GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GAUTENG DEPARTMENT OF EDUCATION /

GAUTENGSE DEPARTMENT VAN ONDERWYS

PROVINCIAL EXAMINATION /

PROVINSIALE EKSAMEN

JUNE 2019 /

JUNIE 2019

GRADE 11 /

GRAAD 11

MATHEMATICS / *WISKUNDE*

PAPER 2 / *VRAESTEL 2*

MARKING GUIDLINE / *NASIENRIGLYNE*

10 Pages / *10 bladsye*

MEMORANDUM	MATHEMATICS / *WISKUNDE* Paper 2 / *Vraestel 2* Grade / *Graad* 11

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MATHEMATICS Paper 2 / *WISKUNDE Vraestel 2*

MARKING GUIDLINE / *NASIENRIGLYNE*

INSTRUCTIONS AND INFORMATION

- Consistent accuracy applies as a general rule.
- If a candidate answers a question twice and does not delete either, mark the FIRST attempt.
- If a candidate answers a question, crosses it out and does not re-do it, mark the deleted attempt.

Marks are awarded as per the guideline, and the following symbols are used:

A – Accuracy

C.A – Continued Accuracy

S – Statement

R – Reason

S. R – Statement and Reason

INSTRUKSIES EN INLIGTING

- *Deurlopende akkuraatheid geld as 'n algemene reël.*
- *Indien 'n kandidaat 'n vraag twee keer beantwoord en nie een van die antwoorde kanselleer nie, merk die EERSTE poging.*
- *Indien 'n kandidaat 'n vraag beantwoord en dit doodtrek maar nie oordoen nie, merk die doodgetrekte poging.*

Punte word toegeken volgens die riglyn en die volgende simbole word gebruik:

