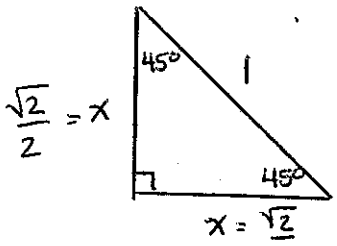
2 special right triangles

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



(isosceles triangle)

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

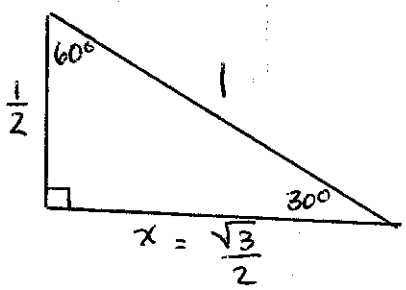
$$2x^2 = 1$$

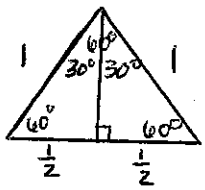
$$x^2 = \frac{1}{2}$$

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

$$x = \frac{\sqrt{1}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

$$x = \frac{\sqrt{2}}{2}$$





$$\left(\frac{1}{2}\right)^2 + x^2 = 1^2$$

$$\frac{1}{4} + x^2 = 1$$

$$x^2 = \frac{3}{4}$$

$$x = \sqrt{\frac{3}{4}}$$

$$x = \frac{\sqrt{3}}{\sqrt{4}} = \frac{\sqrt{3}}{2}$$

Convert special angles from degrees to radians

$45° = \frac{\pi}{4}$

$90° = \frac{\pi}{2}$

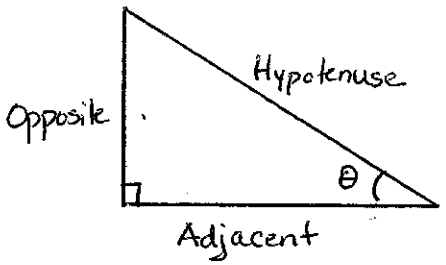
$30° = \frac{\pi}{6}$

$60° = \frac{\pi}{3}$

old definition

output of trig function = ratio of side lengths on a right triangle

input = angle



Using right triangles to define trig functions gives restricted domain

$0^\circ < \theta < 90^\circ$

sine

$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$

cosine

$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$

tangent

$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$

S
O
H
C
A
H
T
O
A

circle centered at origin → $x^2 + y^2 = r^2$

Unit Circle (has radius 1) $x^2 + y^2 = 1^2$ $x^2 + y^2 = 1$