

Scorevoorstel oefentoets vwo B deel 2

Hoofdstuk 8 Goniometrische functies

In deze toets zijn de vragen gelabeld met K, T of I.

K = kennisvraag, T = toepassingsvraag, I = inzichtvraag

De toets bestaat uit 22 vragen met in totaal 62 punten.

Er zijn drie K-vragen met in totaal 3 punten, zestien T-vragen met in totaal 47 punten en drie I-vragen met in totaal 12 punten.

OPGAVE 1

TOTAAL 3P

- K **a** $A = B + k \cdot 2\pi \vee A = -B + k \cdot 2\pi$ 1p
- K **b** $\sin(A + \frac{1}{2}\pi)$ 1p
- K **c** $f'(x) = \cos(x)$ 1p

OPGAVE 2

TOTAAL 6P

- T **a** $\alpha_B = \frac{1}{6}\pi + 2$, dus $B(\cos(\frac{1}{6}\pi + 2), \sin(\frac{1}{6}\pi + 2)) \approx B(-0,815; 0,579)$ 1p
- $\alpha_C = \frac{1}{6}\pi + 3\frac{1}{2}$, dus $C(\cos(\frac{1}{6}\pi + 3\frac{1}{2}), \sin(\frac{1}{6}\pi + 3\frac{1}{2})) \approx C(-0,636; -0,772)$ 1p
- $\alpha_D = \frac{1}{6}\pi + 4\frac{1}{2}$, dus $D(\cos(\frac{1}{6}\pi + 4\frac{1}{2}), \sin(\frac{1}{6}\pi + 4\frac{1}{2})) \approx D(0,306; -0,952)$ 1p
- T **b** $\angle AOD = 2\pi - \frac{1}{6}\pi - 4\frac{1}{2} = 1\frac{5}{6}\pi - 4\frac{1}{2}$ rad 1p
- $\angle AOD = (1\frac{5}{6}\pi - 4\frac{1}{2}) \cdot \frac{180}{\pi} \approx 72,2^\circ$ 2p

OPGAVE 3

TOTAAL 13P

- T **a** $\cos(\frac{1}{3}x - \frac{1}{8}\pi) = \frac{1}{2}\sqrt{3}$ geeft $\frac{1}{3}x - \frac{1}{8}\pi = \frac{1}{6}\pi + k \cdot 2\pi \vee \frac{1}{3}x - \frac{1}{8}\pi = -\frac{1}{6}\pi + k \cdot 2\pi$ 1p
- $\frac{1}{3}x = \frac{7}{24}\pi + k \cdot 2\pi \vee \frac{1}{3}x = -\frac{1}{12}\pi + k \cdot 2\pi$ 1p
- $x = \frac{7}{8}\pi + k \cdot 6\pi \vee x = -\frac{1}{8}\pi + k \cdot 6\pi$ 1p
- T **b** $\tan(x)(\tan(x) - \sqrt{3}) = 0$ geeft $\tan(x) = 0 \vee \tan(x) = \sqrt{3}$ 1p
- $x = k \cdot \pi \vee x = \frac{1}{3}\pi + k \cdot \pi$ 1p
- T **c** $\sin^2(\frac{1}{4}(2x - \pi)) = \frac{1}{4}$ geeft $\sin(\frac{1}{2}x - \frac{1}{4}\pi) = \frac{1}{2} \vee \sin(\frac{1}{2}x - \frac{1}{4}\pi) = -\frac{1}{2}$ 1p
- $\frac{1}{2}x - \frac{1}{4}\pi = \frac{1}{6}\pi + k \cdot 2\pi \vee \frac{1}{2}x - \frac{1}{4}\pi = \frac{5}{6}\pi + k \cdot 2\pi \vee$
- $\frac{1}{2}x - \frac{1}{4}\pi = -\frac{1}{6}\pi + k \cdot 2\pi \vee \frac{1}{2}x - \frac{1}{4}\pi = 1\frac{1}{6}\pi + k \cdot 2\pi$ 1p
- $\frac{1}{2}x = \frac{5}{12}\pi + k \cdot 2\pi \vee \frac{1}{2}x = \frac{13}{12}\pi + k \cdot 2\pi \vee \frac{1}{2}x = \frac{1}{12}\pi + k \cdot 2\pi \vee \frac{1}{2}x = \frac{17}{12}\pi + k \cdot 2\pi$ 1p
- $x = \frac{5}{6}\pi + k \cdot 4\pi \vee x = \frac{13}{6}\pi + k \cdot 4\pi \vee x = \frac{1}{6}\pi + k \cdot 4\pi \vee x = \frac{17}{6}\pi + k \cdot 4\pi$ geeft in $[0, 2\pi]$
- de oplossingen $x = \frac{1}{6}\pi \vee x = \frac{5}{6}\pi$ 1p
- T **d** $\frac{1}{4}\pi x = \frac{1}{2}\pi(x - \frac{1}{2}) + k \cdot 2\pi \vee \frac{1}{4}\pi x = \pi - \frac{1}{2}\pi(x - \frac{1}{2}) + k \cdot 2\pi$ 1p
- $x = 2(x - \frac{1}{2}) + k \cdot 8 \vee x = 4 - 2(x - \frac{1}{2}) + k \cdot 8$ 1p
- $x = 1 + k \cdot 8 \vee x = 1\frac{2}{3} + k \cdot 2\frac{2}{3}$ 1p
- x in $[0, 8]$ geeft $x = 1 \vee x = 1\frac{2}{3} \vee x = 4\frac{1}{3} \vee x = 7$ 1p