A – Akkuraatheid

D.A. – Deurlopende Akkuraatheid

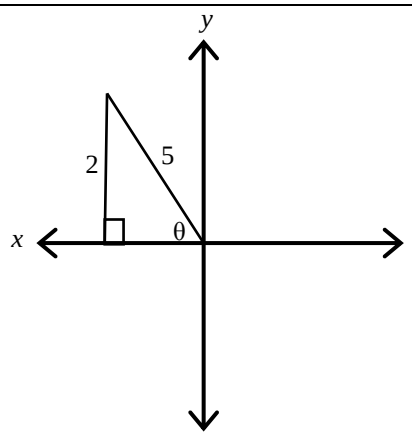
S – Stelling

R – Rede

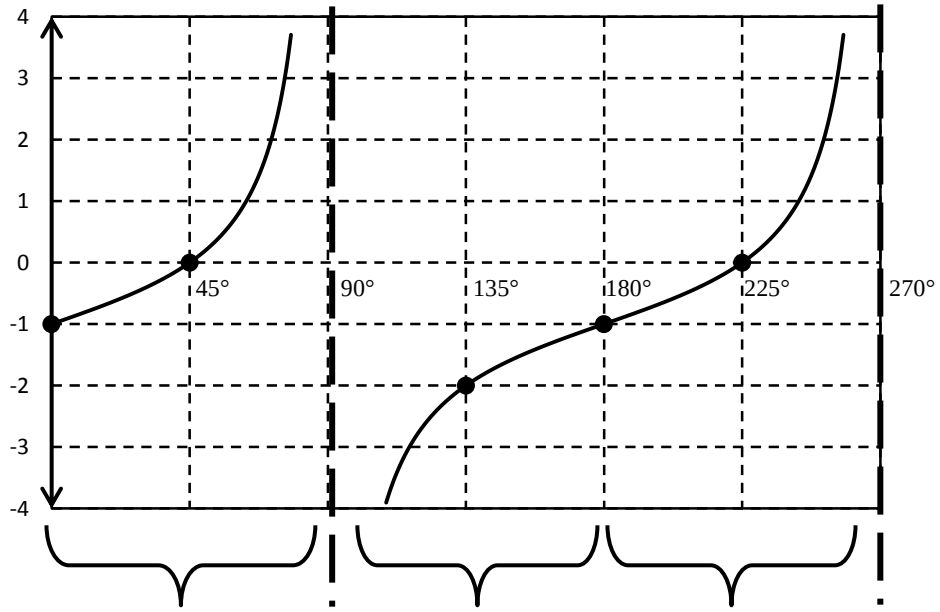
S. R – Stelling en Rede

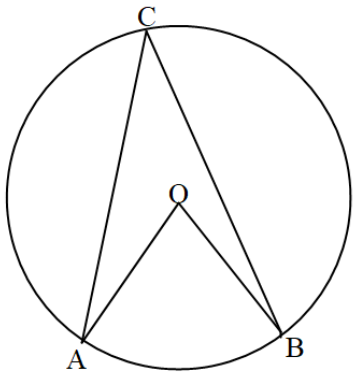
	QUESTION 1 / *VRAAG 1*	
1.1		
1.1.1	$d_{AB} = \sqrt{(y_b - y_{a)}{}^2 - (x_b - x_{a)}{}^2}$ $= \sqrt{(2-(-2))^2 + (1-(-2))^2}$ $= \sqrt{25}$ $= 5$	✓ correct formula / *korrekte form.* ✓ correct subst. / *korrekte verv.* ✓ answer / *antwoord* **(3)**
1.1.2	$\frac{x_1 + x_2}{2}$; $\frac{y_1 + y_2}{2}$ $2 = \frac{1 + x_2}{2}$; $0 = \frac{2 + y_2}{2}$ $4 = 1 + x_2$; $0 = 2 + y_2$ $3 = x_2$; $-2 = y_2$ D (3 ; –2)	✓correct formula / *korrekte form.* ✓correct subst. / *korrekte verv.* ✓answer / *antwoord* **(3)**
1.1.3	$m_{AC} = m_{CE}$ $\frac{y_c - y_a}{x_c - x_a} = \frac{y_e - y_c}{e - x_c}$ $\frac{0-(-2)}{2-(-2)} = \frac{1-0}{p-2}$ $\frac{2}{4} = \frac{1}{p-2}$ $2p - 4 = 4$ $2p = 8$ $p = 4$	✓ equate *m.* / *gelykstelling m* ✓ correct subst. / *korrekte verv.* ✓ simplification / *vereenvoudiging* ($2p - 4 = 4$) ✓ $p = 4$ **(4)**
1.1.4	quadrilateral ABDE is a kite when: m_{CA} . m_{BC} *vierhoek ABDE is 'n vlieër wanneer:* $\frac{y_a - y_c}{x_a - x_c} \cdot \frac{y_c - y_b}{x_c - x_b}$ $\frac{0-(-2)}{2-(-2)} \cdot \frac{0-2}{2-1}$ $\frac{2}{4} \cdot (\frac{-2}{1})$ –1 since the product of the gradients = –1 / *produk van van gradiënte* = –1 ∴ AC ⊥ BC ∴ ABDE is a kite (diagonals intersect 90°) / *ABDE is 'n vlieër (hoeklyne deursny* 90°)	✓ $m_{CA} \times m_{BC}$ ✓ correct subst. / *korrekte verv.* ✓ –1 ✓ explanation / *verduideliking* **(4)**

1.2		
1.2.1	P(0 ; 4)	✓answer / *antwoord* **(1)**
1.2.2	R(4 ; 0)	✓answer / *antwoord* **(1)**
1.2.3	m_{QP} = tan 45° ∴ m_{QP} = 1 $y = mx + c$ $4 = 1(0) + c$ $4 = c$ ∴ $g(x) = x + 4$	✓ m_{QP} = 1 ✓answer / *antwoord* **(2)**
1.2.4.1	m_{PR} = –1 ∴ α = tan (–1) α = 180° – 45° α = 135°	✓ m_{PR} = –1 ✓ answer / *antwoord* **(2)**
1.2.4.2	$P\hat{R}Q = 45°$ (supplementary angles) *(suppl. hoeke)* $\theta = 180° - 90°$ (sum of angles of a Δ) / *(som van hoeke in driehoek)* $\theta = 90°$	✓ S.R ✓ answer / *antwoord* **(2)**
		[22]

