

- (1) As $\sin 28^\circ = a$ en $\cos 32^\circ = b$, bepaal die volgende in terme van a en/of b :

(a) $\cos 28^\circ \rightarrow \cos^2 28^\circ + \sin^2 28^\circ = 1$ (2)

$$\therefore \cos^2 28^\circ = 1 - \sin^2 28^\circ$$

$$\therefore \cos 28^\circ = \sqrt{1 - \sin^2 28^\circ} \quad \checkmark$$

$$\therefore \cos 28^\circ = \sqrt{1 - a^2} \quad \checkmark$$

(b) $\cos 64^\circ = \cos(2 \times 32^\circ) = 2\cos^2 32^\circ - 1 = 2b^2 - 1 \quad \checkmark$ (3)

(c) $\sin 4^\circ = \sin(32^\circ - 28^\circ) \quad \checkmark$ (4)

$$= \sin 32^\circ \times \cos 28^\circ - \cos 32^\circ \times \sin 28^\circ \quad \checkmark$$

$$= \sqrt{1 - \cos^2 32^\circ} \times \sqrt{1 - \sin^2 28^\circ} - \cos 32^\circ \times \sin 28^\circ$$

$$= \sqrt{1 - b^2} \times \sqrt{1 - a^2} - b \times a = \sqrt{1 - b^2} \times \sqrt{1 - a^2} - ab \quad \checkmark \checkmark$$

- (2) Bewys, sonder om 'n sakrekenaar te gebruik, dat as $\sin 28^\circ = a$ en $\cos 32^\circ = b$, (4)

dan is: $b\sqrt{1 - a^2} - a\sqrt{1 - b^2} = \frac{1}{2}$

$$\text{LK} = b\sqrt{1 - a^2} - a\sqrt{1 - b^2} \quad \text{RK} = \frac{1}{2}$$

$$= \cos 32^\circ \sqrt{1 - \sin^2 28^\circ} - \sin 28^\circ \sqrt{1 - \cos^2 32^\circ} \quad \checkmark$$

$$= \cos 32^\circ \sqrt{\cos^2 28^\circ} - \sin 28^\circ \sqrt{\sin^2 32^\circ} \quad \checkmark$$

$$= \cos 32^\circ \cdot \cos 28^\circ - \sin 28^\circ \cdot \sin 32^\circ$$

$$= \cos(32^\circ + 28^\circ) \quad \checkmark$$

$$= \cos(60^\circ) = \frac{1}{2} \quad \checkmark$$

$$\therefore \text{LK} = \text{RK}$$

(3) Evalueer elk van die volgende sonder om 'n sakrekenaar te gebruik.

Toon ALLE bewerkings.

$$(a) \quad \frac{\sin 130^\circ \cdot \tan 60^\circ}{\cos 540^\circ \cdot \tan 230^\circ \cdot \sin 400^\circ} \quad (7)$$

$$= \frac{\sin(180^\circ - 50^\circ) \cdot \tan 60^\circ}{\cos(540^\circ - 360^\circ) \cdot \tan(180^\circ + 50^\circ) \cdot \sin(360^\circ + 40^\circ)}$$

$$= \frac{\sin 50^\circ \cdot \tan 60^\circ}{\cos 180^\circ \cdot \tan 50^\circ \cdot \sin 40^\circ} \quad \checkmark \checkmark \checkmark$$

$$= \frac{\sin 50^\circ \cdot \sqrt{3}}{(-1) \cdot \frac{\sin 50^\circ}{\cos 50^\circ} \cdot \sin 40^\circ} \quad \checkmark \checkmark$$

$$= \frac{\cancel{\sin 50^\circ} \cdot \sqrt{3}}{(-1) \cdot \sin 40^\circ} \times \frac{\cos 50^\circ}{\cancel{\sin 50^\circ}}$$

$$= \frac{\sqrt{3}}{(-1) \cdot \sin(90^\circ - 50^\circ)} \times \frac{\cos 50^\circ}{1}$$

$$= \frac{\sqrt{3}}{(-1) \cdot \cancel{\cos 50^\circ}} \times \frac{\cancel{\cos 50^\circ}}{1} \quad \checkmark$$

