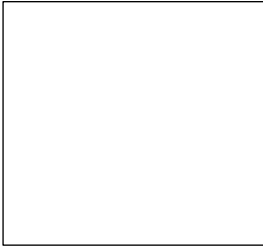
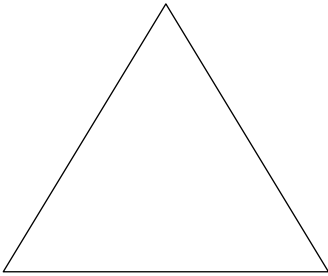


Trig Ratios for "Special" Angles

In order to quickly derive the special triangles, all you have to remember are a square with side length of 1 and an equilateral triangle with a side length of 2.



This leads to the first special triangle:

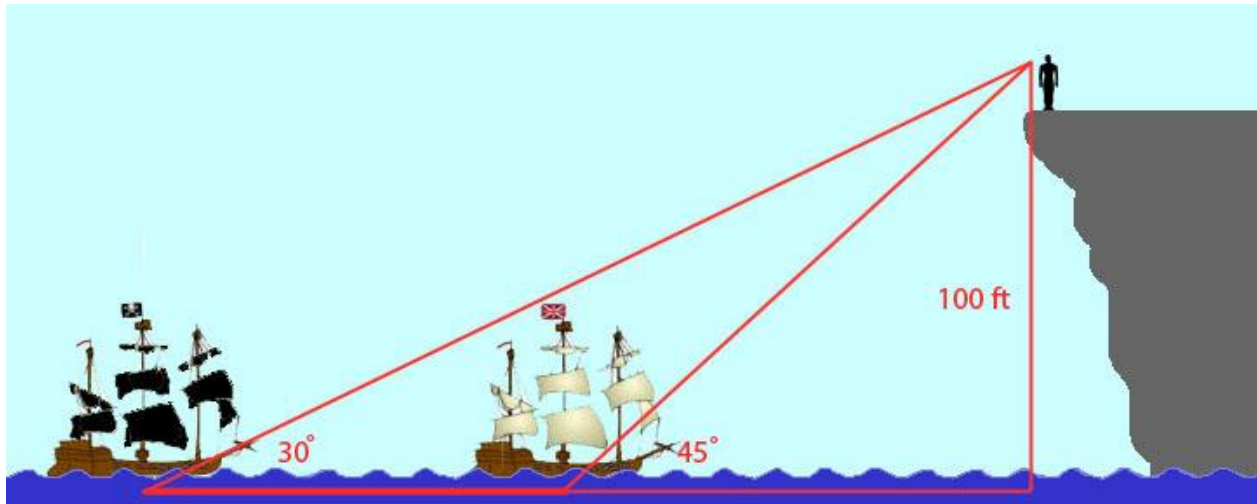


This leads to the second special triangle:



Special triangles can be used to solve many mathematical problems.

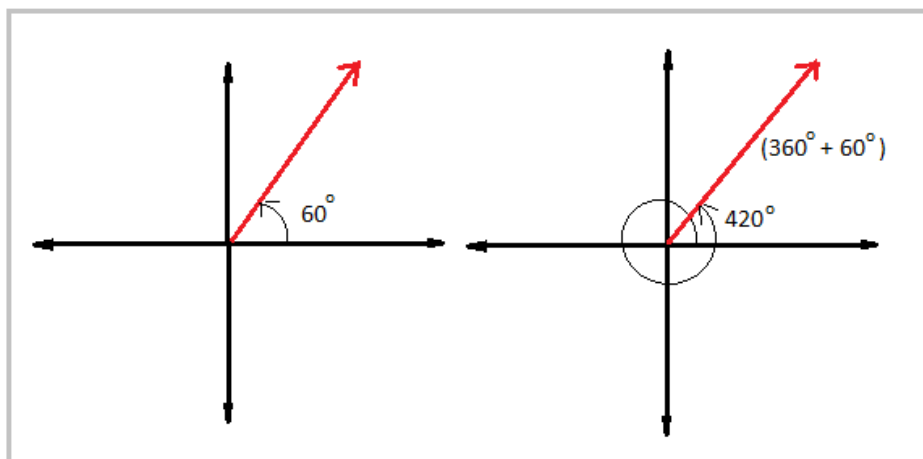
Example The angles of elevation from 2 ships to the top of a nearby cliff are 30° and 45° . The height of the cliff is 100 feet. Find the exact distance of each ship from the cliff.



