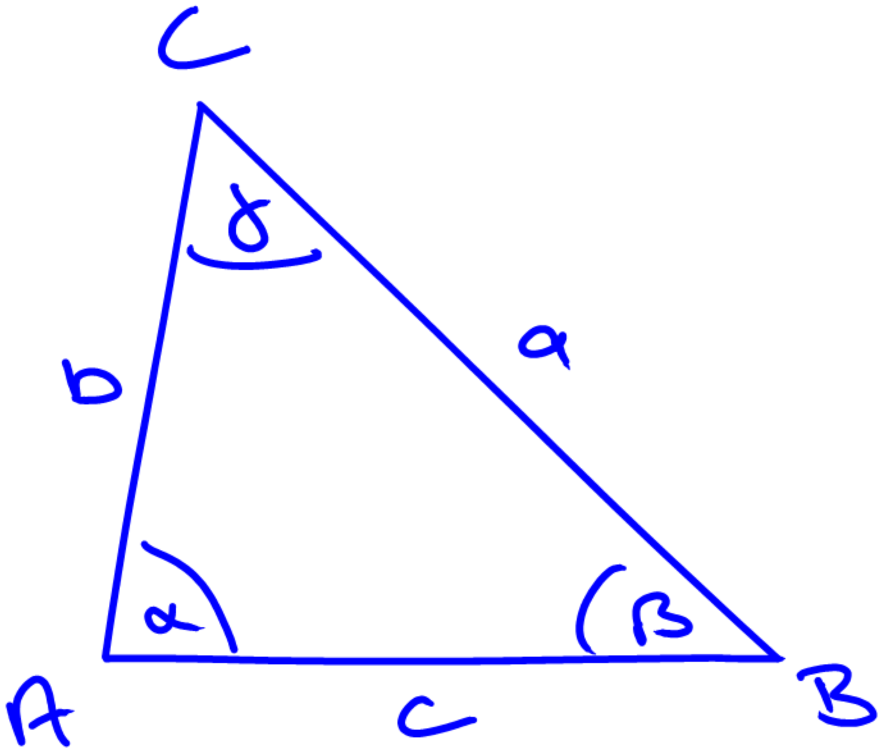
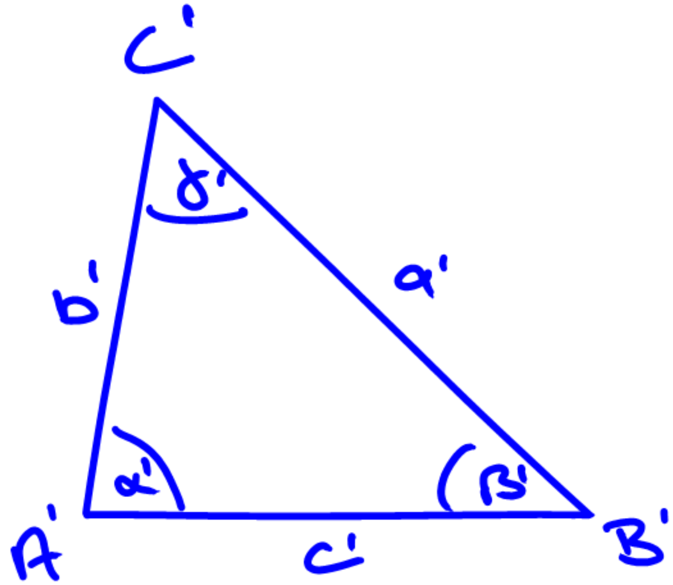
Ähnlichkeit

