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PREPARATORY EXAMINATION *VOORBEREIDENDE EKSAMEN*

2023

MARKING GUIDELINES/*NASIENRIGLYNE*

MATHEMATICS/*WISKUNDE* (PAPER/*VRAESTEL 2*) (10612)

19 pages/*bladsye*

NOTE:

- If a candidate answers a question **TWICE**, only mark the **FIRST** attempt.
- If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed-out version.
- Consistent accuracy applies in **ALL** aspects of the marking guidelines. Stop marking at the second calculation error.
- Assuming answers/values to solve a problem is **NOT** acceptable.

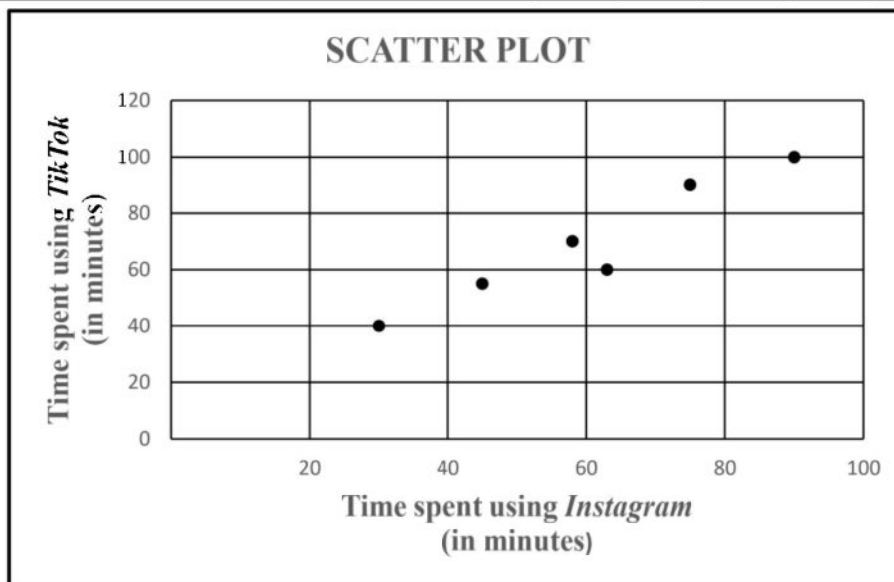
LET WEL:

- *As 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.*
- *As 'n kandidaat 'n antwoord van 'n vraag doodtrek en nie oordoen nie, sien die doodgetrekte poging na.*
- *Volgehoue akkuraatheid word in ALLE aspekte van die nasienriglyne toegepas. Hou op nasien by die tweede berekeningsfout.*
- *Aannames van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat nie.*

GEOMETRY/MEETKUNDE	
S	A mark for a correct statement (A statement mark is independent of a reason.)
	<i>'n Punt vir 'n korrekte bewering ('n Punt vir 'n bewering is onafhanklik van die rede.)</i>
R	A mark for a correct reason (A reason mark may only be awarded if the statement is correct.)
	<i>'n Punt vir 'n korrekte rede ('n Punt word slegs vir die rede toegeken as die bewering korrek is.)</i>
S/R	Award a mark if the statement AND reason are both correct.
	<i>(Ken 'n punt toe as beide die bewering EN rede korrek is.)</i>

QUESTION/VRAAG 1

TIME USED ON <i>INSTAGRAM</i> (in minutes)	30	45	58	63	75	90
TIME USED ON <i>TIKTOK</i> (in minutes)	40	55	70	60	90	100

