

The **Trig Tour** simulation allows students to flexibly translate between multiple representations of trig functions, discover patterns, estimate or determine exact values of trig functions, and deduce the sign (+, -, 0) of trig functions for any given angle without a calculator.

OBSERVE the coordinates change as theta changes

Values

angle = 210.0°

(x,y) = (-0.866, -0.500)

$\cos\theta = \frac{x}{1} = -0.866$

Degrees

Radians

cos

sin

tan

Special Angles

Labels

Grid

Trig Tour

(x,y) = $(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2})$

angle = 225°

$\cos\theta = \frac{x}{1} = -\frac{\sqrt{2}}{2}$

COMPARE different trig functions

SHOW exact values for special angles.

Insights into Student Use

- Unless prompted, students may not notice that they can drag both the red dot along the unit circle and the red dot along the graph.
- Students can continue to rotate the red dot around the circle many times even as the graph extends outside of view.

Suggestions for Use

Sample Challenge Prompts

- Using the formula for the circumference of a circle, find the circumference of a unit circle. What is the relationship between radians and circumference?
- Minimize the Values panel and estimate the coordinates of a point on the circle. Maximize the panel to check your answer. Turn on the Grid to help you!
- What does the graph of each trig function look like beyond the view in this sim? How do you know?
- Turn on Special Angles and play with the sim. Write down any patterns you observe in the Values panel, the graph, or around the circle.

- Keep θ in the first quadrant and turn on Labels. Use your knowledge of right triangle trigonometry to explain why $\cos\theta = x$, $\sin\theta = y$, and $\tan\theta = \frac{y}{x}$. Using two functions in your function machine, find an example of when the order in which you place them matters. Describe your findings. Find a different example of when the order does not matter. Summarize when the order does and does not matter.

Sample Pre- and Post-Assessment Questions

- Determine the sign (positive or negative) for $\sin(330^\circ)$, $\cos(205^\circ)$, and $\tan(112^\circ)$.
- Determine the value of θ for the following coordinate pairs:

$$\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right), \left(-\frac{1}{2}, -\frac{\sqrt{3}}{2}\right), \left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right), \left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$$

Customization Options

Query parameters allow for customization of the simulation, and can be added by appending a '?' to the sim URL, and separating each query parameter with a '&'. The general URL pattern is:

`...html?queryParameter1&queryParameter2&queryParameter3`

For example, in Trig Tour, if you want to run the sim in Spanish (`locale=es`), with external links disabled (`allowLinks=false`) use:

`https://phet.colorado.edu/sims/html/trig-tour/latest/trig-tour_all.html?locale=es&allowLinks=false`

⊗ Indicates this customization can be accessed from the Preferences menu within the simulation.

Query Parameter and Description	Example Links
⊗ <code>locale</code> - specify the language of the simulation using ISO 639-1 codes. Available locales can be found on the simulation page on the Translations tab . Note: this only works if the simulation URL ends in "_all.html".	<code>locale=es</code> (Spanish) <code>locale=fr</code> (French)
⊗ <code>audio</code> - if muted, audio is muted by default. If disabled, all audio is permanently turned off.	<code>audio=muted</code> <code>audio=disabled</code>
<code>allowLinks</code> - when <code>false</code> , disables links that take students to an external URL. Default is <code>true</code> .	<code>allowLinks=false</code>
<code>supportsPanAndZoom</code> - when <code>true</code> , enables panning and zooming of the simulation using pinch-to-zoom or browser zoom controls.	<code>supportsPanAndZoom=false</code>

See all published activities for Trig Tour [here](#).

For more tips on using PhET sims with your students, see [Tips for Using PhET](#).