

How to Make the Unit Circle

1. Make a circle (nice and big, most of a page).
2. Put the x-y axes through the circle, center of circle being the origin of the x-y axes.
3. Put the origin (0,0).
4. Put quadrant signs (+,+), (-,+), (-,-), (+,-).
5. Put the four axis points (1,0), (0,1), (-1,0), (0,-1).
6. Put the basic degrees 0° , 90° , 180° , 270° , 360° .
7. Note: (x, y) is (cos, sin) for each of the points. So $\cos 90^\circ = 0$, $\sin 90^\circ = 1$.
8. The 45° point on the unit circle:
 - a. Make the 45° - 45° - 90° triangle at the bottom of the page. Sides are 1, 1, $\sqrt{2}$.
 - b. Put the 45° point on the unit circle.
 - c. Use the triangle to figure out cosine and sine, and put on unit circle. ($\sqrt{2}/2$, $\sqrt{2}/2$).
 - d. Put the corresponding 45° points in each quadrant, as 135° , 225° , 315° .
 - e. Put (cos, sin) for each quadrant's 45° point. Change signs based on quadrant.
9. The 30° point on the unit circle:
 - a. Make the 30° - 60° - 90° triangle at the bottom of the page. Sides are 1, $\sqrt{3}$, 2.
 - b. Put the 30° point on the unit circle.
 - c. Use the triangle to figure out cosine and sine, and put on unit circle. ($\sqrt{3}/2$, $1/2$).
 - d. Put the corresponding 30° points in each quadrant:
 - i. Reference angles, using the x-axis, from 180° and 360° .
 - ii. The 30° reference angles are 150° , 210° , 330° .
 - e. Put (cos, sin) for each quadrant's 30° point. Change signs based on quadrant.
10. The 60° point on the unit circle:
 - a. Use the 30° - 60° - 90° triangle from above.
 - b. Put the 60° point on the unit circle.
 - c. Use the triangle to figure out cosine and sine, and put on unit circle. ($1/2$, $\sqrt{3}/2$).
 - d. Put the corresponding 60° points in each quadrant:
 - i. Reference angles, using the x-axis, from 180° and 360° .
 - ii. The 60° reference angles are 120° , 240° , 300° .
 - e. Put (cos, sin) for each quadrant's 60° point. Change signs based on quadrant.
11. Radians:
 - a. The four main points: $\pi/2$ (90°), π (180°), $3\pi/2$ (270°), 2π (360°).
 - b. 45° point and the corresponding 45° points in each quadrant: $\pi/4$, $3\pi/4$, $5\pi/4$, $7\pi/4$.
 - c. 30° point and all around the unit circle, **always** reducing when possible: $\pi/6$, $2\pi/6$, $3\pi/6$, $4\pi/6$, $5\pi/6$, $6\pi/6$, $7\pi/6$, $8\pi/6$, $9\pi/6$, $10\pi/6$, $11\pi/6$, $12\pi/6$.
 - i. Note that some of the $\pi/6$ points match the 60° points (such as $2\pi/6 = \pi/3 = 60^\circ$).
 - ii. Note that some of the $\pi/6$ points match the 4 main points (such as $3\pi/6 = \pi/2 = 90^\circ$). $6\pi/6 = \pi = 180^\circ$, etc.