

Reciprocal Trigonometric Functions

Objectives

- ◇ Learn definitions of **cosecant**, **secant** and **cotangent** functions: normally called cosec, sec and cot. *Note:* some textbooks write csc instead of cosec.
- ◇ Be able to evaluate these functions.

Key points

This topic is an introduction to three functions you may not have seen before. They are actually just the reciprocals (meaning 'one divided by ...') the standard trigonometric functions you already know. They are called cosec, sec and cot and are defined like this:

$$\operatorname{cosec}(x) = \frac{1}{\sin(x)}, \quad \sec(x) = \frac{1}{\cos(x)} \quad \text{and} \quad \cot(x) = \frac{1}{\tan(x)}$$

There is nothing clever to do here, just learn their names and know how to calculate them.

They are never strictly necessary as you can always just write out the fractions of the standard functions, but they often making writing and manipulating equations easier.

Once you have learned the three names: cosec, sec and cot then remembering which is which is actually really easy! The trick I like to remember is that the **third letter of the new function matches the first letter of the old function**. So,

cosec is made using **sin**

sec is made using **cos**

cot is made using **tan**

If you like you can also think of these functions as ratios of sides of right-angles triangles. If you learned the SOH-CAH-TOA acronym so that $\sin(x)$ is a ratio of Opposite divided by Hypotenuse, then $\operatorname{cosec}(x)$ is the reciprocal ratio of Hypotenuse divided by Opposite. It is probably easier to learn the definitions above first though.

Recommended links

Highly recommended: Khan Academy link (note: this site uses csc for cosec)

Other links: MathTutor link