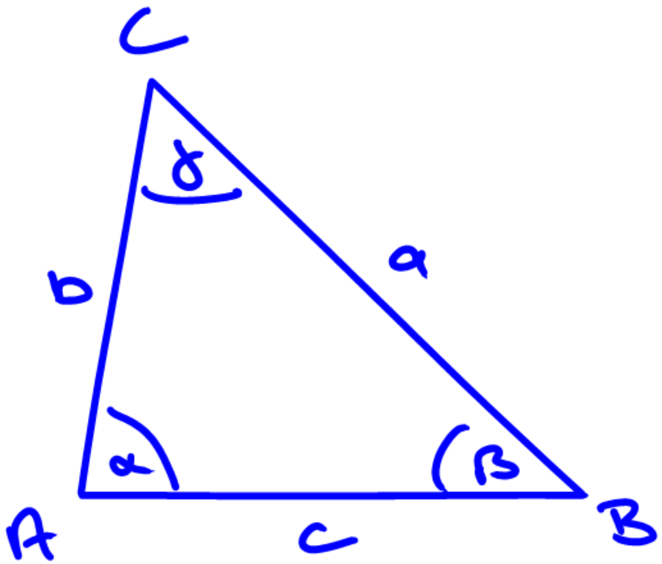




- gleiche Winkel : $\alpha' = \alpha$, $\beta' = \beta$, $\gamma' = \gamma$
- gleiche Seitenverhältnisse $\frac{a'}{b'} = \frac{a}{b}$, $\frac{a'}{c'} = \frac{a}{c}$, $\frac{b'}{c'} = \frac{b}{c}$

bzw. $\frac{a'}{a} = \frac{b'}{b} = \frac{c'}{c} = k$

Zusammenhang zwischen Seitenverhältnissen und Winkeln



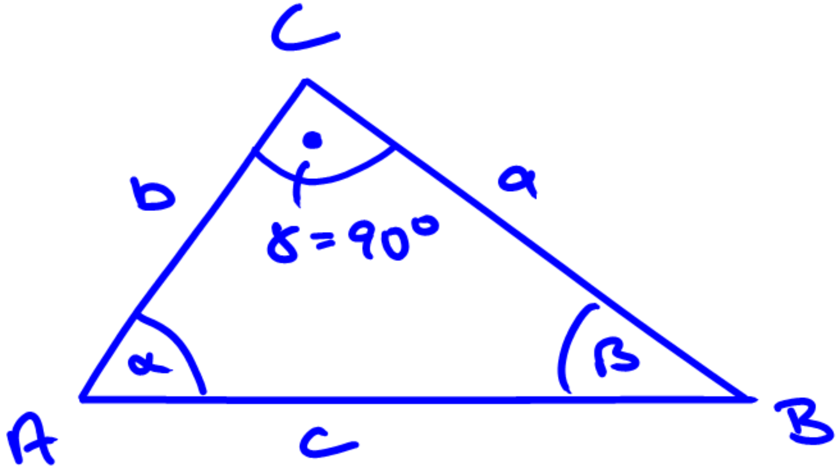
$$\frac{a}{b} = f(\alpha, \beta) \qquad (\gamma = 180° - \alpha - \beta)$$

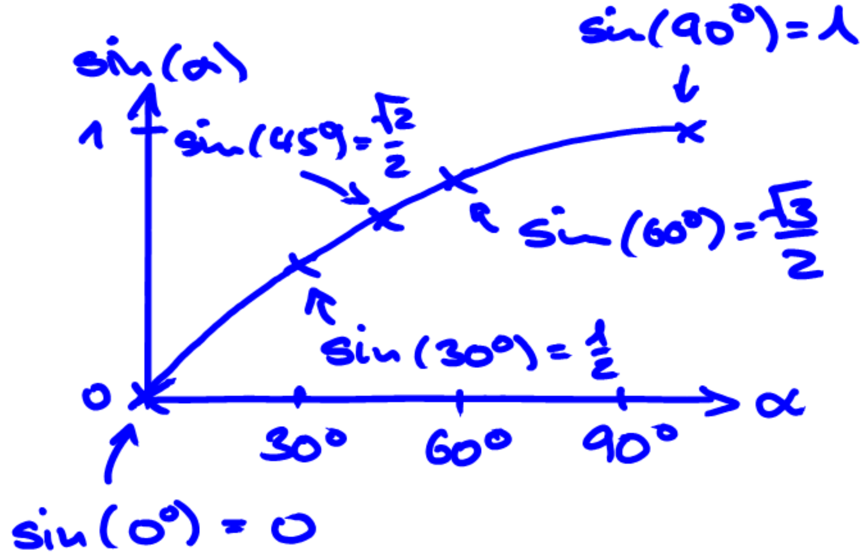
$$\frac{a}{b} = \frac{\sin(\alpha)}{\sin(\beta)} \qquad \text{(Sinussatz)}$$

