



GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINSIALE EKSAMEN

JUNIE 2023

GRAAD 11

NASIENSKALYNE

WISKUNDEN VRAESTEL 2)

10 bladsye

EXEMPLAR

INSTRUKSIES EN INLIGTING:

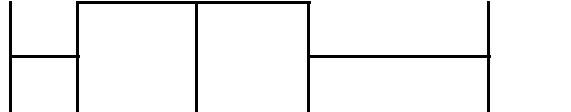
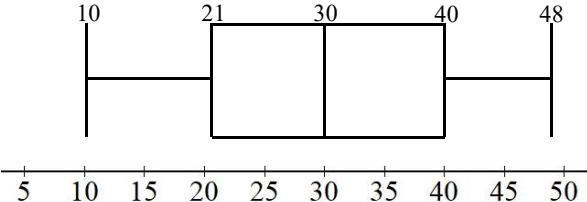
- A – AKKURAATHEID
- CA – KONTINUE AKKURAATHEID
- S – BEWERING
- R – REDE
- S & R – BEWERING met REDE

NOTAS:

- Indien 'n kandidaat 'n vraag TWEE keer beantwoord het, merk slegs die EERSTE poging.
- Indien 'n kandidaat 'n antwoord doodgetrek het, en dit nie weer gedoen het nie, merk die doodgetrekte antwoord.
- Deurlopende akkuraatheid moet op ALLE aspekte van die Nasienriglyne toepas word.
- Dit is onaanvaarbaar om waardes/antwoorde aan te neem om voorvalle op te noem.

EXEMPLAR

VRAAG 1

1.1	10; 13; 17; 21; 21; 23; 27; 29; 31; 34; 37; 38; 42; 43; 46; 48 Min. = 10 ; Q ₁ = 21 ; Maks. = 48 $Q_2 = \frac{29 + 31}{2} = 30 ; Q_3 = \frac{38 + 42}{2} = 40$	✓ Korrekte Min. Q ₁ en Maks. ✓ Korrekte Q ₂ ✓ Korrekte Q ₃ (3)
1.2	Graad 11A  Graad 11B 	✓ Korrekte Min./onderste punt ✓ Korrekte Maks./bovenste punt ✓ Korrekte houer (3)
1.3	$\bar{x} = \frac{480}{16}$ $\bar{x} = 30$	✓ Breuk ✓ Antwoord NB: Antwoord alleen volpunte (2)
1.4	$\sigma = 11,46$	✓✓ Antwoord (2)
1.5	1 σ interval: (30 - 11,46; 30 + 11,46) (18,54; 41,46) Hierdie leerders het meer as 146 punte behaal.	✓ Interval ✓ Antwoord (2)
1.6	Dit is 'n groot verskil in die IKO nie. IKO = 19 vir albei klasse. Alhoewel 41, die middel 50% van Graad 11B tussen 21 en 40 was in vergelyking met Graad 11A waar 50% tussen 11 en 30 was. Die houer vir 11B is nou regtig geskuif. Dus het Graad 11B oor die algemeen beter gevaaar.	✓ Opmerking ✓ IKO waarde (2)
1.7	75%	✓ Antwoord (1)
		[15]

VRAAG 2

2.1	Vergelyking van EG: $3x - y + 6 = 0$ $y = 3x + 6$ dan $m_{EG} = 3$ $\tan \beta = 3$ $\beta = 71,57^\circ$	✓ Gradiënt ✓ Antwoord X (2)
2.2	$x + 3(0) = 8$ $x = 8$ $\therefore (8; 0)$	✓ $x = 0$ Koördinat vorm X (2)
2.3	$M_{DF} = M_{GE}$ hoeklyne halveer mekaar $K\left(\frac{-10+8}{2}; \frac{6+0}{2}\right)$ $K(-1; 3)$ $-1 = \frac{x+1}{2} \quad 3 = \frac{y+9}{2}$ $x = -3 \quad y = -3$ $\therefore E(-3; -3)$	✓ $M_{DE} = M_{GE}$ ✓ Koördinate van K x-waarde y-waarde X (4)
2.4	$m_{DF} \times m_{GE}$ $= -\frac{1}{3} \times 3$ -1 $DF \perp GE$ DGFE 'n ruit. (hoeklyne halveer mekaar loodreg)	✓ m_{DF} ✓ $DF \perp GE$ ✓ Rede X (3)

