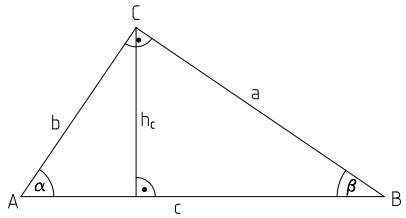
## 9.5 Sinus, Kosinus und Tangens am rechtwinkligen Dreieck

9.5.1 a) $b = \sqrt{c^2 - a^2} = \sqrt{84^2 - 27^2}cm = 80cm$
(Satz des Pythagoras)
$\cos\alpha = \frac{b}{c} = \frac{80cm}{84cm} = \frac{20}{21} \Rightarrow \alpha = 18^o$
$\beta = 180^o - \gamma - \alpha = 180^o - 90^o - 18^o = 72^o$ (Winkelsumme im Dreieck)
$\sin\alpha = \frac{h_c}{b} \Rightarrow h_c = \sin\alpha \cdot b = \sin 18^o \cdot 80cm = 25cm$
$A = \frac{1}{2} \cdot c \cdot h_c = 42cm \cdot 25cm = 1050cm^2 \approx 11dm^2$




b) $c = 40,2cm$; $a = 15,6cm$, $\alpha = 22,8^0$;
$h_c = 14,4cm$; $A = 289cm^2$

9.5.2 $\gamma = 180^o - 2 \cdot 36,7^o = 106,6^o$

$$a = b = \frac{\frac{c}{2}}{\cos\alpha} = \frac{4,5cm}{\cos 36,7^o} = 5,6cm$$

$$h_c = \frac{c}{2} \cdot \tan\alpha = 4,5cm \cdot \tan 36,7^o = 3,4cm$$

9.5.3 $h = m \cdot \sin\alpha = 55,8cm \cdot \sin 43,8^0 = 38,6cm$

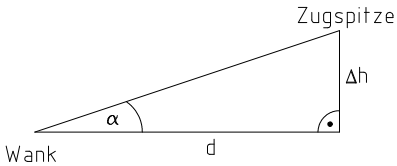
$$r = m \cdot \cos\alpha = 55,8cm \cdot \cos 43,8^0 = 40,3cm$$

$$M = r\pi m = 40,3cm \cdot \pi \cdot 55,8cm = 7064cm^2 = 70,6dm^2$$

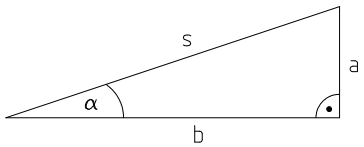
$$V = \frac{1}{3}r^2\pi h = \frac{1}{3}(40,3cm)^2\pi \cdot 38,6cm = 65,6dm^3$$

9.5.4 $d = 29,7cm \cdot 50000 = 14,85km$
(tatsächliche Entfernung)

$$\sin\alpha = \frac{\Delta h}{d} = \frac{2963m - 1780m}{14850m} = \frac{1183}{14850} = 0,07966...$$




$\Rightarrow \alpha = 4,6^0$

9.5.5 $\sin\alpha = \frac{a}{s}$, $\tan\alpha = \frac{a}{b}$

Für sehr kleine Winkel $\alpha$ gilt $b \approx c$.
Also ist $\sin\alpha \approx \tan\alpha$.