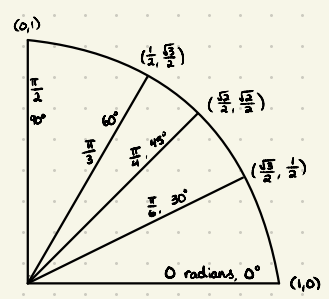


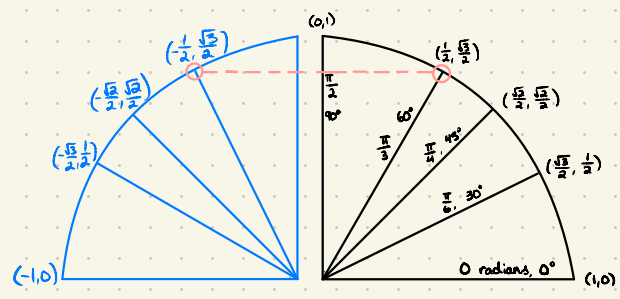
Finishing the Unit Circle

On the exam, only the first quadrant of the unit circle is given:



We can use symmetries to fill out the rest of it.

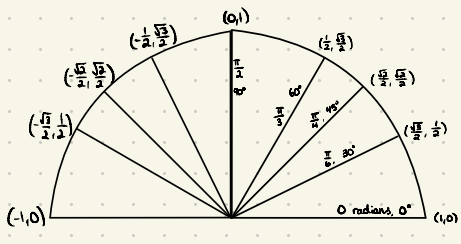
Quadrant II:



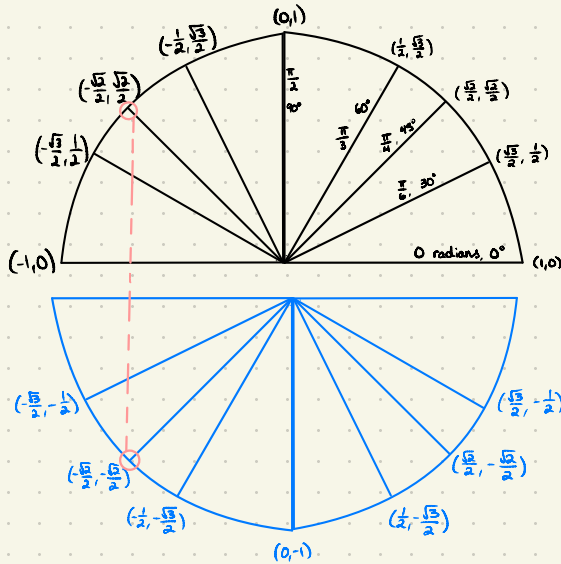
First, draw the mirror image of the given quadrant. Take one of the given points, and find the point in quadrant II that lies on the same horizontal line. The coordinates of this point will be the same as the given point, except the x-coordinate will be negative. (This is just a reflection over the y-axis)

Quadrants III + IV:

We now have quadrants I + II:



We again begin by drawing the mirror image of what we have, this time in the bottom half plane

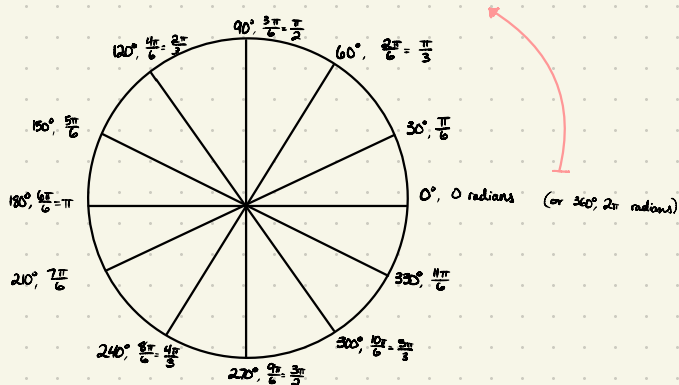


We can then take any point we have and find the point in the bottom half plane that lies on the same vertical line. The coordinates will be the same as the known point, except the y-value will be negative.

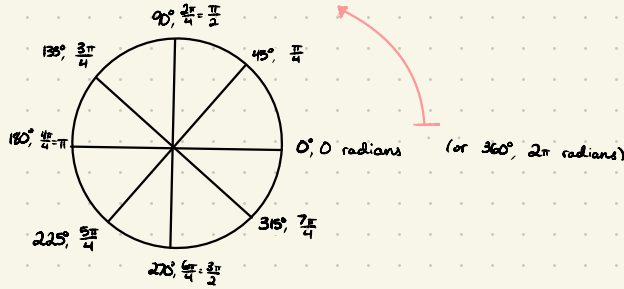
Angles

There are a few ways to fill in the radians/degrees of the angles, pick whichever method makes the most sense to you or whichever is easiest to remember

Remember that a full circle has $360^\circ / 2\pi$ radians. Then, you can imagine the unit circle being split into 12 equal sections. Each section will have an internal angle of $\frac{2\pi}{12} = \frac{\pi}{6}$ radians and $\frac{360}{12} = 30$ degrees. So, since we know the positive x-axis corresponds to 0 radians / 0 degrees, we can just count counterclockwise from there



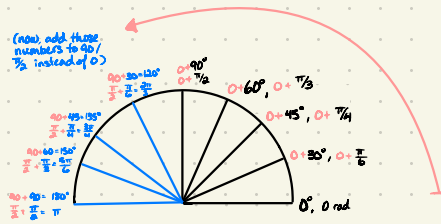
This accounts for nearly all the unit circle angles. The rest we can obtain by splitting the circle into 8 equal sections. Each section will have an internal angle of $\frac{360}{8} = \frac{45}{1}$ radians, or $360/8 = 45^\circ$. We can again count counterclockwise, starting from the positive x-axis.



This then completes the unit circle.

Alternatively, we can note that in the given quadrant of the unit circle, we add $30^\circ/\frac{\pi}{6}$ radians to 0 to get the first line, we add $45^\circ/\frac{\pi}{4}$ radians to 0 to get the second, we add $60^\circ/\frac{\pi}{3}$ rad for the third, and finally $90^\circ/\frac{\pi}{2}$ rad for the last. To fill in the rest, we just repeat that pattern.

As an example, quadrant II:



Then, for quadrant III, we add those numbers in that order to $180^\circ/\pi$ instead. For IV, we add to $270^\circ/\frac{3\pi}{2}$