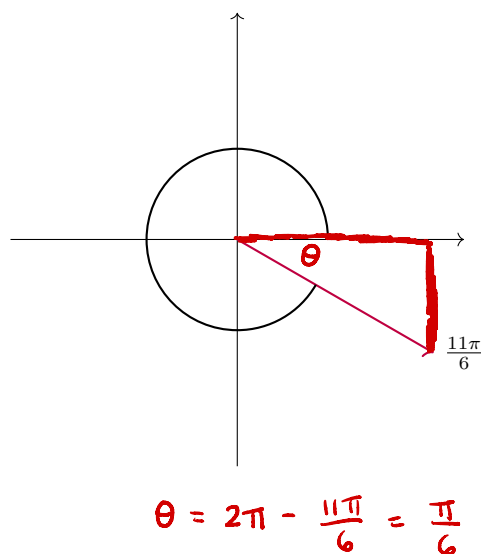
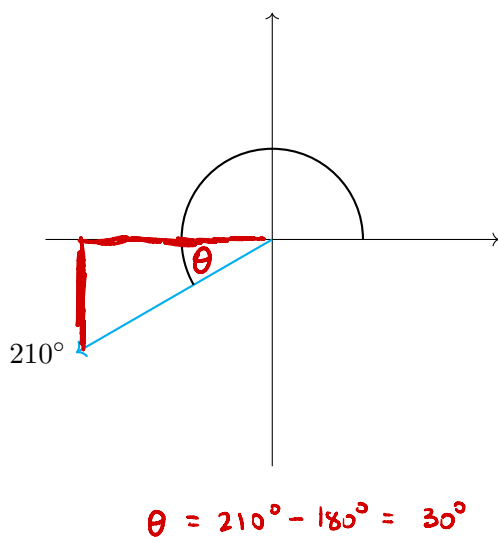
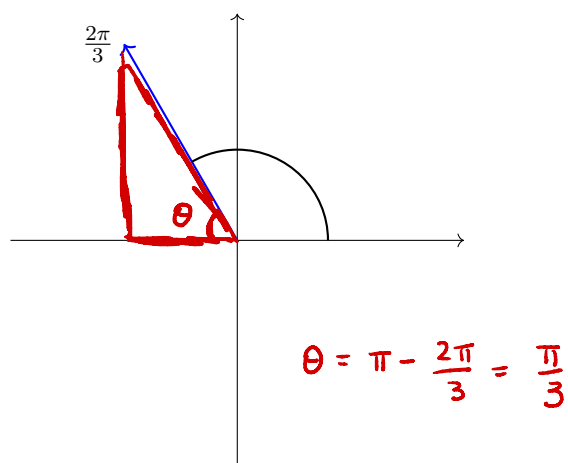
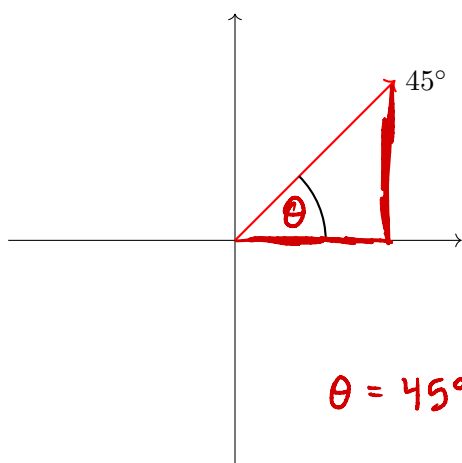


Unit Circle and Reference Angles

Definition. The **reference angle** of an angle θ is the positive acute angle formed between the terminal side of a given angle and the x -axis.

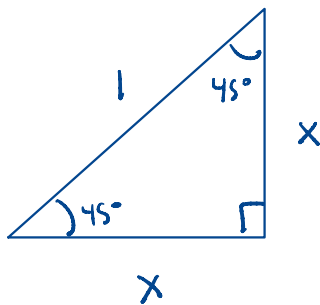
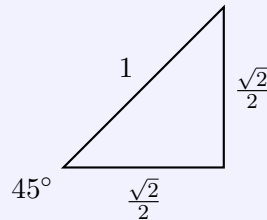
Example. Compute the reference angle of the following angles.



Special Triangles

45-45-90 Triangles

Theorem. If a right triangle has angles measuring 45° , 45° , and 90° , and the hypotenuse is of length 1, then both legs have length $\frac{\sqrt{2}}{2}$.



