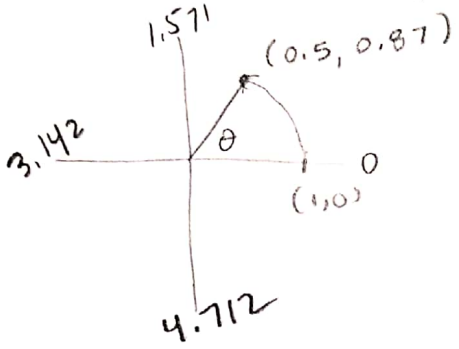
Honors Pre-calculus

Name key Hour ____

Using Sine and Cosine to track circular motion Round 3 dec.

1) An arctic village skiing trail has a radius of 1 kilometer. A skier started at position (1,0) on a coordinate axes and skied counter-clockwise. After skiing counter-clockwise, the skier paused for a rest at the point (0.5,0.87). Draw a diagram of the situation described. Find the central angle (measured in radians) the represents the amount of turn from the start position to the resting point.

rounded #s



$\cos\theta = 0.5$ $\quad \theta = 1.047$ Radians

$\sin\theta = 0.87$ $\quad \theta = 1.055$

2) A second arctic village maintains a circular cross-country ski trail that has a radius of 2.5 km. A skier started skiing from the position (2.5,0) and skied counter-clockwise for 2.75 km. before stopping for a rest.

a) Find the number of radius lengths the skier has traveled around the circular path. (In other words, find the central angle measured in radians)

$s = r\theta$

$\theta = \frac{s}{r}$

$\theta = \frac{2.75}{2.5} = 1.1$

b) Determine the ordered pair (measured in km) on the coordinate axes that identifies the location where the skier rested.

$(r\cos\theta, r\sin\theta)$

$(2.5\cos 1.1, 2.5\sin 1.1)$

$(1.134, 2.226)$

The skier then continued along the trail, traveling counter-clockwise until he had traveled for a total of 10 km before stopping for another rest.

c) Determine the ordered pair (measured in km) on the coordinate axes that identifies the location where the skier rested after traveling a total of 10 km.

$\theta = \frac{10}{2.5} = 4$

$(2.5\cos 4, 2.5\sin 4)$

$(-1.634, -1.892)$

Suppose that a different skier skiing from the position (2.5,0) skied **clockwise** for 5 km before stopping for a rest.

Neg $\quad \theta = -\frac{5}{2.5} = -2$

d) Determine the ordered pair (measured in km) on the coordinate axes that identifies the location where the skier rested.

$(2.5\cos(-2), 2.5\sin(-2))$

$(-1.040, -2.273)$