$$\frac{a}{c} = \frac{\sin(\alpha)}{\sin(\gamma)}$$

$$\frac{b}{c} = \frac{\sin(\beta)}{\sin(\gamma)}$$

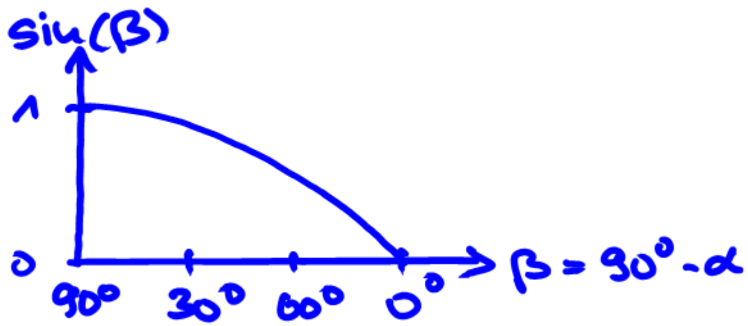
Spezialfall rechtwinkliges Dreieck ABC



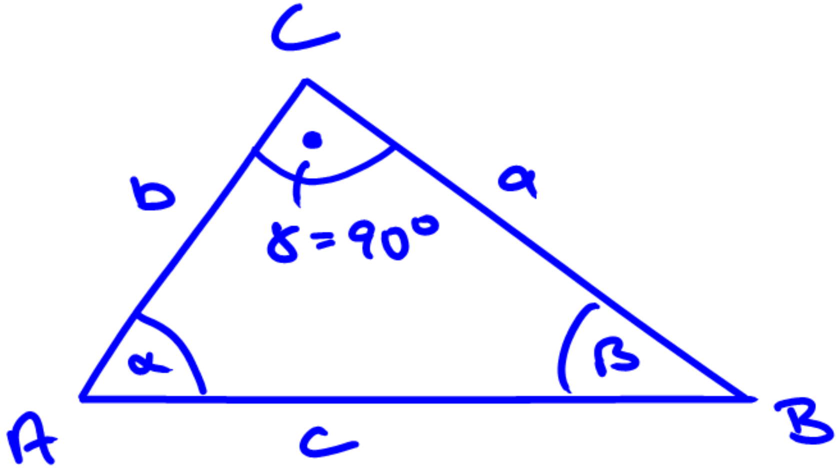


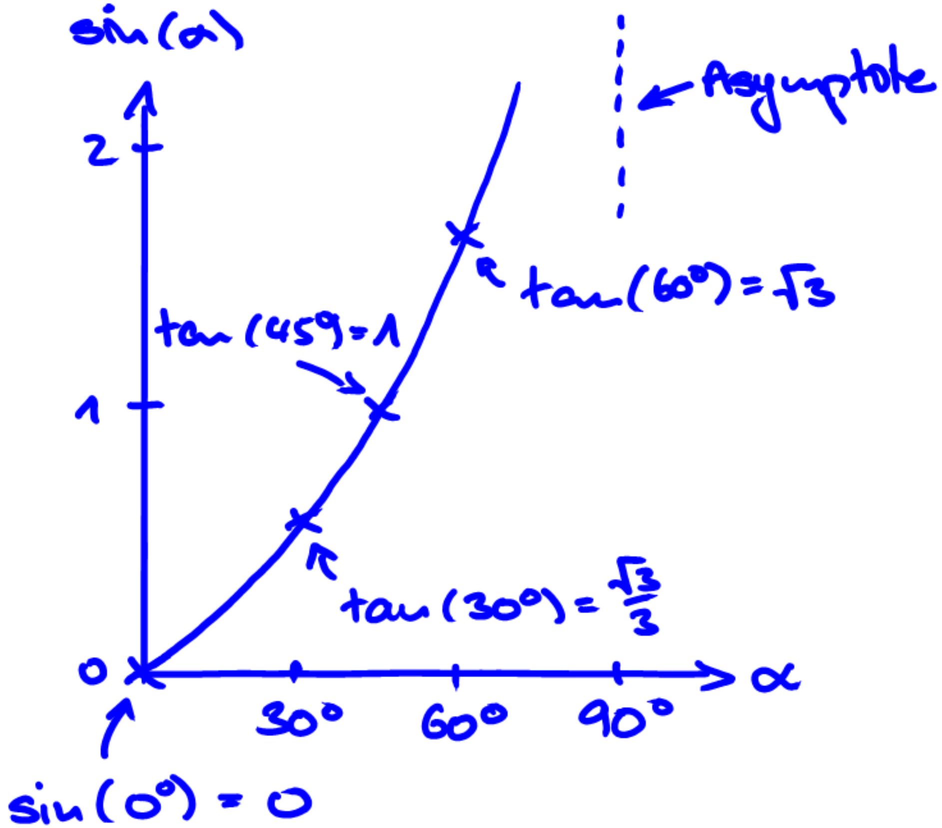
$$\frac{a}{c} = \frac{\sin(\alpha)}{\sin(90^\circ)} = \sin(\alpha)$$

