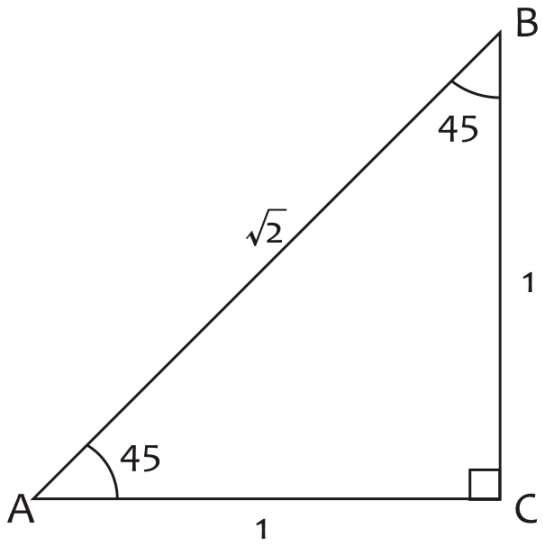
SPECIAL ANGLES

The trigonometric ratios of the angles 30^{o}, 45^{o}, and 60^{o} are often used in mechanics and other branches of mathematics. So it is useful to calculate them and show their values by heart.

45^{o}

Consider the triangle below.



$$H = \sqrt{1^2+1^2} = \sqrt{1+1} = \sqrt{2}$$

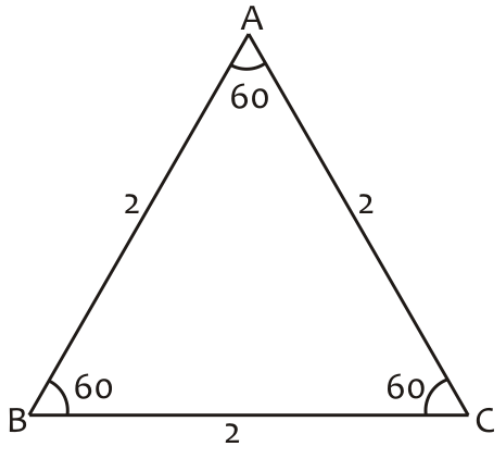
$$sin45^o = \frac{O}{H} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\cos 45^o = \frac{A}{H} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

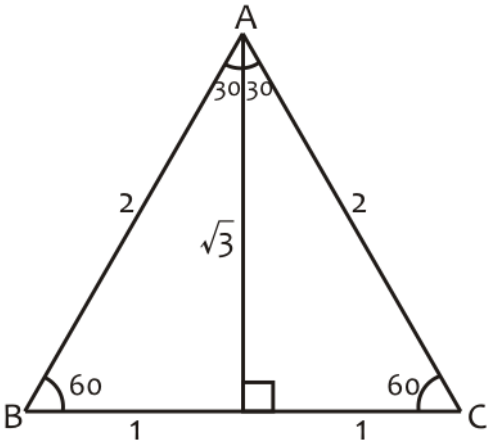
$$\tan 45^o = \frac{O}{A} = \frac{1}{1} = 1$$

Notice that cos45° = sin45°.

60° and 30°



Consider the equilateral triangle above. Draw a line AD from A perpendicular to BC. AD bisects BC giving BC = CD = 1.



$H^2 = A^2 + O^2 \rightarrow\ O^2 = H^2 - A^2$

$O = \sqrt{H^2 - A^2} = \sqrt{2^2 - 1^2} = \sqrt{4 - 1}\ = \sqrt{3}$

$sin60 = \frac{O}{H} = \frac{\sqrt{3}}{2};$ $sin30 = \frac{O}{H} = \frac{1}{2}$

$cos60 = \frac{A}{H} = \frac{1}{2};$ $cos30 = \frac{A}{H} = \frac{\sqrt{3}}{2}$

$tan60 = \frac{O}{A} = \frac{\sqrt{3}}{1} = \sqrt{3};$ $tan30 = \frac{O}{A} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$