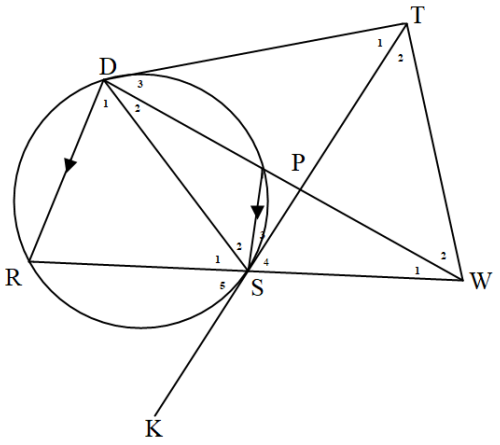
	QUESTION 2 / *VRAAG 2*	
2.1		
2.1.1	 $x^2+y^2=r^2$ $x^2=(5)^2-(2)^2$ $x^2=16$ $x=\pm 4$ ……..restriction / *beperking* $(90°;270°)$ $\therefore x=-4$ $\cos\theta=\frac{x}{r}=\frac{-4}{5}$	✓correct sketch / *korrekte skets* ✓application Pyth. / *Pythagoras* ✓choose / *kies* $x=-4$ ✓answer / *antwoord* **(4)**
2.2		
2.2.1	$\cos^2 45°+\sin 330°.\tan^2 210°$ $=\cos^2 45°+\sin(360°-30°).\tan^2(180°+30°)$ $=\cos^2 45°-\sin 30°.\tan^2 30°$ $=\left(\frac{\sqrt{2}}{2}\right)^2-\frac{1}{2}.\left(\frac{1}{\sqrt{3}}\right)^2$ $=\frac{1}{3}$	✓correct expansion / *korrekte uitbreiding.* ✓correct reduction / *korrekte reduksie* ✓✓✓substitution / *vervanging* ✓answer / *antwoord* **(6)**
2.2.2	$\frac{\sin(90°-x).\tan(-x).\cos(x+180°)}{\cos(1080°+x).\cos(90°+x)}$ $=\frac{\cos x.(-\tan x)(-\cos x)}{1.(-\sin x)}$ $=\frac{\cos x\left(\frac{\sin x}{\cos x}\right)(\cos x)}{-\sin x}$ $=\frac{\sin x.\cos x}{-\sin x}$ $=-\cos x$	✓$-\cos x$ ✓$-\tan x$ ✓$-\sin x$ ✓$\frac{\sin x}{\cos x}$ ✓simplification / *vereenvoudiging* ✓answer / *antwoord* **(6)**

2.3	$\sqrt{1-\tan(180°-\theta).\cot(90°-\theta)}$ $\sqrt{1-(-\tan\theta).(\tan\theta)}$ $\sqrt{1+\tan^2\theta}$ $\sqrt{\sec^2\theta}$ $\sec\theta$	✓–tan θ ✓ tan θ ✓ identity / *identiteit* ✓simplification / *vereenvoudiging* ✓answer / *antwoord* **(5)**
2.4	$x=0°$ $x=90°$ $x=180°$	✓answer / *antwoord* ✓answer / *antwoord* ✓answer / *antwoord* **(3)**
		[24]

	QUESTION 3 / *VRAAG 3*	
3.1		
3.1.1	$p = 2$ $q = -1$ $k = -1$	✓ answer / *antwoord* ✓ answer / *antwoord* ✓ answer / *antwoord* **(3)**
3.2		
3.2.1	$x = 90°$ $x = 325°$	✓answer / *antwoord* ✓answer / *antwoord* **(2)**
3.2.2	$90° < x < 325°$	✓corr. critical value / *korr. kritieke waarde* ✓corr. inequality *korr. ongelykhede* **(2)**
3.3		✓ asymptotes / *asimptote* ✓ shape / *vorm* ✓*x*-intercepts / *x-afsnitte* ✓*y*-intercept / *y-afsnit* **(4)**
		[11]

	QUESTION 4 / *VRAAG 4*	
4.1	... twice angle at circumference / *twee keer die hoek op die omtrek.*	✓ answer / *antwoord* (1)
		