$$\frac{b}{c} = \frac{\sin(\beta)}{\sin(90^\circ)} = \sin(\beta) = \sin(90^\circ - \alpha) = \cos(\alpha)$$



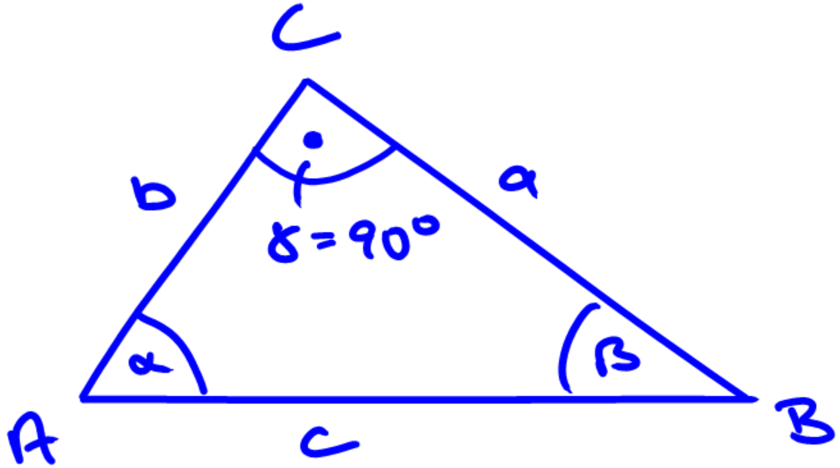
Spezialfall rechtwinkliges Dreieck ABC





$$\frac{a}{b} = \frac{\sin(\alpha)}{\sin(\beta)} = \frac{\sin(\alpha)}{\sin(90^\circ-\alpha)} = \frac{\sin(\alpha)}{\cos(\alpha)} = \tan(\alpha)$$

Spezialfall rechtwinkliges Dreieck ABC



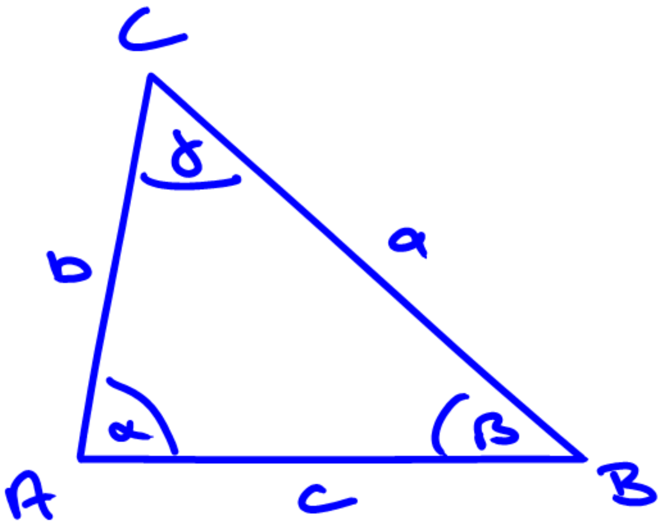
Satz des Pythagoras:

$c^2 = a^2 + b^2$ wenn $\gamma = 90°$

Gilt auch umgekehrt.

Beweise siehe Buch.