$$= -\sqrt{3} \quad \checkmark$$

$$(b) \quad (1 - \sqrt{2} \sin 75^\circ)(\sqrt{2} \sin 75^\circ + 1) \quad (4)$$

$$= 1 - (\sqrt{2} \sin 75^\circ)^2 \quad \checkmark$$

$$= 1 - 2 \sin^2 75^\circ \quad \checkmark$$

$$= \cos 150^\circ = \cos(180^\circ - 30^\circ) = -\cos 30^\circ \quad \checkmark$$

$$= -\frac{\sqrt{3}}{2} \quad \checkmark$$

$$(4) \quad \text{Bepaal die algemene oplossing van: } \sin^2 x + \cos 2x - \cos x = 0 \quad (7)$$

$$\sin^2 x + \cos^2 x - \sin^2 x - \cos x = 0 \quad \checkmark$$

$$\cos^2 x - \cos x = 0$$

$$\cos x(\cos x - 1) = 0 \quad \checkmark$$

$$\cos x = 0 \quad \checkmark \quad \text{of} \quad \cos x = 1 \quad \checkmark$$

$$\therefore x = 90^\circ + k \cdot 360^\circ$$

$$x = 0^\circ + k \cdot 360^\circ$$

$$\therefore x = 90^\circ + k \cdot 360^\circ \quad \checkmark$$

$$x = k \cdot 360^\circ \quad \checkmark \quad \text{met } k \in \mathbb{Z} \quad \checkmark$$

(5) Beskou: $\frac{\cos 2x \cdot \tan x}{\sin^2 x}$

(a) Vir watter waardes van $x \in [0^\circ; 180^\circ]$, sal die uitdrukking ongedefinieer wees? (3)

$$\sin^2 x \neq 0$$

$$\tan x$$

$\therefore$ Ongedefinieerd as: $x = 0^\circ$ of $x = 180^\circ$ ✓✓

$x = 90^\circ$ ✓

(b) Bewys dat: $\frac{\cos 2x \cdot \tan x}{\sin^2 x} = \frac{\cos x}{\sin x} - \tan x$ (5)

$$\begin{aligned} \text{LK} &= \frac{\cos 2x \cdot \tan x}{\sin^2 x} \\ &= \frac{(\cos^2 x - \sin^2 x) \cdot \frac{\sin x}{\cos x}}{\sin^2 x} \quad \checkmark \checkmark \\ &= \frac{(\cos^2 x - \sin^2 x)}{\sin x \cdot \cos x} \quad \checkmark \end{aligned}$$

$$\begin{aligned} \text{RK} &= \frac{\cos x}{\sin x} - \tan x \\ &= \frac{\cos x}{\sin x} - \frac{\sin x}{\cos x} \quad \checkmark \\ &= \frac{\cos^2 x - \sin^2 x}{\sin x \cdot \cos x} \quad \checkmark \end{aligned}$$

$$\therefore \text{LK} = \text{RK}$$

(6) Die diagram langsaaan toon een sy van die hoogte van 'n huis. Party afmetings (in meter) word op die diagram aangedui.

Bereken, afgerond tot EEN desimale plek:

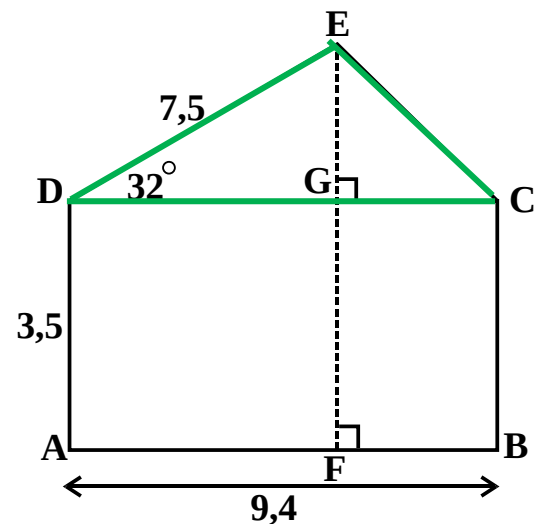
(a) EC In $\triangle CDE$: (3)

$$EC^2 = DE^2 + DC^2 - 2DE \cdot DC \cdot \cos \hat{D} \quad \checkmark$$

$$\therefore EC^2 = (7,5)^2 + (9,4)^2 - 2 \times 7,5 \times 9,4 \times \cos 32^\circ \quad \checkmark$$

$$\therefore EC^2 = 25,035$$

$$\therefore EC \approx 5 \text{ meter} \quad \checkmark$$



(b) $\hat{DCE} \rightarrow$ In $\triangle CDE$: (3)

