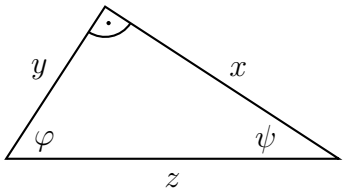
Trigonometrie

Übungen (L+)

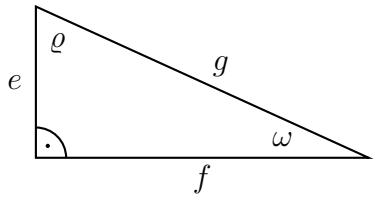
Version vom 23. Juni 2021

Aufgabe 1.1



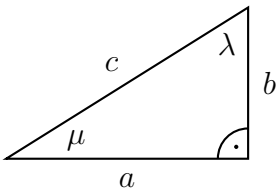
- $\sin(\varphi) = \frac{x}{z}$
- $\tan(\varphi) = \frac{x}{y}$
- $\cos(\psi) = \frac{x}{z}$

Aufgabe 1.2



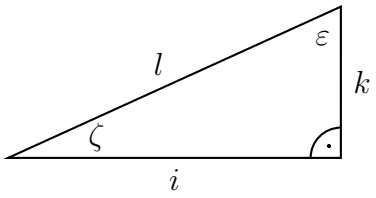
- $\cos(\omega) = \frac{f}{g}$
- $\sin(\rho) = \frac{f}{g}$
- $\tan(\omega) = \frac{e}{f}$

Aufgabe 1.3



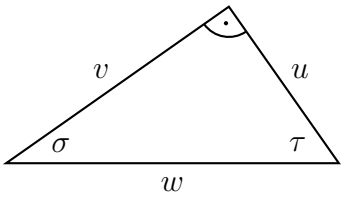
- $\tan(\lambda) = \frac{a}{b}$
- $\cos(\mu) = \frac{a}{c}$
- $\sin(\mu) = \frac{b}{c}$

Aufgabe 1.4



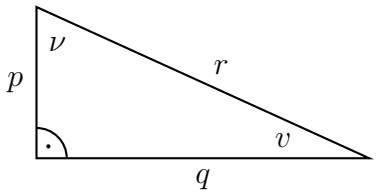
- $\cos(\varepsilon) = \dfrac{k}{l}$
- $\tan(\zeta) = \dfrac{k}{i}$
- $\sin(\zeta) = \dfrac{k}{l}$

Aufgabe 1.5



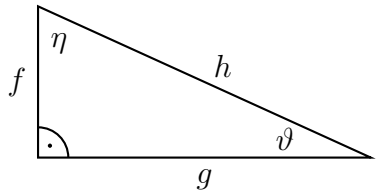
- $\sin(\tau) = \dfrac{v}{w}$
- $\cos(\sigma) = \dfrac{v}{w}$
- $\tan(\tau) = \dfrac{v}{u}$

Aufgabe 1.6



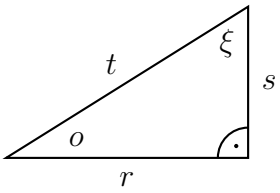
- $\tan(\nu) = \dfrac{q}{p}$
- $\sin(\nu) = \dfrac{q}{r}$
- $\cos(\upsilon) = \dfrac{q}{r}$

Aufgabe 1.7



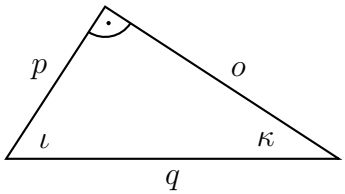
- $\dfrac{f}{h} = \sin(\vartheta) = \cos(\eta)$
- $\dfrac{f}{g} = \tan(\vartheta)$
- $\dfrac{g}{h} = \sin(\eta) = \cos(\vartheta)$

Aufgabe 1.8



- $\frac{s}{r} = \tan(o)$
- $\frac{r}{t} = \sin(\xi) = \cos(o)$
- $\frac{r}{s} = \tan(\xi)$

Aufgabe 1.9



- $\frac{q}{p} = \text{unbekannt}$
- $\frac{o}{q} = \sin(\iota) = \cos(\varkappa)$
- $\frac{p}{o} = \tan(\varkappa)$

Aufgabe 2.1

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

$$c \cdot \sin\alpha = a$$

$$a = c \cdot \sin\alpha = 7.2\,\text{cm} \cdot \sin 44^\circ = 5.0\,\text{cm}$$

Aufgabe 2.2

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

$$a \cdot \tan\beta = b$$

$$a = \frac{b}{\tan\beta} = \frac{4.4\,\text{cm}}{\tan 56^\circ} = 2.97\,\text{cm}$$

Aufgabe 2.3

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

$$c \cdot \cos\alpha = b$$

$$c = \frac{b}{\cos\alpha} = \frac{37.62\,\text{cm}}{\cos 76^\circ} = 37.62\,\text{cm}$$

Aufgabe 2.4

$$\cos\beta = \frac{a}{c}$$

$$c \cdot \cos\beta = a$$

$$a = c \cdot \cos\beta = 14.3\,\text{cm} \cdot \cos 82^\circ = 1.99\,\text{cm}$$

Aufgabe 2.5

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

$$c \cdot \sin\alpha = a$$

$$c = \frac{a}{\sin\alpha} = \frac{16.0\,\text{cm}}{\sin 30^\circ} = 16.0\,\text{cm}$$