[11]

VRAAG 3

3.1	$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $AC = \sqrt{(1 - (-2))^2 + (5 - (-1))^2}$ $AC = 3\sqrt{5}$	✓ Substitusie ✓ Antwoord (2)
3.2	$m_{BC} = \frac{5 - 4}{1 - (-3)}$ $m_{BC} = \frac{1}{4}$	✓ Substitusie ✓ Antwoord (2)
3.3	$m_{BC} = m_{BD} = m_{CD}$ $\frac{1}{4} = \frac{y - 5}{5 - 1} \quad \text{of} \quad \frac{1}{4} = \frac{y - 4}{5 - (-3)}$ $y = 6$	✓ Analyke gradiënte ✓ Substitusie ✓ $y = 6$ (3)
3.4	$m_{AH} = -4 \quad (\text{AH} \perp \text{BC})$ $y - (-1) = -4(x - (-2))$ $y = -4x - 9$	✓ m_{AH} ✓ Vervang A ✓ Vergelyking (3)

[10]

VRAAG 4

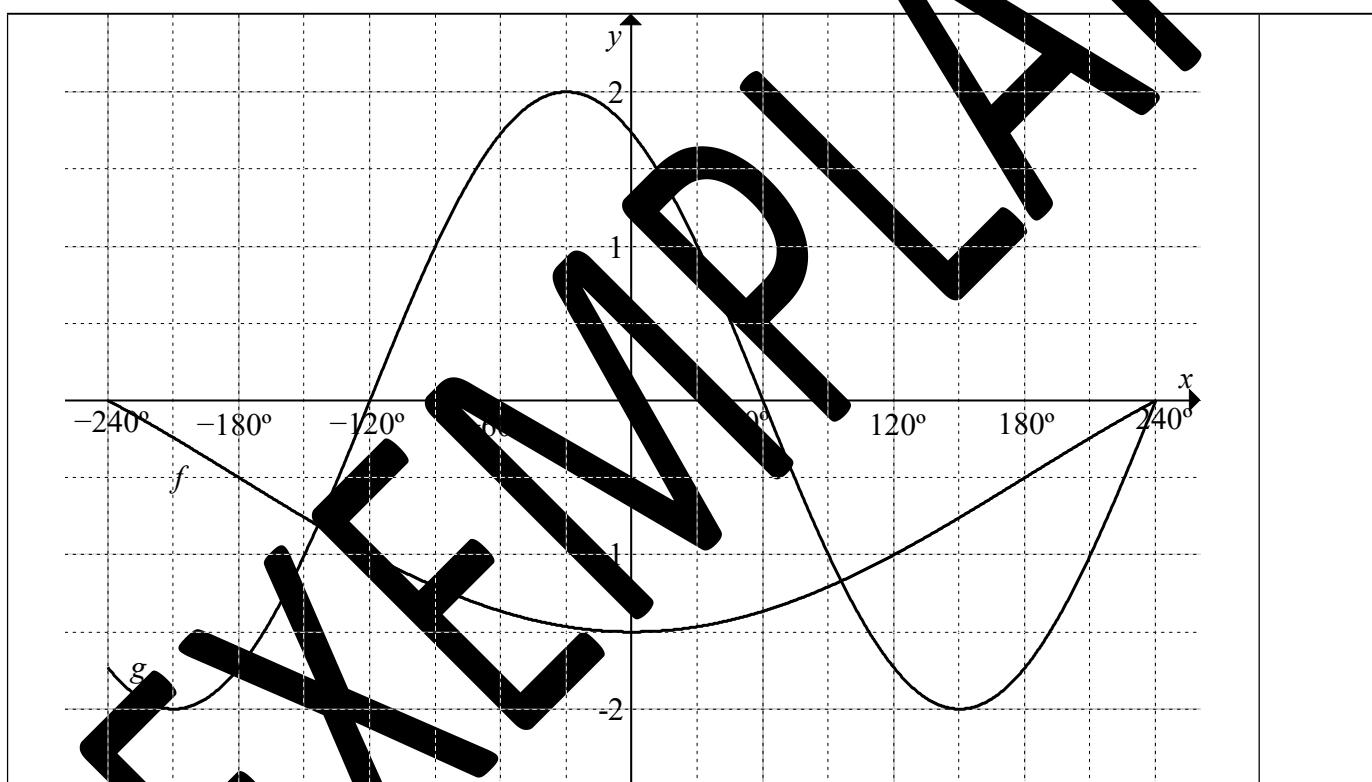
4.1	4.1.1	$x^2 + (-24)^2 = 25^2$ $x = -$	✓ Vervang in Pythagoras ✓ Antwoord (2)
	4.1.2	$\cos(\alpha) = \sin(\beta)$ $= -\frac{\sqrt{3}}{2}$	✓ Antwoord (1)
		$\cos(180^\circ - \beta)$ $= -\cos(\beta)$ $= -\left(\frac{-7}{25}\right)$ $= \frac{7}{25}$	✓ Reduseer ✓ Vereenvoudigde antwoord (2)

