6.2.1 Special Triangles and The Unit Circle
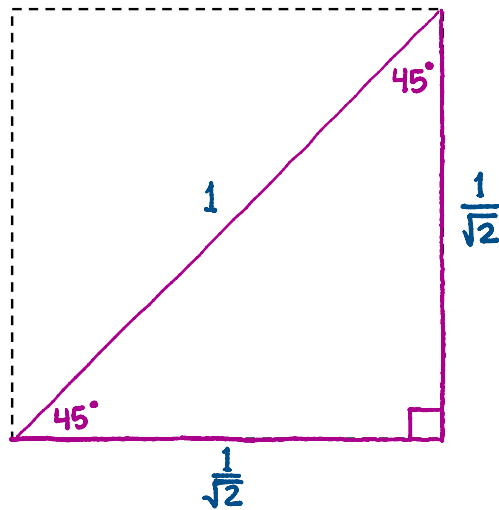
The Unit Circle

Construct the special triangles (30 – 60 – 90) and (45 – 45 – 90) and label the side lengths such that the hypotenuse is 1. (*Hint: You may need to apply the Pythagorean Theorem to determine the other side lengths.*)

45 – 45 – 90 triangle:
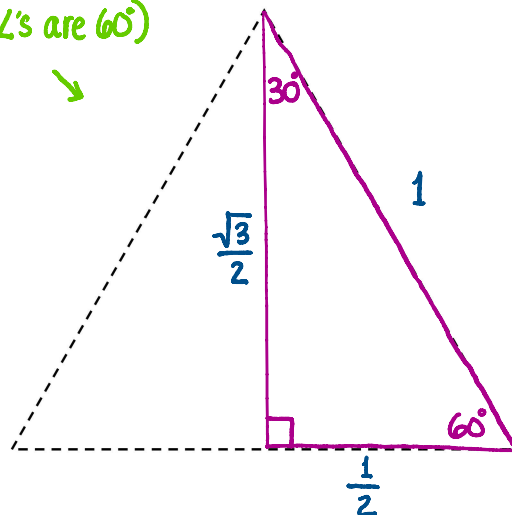
$$a^2 + b^2 = c^2$$
$$a^2 + a^2 = 1^2$$
$$2a^2 = 1$$
$$a^2 = \frac{1}{2}$$
$$a = \sqrt{\frac{1}{2}} = \frac{\sqrt{1}}{\sqrt{2}} = \frac{1}{\sqrt{2}}$$

Triangle labels: $45°$, $45°$, sides 1, $\frac{1}{\sqrt{2}}$, $\frac{1}{\sqrt{2}}$

30 – 60 – 90 triangle:

equilateral $\triangle$
(all $\angle$'s are $60°$)

$$a^2 + \left(\frac{1}{2}\right)^2 = 1^2$$
$$a^2 + \frac{1}{4} = 1$$
$$a^2 = \frac{3}{4}$$
$$a = \sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{\sqrt{4}} = \frac{\sqrt{3}}{2}$$

Triangle labels: $30°$, $60°$, sides 1, $\frac{\sqrt{3}}{2}$, $\frac{1}{2}$