

Winkelrechnung (Lösungen)

1.

a) $\sin \alpha = 0,5358$	b) $\sin \alpha = 0,9921$	c) $\sin \alpha = 0,2706$	d) $\sin \alpha = -0,8934$
$\cos \alpha = 0,8443$	$\cos \alpha = 0,1253$	$\cos \alpha = -0,9627$	$\cos \alpha = -0,4493$
$\tan \alpha = 0,6346$	$\tan \alpha = 7,916$	$\tan \alpha = -0,2811$	$\tan \alpha = 1,988$
$\cot \alpha = 1,576$	$\cot \alpha = 0,1263$	$\cot \alpha = -3,558$	$\cot \alpha = 0,5029$
e) $\sin \alpha = 0,5269$	f) $\sin \alpha = 0,6755$	g) $\sin \alpha = -0,9825$	h) $\sin \alpha = 0,1822$
$\cos \alpha = 0,8499$	$\cos \alpha = -0,7374$	$\cos \alpha = 0,1865$	$\cos \alpha = 0,9833$
$\tan \alpha = 0,6200$	$\tan \alpha = -0,9160$	$\tan \alpha = -5,267$	$\tan \alpha = 0,1853$
$\cot \alpha = 1,613$	$\cot \alpha = -1,092$	$\cot \alpha = -0,1898$	$\cot \alpha = 5,398$

2.

a) $c = 92,7 \text{ cm}$	b) $\beta = 46,4^\circ$	c) $\beta = 71,1^\circ$	d) $\alpha = 30,5^\circ$
$\alpha = 32,6^\circ$	$b = 42,0 \text{ cm}$	$c = 74,0 \text{ cm}$	$b = 56,0 \text{ cm}$
$\beta = 57,4^\circ$	$c = 58,0 \text{ cm}$	$a = 24,0 \text{ cm}$	$a = 33,0 \text{ cm}$

3.

a) $\alpha = 55,7^\circ$	b) $\gamma = 79,3^\circ$	c) $c = 189,6 \text{ m}$	d) $\alpha = 33,6^\circ$
$\gamma = 18,3^\circ$	$b = 55,2 \text{ m}$	$\alpha = 53,0^\circ$	$\beta = 128,8^\circ$
$c = 68,1 \text{ m}$	$a = 103,2 \text{ m}$	$\beta = 79,5^\circ$	$\gamma = 17,6^\circ$

4.

a) $26,6^\circ$	b) 45°	c) $68,2^\circ$	d) 135°
$206,6^\circ$	135°	$248,2^\circ$	315°
e) 30°	f) 210°	g) $104,5^\circ$	h) 180°
330°	330°	$255,5^\circ$	

5. Nachfolgend gilt $k = 0, \pm 1, \pm 2, \pm 3, \dots$

a) $2^\circ + k \cdot 360^\circ$	b) $65^\circ + k \cdot 180^\circ$	c) $54^\circ + k \cdot 180^\circ$	d) $72^\circ + k \cdot 720^\circ$
$238^\circ + k \cdot 360^\circ$	$175^\circ + k \cdot 180^\circ$	$126^\circ + k \cdot 180^\circ$	$216^\circ + k \cdot 720^\circ$

6.

a) $58,9^\circ$	b) 0°	c) 90°	d) 90°	e) 90°
$121,1^\circ$	45°	210°	180°	180°
$238,9^\circ$	180°	330°	270°	270°
$301,1^\circ$	225°			
	360°			
f) \emptyset	g) 180°	h) 30°	i) $40,1^\circ$	j) 0°
	270°	90°	$139,9^\circ$	90°
		150°	$220,1^\circ$	360°
			$319,9^\circ$	

7. Im rechtwinkligen Dreieck mit der Hypotenuse c gilt:

$$\sin \alpha = \frac{a}{c}, \quad \cos \alpha = \frac{b}{c}, \quad \tan \alpha = \frac{a}{b}, \quad \cot \alpha = \frac{b}{a} \quad \text{und} \quad a^2 + b^2 = c^2.$$

Ab Aufgabe d) wird die Kenntnis der Doppelwinkel-Formeln benötigt:

$$\sin(2\alpha) = 2 \sin \alpha \cdot \cos \alpha \quad \text{und}$$

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

8.

a) $0; \frac{\pi}{6}; \pi; \frac{11\pi}{6}; 2\pi$	b) $0; \frac{2\pi}{3}; \frac{4\pi}{3}; 2\pi$
c) $\frac{\pi}{4}; \frac{3}{4}\pi; \frac{5}{4}\pi; \frac{7}{4}\pi$	d) $\frac{\pi}{3}; \frac{5\pi}{3}$
e) $\pi; \frac{2\pi}{3}$	f) $0; 2\pi$