		(c)	$\begin{aligned} \tan^2(-\beta) &= \tan^2 \beta \\ &= \left(\frac{-24}{-7}\right)^2 \\ &= \frac{576}{49} \end{aligned}$	<ul style="list-style-type: none"> ✓ Reduseer ✓ Vereenvoudigde antwoord 	
					(2)
4.1.3	(a)		$\begin{aligned} \sin \beta &= \frac{-24}{25} \\ \frac{y}{15} &= \frac{-24}{25} \\ y &= \frac{-72}{5} \\ \cos \beta &= \frac{-7}{25} \\ \frac{x}{15} &= \frac{-7}{25} \\ x &= \frac{-21}{5} \end{aligned}$	<ul style="list-style-type: none"> ✓ $\sin \beta = \frac{-24}{25}$ ✓ Stel sin verhouding gelyk ✓ $\cos \beta = \frac{x}{15}$ ✓ Stel cos verhouding gelyk 	
					(4)
	(b)		<p>ALTERNATIEF</p> $\begin{aligned} C_F &= 15 & F &= 12 \\ \beta &= 253,7397^\circ & & \\ \text{Opp}\Delta\text{ROT} &= \frac{1}{2}(15)(12) \sin(106,26^\circ) \\ \text{Opp}\Delta\text{ROT} &= 86,4 \text{ units}^2 \end{aligned}$	<ul style="list-style-type: none"> ✓ Formule vir oppervlak van Δ ✓ Basis = 12 ✓ Hoogte = $\frac{72}{5}$ ✓ Oppervlak ✓ OT lengte ✓ $106,26^\circ$ ✓ Vervang in sin oppervlak formule ✓ Oppervlakte 	
					(4)

4.2	$\begin{aligned} & \frac{\tan 225^\circ + \sin(180^\circ - \theta) \cos(90^\circ + \theta)}{\cos(90^\circ - \theta) \sin(-\theta - 540^\circ)} \\ &= \frac{1 + \sin \theta - \sin \theta}{\sin \theta \cdot \sin \theta} \\ &= \frac{1 - \sin^2 \theta}{\sin^2 \theta} \\ &= \frac{\cos^2 \theta}{\sin^2 \theta} \\ &= \tan^2 \theta \end{aligned}$	<ul style="list-style-type: none"> ✓ $\tan 225^\circ = 1$ ✓ $\sin(180^\circ - \theta) = \sin \theta$ ✓ $\cos(90^\circ + \theta) = -\sin \theta$ ✓ $\sin(-\theta - 540^\circ) = \sin \theta$ ✓ $1 - \sin^2 \theta = \cos^2 \theta$ ✓ $\frac{\cos^2 \theta}{\sin^2 \theta} = \tan^2 \theta$ 	
			(6)

[21]

VRAAG 5



5.1	$A = 2$	✓ Antwoord	(1)
5.2	Periode = 120°	✓ Antwoord	(1)
5.3	$a = -1$ $p = -60^\circ$	<ul style="list-style-type: none"> ✓ Waarde van a ✓ Waarde van p 	(2)
5.4	$-120^\circ \leq x \leq 60^\circ$ of $x = -240^\circ$ of $x = 240^\circ$	<ul style="list-style-type: none"> ✓ Interval ✓ $-240^\circ; 240^\circ$ 	(2)
5.5	$p = 30^\circ$	✓✓ Waarde van p	(2)
			[8]