OPGAVE 4**TOTAAL 8P**

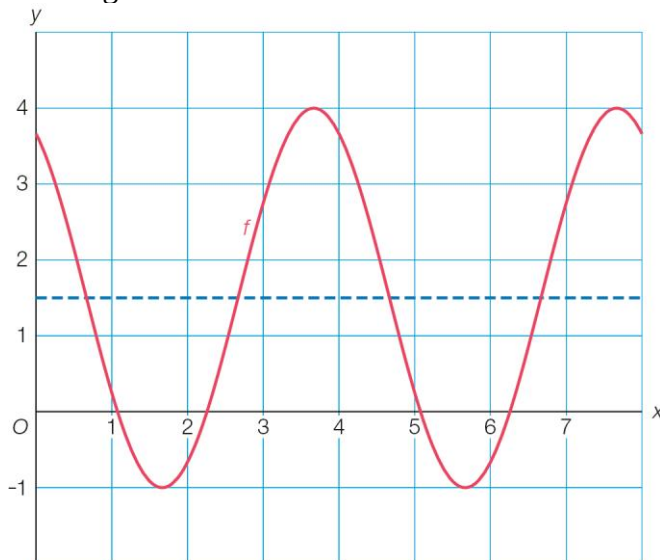
- T **a** $-\cos(2x - 1\frac{1}{6}\pi) = \cos(2x - 1\frac{1}{6}\pi + \pi)$ 1p
 $\cos(2x - \frac{1}{6}\pi) = \sin(2x - \frac{1}{6}\pi + \frac{1}{2}\pi) = \sin(2x + \frac{1}{3}\pi)$ 1p
- T **b** $\frac{\cos(x)}{2\tan(x)} = \frac{\cos(x)}{2 \cdot \frac{\sin(x)}{\cos(x)}} = \frac{\cos^2(x)}{2\sin(x)} = \frac{1 - \sin^2(x)}{2\sin(x)}$ 2p
- I **c** $N = \sin(3x + p + \frac{1}{2}\pi) + \sin(3x - \frac{1}{4}\pi + \pi)$ 2p
 $N = \sin(3x + p + \frac{1}{2}\pi) + \sin(3x + \frac{3}{4}\pi)$, dus $p + \frac{1}{2}\pi = \frac{3}{4}\pi$ 1p
 $p = \frac{1}{4}\pi$ en $q = \frac{3}{4}\pi$ 1p

OPGAVE 5**TOTAAL 6P**

- T **a** $f'(x) = \cos(x) \cdot \cos(x^2) + \sin(x) \cdot (-\sin(x^2)) \cdot 2x = \cos(x)\cos(x^2) - 2x\sin(x)\sin(x^2)$ 2p
- T **b** $g(x) = \tan^2(x) - 2(\cos(x))^{-1}$ 1p
 $g'(x) = 2\tan(x) \cdot \frac{1}{\cos^2(x)} + 2(\cos(x))^{-2} \cdot -\sin(x)$ 2p
 $g'(x) = \frac{2\tan(x)}{\cos^2(x)} - \frac{2\sin(x)}{\cos^2(x)} = \frac{2(\tan(x) - \sin(x))}{\cos^2(x)}$ 1p

