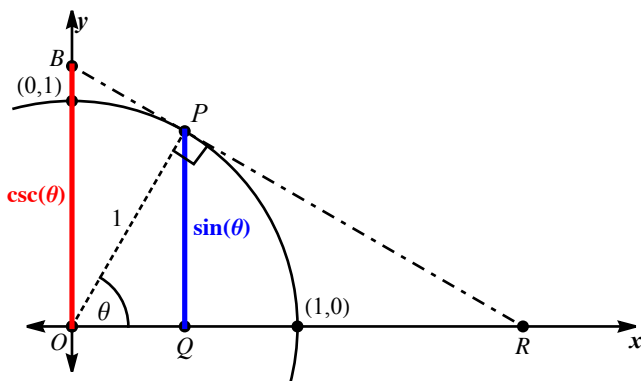


Trigonometry 34: Reciprocal Identities: Cosecant

The **cosecant** function, $y = \csc(\theta)$ is the length OB (highlighted in red) in the unit circle diagram below.



From our work with the cotangent function we know that

$$BP = \cot \theta = \frac{1}{\tan \theta} = \frac{\cos \theta}{\sin \theta}$$

Using the Pythagorean Theorem on triangle OBP gives

$$OB^2 = OP^2 + BP^2$$

$$OB^2 = 1^2 + \frac{\cos^2 \theta}{\sin^2 \theta}$$

$$OB^2 = \frac{\sin^2 \theta}{\sin^2 \theta} + \frac{\cos^2 \theta}{\sin^2 \theta}$$

$$OB^2 = \frac{\cos^2 \theta + \sin^2 \theta}{\sin^2 \theta}$$

$$OB^2 = \frac{1}{\sin^2 \theta}$$

$$OB = \csc \theta = \frac{1}{\sin \theta}$$

This relationship is also a reciprocal identity.

The graph of the cosecant function:

