

Trigonometric Ratios of Any Angle

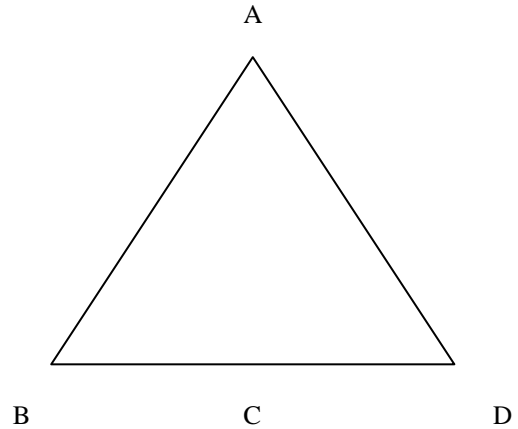
1. 30° , 45° , 60° Trig Values

Consider an equilateral triangle with side lengths of 2.

- Bisect the triangle and label the sides and angles.
- What is the length of BC ?

c. What is the length of AC ?

d. Find the sine and cosine ratios of the angles.

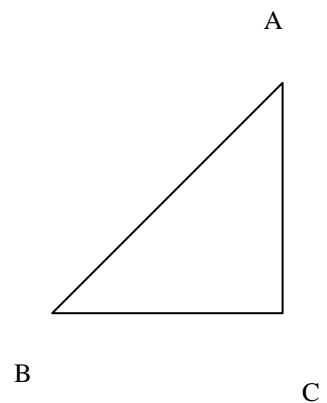


Consider an Isosceles Triangle with side lengths of 1.

e. Label the angles.

f. Find the length of AB .

g. Find the sine and cosine ratios for the angle.



Always give the exact value for Trig Ratios of angles related to 30° , 45° , 60° , and 90°

Trigonometric Ratios of Any Angle

Angles in Standard Position

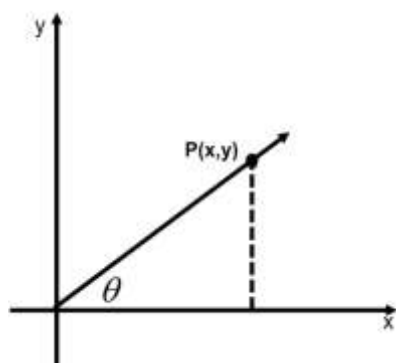
Key Terms:

ANGLE IN STANDARD POSITION

UNIT CIRCLE

INITIAL ARM

TERMINAL ARM



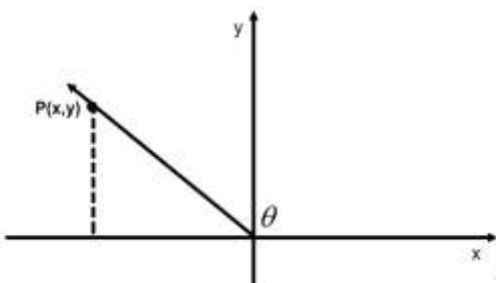
Let $P(x,y)$ be any point on the terminal arm.

Drop a vertical line from P to the x -axis to make a right triangle.

- Find the length of OP . Call it r .

Find the 3 primary trig ratios of θ in terms of x,y , and r .

Example: Given $\sin \theta = \frac{3}{5}$ for an angle θ in Quadrant 1, find $\cos \theta$ and θ .



The terminal arm can be positioned in any quadrant.

The angle of rotation always begins at the positive x -axis (initial arm).

