

# 13.1 Day 1: Use Trig with Right Triangles

## Right Triangle Definitions: S<sup>o</sup># C<sup>A</sup># T<sup>o</sup>A

$$\sin\theta = \frac{\text{OPP}}{\text{HYP}} \longleftrightarrow \csc\theta = \frac{\text{HYP}}{\text{OPP}}$$

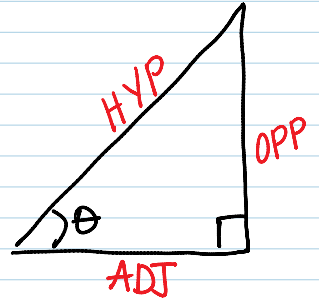
cosecant

$$\cos\theta = \frac{\text{ADJ}}{\text{HYP}} \longleftrightarrow \sec\theta = \frac{\text{HYP}}{\text{ADJ}}$$

secant

$$\tan\theta = \frac{\text{OPP}}{\text{ADJ}} \longleftrightarrow \cot\theta = \frac{\text{ADJ}}{\text{OPP}}$$

cotangent



SIN, CSC

COS, SEC

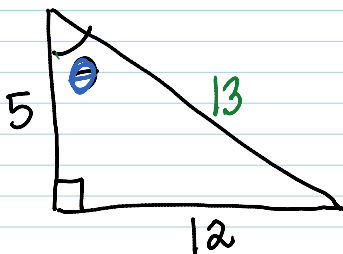
TAN, COT

ARE RECIPROCAL

Use them!

Evaluate the six trig functions of  $\theta$ .

1)



$$\sin\theta = \frac{12}{13}$$

$$\csc\theta = \frac{13}{12}$$

$$\cos\theta = \frac{5}{13}$$

$$\sec\theta = \frac{13}{5}$$

$$\tan\theta = \frac{12}{5}$$

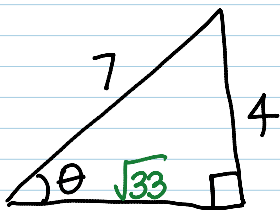
$$\cot\theta = \frac{5}{12}$$

$$a^2 + b^2 = c^2$$

$$5^2 + 12^2 = c^2$$

$$13 = c$$

2)



$$4^2 + x^2 = 7^2$$

$$16 + x^2 = 49$$

$$x^2 = 33$$

$$x = \sqrt{33}$$

$$\sin \theta = \frac{4}{7}$$

$$\csc \theta = \frac{7}{4}$$

$$\cos \theta = \frac{\sqrt{33}}{7}$$

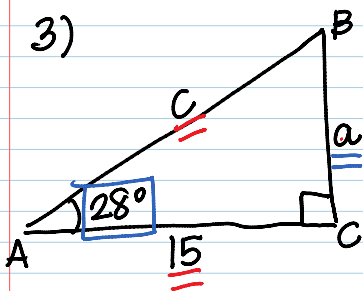
$$\sec \theta = \frac{7\sqrt{33}}{33}$$

$$\tan \theta = \frac{4}{\sqrt{33}} \cdot \frac{\sqrt{33}}{\sqrt{33}} = \frac{4\sqrt{33}}{33}$$

$$\cot \theta = \frac{\sqrt{33}}{4}$$

Use a calculator to solve a right triangle.

3)



$$B = 180 - (28 + 90) \quad 15 \tan 28^\circ = \frac{a}{15} \cdot 15$$

$$B = 180 - 118$$

$$15 \tan 28 = a$$

$$B = 62^\circ$$

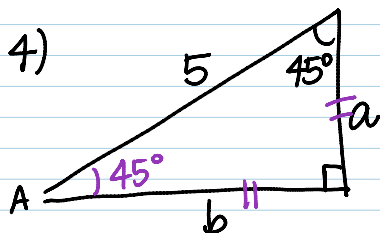
$$7.98 \approx a$$

$$c \cdot \cos 28^\circ = \frac{15}{c} \cdot c$$

$$\frac{c \cdot \cos 28}{\cos 28} = \frac{15}{\cos 28}$$

$$c = \frac{15}{\cos 28} \quad c \approx 16.99$$

4)



$$180 - (90 + 45)$$

$$\boxed{A = 45^\circ}$$

$$\sin 45 = \frac{a}{5}$$

$$\cos 45 = \frac{b}{5}$$

$$5 \sin 45 = a$$

$$\boxed{a \approx 3.54}$$

$$5 \cos 45 = b$$

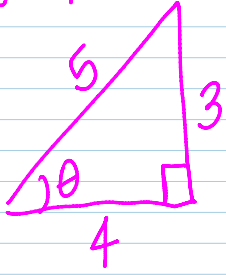
$$\boxed{b \approx 3.54}$$

If  $\theta$  is an acute angle of a right triangle and  $\tan \theta = \frac{3}{4}$ , what is  $\csc \theta$ ?

$$\frac{\text{OPP}}{\text{ADJ}} = \frac{3}{4}$$

$$\frac{\text{HYP}}{\text{OPP}}$$

$$\frac{\text{OPP}}{\text{ADJ}} = \frac{3}{4}$$



$$\frac{\text{HYP}}{\text{OPP}}$$

$$\text{CSC}\theta = \frac{5}{3}$$