$$\frac{\sin \hat{DCE}}{DE} = \frac{\sin \hat{D}}{EC} \quad \checkmark$$

$$\therefore \frac{\sin \hat{DCE}}{7,5} = \frac{\sin 32^\circ}{5} \quad \checkmark$$

$$\therefore \sin \hat{DCE} = \frac{7,5 \sin 32^\circ}{5}$$

$$\therefore \sin \hat{DCE} = 0,794 \dots$$

$$\therefore \hat{DCE} \approx 52,6^\circ \quad \checkmark$$

(c) Oppervlakte van $\Delta DEC \rightarrow$ In ΔCDE :

(2)

$$\begin{aligned}\text{Opp } \Delta CDE &= \frac{1}{2} DE \cdot DC \cdot \sin \hat{DCE} \\ &= \frac{1}{2} \times 7,5 \times 9,4 \sin 32^\circ \checkmark\end{aligned}$$

$$\therefore \text{Opp } \Delta CDE \approx 18,7 \text{ m}^2 \checkmark$$

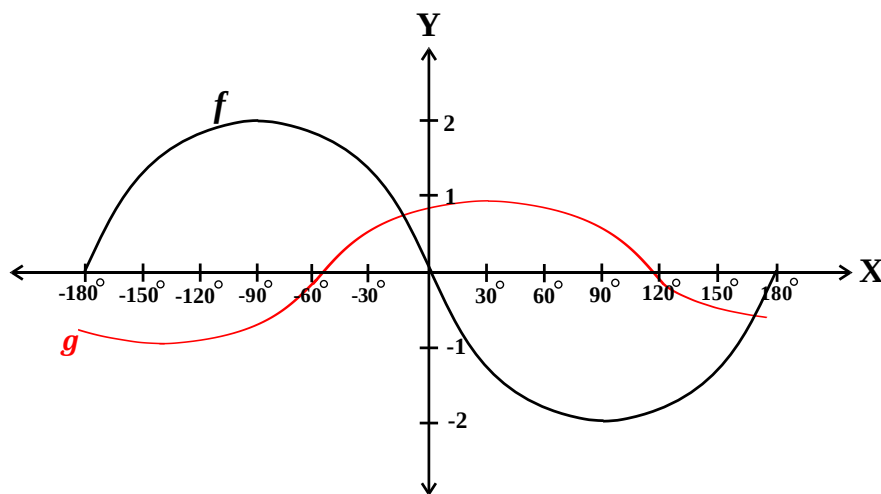
(d) Die hoogte van EF.

(3)

$$\begin{aligned}\text{Opp } \Delta CDE &= \frac{1}{2} DC \times EG \\ \therefore 18,7 &= \frac{1}{2} \times 9,4 \times EG \checkmark \\ \therefore EG &= \frac{18,7 \times 2}{9,4} \\ \therefore EG &\approx 4,0 \checkmark \\ \therefore EF &= EG + GF = 4 + 3,5\end{aligned}$$

$$\therefore EF = 7,5 \text{ meter} \checkmark$$

(7) Die grafiek van $f(x) = -2 \sin x$ is hieronder geskets.



(a) Skryf die periode van f neer.

$$360^\circ \checkmark$$

(1)

(b) Skryf die amplitude van h neer as $h(x) = \frac{f(x)}{4}$

(2)

$$\therefore h(x) = \frac{-2 \sin x}{4} = -\frac{1}{2} \sin x \checkmark \rightarrow \text{Amplitude van } h \text{ is } \frac{1}{2} \checkmark$$

(c) Teken die grafiek van $g(x) = \cos(x - 30^\circ)$ vir $x \in [-180^\circ; 180^\circ]$

(3)

in op die bogaande grafiek. **Sien in rooi op die grafiek.**

✓ **Vorm** ✓ **x-afsnitte** ✓ **Amplitude**

- (d) Gebruik die grafiek om die AANTAL oplossings te bepaal vir (1)
 $-2 \sin x = \cos(x - 30^\circ)$, vir $x \in [-180^\circ; 180^\circ]$.

Twee snypunte ✓

- (e) Vir watter waardes van x is $g(x) \geq 0$? (2)

$-60^\circ \leq x \leq 120^\circ$ of **$x \in [-60^\circ; 120^\circ]$** ✓✓