



CAMI Wiskunde: Graad 12

12.9 Trigonometrie

12.9 Saamgestelde hoek identiteite

1. Inleiding tot saamgestelde hoeke

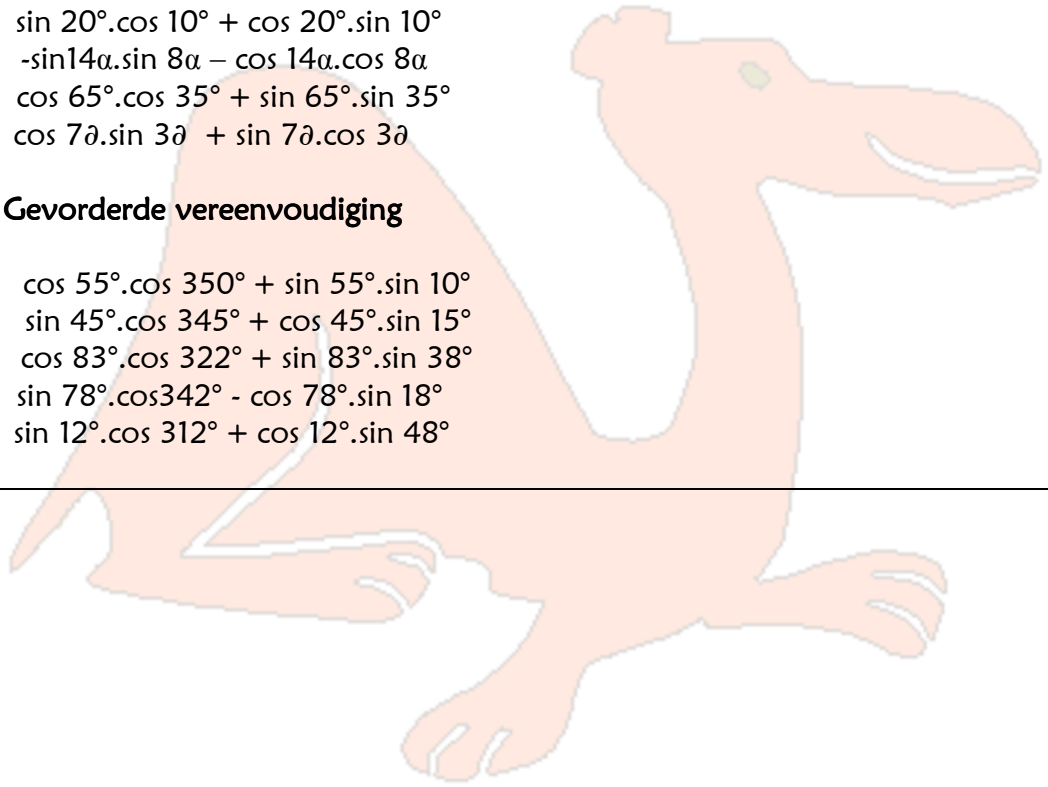
- (a) $\sin (270^\circ - \alpha)$
- (b) $\cos (180^\circ + \pi)$
- (c) $\sin (360^\circ - \theta)$
- (d) $\cos (90^\circ - \Omega)$
- (e) $\cos (90^\circ + \pi)$

2. Vereenvoudiging

- (a) $\cos 12\pi \cdot \sin 9\pi - \sin 12\pi \cdot \cos 9\pi$
- (b) $\sin 20^\circ \cdot \cos 10^\circ + \cos 20^\circ \cdot \sin 10^\circ$
- (c) $-\sin 14\alpha \cdot \sin 8\alpha - \cos 14\alpha \cdot \cos 8\alpha$
- (d) $\cos 65^\circ \cdot \cos 35^\circ + \sin 65^\circ \cdot \sin 35^\circ$
- (e) $\cos 7\theta \cdot \sin 3\theta + \sin 7\theta \cdot \cos 3\theta$

3. Gevorderde vereenvoudiging

- (a) $\cos 55^\circ \cdot \cos 350^\circ + \sin 55^\circ \cdot \sin 10^\circ$
- (b) $\sin 45^\circ \cdot \cos 345^\circ + \cos 45^\circ \cdot \sin 15^\circ$
- (c) $\cos 83^\circ \cdot \cos 322^\circ + \sin 83^\circ \cdot \sin 38^\circ$
- (d) $\sin 78^\circ \cdot \cos 342^\circ - \cos 78^\circ \cdot \sin 18^\circ$
- (e) $\sin 12^\circ \cdot \cos 312^\circ + \cos 12^\circ \cdot \sin 48^\circ$





