

### 4.3 Circular Functions

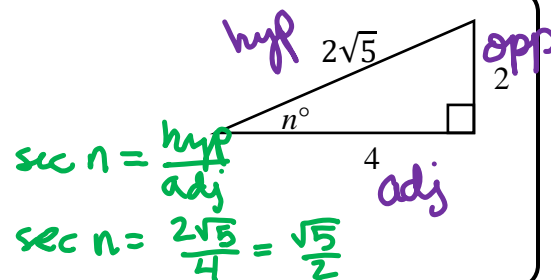
Target 5A: Evaluate trigonometric functions and expressions

Target 5B: Use reference angles to evaluate trigonometric ratios given specific constraints

Review of Prior Concepts

In the following triangle, what is the value of  $\sec n$ ?

- (A)  $\sqrt{5}$     (B)  $2\sqrt{5}$     (C)  $\frac{\sqrt{5}}{2}$     (D)  $\frac{\sqrt{5}}{5}$     (E)  $\frac{2\sqrt{5}}{5}$



### More Practice

#### Trigonometric Ratios

<http://www.themathpage.com/atrig/solve-right-triangles.htm>

<http://www.mathguide.com/lessons/RightTriTrig.html>

<https://www.youtube.com/watch?v=15VbdqRjTXc>

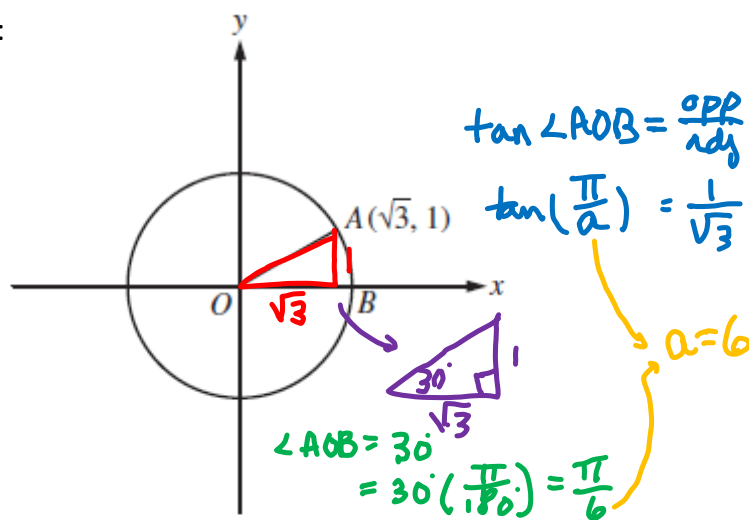


#### SAT Connection

#### Passport to Advanced Math

14. Use structure to isolate or identify a quantity of interest in an expression

Example:



6				
/	○	○		
.	○	○	○	○
0	○	○	○	○
1	○	○	○	○
2	○	○	○	○
3	○	○	○	○
4	○	○	○	○
5	○	○	○	○
6	●	○	○	○
7	○	○	○	○
8	○	○	○	○
9	○	○	○	○

**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

In the  $xy$ -plane above,  $O$  is the center of the circle, and the measure of  $\angle AOB$  is  $\frac{\pi}{a}$  radians. What is the value of  $a$ ?

Solution

Vocabulary



Key Idea	Definition (in your own words)	Sketch/Drawing/Diagram
Initial Side	beginning position of the ray	
Vertex	endpoint of ray	
Terminal Side	final position of the ray	
Positive Angles	counter-clockwise rotations	
Negative Angles	clockwise rotations	
Standard Position	vertex @ origin <u>and</u> initial side on positive x-axis	
Coterminal Angles	angles with <u>same</u> initial side <u>AND</u> <u>same</u> terminal side	

Examples

Sketch the angle  $\theta$  whose terminal side in standard position passes through the given point, and find the six trigonometric functions for  $\theta$ .

