Angles in Standard Position in Quadrant 1

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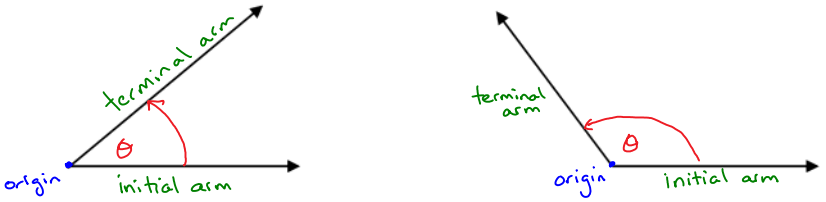
PRE-CALCULUS 11
TRIGONOMETRY
ANGLES IN STANDARD POSITION IN QUADRANT 1

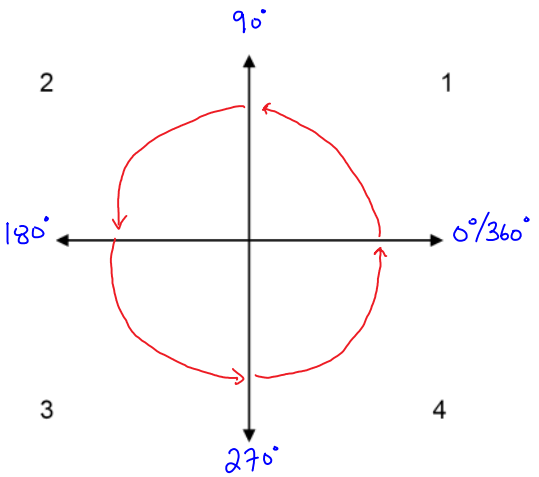
A. Definitions

1. **Quadrant:** the area of the coordinate graph that the point or shape is located.
2. **Theta:** a Greek Symbol θ , used to represent an angle.
3. **Standard Position:** an angle whose endpoints are at the origin and whose initial arm lies on the positive side of the x-axis. The positive angles are measured in a counter clockwise direction.
4. **Initial Arm:** the arm where the angle begins and is measured from.
5. **Terminal Arm:** the arm of an angle in standard position that meets the initial arm at the origin to form an angle.



B. Quadrants on a Coordinate Graph

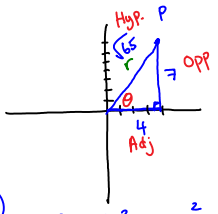
Remember from Grade 9 the way the coordinate graph is divided into quadrants.



The coordinate graph is broken into 4 quadrants. Each quadrant is labelled with a number (1, 2, 3, 4). It is important to learn the quadrants of the graph and which quadrant a specific point is located in.

C. Examples

1) The point $P(4,7)$ is on the terminal arm of an angle θ in standard position.
   a) Determine the distance r from the origin to point P.
   b) Determine the primary trigonometric ratios of θ.
   c) Determine the measure of θ to the nearest degree.



a)
$a^2 + b^2 = c^2$
$(4)^2 + (7)^2 = c^2$
$16 + 49 = c^2$
$65 = c^2$
$c = \pm\sqrt{65}$
$c = \sqrt{65}$
$r = \sqrt{65}$

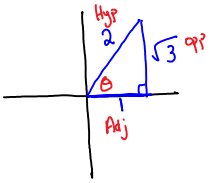
b) $\sin\theta = \frac{7}{\sqrt{65}} \times \frac{\sqrt{65}}{\sqrt{65}} = \frac{7\sqrt{65}}{65}$

$\cos\theta = \frac{4}{\sqrt{65}} \times \frac{\sqrt{65}}{\sqrt{65}} = \frac{4\sqrt{65}}{65}$

$\tan\theta = \frac{7}{4}$

c) $\angle\theta = 60°$

2) If angle θ is in standard position in Quadrant 1 and $\sin\theta = \frac{\sqrt{3}}{2}$, determine $\cos\theta$ and $\tan\theta$.



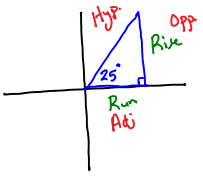
$\sin\theta = \frac{\sqrt{3}}{2}$ Opp / Hyp.

$a^2 + b^2 = c^2$
$a^2 + (\sqrt{3})^2 = (2)^2$
$a^2 + 3 = 4$
$-3 \quad -3$
$a^2 = 1$
$a = \pm\sqrt{1}$
$a = 1$

$\cos\theta = \frac{1}{2}$

$\tan\theta = \frac{\sqrt{3}}{1}$ or $\sqrt{3}$

3) Determine the slope of the terminal arm for an angle of 25^o in standard position. Round your answer to one decimal place.



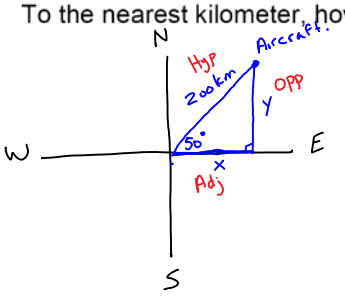
Slope = Tan 25°

= 0.4663...

= 0.5

Slope = $\frac{\text{Rise}}{\text{Run}}$.

4) An aircraft makes an emergency landing 200 km from an airport. It's heading from the airport was $E50^oN$. The rescue team has to travel east then north to get to the aircraft. To the nearest kilometer, how far will the team travel to reach the aircraft?



Never Eat Soggy Wheat.

E50°N means the angle is measured from east to north

$200\left[\cos 50^\circ = \frac{x}{200}\right]$

$(200)(\cos 50^\circ) = x$

$x = 128.557...$

$200\left[\sin 50^\circ = \frac{y}{200}\right]$

$(200)(\sin 50^\circ) = y$

$y = 153.208...$

128.557 + 153.208

= 281.765

= 282 km

Assignment: Pg. 431 #1 - 12