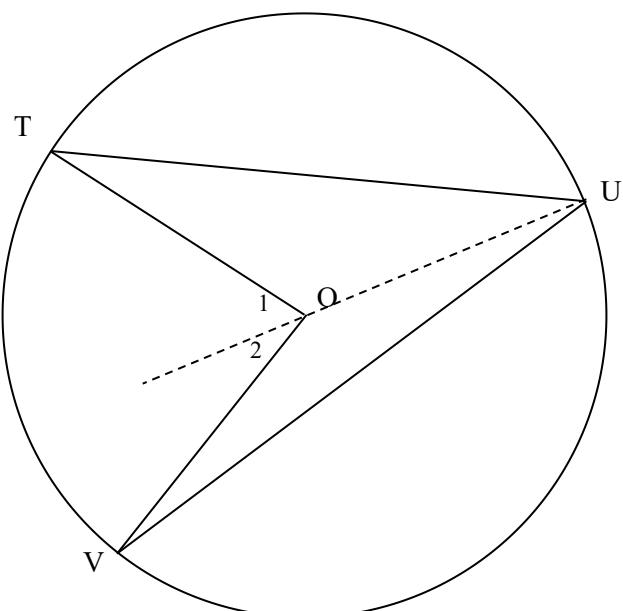
VRAAG 6

6.1	$\tan\left(\frac{\theta}{2}\right) = \frac{r}{R}$ $R \cdot \tan\left(\frac{\theta}{2}\right) = r$	<ul style="list-style-type: none"> ✓ Substitusie ✓ Manipulasie 	(2)
6.2	$V_{\text{hemisfeer}} = \frac{1}{2} \cdot \frac{4}{3} \pi R^3$ $V_{\text{hemisfeer}} = \frac{2}{3} \pi R^3$ $V_{\text{keel}} = \frac{1}{3} \pi r^2 R$ $V_{\text{keel}} = \frac{1}{3} \pi \left(R \cdot \tan\left(\frac{\theta}{2}\right) \right)^2 R$ $V_{\text{keel}} = \frac{2}{3} \pi R^3 \tan^2\left(\frac{\theta}{2}\right)$ $V_{\text{oorblywende}} = \frac{2}{3} \pi R^3 - \frac{1}{3} \pi R^3 \tan^2\left(\frac{\theta}{2}\right)$ $V_{\text{oorblywende}} = \frac{\pi R^3}{3} \left(2 - \tan^2\left(\frac{\theta}{2}\right) \right)$	<ul style="list-style-type: none"> ✓ $\frac{1}{2}$ Volume Sfeer ✓ Very similar to 6.1 ✓ Three volumes of (Metode) Faktore 	(4)
6.3	$V_{\text{keel}} = \frac{1}{3} \pi R^3 \tan^2\left(\frac{\theta}{2}\right)$ $V_{\text{keel}} = \frac{1}{3} \pi (11) \tan^2\left(\frac{36^\circ}{2}\right)$ $V_{\text{keel}} = 147,1 \text{ cm}^3$	<ul style="list-style-type: none"> ✓ $V_{\text{keel}} = \frac{1}{3} \pi R^3 \tan^2\left(\frac{\theta}{2}\right)$ ✓ Vervang $R = 11$ en $\theta = 36^\circ$ ✓ Volume van kerswas 	(3)

VRA G 7

7.1	7.1.1 $\hat{K}_2 = 40^\circ$	raaklyn koord stelling	✓ S ✓ R	(2)
7.1.2	$\hat{K}_1 = 30^\circ$	\angle in 'n halwe sirkel	✓ S ✓ R	(2)
7.1.3	$\hat{P}_1 = 25^\circ$	buite \angle van 'n Δ	✓ S ✓ R	(2)
7.2	$\hat{T}_1 = 65^\circ$ TC = QC	buite \angle van Δ sye teen gelyke \angle e	✓ R ✓ R	(2)

