a conversion by pressing the button indicating the units for the number in the display. All of the units this value can be converted too—in this case, all of the speed buttons—are highlighted. All other buttons except  are dimmed, and cannot be used. Use  to cancel the operation and all other pending operations, or press the same unit button to cancel the conversion. For example, if a conversion from kilometers per hour is started, press kilometers per hour again to cancel the conversion without changing the number in the display.



Convert to or from feet per second. One foot per second is 0.3048 meters per second.



Convert to or from miles per hour. One mile per hour is 0.44704 meters per second.



Convert to or from centimeters per second. One centimeters per second is 0.01 meters per second.



Convert to or from meters per second. One meter per second is the average speed required to travel one meter in one second.



Convert to or from kilometers per hour. One kilometers per hour is 1000/3600 meters per second.