Since both angles are 45° , the opposite sides are equal (i.e. this is an isosceles triangle)

By the Pythagorean Thm,

$$x^2 + x^2 = 1$$

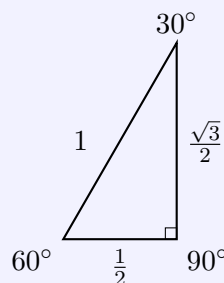
$$2x^2 = 1$$

$$x^2 = \frac{1}{2} \Rightarrow x = \sqrt{\frac{1}{2}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$\swarrow a^2 + b^2 = c^2$

30-60-90 Triangles

Theorem. If a right triangle has angles measuring 30° , 60° , and 90° , and the hypotenuse is of length 1, then the sides are:



$\swarrow$ Can use the Pythagorean Thm to get these sides like above.

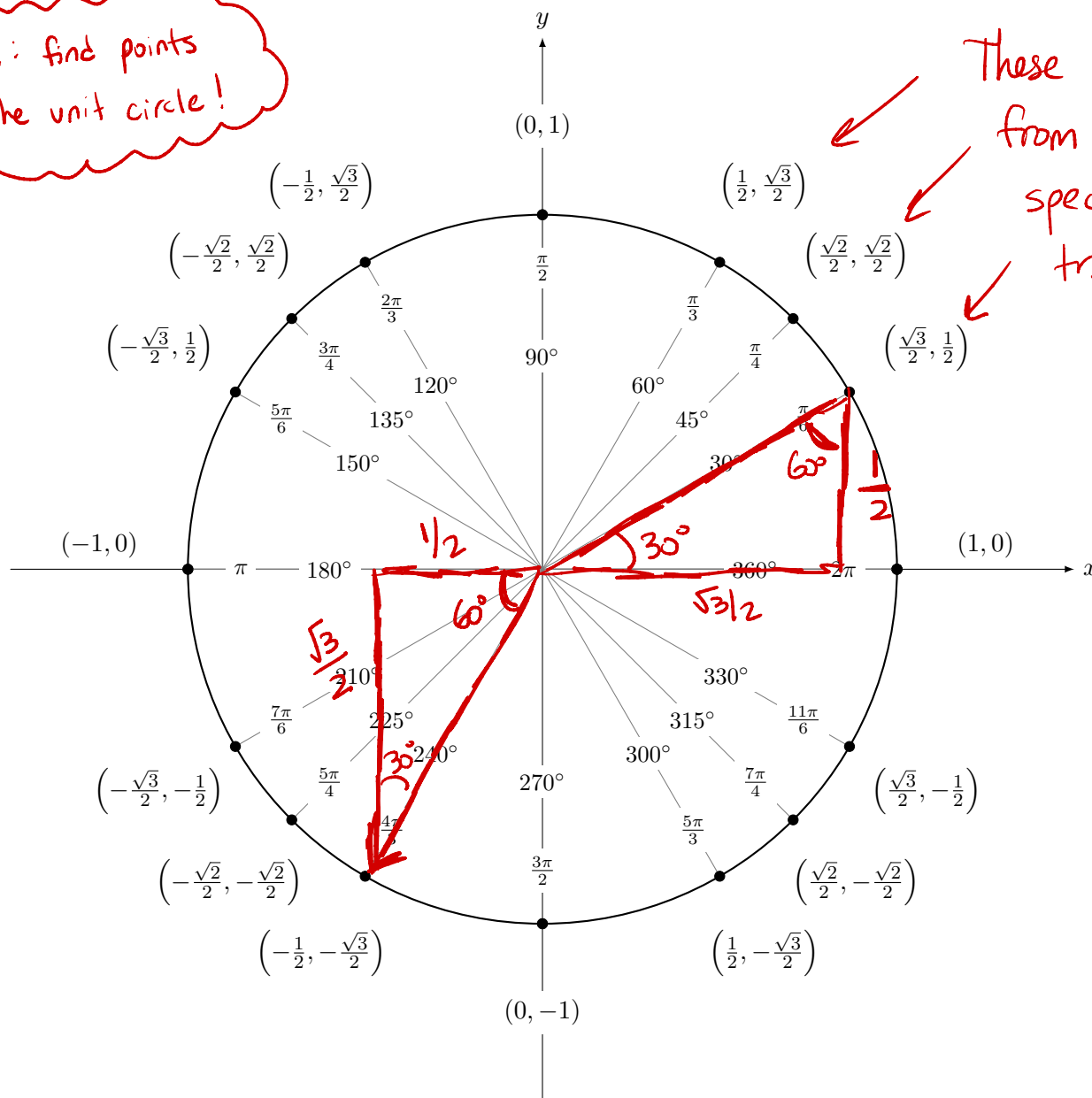
The Unit Circle

The **unit circle** is the circle with radius 1, centered at the origin. Its equation is given by:

$$x^2 + y^2 = 1$$

By the Pythagorean Thm, this describes all triangles with hypotenuse 1. The sides are x and y (or $|x|$ and $|y|$)

Goal: find points on the unit circle!



These come from the special triangles

Quadrants II, III, and IV come from symmetry or reference angles.