By representing rotation angles on the Cartesian Plane, we can also find the exact trig ratios for any angle related to these acute special angles. Before we do that, there is some terminology we need to introduce/review.

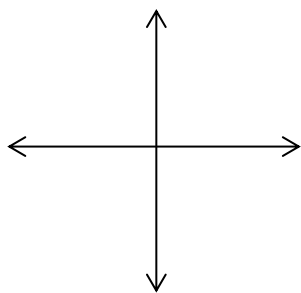
Rotation Angles

An angle in the Cartesian Plane is in standard position if its vertex is at the origin and its initial arm lies on the positive x-axis.

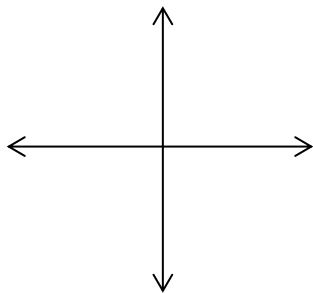


Example Sketch each angle in standard position.

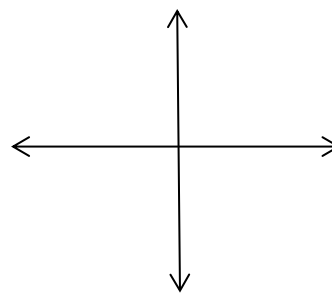
a. 270°



b. -45°

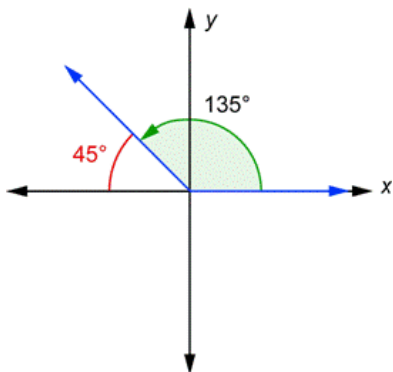


c. 120°



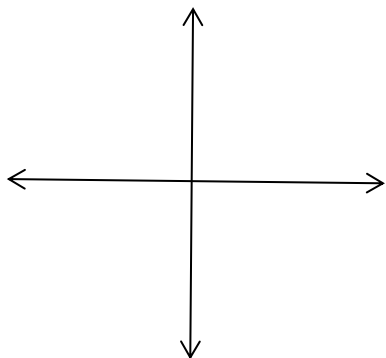
Reference Angles

For any angle in the Cartesian Plane, the reference angle is the positive acute angle between the terminal arm and the x-axis. For example, the reference angle for an angle of 135° is 45° .

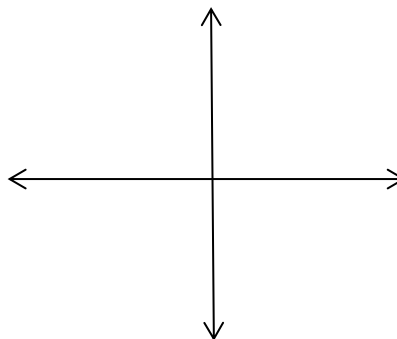


Example Find the reference angle for each angle.

a. 210°

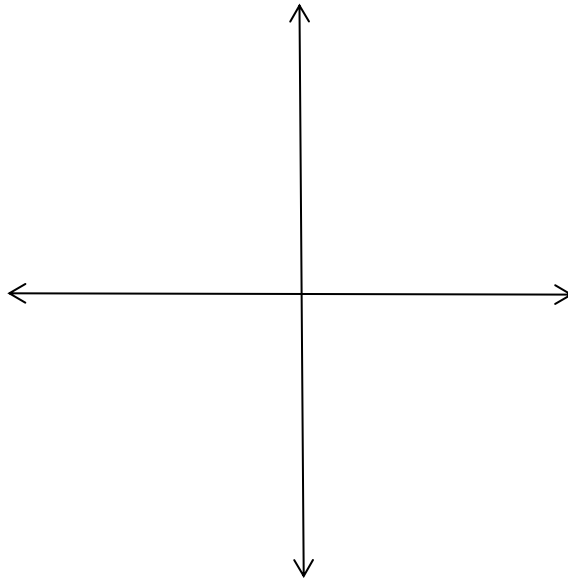


b. 320°



Related Angles are angles that have the same reference angle.

Example List 3 related angles for an angle of 30° .



Coterminal angles have the same terminal arm.

Example List 4 angles that are coterminal with 60° .