OPGAVE 6**TOTAAL 15P**

- T **a** $f(x) = 1\frac{1}{2} - 2\frac{1}{2}\sin(\frac{1}{2}\pi(x - \frac{2}{3}))$ 1p
evenwichtsstand $1\frac{1}{2}$, amplitude $2\frac{1}{2}$, periode $\frac{2\pi}{\frac{1}{2}\pi} = 4$, beginpunt $(\frac{2}{3}, 1\frac{1}{2})$ 2p
- T **b** tekening 3p



- T **c** $\frac{2}{3} + 1 = 1\frac{2}{3}$ en $\frac{2}{3} + 3 = 3\frac{2}{3}$, dus $(1\frac{2}{3}, -1)$, $(3\frac{2}{3}, 4)$, $(5\frac{2}{3}, -1)$ en $(7\frac{2}{3}, 4)$ 2p
- T **d** $f(x) = 2\frac{3}{4}$ geeft $\sin(\frac{1}{2}\pi x - \frac{1}{3}\pi) = -\frac{1}{2}$ 1p
 $\frac{1}{2}\pi x - \frac{1}{3}\pi = -\frac{1}{6}\pi + k \cdot 2\pi \vee \frac{1}{2}\pi x - \frac{1}{3}\pi = 1\frac{1}{6}\pi + k \cdot 2\pi$ 1p
 $x = \frac{1}{3} + k \cdot 4 \vee x = 3 + k \cdot 4$ 1p
 x in $[0, 8]$ geeft $x = \frac{1}{3} \vee x = 4\frac{1}{3} \vee x = 3 \vee x = 7$ 1p
 $f(x) > 2\frac{3}{4}$ geeft $0 \leq x < \frac{1}{3} \vee 3 < x < 4\frac{1}{3} \vee 7 < x \leq 8$ 1p

T **e** $f'(x) = -2\frac{1}{2} \cos(\frac{1}{2}\pi x - \frac{1}{3}\pi) \cdot \frac{1}{2}\pi = -1\frac{1}{4}\pi \cos(\frac{1}{2}\pi x - \frac{1}{3}\pi)$ 1p

$rc_k = f'(1) = -1\frac{1}{4}\pi \cos(\frac{1}{6}\pi) = -1\frac{1}{4}\pi \cdot \frac{1}{2}\sqrt{3} = -\frac{5}{8}\pi\sqrt{3}$ 1p

OPGAVE 7**TOTAAL 11P**

T **a** $a = 2\frac{3}{4}$ en $b = 2\frac{3}{4} - \frac{1}{4} = 2\frac{1}{2}$ 1p

$\frac{1}{2}$ periode $= \frac{11}{12}\pi - \frac{1}{4}\pi = \frac{2}{3}\pi$, dus periode $= \frac{4}{3}\pi$ en $c = \frac{2\pi}{\frac{4}{3}\pi} = 1\frac{1}{2}$ 1p

$y = 2\frac{3}{4} + 2\frac{1}{2}\sin(1\frac{1}{2}(x - \frac{11}{12}\pi))$ 1p

I **b** $a = \frac{2\frac{3}{4} + 0}{2} = 1\frac{3}{8}$ en $b = -1\frac{3}{8}$ 1p

periode $= \frac{11}{12}\pi - \frac{1}{4}\pi = \frac{2}{3}\pi$, dus $c = \frac{2\pi}{\frac{2}{3}\pi} = 3$ 1p

$\frac{\frac{1}{4}\pi + \frac{11}{12}\pi}{2} = \frac{7}{12}\pi$, dus een laagste punt is $(\frac{7}{12}\pi, 0)$ 1p

$g(x) = 1\frac{3}{8} - 1\frac{3}{8}\cos(3(x - \frac{7}{12}\pi))$ 1p

I **c** top $(\frac{7}{12}\pi, \frac{1}{4})$, dus $y = a(x - \frac{7}{12}\pi)^2 + \frac{1}{4}$ 1p

door $A(\frac{1}{4}\pi, 2\frac{3}{4})$ geeft $a \cdot (-\frac{1}{3}\pi)^2 + \frac{1}{4} = 2\frac{3}{4}$ 1p

$\frac{1}{9}\pi^2 \cdot a = 2\frac{1}{2}$ geeft $a = \frac{45}{2\pi^2}$ 1p

$a = \frac{45}{2\pi^2}$, $p = \frac{7}{12}\pi$ en $q = \frac{1}{4}$ 1p