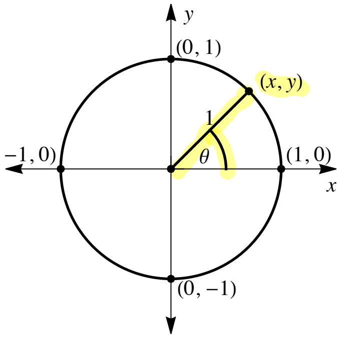
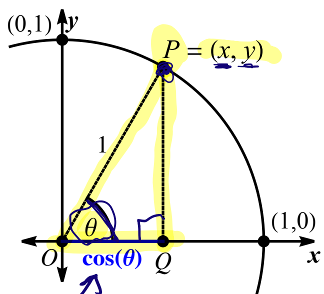
Trigonometry 7: The Definition of Cosine

When began looking at points on the unit circle, we started by considering a radial line making an angle with the positive x-axis. We called the angle formed θ and we said the corresponding coordinate point on the unit circle had an x-coordinate x and a y-coordinate y, as shown in this figure:



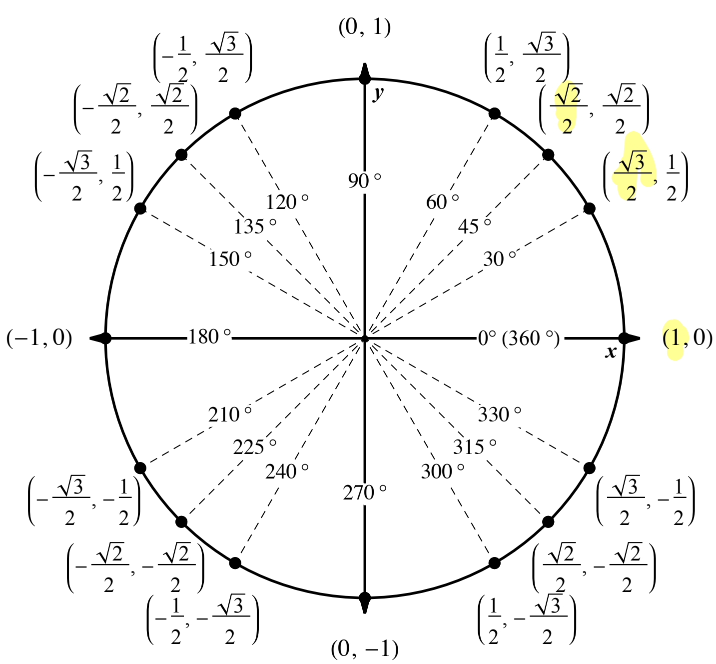
Consider a Unit Circle with some point (in the first quadrant) with coordinate point $P = (x, y)$. As before, a radial line from this point to the origin (point O) makes an angle θ with the positive x-axis, as shown in the figure below:



Since it is very cumbersome for mathematicians to have to say "the corresponding x-coordinate for the point on the unit circle when a radial line makes an angle of θ degrees with the x-axis", they instead use shorthand notation:

$\cos(\theta) = x$

or, in words, the **cosine** of θ is x. Very often the parentheses are omitted and we use: $\cos\theta = x$. Also note that $\cos(\theta)$ corresponds to the length OQ (highlighted in blue).



θ	$\cos\theta$	θ	$\cos\theta$
0°	1	180°	-1
30°	$\sqrt{3}/2$	210°	$-\sqrt{3}/2$
45°	$\sqrt{2}/2$	225°	$-\sqrt{2}/2$
60°	$1/2$	240°	$-1/2$
90°	0	270°	0
120°	$-1/2$	300°	$1/2$
135°	$-\sqrt{2}/2$	315°	$\sqrt{2}/2$
150°	$-\sqrt{3}/2$	330°	$\sqrt{3}/2$