MEMO

1. Inleiding tot saamgestelde hoeke [7.5.4.1]

(a) $\sin(270^\circ - \alpha)$

$$\sin(270^\circ - \alpha) = \sin 270^\circ \cdot \cos \alpha - \cos 270^\circ \cdot \sin \alpha$$

$$\sin(270^\circ - \alpha) = -1 \cdot \cos \alpha - 0 \cdot \sin \alpha$$

$$\sin(270^\circ - \alpha) = -\cos \alpha$$

(b) $\cos(180^\circ + \pi)$

$$\cos(180^\circ + \pi) = \cos 180^\circ \cdot \cos \pi - \sin 180^\circ \sin \pi$$

$$\cos(180^\circ + \pi) = -1 \cdot \cos \pi - 0 \cdot \sin \pi$$

$$\cos(180^\circ + \pi) = -\cos \pi$$

(c) $\sin(360^\circ - \vartheta)$

$$\sin(360^\circ - \vartheta) = \sin 360^\circ \cdot \cos \vartheta - \cos 360^\circ \cdot \sin \vartheta$$

$$\sin(360^\circ - \vartheta) = 0 \cdot \cos \vartheta - 1 \cdot \sin \vartheta$$

$$\sin(360^\circ - \vartheta) = -\sin \vartheta$$

(d) $\cos(90^\circ - \Omega)$

$$\cos(90^\circ - \Omega) = \cos 90^\circ \cdot \cos \Omega + \sin 90^\circ \cdot \sin \Omega$$

$$\cos(90^\circ - \Omega) = 0 \cdot \cos \Omega + 1 \cdot \sin \Omega$$

$$\cos(90^\circ - \Omega) = \sin \Omega$$

(e) $\cos(90^\circ + \pi)$

$$\cos(90^\circ + \pi) = \cos 90^\circ \cdot \cos \pi - \sin 90^\circ \cdot \sin \pi$$

$$\cos(90^\circ + \pi) = 0 \cdot \cos \pi - 1 \cdot \sin \pi$$

$$\cos(90^\circ + \pi) = -\sin \pi$$



2. Vereenvoudiging [7.5.4.2]

$$\begin{aligned} \text{(a)} \quad & \cos 12\pi \cdot \sin 9\pi - \sin 12\pi \cdot \cos 9\pi \\ &= \sin(9\pi - 12\pi) \\ &= \sin(-3\pi) \\ &= -\sin(3\pi) \end{aligned}$$

$$\begin{aligned} \text{(b)} \quad & \sin 20^\circ \cdot \cos 10^\circ + \cos 20^\circ \cdot \sin 10^\circ \\ &= \sin(20^\circ + 10^\circ) \\ &= \sin 30^\circ \\ &= \frac{1}{2} \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad & -\sin 14\alpha \cdot \sin 8\alpha - \cos 14\alpha \cdot \cos 8\alpha \\ &= -(\sin 14\alpha \cdot \sin 8\alpha + \cos 14\alpha \cdot \cos 8\alpha) \\ &= -\cos(14\alpha - 8\alpha) \\ &= -\cos 6\alpha \end{aligned}$$

$$\begin{aligned} \text{(d)} \quad & \cos 65^\circ \cdot \cos 35^\circ + \sin 65^\circ \cdot \sin 35^\circ \\ &= \cos(65^\circ - 35^\circ) \\ &= \cos 30^\circ \\ &= \frac{\sqrt{3}}{2} \end{aligned}$$

$$\begin{aligned} \text{(e)} \quad & \cos 7\vartheta \cdot \sin 3\vartheta + \sin 7\vartheta \cdot \cos 3\vartheta \\ &= \sin(3\vartheta + 7\vartheta) \\ &= \sin 10\vartheta \end{aligned}$$

3. Gevorderde vereenvoudiging [7.5.4.3]

$$\begin{aligned} \text{(a)} \quad & \cos 55^\circ \cdot \cos 350^\circ + \sin 55^\circ \cdot \sin 10^\circ \\ &= \cos 55^\circ \cdot \cos 10^\circ + \sin 55^\circ \cdot \sin 10^\circ \\ &= \cos(55^\circ - 10^\circ) \\ &= \cos 45^\circ \\ &= \frac{\sqrt{2}}{2} \end{aligned}$$



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$$\begin{aligned} \text{(b)} \quad & \sin 45^\circ \cdot \cos 345^\circ + \cos 45^\circ \cdot \sin 15^\circ \\ &= \sin 45^\circ \cdot \cos 15^\circ + \cos 45^\circ \cdot \sin 15^\circ \\ &= \sin(45^\circ + 15^\circ) \\ &= \sin 60^\circ \\ &= \frac{\sqrt{3}}{2} \end{aligned}$$

$$\begin{aligned} \text{(c)} \quad & \cos 83^\circ \cdot \cos 322^\circ + \sin 83^\circ \cdot \sin 38^\circ \\ &= \cos 83^\circ \cdot \cos 38^\circ + \sin 83^\circ \cdot \sin 38^\circ \\ &= \cos(83^\circ - 38^\circ) \\ &= \cos 45^\circ \\ &= \frac{\sqrt{2}}{2} \end{aligned}$$

$$\begin{aligned} \text{(d)} \quad & \sin 78^\circ \cdot \cos 342^\circ - \cos 78^\circ \cdot \sin 18^\circ \\ &= \sin 78^\circ \cdot \cos 18^\circ - \cos 78^\circ \cdot \sin 18^\circ \\ &= \sin(78^\circ - 18^\circ) \\ &= \sin 60^\circ \\ &= \frac{\sqrt{3}}{2} \end{aligned}$$

$$\begin{aligned} \text{(e)} \quad & \sin 12^\circ \cdot \cos 312^\circ + \cos 12^\circ \cdot \sin 48^\circ \\ &= \sin 12^\circ \cdot \cos 48^\circ + \cos 12^\circ \cdot \sin 48^\circ \\ &= \sin(12^\circ + 48^\circ) \\ &= \sin 60^\circ \\ &= \frac{\sqrt{3}}{2} \end{aligned}$$