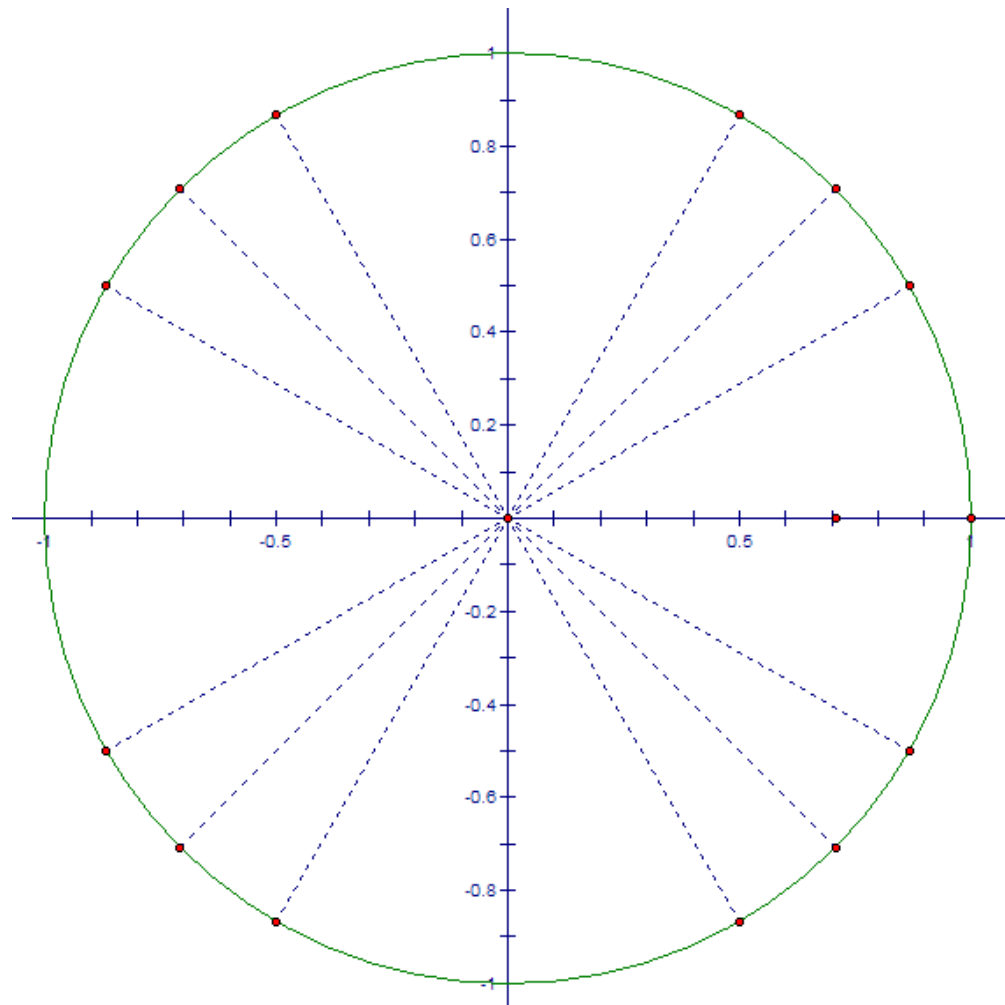
Trig Ratios for θ are still defined by x , y , and r .

Example: An angle lies in the second quadrant with point $P(-7,24)$ on the terminal arm. Find the 3 trig ratios and the angle.

Trigonometric Ratios of Any Angle

Exercise 1 :

- Draw a terminal arm at 30° . (Hint: Divide the first quadrant into thirds)
- Drop a vertical line onto the x-axis.
- The radius of this circle is 1 - use special triangles to determine the lengths of the vertical and horizontal sides of the triangle.
- The Horizontal and Vertical sides of the triangle become the coordinates of the point where the terminal arm meets the unit circle. Label the coordinates of this point.
- REFLECT: How are the values in the triangle related to the sine and cosine of the angle?



Trigonometric Ratios of Any Angle

Exercise 2:

- Repeat Exercise 1 for 45° and 60°

Exercise 3:

- Use the Unit Circle to find exact values for 0° , 90° , 180° , 270° , and 360° .
- Label the coordinates for each of these angles.

Exercise 4:

- Complete the UNIT CIRCLE by adding the angles in the second, third, and fourth quadrants
- Find the trig ratios for 135° using a reference angle of 45° .
 - What reference angle should be used to find the trig ratios for 120° ?
- Use the symmetry of the unit circle to determine the exact values for the angles shown in each quadrant.
- Add the exact values of the trig ratios to the table.

Angle	$\sin\theta$	$\cos\theta$	$\tan\theta$
0			
30			
45			
60			
90			
180			
270			
360			