

## Mathematics Calculator Reference Guide



## Reference Guide for the Calculator

### Prior to test day:

- Become familiar with and use the OGT calculator.
- When using the calculator, particularly in multi-step problems, wait for the display before entering another sequence of operations
- Locate and use the keys for functions related to the concepts and skills that are assessed
- Practice entering numbers and commands, as well as correcting entry errors.

### Getting Started:

**To turn the calculator on and off:** The calculator will automatically turn on and off when the “slide cover” is removed and replaced.




























**To clear the calculator prior to use:** Press the **AC** (all clear) key to clear the display, the memory and all numbers or operations entered.

### To correct entry errors:

- Press the **→** key to clear the last digit entered or press **C/CE** one time to clear the entire number. Pressing **C/CE** two times clears all numbers and operations.
- Press the **C/CE** key when “-E-“ (overflow or error indicator) appears in the display.

### Quick Reference for Frequently Used Keys:

Function	Keying Instructions
$\boxed{+}$ $\boxed{-}$ $\boxed{\div}$ $\boxed{\times}$ $\boxed{=}$ Add subtract divide multiply	Calculator follows order of operations when performing computations. Results of computation will be displayed when $\boxed{=}$ is pressed. Caution: Each time $\boxed{=}$ is pressed, the last operation is repeated.

<p style="text-align: center;"></p> <p style="text-align: center;">positive/negative signs</p>	<p>Pressing the  will change the sign of the number displayed.</p> <p>To enter a negative number, press the number and then the  key</p>
<p style="text-align: center;"></p> <p style="text-align: center;">parentheses</p>	<p>Press the  and enter the expression followed by the .</p> <p>Note: The display will show 0 initially when the  is pressed. Small ( ) will appear in the right end of the display until the  key is pressed.</p> <p>Note: Cannot be used as implied multiplication. To multiply an expression by another expression or number, press the  key between the sets of parentheses. For example,</p> <p>To enter <math>(35)(13) =</math>, press  3 5    1 3  </p>
<p style="text-align: center;">%</p> <p style="text-align: center;">percent</p> <p>The % key is a second function key.</p>	<p>Divides the displayed value by 100. Pressing the  key followed by the  key will change the last number entered to the decimal equivalent.</p> <p>Caution: when working in fraction mode, using the  function does not change the fraction to its decimal equivalent but considers the fraction as a percent; e.g., 3 4 is considered <math>\frac{3}{4}</math> % or 0.0075 .</p>
<p style="text-align: center;"><math>\pi</math></p> <p style="text-align: center;">Pi</p> <p>The <math>\pi</math> key is a second function key.</p>	<p>Displays the value of Pi to nine places. To enter <math>\pi</math>, press the  followed by the  key.</p>
<p style="text-align: center;"><math>\sqrt{\quad}</math></p> <p style="text-align: center;">square root</p> <p>The <math>\sqrt{\quad}</math> key is a second function key.</p>	<p>Calculates the positive square root of the number in the display.</p> <p>To find the <math>\sqrt{\quad}</math> of a number, enter the number and then press the  followed by the  key.</p>
<p style="text-align: center;"></p> <p style="text-align: center;">Fraction</p>	<p>Allows entry of a fraction or mixed number. The  key is pressed after entering the each component of the fraction or mixed number.</p> <p>For example, to enter <math>\frac{5}{6}</math>, press 5  6. The display will show 5_6.</p> <p>To enter <math>3\frac{1}{2}</math>, press 3  1  2 . The display will show</p>

