Angles in Standard Position in All Quadrants Part 2

April-12-19
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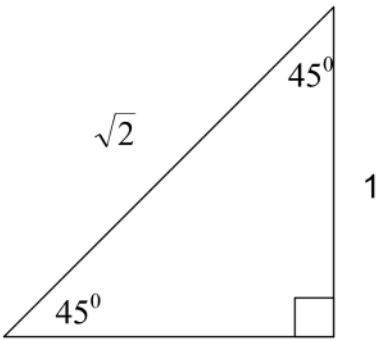
PRE-CALCULUS 11
TRIGONOMETRY
ANGLES IN STANDARD POSITION IN ALL QUADRANTS PART 2

A. Special Right Triangles & Angles

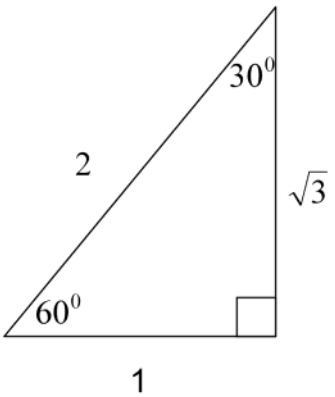
1) The 45^o - 45^o - 90^o Triangle

The ratio for the sides in a 45^0 - 45^0 - 90^0 triangle are always 1,1, $\sqrt{2}$



2) The 30^0 - 60^0 - 90^0 Triangle

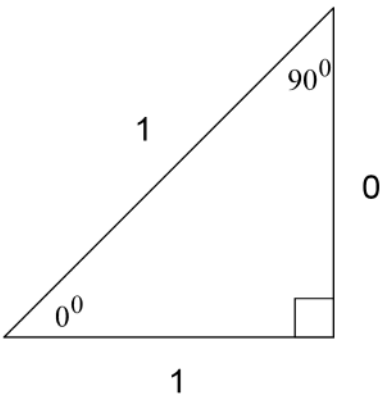
The ratio for the sides in a 30^0 - 60^0 - 90^0 triangle are always 1, $\sqrt{3}$, 2



3) The 0^0- 90^0- 90^0 Triangle (Quadrantal Angles) $0°, 90°, 180°, 270°, 360°$

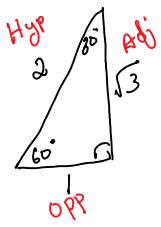
This is an impossible triangle to create because you can't actually have an angle of 0^0 inside of a triangle. It does, however, help to explain how we find trigonometry functions for quadrantal angles like 0^0 and 90^0.

The ratio for the sides in a 0^0- 90^0- 90^0 triangle are always 0, 1 , 1



Use your knowledge of Special Triangles to find the following trig ratios.

a) $Sin30^0$



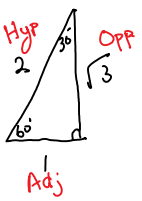
$\sin 30° = \frac{1}{2}$

b) $Sin45^0$

$\sin 45° = \frac{1 \times \sqrt{2}}{\sqrt{2} \times \sqrt{2}}$

$\sin 45° = \frac{\sqrt{2}}{2}$

c) $Tan60^0$



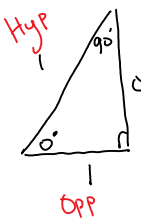
$\tan 60° = \frac{\sqrt{3}}{1}$ or $\sqrt{3}$

d) $Sin0^o$

$\sin 0° = \frac{0}{1}$

$\sin 0° = 0$

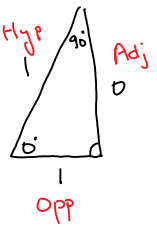
e) $Cos90^o$



$\cos 0° = \frac{0}{1}$

$\cos 90° = 0$

f) $Tan90^0$



$\tan 90° = \frac{1}{0}$

Undefined

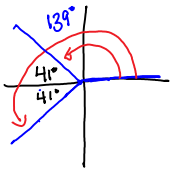
$\tan 90°$ = No Solution

B. Examples

1) To the nearest degree, which values of θ satisfy the equation for $0^0 \le \theta \le 360^0$?

Q1 – Q4

a) $\cos\theta = -\frac{3}{4}$



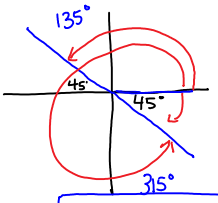
Q2 & Q3

$\angle\theta = 139°$ or $\angle\theta = 221°$

b) $\tan\theta = -1$

Q2 & Q4

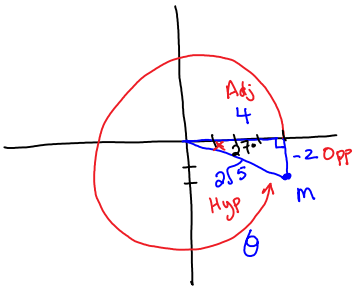
$-45°$ clockwise.



$\angle\theta = 315°$ or $\angle\theta = 135°$

2) The point $M(4,-2)$ lies on the terminal arm of an angle θ in standard position. Determine:

a) the primary trigonometric ratios of θ
b) the measure $\angle\theta$ to the nearest degree



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

$(4)^2 + (-2)^2 = c^2$

$16 + 4 = c^2$

$20 = c^2$

$c = \pm\sqrt{20}$ $\sqrt{4}\cdot\sqrt{5}$

$c = 2\sqrt{5}$

a) $\sin\theta = \frac{-2}{2\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{-2\sqrt{5}}{10} = -\frac{\sqrt{5}}{5}$

$\cos\theta = \frac{4}{2\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{4\sqrt{5}}{10} = \frac{2\sqrt{5}}{5}$

$\tan\theta = \frac{-2}{4} = -\frac{1}{2}$

b) $-27°$ clockwise

$\angle\theta = 333°$

Assignment: Pg. 451 #9, 10, 13, 14, 15, 16