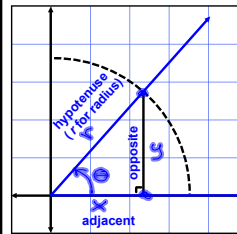


# Algebra II

12-2

## Trigonometric Functions of Acute Angles

### Definition of the Six Trigonometric Functions



$\theta$  - theta  
 $\alpha$  - alpha  
 $\psi$  - psi  
 $\phi$  - phi

greek letters commonly used for angle variables.

SOHCAHTOA  
 3 4 5  
 3 4 5

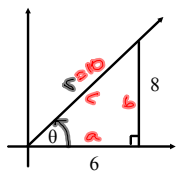
Reciprocal

sine - $\sin \theta = \frac{y}{r} = \frac{\text{opposite}}{\text{hypotenuse}}$	cosecant - $\csc \theta = \frac{r}{y} = \frac{1}{\sin \theta}$
cosine - $\cos \theta = \frac{x}{r} = \frac{\text{adjacent}}{\text{hypotenuse}}$	secant - $\sec \theta = \frac{r}{x} = \frac{1}{\cos \theta}$
tangent - $\tan \theta = \frac{y}{x} = \frac{\text{opposite}}{\text{adjacent}}$	cotangent - $\cot \theta = \frac{x}{y} = \frac{1}{\tan \theta}$

These are called the reciprocal trigonometric functions.

Find the values of the six trigonometric function of angle  $\theta$ . (pg 559)

1)



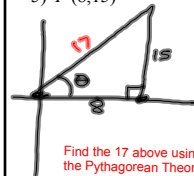
$\sin(\theta) = \frac{8}{10} = \frac{4}{5}$	$\csc(\theta) = \frac{5}{4}$
$\cos(\theta) = \frac{6}{10} = \frac{3}{5}$	$\sec(\theta) = \frac{5}{3}$
$\tan(\theta) = \frac{8}{6} = \frac{4}{3}$	$\cot(\theta) = \frac{3}{4}$

Pythagorean Theorem

$$\begin{aligned} a^2 + b^2 &= c^2 \\ 6^2 + 8^2 &= c^2 \\ 36 + 64 &= c^2 \\ 100 &= c^2 \\ 10 &= c \end{aligned}$$

Find the values of the six trigonometric functions of an angle  $\theta$  in standard position whose terminal side passes through point P.

5) P(8,15)



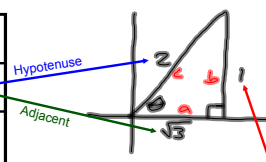
Find the 17 above using the Pythagorean Theorem.

$\sin(\theta) = \frac{15}{17}$	$\csc(\theta) = \frac{17}{15}$
$\cos(\theta) = \frac{8}{17}$	$\sec(\theta) = \frac{17}{8}$
$\tan(\theta) = \frac{15}{8}$	$\cot(\theta) = \frac{8}{15}$

Complete the table. In each case,  $\theta$  is an acute angle.

11)

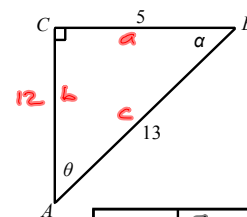
$\sin(\theta) =$	$\frac{1}{2}$
$\cos(\theta) =$	$\frac{\sqrt{3}}{2}$
$\tan(\theta) =$	$\frac{\sqrt{3}}{1}$



Pythagorean Theorem

$$\begin{aligned} (\sqrt{3})^2 + b^2 &= 2^2 \\ 3 + b^2 &= 4 \\ b^2 &= 1 \\ b &= 1 \end{aligned}$$

### Co-function Identities



$\theta$  and  $\alpha$  are complementary.

$\sin \theta = \cos \alpha$   
 Co-functions are equal if their angles are complementary (add up to 90°)

$\sin(\theta) = \frac{5}{13}$	$\sin(\alpha) = \frac{12}{13}$
$\cos(\theta) = \frac{12}{13}$	$\cos(\alpha) = \frac{5}{13}$
$\tan(\theta) = \frac{5}{12}$	$\tan(\alpha) = \frac{12}{5}$

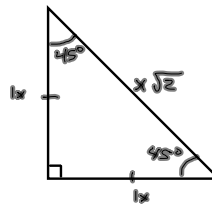
Use co-function identities to find the measure of the acute angle  $\phi$ .

$$17) \cos \phi = \sin 40^\circ$$

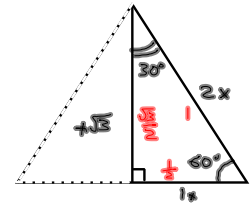
$$\phi = 50^\circ$$

Co- functions are equal if their angles are complementary (add up to  $90^\circ$ )

### Special Triangle Relationships



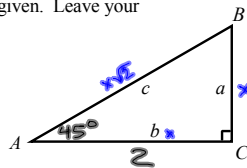
Isosceles  
Right Triangle



Half of an Equilateral  
Triangle

Use the diagram at the right. Find the lengths of the sides and the measures of the angles that are not given. Leave your answers in simplest radical form.

$$\begin{aligned} 21) \quad & b = 2 \\ & \angle A = 45^\circ \\ & \angle B = 45^\circ \\ & a = 2 \\ & c = 2\sqrt{2} \end{aligned}$$



Assignment:  
Pg. 559  
2-28 even