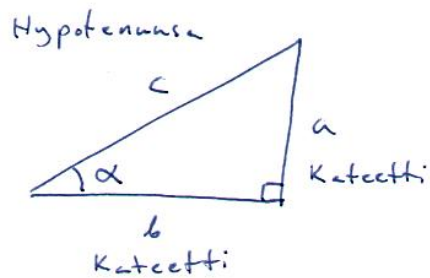


Suorakulmaisessa kolmiossa



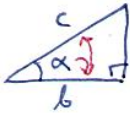
alfa $\alpha \alpha \alpha$
beeta $\beta \beta \beta$
gamma $\gamma \gamma \gamma$

Kulman α sini on vastapäisen kateetin suhde hypotenuusaan.



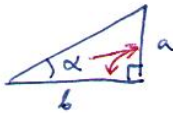
$$\sin \alpha = \frac{a}{c}$$

Kulman α kosini on viereisen kateetin suhde hypotenuusaan.



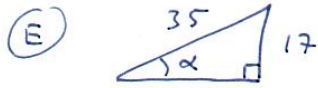
$$\cos \alpha = \frac{b}{c}$$

Kulman α tangentti on vastaisen kateetin suhde viereiseen kateettiin.



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

Kulma selville



Laadi ensin aloitusyhtälö:

$$\sin \alpha = \frac{17}{35}$$

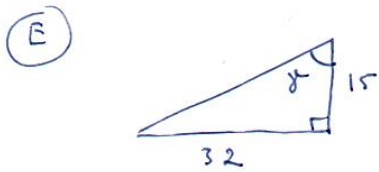
$$\alpha = \sin^{-1}\left(\frac{17}{35}\right) \approx 29,06^\circ$$

Tuntematon kulma selville
 \sin^{-1} , \cos^{-1} tai \tan^{-1} -toiminolla!

(E)

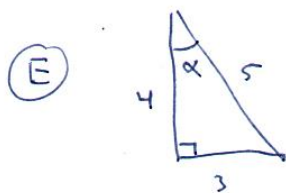
$$\cos \beta = 0,428$$

$$\beta = \cos^{-1}(0,428) \approx 64,7^\circ$$



$$\tan \gamma = \frac{32}{15}$$

$$\gamma \approx 64,9^\circ$$



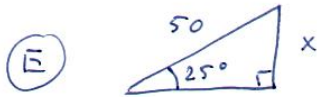
$$\cos \alpha = \frac{4}{5}$$

$$\alpha \approx 36,9^\circ$$

Sivun pituus selville

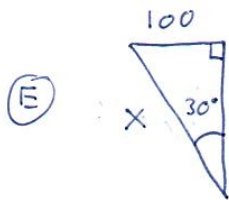
Jos kulma tiedetään, painetaan vain sin, cos tai tan-näppäintä.

(E) $\sin 12^\circ \approx 0,2079$



$$\sin 25^\circ = \frac{x}{50} \quad || \cdot 50$$

$$x = 50 \cdot \sin 25^\circ \approx 21,1$$

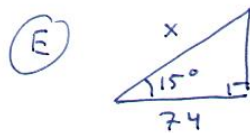


$$\frac{\sin 30^\circ}{1} = \frac{100}{x}$$

Tämän voi ajatella
verrantaona!

$$x \cdot \sin 30^\circ = 1 \cdot 100 \quad || : \sin 30^\circ$$

$$x = \frac{100}{\sin 30^\circ} \approx 200$$



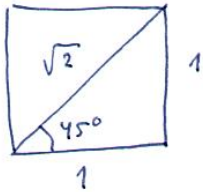
$$\cos 15^\circ = \frac{74}{x}$$

↔
näiden paikat voi vaihtaa

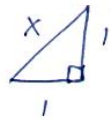
$$x = \frac{74}{\cos 15^\circ} \approx 76,6$$

Niin sanotut "muistikolmiot" saadaan näin:

Neliö, jonka sivun pituus on 1



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



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

$$\Rightarrow \begin{cases} \sin 45^\circ = \frac{1}{\sqrt{2}} \\ \cos 45^\circ = \frac{1}{\sqrt{2}} \\ \tan 45^\circ = \frac{1}{1} = 1 \end{cases}$$

Tasasiivainen kolmio, jossa sivu on 2



Pythagoralla korkeusjana!



$$2^2 = x^2 + 1^2$$
$$x = \sqrt{2^2 - 1^2} = \sqrt{3}$$

$$\Rightarrow \begin{cases} \sin 30^\circ = \frac{1}{2} \\ \cos 30^\circ = \frac{\sqrt{3}}{2} \\ \tan 30^\circ = \frac{1}{\sqrt{3}} \end{cases}$$

$$\Rightarrow \begin{cases} \sin 60^\circ = \frac{\sqrt{3}}{2} \\ \cos 60^\circ = \frac{1}{2} \\ \tan 60^\circ = \frac{\sqrt{3}}{1} = \sqrt{3} \end{cases}$$

TK s. 54-55!