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REPUBLIC OF SOUTH AFRICA

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*GAUTENGSE DEPARTMENT VAN ONDERWYS***

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GRAAD 11

MATHEMATICS / *WISKUNDE*

PAPER 2 / *VRAESTEL 2*

MARKING GUIDLINE / *NASIENRIGLYNE*

10 Pages / *10 bladsye*

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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

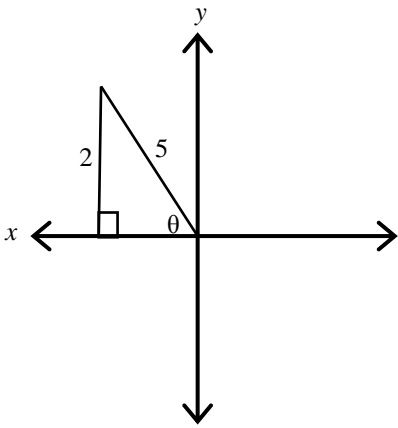
- *Deurlopende akkuraatheid geld as 'n algemene reël.*
- *Indien 'n kandidaat 'n vraag twee keer beantwoord en nie een van die antwoorde kanselleer nie, merk die EERSTE poging.*
- *Indien 'n kandidaat 'n vraag beantwoord en dit doodtrek maar nie oordoen nie, merk die doodgetrekte poging.*

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*

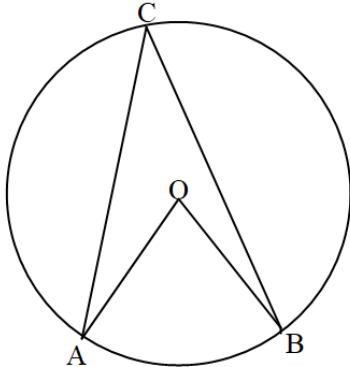
QUESTION 1 / VRAAG 1		
1.1		
1.1.1	$d_{AB} = \sqrt{(y_b - y_a)^2 + (x_b - x_a)^2}$ $= \sqrt{(2 - (-2))^2 + (1 - (-2))^2}$ $= \sqrt{25}$ $= 5$	✓ correct formula / <i>korrekte form.</i> ✓ correct subst. / <i>korrekte verv.</i> ✓ answer / <i>antwoord</i> (3)
1.1.2	$\frac{x_1 + x_2}{2} ; \frac{y_1 + y_2}{2}$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

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

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

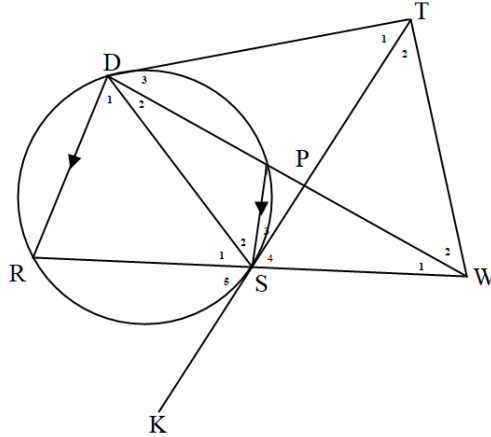
2.3	$\sqrt{1 - \tan(180^\circ - \theta) \cdot \cot(90^\circ - \theta)}$ $\sqrt{1 - (-\tan \theta) \cdot (\tan \theta)}$ $\sqrt{1 + \tan^2 \theta}$ $\sqrt{\sec^2 \theta}$ $\sec \theta$	<ul style="list-style-type: none"> ✓ $-\tan \theta$ ✓ $\tan \theta$ ✓ identity / <i>identiteit</i> ✓ simplification / <i>vereenvoudiging</i> ✓ answer / <i>antwoord</i> <p style="text-align: right;">(5)</p>
2.4	$x = 0^\circ$ $x = 90^\circ$ $x = 180^\circ$	<ul style="list-style-type: none"> ✓ answer / <i>antwoord</i> ✓ answer / <i>antwoord</i> ✓ answer / <i>antwoord</i> <p style="text-align: right;">(3)</p>
		[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	$x = 90^\circ$ $x = 325^\circ$	✓ answer / antwoord ✓ answer / antwoord (2)
3.2.2	$90^\circ < x < 325^\circ$	✓ 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	<p>Construction / konstruksie: Join CO and produce it./ lyn CO verleng</p> <p>Proof / bewys: In $\triangle ACO$: $\hat{O}_2 = \hat{A} + \hat{C}_2$ (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: $\hat{O}_1 = 2 \hat{C}_1$ $\hat{O}_2 + \hat{O}_1 = 2 \hat{C}_2 + 2 \hat{C}_1$ $\therefore \hat{AOB} = 2 \hat{ACB}$</p>	<p>✓ construction / konstruksie</p> <p>✓ ✓ SR</p> <p>✓ S</p> <p>✓ equating / gelykstelling</p> <p>✓ substitution / vervanging</p> <p>(6)</p>
		[7]