4.2	Construction / *konstruksie*: Join CO and produce it./ *lyn CO verleng* Proof / *bewys*: In ΔACO: $\hat{O}_2 = \hat{A} + \hat{C}_2$ (exterior angle of a triangle is equal to sum of int. opp. angles / *buite hoek van* Δ) but / *maar* $\hat{A} = \hat{C}_2 (OA = OC)$ (radii / *radius*) $\therefore \hat{O}_2 = \hat{C}_2 + \hat{C}_2$ $\hat{O}_2 = 2\hat{C}_2$ Similarly we can prove that / *kan ook bewys word dat*: $\hat{O}_1 = 2\hat{C}_1$ $\hat{O}_2 + \hat{O}_1 = 2\hat{C}_2 + 2\hat{C}_1$ $\therefore$ AÔB = 2 AĈB	✓ construction / *konstruksie* ✓ ✓ SR ✓ S ✓ equating / *gelykstelling* ✓ substitution / *vervanging* **(6)**
		[7]

	QUESTION 5 / *VRAAG 5*	
5.1	... supplementary / *suppl.*	✓ answer / *antwoord* **(1)**
5.2		
5.2.1	$\hat{S} = \hat{Q} = x$ (subt. by same arc / *omtrekshoeke onderspan deur dieselfde boog)* $Q\hat{R}S = \hat{Q} = x$ (alternate angles/ *verwisselende binnehoeke*: PQ || RS) $\hat{S} = Q\hat{P}S = x$ (alternate angles: *verwisselende binnehoeke* PQ || RS)	✓✓ S.R ✓✓ S.R ✓✓ S.R **(6)**
5.2.2	$P\hat{T}R = x + x$ (ext. angle of Δ = sum of int. opp. angles / *buitehoek van* Δ) $= 2x$	✓ ✓ S.R ✓ answer / *antwoord* **(3)**
5.2.3	$P\hat{T}R = 2x$ (ext. angle of Δ = sum of int. opp. angles / *buitehoek van* Δ) $P\hat{O}R = 2x$ (angle at centre th. / *middelpunt stelling)* Line PR subtends equal angles at $P\hat{T}R$ and $P\hat{O}R$ *gelyke omtrekshoeke onderspan deur dieselfde koord* ∴ quadrilateral PTOR is concyclic / ∴ *PTOR is 'n koordevierhoek*	✓ SR ✓ SR ✓conclusion / *gevolgtrekking* **(3)**
		[13]
	QUESTION 6 / *VRAAG 6*	
6.1		
6.1.	$\frac{AO}{OB} = \frac{AE}{EC}$ (midpoint Th. / *middelpunt stelling*) $\frac{10}{10} = \frac{AE}{EC}$ $\frac{1}{1} = \frac{AE}{EC}$ ∴ AE = EC	✓✓SR ✓substitution / *vervanging* ✓conclusion / *gevolgtrekking* **(4)**
6.2	$\hat{E}_1 = 90°$ (line from centre of a circle bisecting the chord is ⊥ to chord) *(lyn van middelpunt van koord na middelpunt van sirkel loodreg)*	✓ S ✓✓ R **(3)**
6.3	$OE^2 = 10^2 - 8^2$ (Theorem of Pythagoras / *Pythagoras Stelling*) $OE = 6cm$ $\therefore ED = 4cm$	✓✓S R ✓OE = 6cm ✓answer / *antwoord* **(4)**
		[11]

	QUESTION 7 / *VRAAG 7*	
		
7.1.	Let: $D_3 = x$ $\therefore D_3 = S_2 = x$ (tan / chord / *raaklyn / koord*) $\therefore S_2 = D_1 = x$ (alternate angles / *verwisellende hoeke*, DR ‖ PS) but / *maar* $S_2 = S_4$ (given / *gegee*) $\therefore S_4 = S_3 = x$ (v.o.a / *teenoorstande hoeke*) hence / *dus* $S_3 = D_1 = x$ $\therefore$ TS is a tangent (angle between tang. and chord is = to angle in alter. seg.) $\therefore$ *TS is 'n raaklyn(tussen lyn en koord)*	✓✓S R ✓✓S R ✓S R ✓ R **(6)**
7.1.2	$\hat{T}_2 = \hat{D}_2$ (angles subt. by the same chord / *omtrekshoeke onderspan deur dieselfde koord)* but / *maar* $D_2 = P\hat{S}T$ (tan / chord / *raaklyn / koord*) $\therefore P\hat{S}T = T_2$ (alternate angles / *verwisselende binnehoeke*) TW ‖ PS	✓✓ S R ✓✓ S R ✓✓ S R **(6)**
		[12]
	TOTAL / *TOTAAL*:	**100**