

## Precalculus A

### 4.2 Trigonometric Functions of Acute Angles

Day 1

Hw: Assignment #3 (Front and Back)

Unit Circle Quiz Tomorrow!!!

D. Paulson

Use the appropriate arc length formula to find the missing information.

$s$	$r$	$\theta$
50 in	2 in.	25 rad
1.5 ft	$\frac{6}{\pi}$	$\frac{\pi}{4}$ rad
3 m	1 m	3 rad
40 cm	$\frac{360}{\pi}$	20°

$$s = r\theta = 2(25) = 50$$

$$1.5 = \frac{\pi}{4} r$$

$$3 = 1r$$

$$40 = \frac{\pi(20)}{180} r$$

$$S = \frac{\pi r \theta}{180}$$

$$40 = \frac{\pi r (20)}{180}$$

$$360 = \frac{\pi r}{\pi}$$

D. Paulson

### Objectives:

SWBAT have an understanding of the six trigonometric functions.

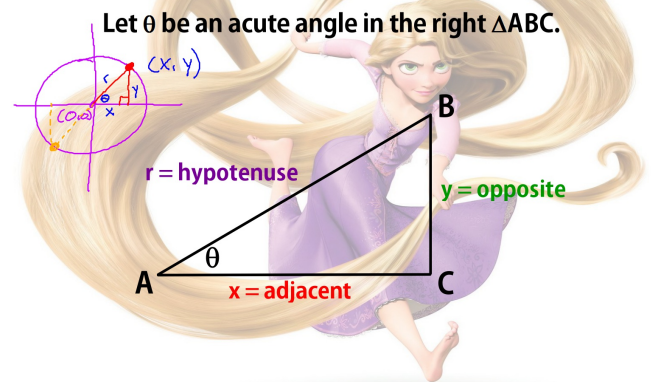
SWBAT use special triangles to solve right triangle problems.

SWBAT apply right triangle trigonometry in real world applications.

D. Paulson

### The Six Trigonometric Functions:

Let  $\theta$  be an acute angle in the right  $\triangle ABC$ .



D. Paulson

### The Six Trigonometric Functions:

Let  $\theta$  be an acute angle in the right  $\triangle ABC$ .

SOH  
CAH  
TOA

$$\sin \theta = \frac{\text{opp}}{\text{hyp}} = \frac{y}{r}$$

cosecant

$$\csc \theta = \frac{\text{hyp}}{\text{opp}} = \frac{r}{y}$$

$$\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{x}{r}$$

secant

$$\sec \theta = \frac{\text{hyp}}{\text{adj}} = \frac{r}{x}$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{y}{x}$$

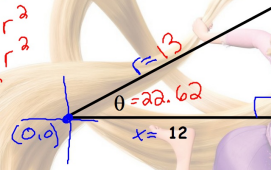
cotangent

$$\cot \theta = \frac{\text{adj}}{\text{opp}} = \frac{x}{y}$$

D. Paulson

Given the following triangle find all six trigonometric values. Leave answers in exact value format.

$$\begin{aligned} x^2 + y^2 &= r^2 \\ 12^2 + 5^2 &= r^2 \\ 144 + 25 &= r^2 \\ \sqrt{169} &= r \\ 13 &= r \end{aligned}$$



$$\sin \theta = \frac{y}{r} = \frac{5}{13}$$

$$\csc \theta = \frac{r}{y} = \frac{13}{5}$$

$$\cos \theta = \frac{x}{r} = \frac{12}{13}$$

$$\sec \theta = \frac{r}{x} = \frac{13}{12}$$

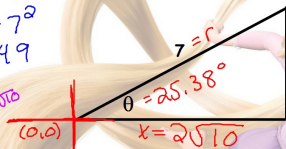
$$\tan \theta = \frac{y}{x} = \frac{5}{12}$$

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

D. Paulson

Given the following triangle find all six trigonometric values. Leave answers in exact value format.

$$\begin{aligned} x^2 + y^2 &= r^2 \\ x^2 + 3^2 &= 7^2 \\ x^2 + 9 &= 49 \\ x^2 &= 40 \\ x &= \sqrt{40} = \sqrt{4 \cdot 10} \\ x &= 2\sqrt{10} \end{aligned}$$



$$\sin \theta = \frac{3}{7}$$

$$\csc \theta = \frac{7}{3}$$

$$\cos \theta = \frac{2\sqrt{10}}{7}$$

$$\sec \theta = \frac{7}{2\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}} = \frac{7\sqrt{10}}{20}$$

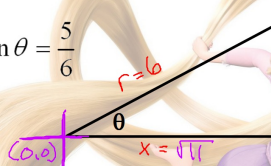
$$\tan \theta = \frac{3}{2\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}} = \frac{3\sqrt{10}}{20}$$

$$\cot \theta = \frac{2\sqrt{10}}{3}$$

D. Paulson

Finding the missing trigonometric functions given only one function.

$$\sin \theta = \frac{5}{6}$$



$$\sin \theta = \frac{5}{6}$$

$$\csc \theta = \frac{6}{5}$$

$$\cos \theta = \frac{\sqrt{11}}{6}$$

$$\sec \theta = \frac{6\sqrt{11}}{11}$$

$$\tan \theta = \frac{5\sqrt{11}}{11}$$

$$\cot \theta = \frac{11}{5}$$

D. Paulson

### Special Right Triangles (From Geometry!)

$\sin 45 = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$   
 $\cos 45 = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$   
 $\tan 45 = \frac{1}{1} = 1$

$\sin 30 = \frac{1}{2}$   
 $\cos 30 = \frac{\sqrt{3}}{2}$   
 $\tan 30 = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

Left triangle:  $45^\circ$ ,  $1=x$ ,  $1=y$ ,  $\sqrt{2}=r$   
 Right triangle:  $30^\circ$ ,  $60^\circ$ ,  $1=x$ ,  $\sqrt{3}=y$ ,  $r=2$

These triangles will help you to find the exact values of angles in the unit circle.

### Special Angles (Make Flashcards!)

	$30^\circ = \frac{\pi}{6}$	$60^\circ = \frac{\pi}{3}$	$45^\circ = \frac{\pi}{4}$
$\sin \theta$	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$
$\cos \theta$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$
$\tan \theta$	$\frac{\sqrt{3}}{3}$	$\sqrt{3}$	1

You must memorize these! NO JOKE!!!