QUESTION 5 / VRAAG 5		
5.1	... supplementary / <i>suppl.</i>	✓ answer / <i>antwoord</i> (1)
5.2		
5.2.1	$\hat{S} = \hat{Q} = x$ (subt. by same arc / <i>omtrekshoeke onderspan deur dieselfde boog</i>) $\hat{Q}\hat{R}\hat{S} = \hat{Q} = x$ (alternate angles/ <i>verwisselende binnehoeke: PQ RS</i>) $\hat{S} = \hat{Q}\hat{P}\hat{S} = x$ (alternate angles: <i>verwisselende binnehoeke PQ RS</i>)	✓✓ S.R ✓✓ S.R ✓✓ S.R (6)
5.2.2	$\hat{P}\hat{T}\hat{R} = x + x$ (ext. angle of $\Delta =$ sum of int. opp. angles / <i>buitehoek van Δ</i>) $= 2x$	✓✓ S.R ✓ answer / <i>antwoord</i> (3)
5.2.3	$\hat{P}\hat{T}\hat{R} = 2x$ (ext. angle of $\Delta =$ sum of int. opp. angles / <i>buitehoek van Δ</i>) $\hat{P}\hat{O}\hat{R} = 2x$ (angle at centre th. / <i>middelpunt stelling</i>) Line PR subtends equal angles at $\hat{P}\hat{T}\hat{R}$ and $\hat{P}\hat{O}\hat{R}$ <i>gelyke omtrekshoeke onderspan deur dieselfde koord</i> \therefore quadrilateral PTOR is concyclic / \therefore PTOR is 'n koordevierhoek	✓ SR ✓ SR ✓ conclusion / <i>gevolgtrekking</i> (3)
		[13]
QUESTION 6 / VRAAG 6		
6.1		
6.1.	$\frac{AO}{OB} = \frac{AE}{EC}$ (midpoint Th. / <i>middelpunt stelling</i>) $\frac{10}{10} = \frac{AE}{EC}$ $\frac{1}{1} = \frac{AE}{EC}$ $\therefore AE = EC$	✓✓ SR ✓ substitution / <i>vervang</i> ✓ conclusion / <i>gevolgtrekking</i> (4)
6.2	$\hat{E}_1 = 90^\circ$ (line from centre of a circle bisecting the chord is \perp to chord) <i>(lyn van middelpunt van koord na middelpunt van sirkel loodreg)</i>	✓ S ✓✓ R (3)
6.3	$OE^2 = 10^2 - 8^2$ (Theorem of Pythagoras / <i>Pythagoras Stelling</i>) $OE = 6\text{cm}$ $\therefore ED = 4\text{cm}$	✓✓ S R ✓ OE = 6cm ✓ answer / <i>antwoord</i> (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 / verwissellende hoeke, $DR \parallel PS$)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 $D_2 = \hat{PST}$ (tan / chord / raaklyn / koord) $\therefore \hat{PST} = T_2$ (alternate angles / verwisselende binnehoeke) $TW \parallel PS$

✓✓ S R

✓✓ S R

✓✓ S R

(6)

[12]

TOTAL / TOTAAL:

100