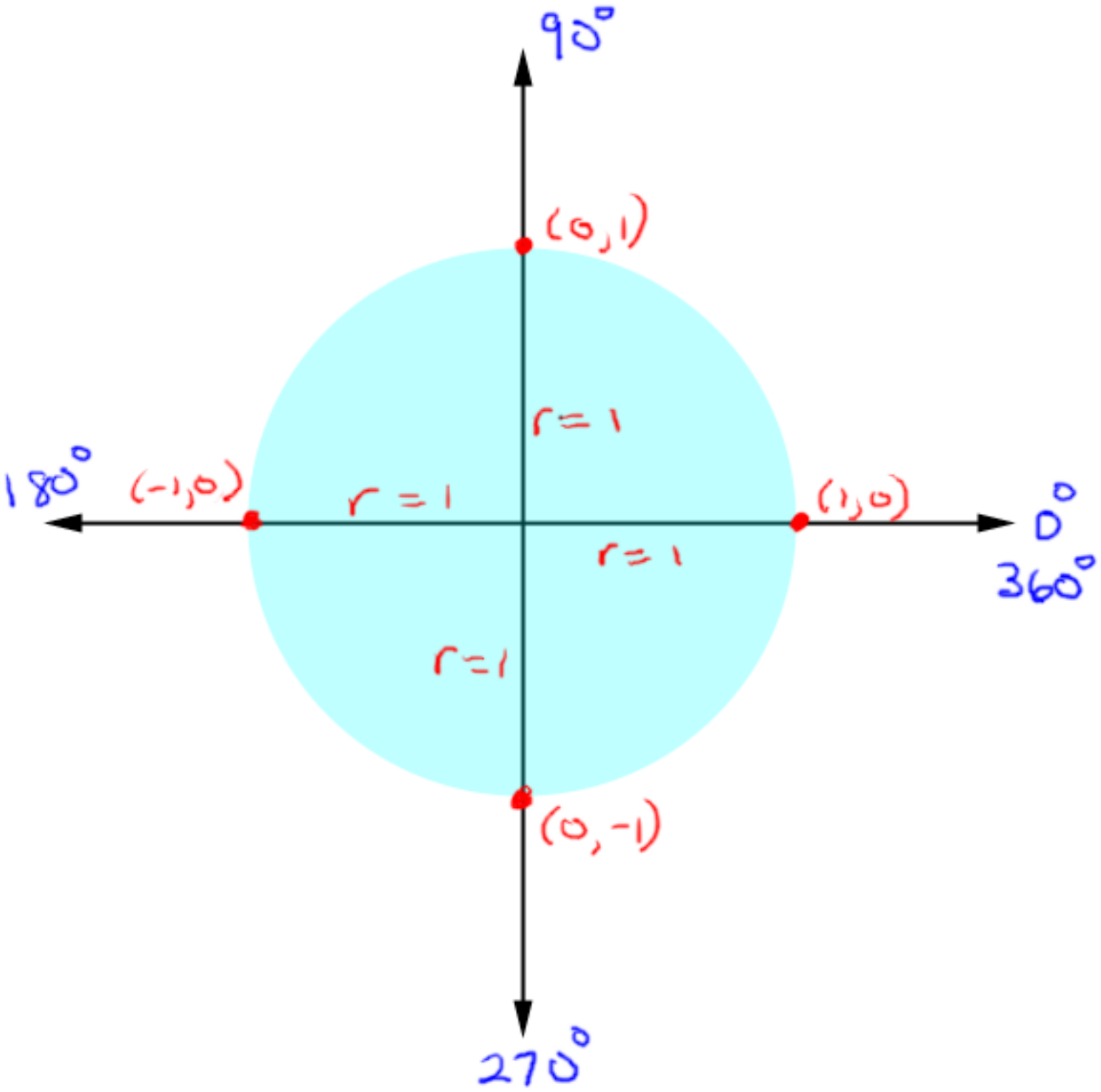
Algebra 2 Lesson 12-3 The Unit Circle

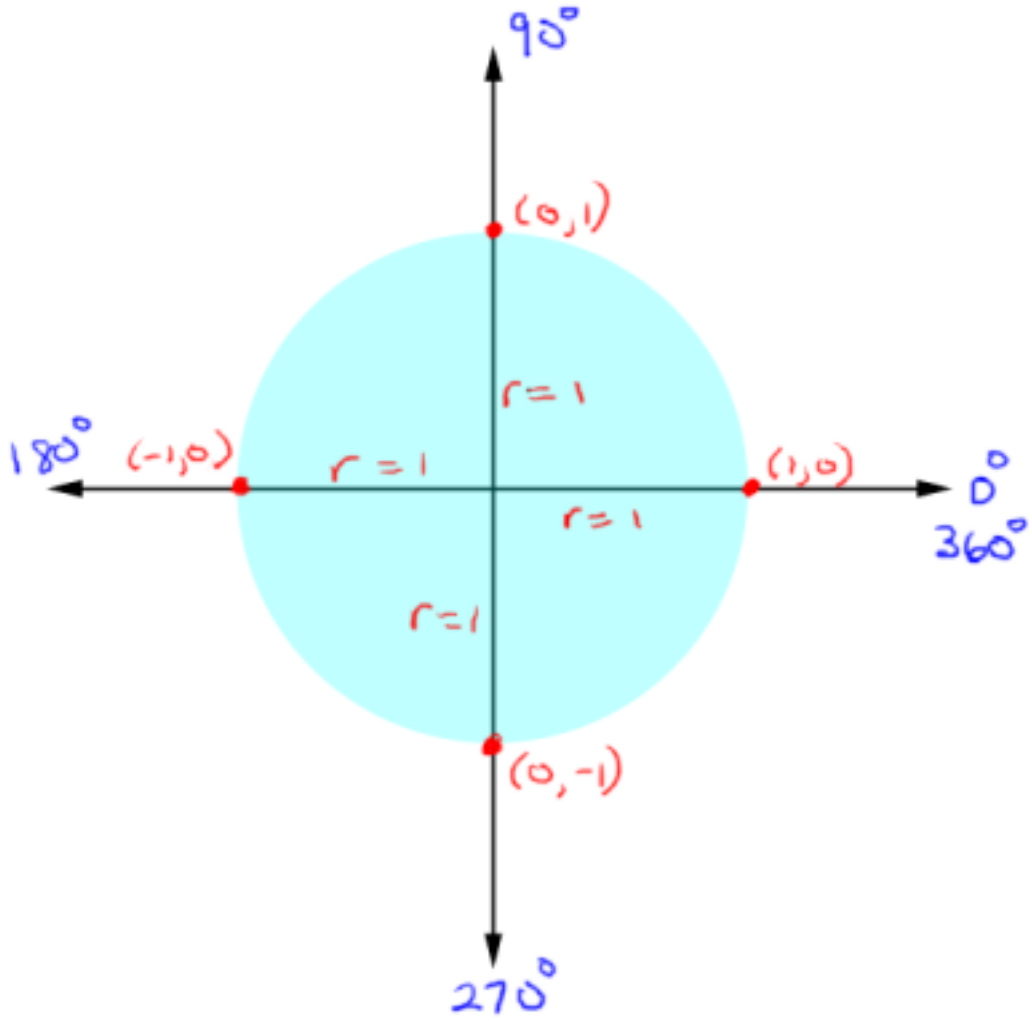
While we can find the Trig. ratios for many angles using the 30°, 60°, 90° and 45°, 45°, 90° triangles from Geometry, we need something else to help us find the Trig. ratios for the Quadrantal angles (angles whose terminal sides are on the ***x*** or ***y*** axis: 0°, 90°, 180°, 270°, and 360°.)

The Unit Circle is a circle whose center is at the origin (0, 0) and has a radius of one. This circle intersects the ***x*** and ***y*** axis at four points: (1,0), (0,1), (-1,0), (0,-1).


90°
(0,1)
r = 1
180°
(-1,0)
r = 1
(1,0)
0°
360°
r = 1
r = 1
(0,-1)
270°

Ex 1) Find all six Trig. ratios for 270°.

For our 270° angle, our (x, y) coordinates are (0, -1) and our radius is 1.



$\sin 270^\circ = \frac{y}{r} = \frac{-1}{1} = -1$

$\cos 270^\circ = \frac{x}{r} = \frac{0}{1} = 0$

$\tan 270^\circ = \frac{y}{x} = \frac{-1}{0} =$ undefined

$\csc 270^\circ = \frac{r}{y} = \frac{1}{-1} = -1$

$\sec 270^\circ = \frac{r}{x} = \frac{1}{0} =$ undefined

$\cot 270^\circ = \frac{x}{y} = \frac{0}{-1} = 0$