Aufgabe 2.6

$$\sin\beta = \frac{b}{c}$$

$$c \cdot \sin\beta = b$$

$$c = \frac{b}{\sin\beta} = \frac{0.8\,\text{cm}}{\sin 23^\circ} = 2.05\,\text{cm}$$

Aufgabe 2.7

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

$$c \cdot \cos\alpha = b$$

$$b = c \cdot \cos\alpha = 1.5\,\text{cm} \cdot \cos 63^\circ = 0.68\,\text{cm}$$

Aufgabe 2.8

$$\cos\beta = \frac{a}{c}$$

$$c \cdot \cos\beta = a$$

$$c = \frac{a}{\cos\beta} = \frac{24\,\text{cm}}{\cos 25^\circ} = 26.48\,\text{cm}$$

Aufgabe 2.9

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

$$b \cdot \tan\alpha = a$$

$$b = \frac{a}{\tan\alpha} = \frac{2.5\,\text{cm}}{\tan 29^\circ} = 4.51\,\text{cm}$$

Aufgabe 2.10

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

$$a \cdot \tan\beta = b$$

$$b = a \cdot \tan\beta = 9.8\,\text{cm} \cdot \tan 45^\circ = 9.8\,\text{cm}$$

Aufgabe 2.11

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

$$b \cdot \tan\alpha = a$$

$$a = b \cdot \tan\alpha = 12.6\,\text{cm} \cdot \tan 13^\circ = 2.91\,\text{cm}$$

Aufgabe 2.12

$$\sin\beta = \frac{b}{c}$$

$$c \cdot \sin\beta = b$$

$$b = c \cdot \sin\beta = 89\,\text{cm} \cdot \sin 7^\circ = 10.85\,\text{cm}$$

Aufgabe 3.1

$$\tan\alpha = \frac{a}{b} \quad \Rightarrow \quad \alpha = \arctan\frac{a}{b}$$

$$\alpha = \arctan\frac{7.6}{5.8} = 52.65^\circ$$

Aufgabe 3.2

$$\sin\alpha = \frac{a}{c} \quad \Rightarrow \quad \alpha = \arcsin\frac{a}{c}$$

$$\alpha = \arcsin\frac{5}{9} = 33.75^\circ$$

Aufgabe 3.3

$$\cos\alpha = \frac{b}{c} \quad \Rightarrow \quad \alpha = \arccos\frac{b}{c}$$

$$\alpha = \arccos\frac{2.7}{3.1} = 29.43^\circ$$

Aufgabe 3.4

$$\tan\beta = \frac{b}{a} \quad \Rightarrow \quad \beta = \arctan\frac{b}{a}$$

$$\beta = \arctan \frac{13.6}{1.2} = 84.96°$$

Aufgabe 3.5

$$\cos \beta = \frac{a}{c} \quad \Rightarrow \quad \beta = \arccos \frac{a}{c}$$

$$\beta = \arccos \frac{0.4}{0.8} = 60.0°$$

Aufgabe 3.6

$$\sin \beta = \frac{b}{c} \quad \Rightarrow \quad \beta = \arcsin \frac{b}{c}$$

$$\beta = \arcsin \frac{6.3}{6.5} = 75.75°$$

Aufgabe 4.1

$$\frac{h}{l} = \sin 62°$$

$$h = l \cdot \sin 62°$$

$$h = 30\,\text{m} \cdot \sin 62°$$

$$h = 26.49\ \text{m}$$

Der Drache steigt etwa 26.5 m hoch.

Aufgabe 4.2

$$\sin \alpha = \frac{\overline{BC}}{\overline{AB}}$$

$$\alpha = \arcsin \frac{\overline{BC}}{\overline{AB}}$$

$$\alpha = \arcsin \frac{4.5\,\text{m}}{47\,\text{m}}$$

$$\alpha = 5.49°$$

Aufgabe 4.3

$$\cos \beta = \frac{c/2}{b}$$

$$\beta = \arccos \frac{c}{2b}$$

$$\beta = \arccos \frac{6\,\text{cm}}{16\,\text{cm}}$$

$$\beta = 67.98°$$

$\gamma = 180° - 2\beta$
$\gamma = 44.04°$

Aufgabe 4.4

$$\sin\alpha = \frac{h_a}{a}$$
$$h_a = a \cdot \sin\alpha$$
$$A = a \cdot h_a = a \cdot a \cdot \sin\alpha = a^2 \sin\alpha$$
$$A = (9\,\text{cm})^2 \cdot \sin 55°$$
$$A = 66.35\,\text{cm}^2$$

Aufgabe 4.5

$$\sin(\gamma/2) = \frac{c/2}{b}$$
$$b \cdot \sin(\gamma/2) = c/2$$
$$b = \frac{c/2}{\sin(\gamma/2)}$$
$$b = \frac{3.2\,\text{cm}}{\sin 23°}$$
$$b = 8.19\ \text{cm}$$

Aufgabe 4.6

- $\overline{AF} = \frac{1}{2} \cdot \overline{AC} = \frac{1}{2} \cdot a \cdot \sqrt{2}$

  $\overline{AF} = 162.64\,\text{m}$

- $\tan\alpha = \frac{h}{\overline{AF}}$

  $$\alpha = \arctan\frac{h}{\overline{AF}}$$
  $$\alpha = \arctan\frac{137\,\text{m}}{162.64\,\text{m}}$$
  $$\alpha = 40.11°$$