VRAAG 8



✓

8.1 Konstrueer UO en verleng.

In ΔTOU

$$\hat{O}_1 = \hat{T} + \hat{U}_1$$

$$\hat{T} = \hat{U}_1$$

$$\therefore \hat{O}_1 = 2\hat{U}_1$$

Net so in ΔTOU

$$\therefore \hat{O}_2 = 2\hat{U}_2$$

$$\therefore \hat{O}_1 + \hat{O}_2 = 2(\hat{U}_1 + \hat{U}_2)$$

$$\therefore \hat{O}_1 + \hat{O}_2 = 2(\hat{U}_1 + \hat{U}_2)$$

$$\therefore \hat{O}_1 + \hat{O}_2 = 2(\hat{U}_1 + \hat{U}_2)$$

buite \angle van Δ

\angle en \angle buite radie

Konstruksie

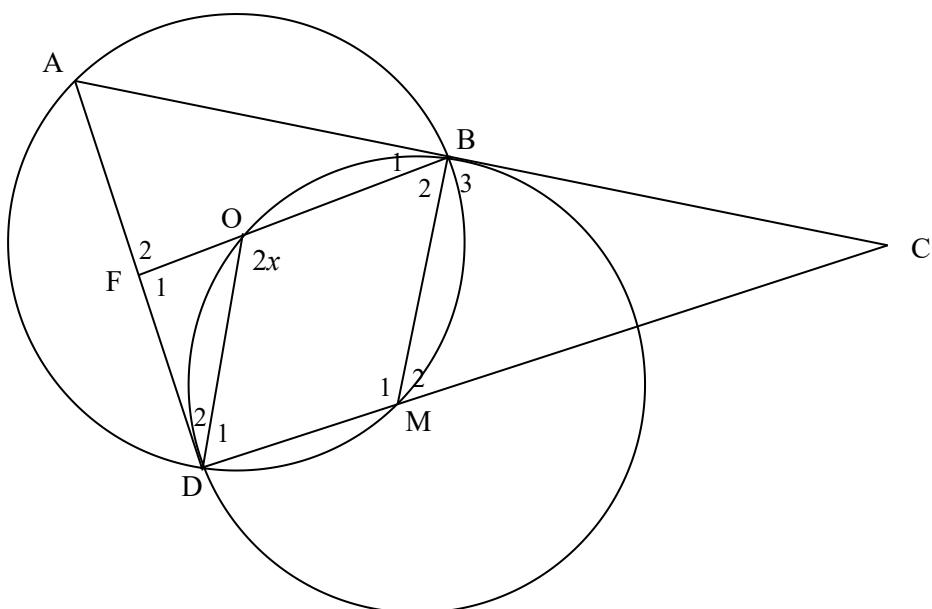
✓ SR

✓ SR

✓ S

✓ Gevolgtrekking

(5)



8.2	8.2.1	Twee pare aangrensende sye gelyk.	✓ R	(1)
	8.2.2 (a)	midpts $\angle = 2 \times$ omtreks \angle	✓ R	(1)
	(b)	buite \angle van koordevierhoek	✓ R	(1)
	(c)	ooreenkoms $\angle e$, $OD \parallel MB$	✓ R	(1)
	(d)	teenoorgest $\angle e$, ruit vele $\angle e$, $OB \perp DM$	✓ R	
	8.3	$\hat{D}_2 + x = 90^\circ$ $\hat{D}_2 = 90^\circ - x$ $\beta_3 = 90^\circ$ $\hat{C} = 90^\circ - x$ $\therefore \hat{D}_2 = \hat{C}$	raaklyn \perp rad raaklyn \perp rad binne $\angle e$ van Δ albei $90^\circ - x$	✓ R ✓ S ✓ SR ✓ Gevolgtrekking (4)
	8.2.4	$\hat{F}_2 = 90^\circ$ $AF = FD$ $AB = BC$	ooreenk $\angle e$, $FB \parallel DM$ lyn van midpt \perp koord lyn deur midpt $\parallel 2^{\text{de}}$ sy	✓ SR ✓ S ✓ R ✓ R (4)
				[18]
				TOTAAL: 100