1. (9,12)

$9^2 + 12^2 = c^2$   
 $81 + 144 = c^2$   
 $225 = c^2$   
 $15 = c$

$\sin \theta = \frac{12}{15}$   
 $\sin \theta = \frac{4}{5}$      $\csc \theta = \frac{5}{4}$   
 $\cos \theta = \frac{9}{15}$   
 $\cos \theta = \frac{3}{5}$      $\sec \theta = \frac{5}{3}$   
 $\tan \theta = \frac{12}{9}$   
 $\tan \theta = \frac{4}{3}$      $\cot \theta = \frac{3}{4}$

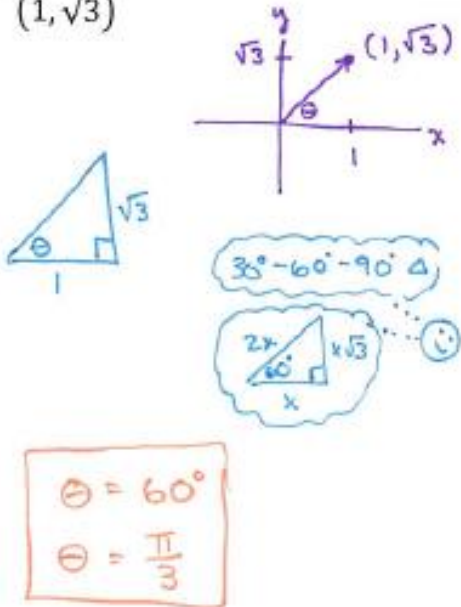
2. (-4,3)

$3^2 + (-4)^2 = c^2$   
 $9 + 16 = c^2$   
 $25 = c^2$   
 $5 = c$

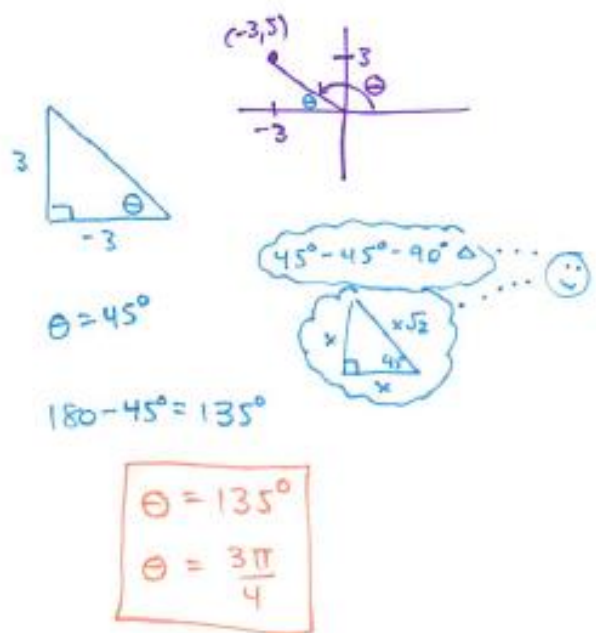
$\sin \theta = \frac{3}{5}$      $\csc \theta = \frac{5}{3}$   
 $\cos \theta = -\frac{4}{5}$      $\sec \theta = -\frac{5}{4}$   
 $\tan \theta = -\frac{3}{4}$      $\cot \theta = -\frac{4}{3}$

Find the angle that passes through the given point. Give your answer in radians and degrees.

3.  $(1, \sqrt{3})$



4.  $(-3, 3)$



More Practice

Exact Value of Angles

<http://www.purplemath.com/modules/quadangs2.htm>

<https://www.youtube.com/watch?v=BZwIbvrcbEQ>

<https://www.youtube.com/watch?v=kpcT8lMAOV4>

Homework Assignment

p.347 #1,3,7,10,13,17,19,25,27,29

**SAT Connection****Solution**

The correct answer is 6. By the distance formula, the length of radius  $OA$  is  $\sqrt{(\sqrt{3})^2 + 1^2} = \sqrt{3 + 1} = 2$ . Thus,  $\sin(\angle AOB) = \frac{1}{2}$ . Therefore, the measure of  $\angle AOB$  is  $30^\circ$ , which is equal to  $30\left(\frac{\pi}{180}\right) = \frac{\pi}{6}$  radians. Hence, the value of  $a$  is 6.