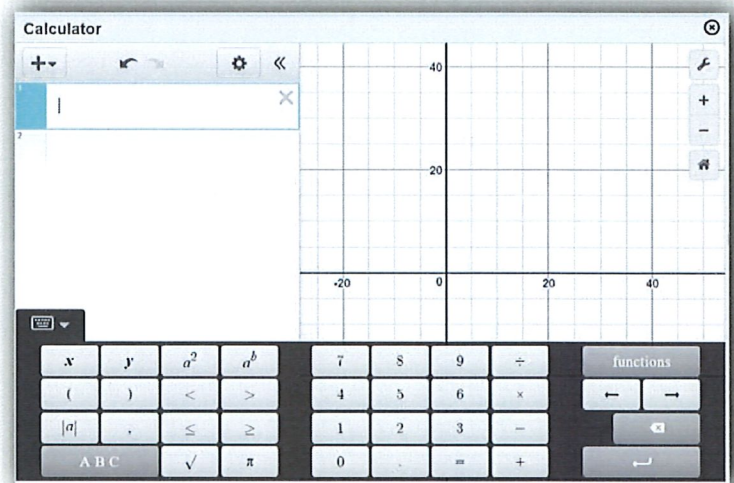
<p>The D/C key is the second function key of <math>\boxed{A\frac{B}{C}}</math>.</p>	<p>3_1_2.</p> <p>The fraction will be reduced to lowest terms when an operation or <math>\boxed{=}</math> key is pressed.</p> <p>A mixed number can be changed to an improper fraction by pressing <math>\boxed{INV}\boxed{A\frac{B}{C}}</math>.</p> <p>The result of a calculation involving a fraction and a decimal will be displayed as a decimal.</p>
<p><math>\boxed{1/x}</math> reciprocal</p>	<p>Calculates the reciprocal of the number in decimal notation in the display.</p> <p>To enter the reciprocal of 3, press 3 followed by <math>\boxed{1/x}</math> key.</p>
<p><math>\boxed{x^2}</math> square</p>	<p>Calculates the square of the number in the display.</p> <p>To enter the square of a number, enter the number followed by the <math>\boxed{x^2}</math> key.</p>
<p>n! factorial</p> <p>The factorial key is a second function key.</p>	<p>Calculates the factorial of the number in the display.</p> <p>To enter a factorial, enter the number followed by <math>\boxed{INV}\boxed{M+}</math></p>
<p><math>\boxed{y^x}</math> powers</p>	<p>Raises the displayed value to the power entered.</p> <p>To enter a power for a number, enter the base followed by the <math>\boxed{y^x}</math> then the exponent. To enter <math>2^5</math>, press 2 <math>\boxed{y^x}</math> 5.</p>
<p><math>\boxed{E_x p}</math> exponent</p>	<p>To enter a number written in scientific notation, enter the mantissa followed by <math>\boxed{E_x p}</math> and the power of ten. For example,</p> <p>To enter <math>6.5 \times 10^4</math>, press 6 <math>\boxed{\cdot}</math> 5 <math>\boxed{E_x p}</math> 4.</p>
<p><math>\boxed{SIN}</math> <math>\boxed{COS}</math> <math>\boxed{TAN}</math> Sine Cosine Tangent</p>	<p>To enter a trigonometric function, enter angle measure followed by the trig function key. For example,</p> <p>To enter <math>\tan 30^\circ</math>, enter 30 followed by TAN .</p> <p>Note: Make sure DEG appears in the display.</p>

# Guidance on Desmos Calculators for High School

Beginning with the 2017-2018 school year, Ohio's State Tests will use Desmos as the online calculator. The Desmos graphing calculator available in the [Test Portal](#) has been modified for Ohio. The Ohio version of the Desmos calculator is accessible through the online [practice tests](#) and as a [direct link](#).

## HIGH SCHOOL: GRAPHING CALCULATOR

This modified version of Desmos is available to use for practice at any time and is the same version students will have available during online testing. The calculators were modified for testing with certain features disabled or removed. The modifications were made either because removed functions a) concerned content above the grade level of the test; or b) could have affected the tests' ability to measure a student's understanding of grade-level content in some areas of the standards.



## MODIFICATIONS FOR TESTING

The graphing calculator on Ohio's State Tests is nearly identical to the one available on [www.desmos.com/calculator](http://www.desmos.com/calculator), with a few small modifications:

- The "ABC" keypad is alphabetical instead of QWERTY.
- Single-variable equations, like  $x=5x-14$ , are not automatically solved.
- Students cannot upload images, add notes or create folders.
- The default angle mode is degrees instead of radians.
- The following functions have been disabled: csc, sec, cot, arcsec, arccsc, arccot, csch, sech, coth, arccsch, arcsech, arccoth, mad and cov (covariance).

## ACCESSIBILITY

The graphing calculator within Ohio's State Tests is fully accessible for vision-impaired and blind students. It complies with the WCAG 2.0 standards at the AA level, and works with most assistive technologies, like screen readers. For more information, visit [www.desmos.com/accessibility](http://www.desmos.com/accessibility).

## ADDITIONAL PRACTICE FOR TEACHERS AND STUDENTS

A full version of the Desmos graphing calculator is available at their [website](#). You also can download the calculator at the [iOS](#) or [Android](#) app stores for free. Once downloaded, you can use these apps without an internet connection. Districts can use the full version for instruction any time before and after state testing; however, the full version will not be available on state tests. [Click here](#) for more information on how you can use Desmos to design classroom activities to use with instruction.

Graphing calculator tutorials are available at [learn.desmos.com/graphing](http://learn.desmos.com/graphing) and you can read the [Desmos User Guide \(English\)](#) to learn more about the graphing calculator's functionality. The Desmos User Guide also is available in [Spanish](#) and [16 other languages](#).