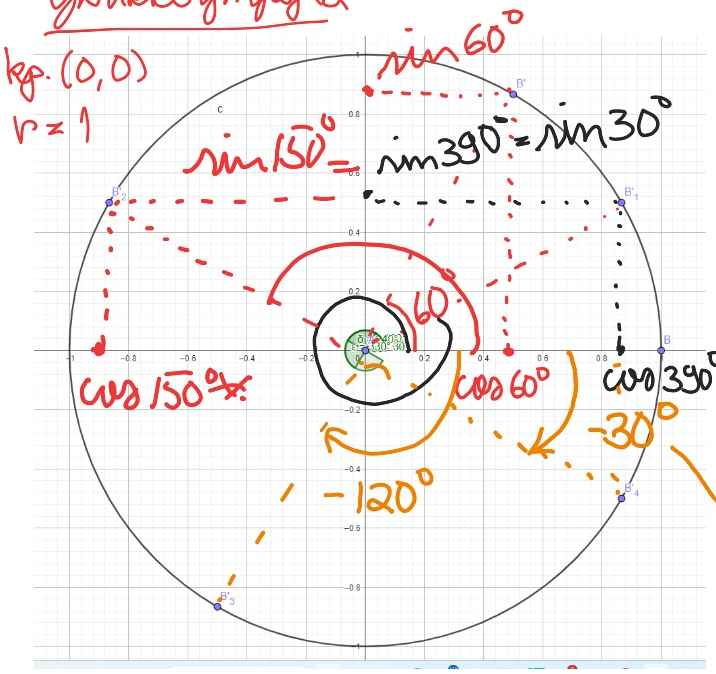
# Yksikköympyrä




- kulman aikaa kylki on välillä (1,0) - (0,0)
  - 0° kulman kehäpiste
- kulman α kehäpisteen x-koordinaatti on cos α
- kulman α kehäpisteen y-koordinaatti on sin α

HUOM!

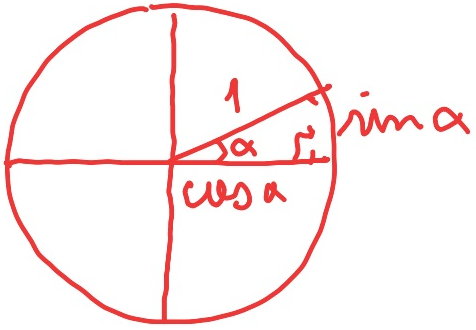
* $\cos 150° = -\cos 30°$ (symmetria)

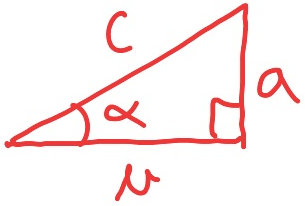
→ Kun kierretään myötäpäivään niin kulma on negatiivinen

## Peruskaavat

$$\sin^2 x + \cos^2 x = 1$$

$$\tan x = \frac{\sin x}{\cos x}$$




$$\tan\alpha = \frac{a}{b}$$

$$\tan\alpha = \frac{\sin\alpha}{\cos\alpha}$$

Pythagoras:

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

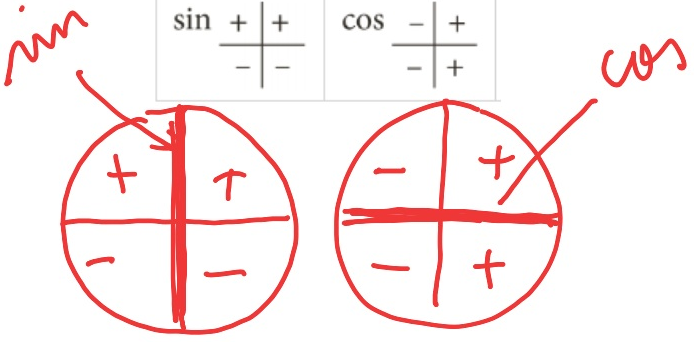
$$(\sin\alpha)^2 + (\cos\alpha)^2 = 1^2$$

$$\sin^2\alpha + \cos^2\alpha = 1$$

## Merkkikaaviot

| sin | | |
|---|---|---|
| | + | + |
| | − | − |

| cos | | |
|---|---|---|
| | − | + |
| | − | + |



## Palautuskaavat

| |
|---|
| $\sin(-x) = -\sin x$ |
| $\cos(-x) = \cos x$ |
| $\tan(-x) = -\tan x$ |
| $\sin x = -\sin(-x) = \cos\left(\frac{\pi}{2} - x\right) = \sin(\pi - x) = \sin(x + n2\pi)$ |
| $\cos x = \cos(-x) = \sin\left(\frac{\pi}{2} - x\right) = -\cos(\pi - x) = \cos(x + n2\pi)$ |
| $\tan x = -\tan(-x) = -\tan(\pi - x) = \tan(x + n\pi)$ |

$\cos(-30°) = \cos(30°)$

$180°$

$180° - 30°$

$\sin 150° = \sin 30°$

solve($\frac{4}{\sin(50)} = \frac{2.5}{\sin(x)}$

solve($\sin(x) = \frac{4}{7}$)

{x=360·constn(1)+151.3943929, x=360·constn(2)+28.60560709}

vakio

vakio 0, 1, 2, 3 . . .

{x=360·constn(1)+145.1500954, x=360·constn(2)−34.84990458}

$180° - 34{,}8\ldots°$

$34{,}8°$