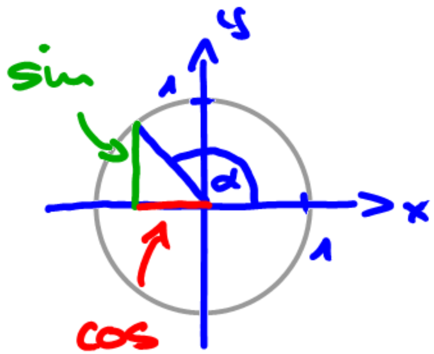
allgemein (Kosinussatz):

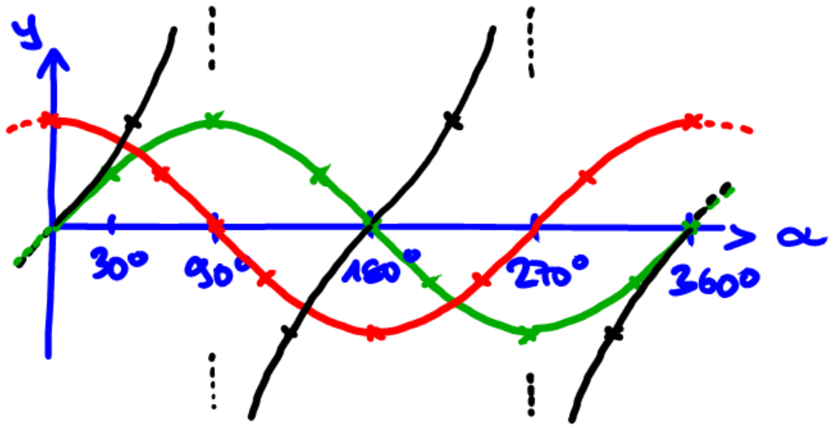


$$c^2 = a^2 + b^2 \underbrace{- 2ab\cos(\gamma)}_{=0 \text{ für } \gamma = 90°}$$

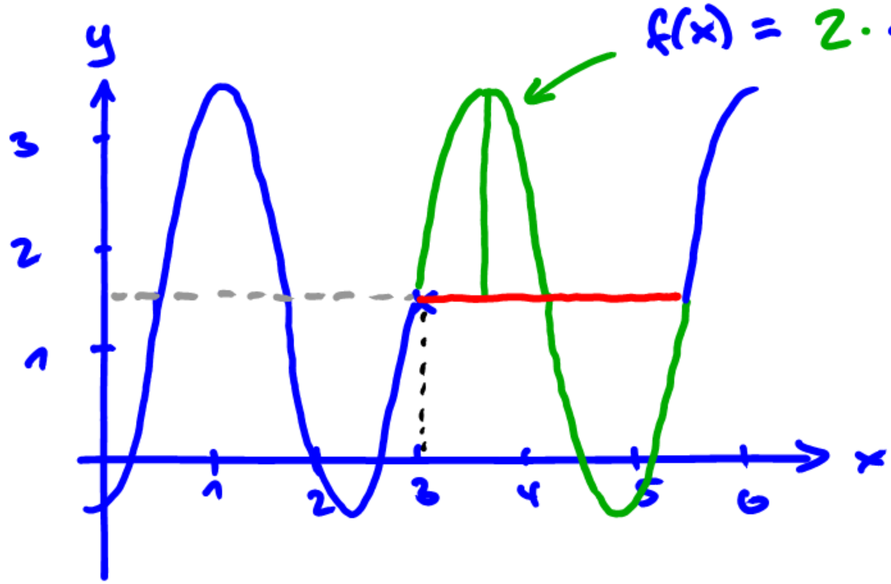
sin(α), cos(α) und tan(α) für α > 90°

anschauliche Darstellung: Einheitskreis





$$f(x) = 2 \cdot \sin\left(\frac{360°}{2{,}5}(x-3)\right) + 1{,}5$$



Kleine Merkhilfe

α	$0°$	$30°$	$45°$	$60°$	$90°$
$\sin(\alpha)$	$\frac{\sqrt{0}}{2}=0$	$\frac{\sqrt{1}}{2}=\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{4}}{2}=1$
$\cos(\alpha)$	$\frac{\sqrt{4}}{2}=1$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{1}}{2}=\frac{1}{2}$	$\frac{\sqrt{0}}{2}=0$
$\tan(\alpha)$ $=\frac{\sin(\alpha)}{\cos(\alpha)}$	$\frac{\sqrt{0}}{\sqrt{4}}=0$	$\frac{\sqrt{1}}{\sqrt{3}}=\frac{\sqrt{3}}{3}$	$\frac{\sqrt{2}}{\sqrt{2}}=1$	$\frac{\sqrt{3}}{\sqrt{1}}=\sqrt{3}$	$\frac{\sqrt{4}}{\sqrt{0}}$ /