Name: _____ Date: _____

THE UNIT CIRCLE
MATH III HONORS

The basis of trigonometry will be a very special circle known as **the unit circle**. This is simply a circle that has its center located at the origin and has a radius equal to one unit (hence the name "unit").

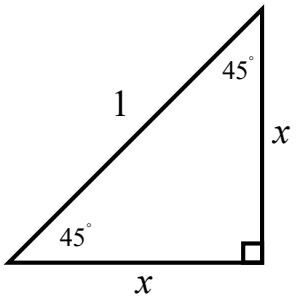
***Exercise* #1:** From our work with equations of circles, which of the following would represent the equation of the unit circle?

(1) $x + y = 1$ (3) $x^2 + y^2 = 1$

(2) $y = x^2 + 1$ (4) $(x-1)^2 + (y-1)^2 = 1$ _____

Next we will seek to produce some of the coordinate points that lie on the unit circle through the use of the Pythagorean Theorem. The next two exercises will illustrate the important right triangles we will need.

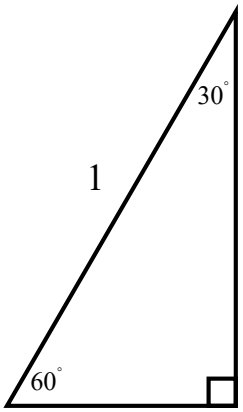
***Exercise* #2:** Consider the right triangle shown whose hypotenuse is equal to one and whose angles are both equal to 45°. Since this is an isosceles right triangle, the two equal sides are labeled *x*. Solve for *x* and place your answer in simplest radical form.



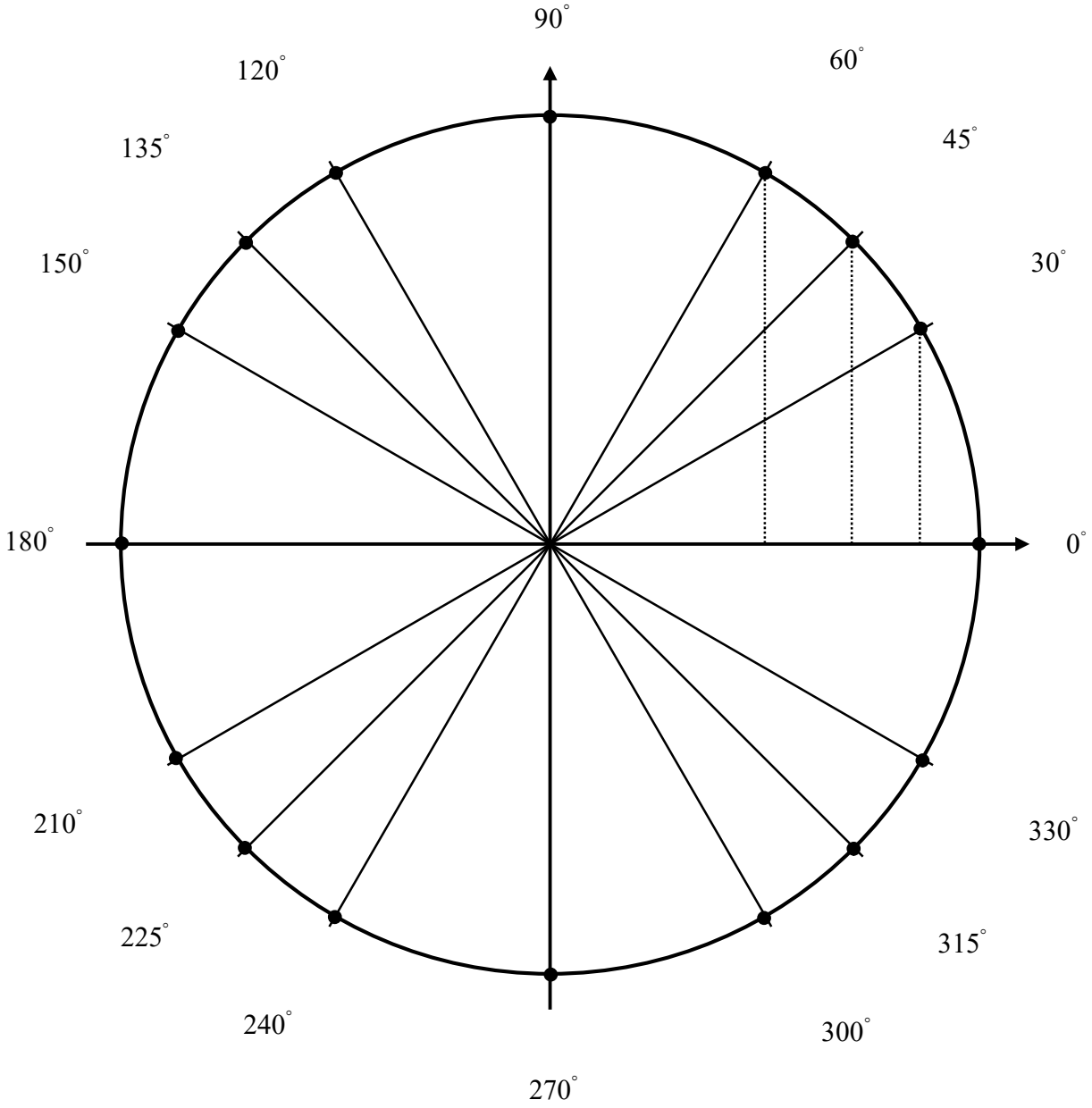
***Exercise* #3:** Consider the 30°-60° right triangle shown whose hypotenuse is equal to one. Clearly this triangle is half of an equilateral triangle.

(a) What is the length of the shorter side of this right triangle?

(b) Using the Pythagorean Theorem, find the length of the longer side in simplest radical form.



***Exercise* #4:** The diagram below represents the **unit circle**. Based on your work from *Exercises* #2 and #3, fill in the ordered pairs at each of the following angles that are assumed to be drawn in standard position.



***Exercise* #5:** For each of the following angles drawn in standard position, give the coordinate pair from the unit circle.

(a) -120° (b) 495° (c) $\frac{\pi}{3}$ (d) $\frac{3\pi}{2}$