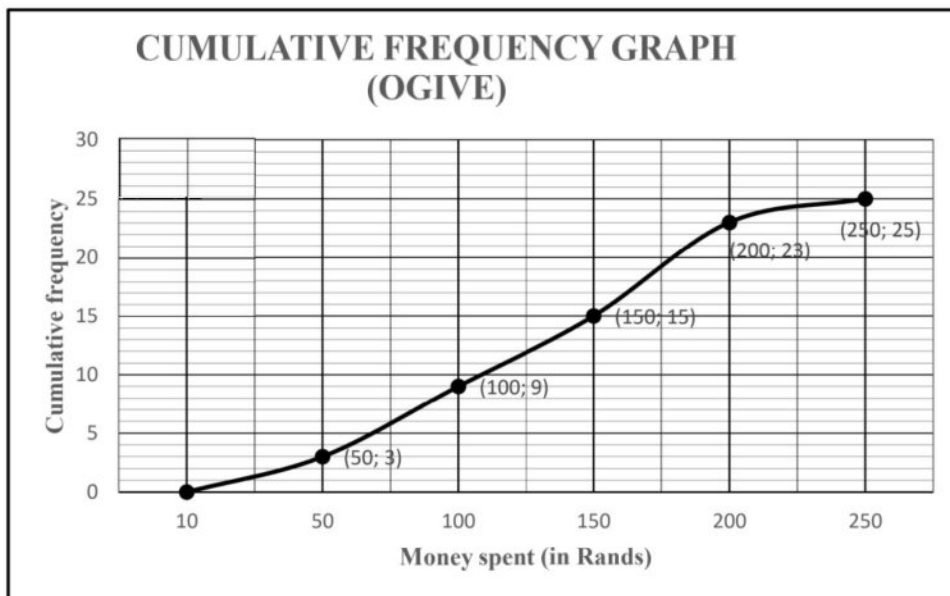


1.1	$r = 0,96$	✓ answer/antwoord (1)
1.2	Very strong /Baie sterk	✓ answer/antwoord Accept: Strong Aanvaar: Sterk (1)
1.3	$a = 8,12$ $b = 1,01$ $\hat{y} = 8,12 + 1,01x$ <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> NOTE: If equation only with the values with a and b, swopped: award 1 mark. <i>Indien slegs die vergelyking gegee word met a en b se waardes omgeruil: 1 punt</i> </div>	✓ $a = 8,12$ ✓ $b = 1,01$ ✓ $\hat{y} = 8,12 + 1,01x$ <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> Answer only: Full marks Slegs antwoord: Volpunte </div> (3)
1.4	$\hat{y} = 8,12 + 1,01(115)$ $= 124,27 \approx 124 \text{ minutes/minute}$ OR $\hat{y} = 124,80 \approx 125 \text{ minutes / minute (calculator)}$	✓ substitute/vervang 115 ✓ answer/antwoord OR ✓ ✓ answer/antwoord (2)

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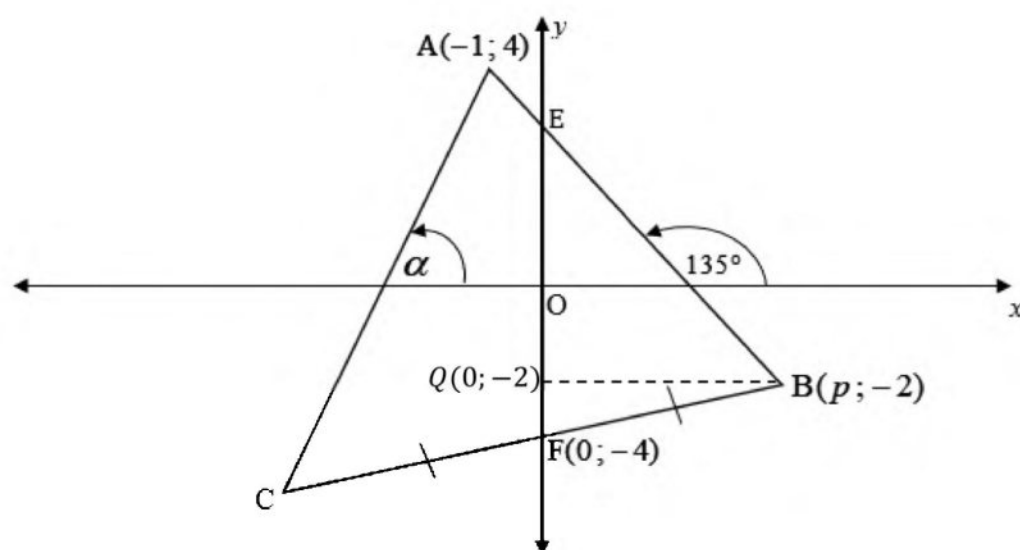
1.5	$73,4 = \frac{\sum x}{10} \quad \text{OR/OF} \quad 73,4 = \frac{\sum x}{20}$ Total/Totaal = 734 minutes/minute Total for Instagram and TikTok = 1 468 minutes Totaal vir Instagram en TikTok = 1 468 minute $\frac{1\,468}{60} = 24,47$ \therefore Yes I agree. More than a day was spent./ \therefore Ja, ek stem saam. Meer as 'n dag is spandeer.	\checkmark 1 468 minutes/minute $\checkmark \frac{1468}{60} = 24,47$ hours/ure \checkmark conclusion/gevolgtrekking (3)
		[10]

QUESTION/VRAAG 2



2.1.1	25 learners/ <i>leerders</i>	✓ answer/ <i>Antwoord</i> (1)
2.1.2	$a = 3$ $b = 6$	✓ $a = 3$ ✓ $b = 6$ (2)
2.1.3	25 – 19 = 6 learners/ <i>leerders</i> $\frac{6}{25} \times 100 = 24\%$ \therefore 24% of the learners spent more than R175/ <i>van die leerders het meer as R175 gespandeer</i>	✓ 6 ✓ 24% (2)
2.2	$\bar{x} - 2\sigma = 4,8$ $13,20 - 2\sigma = 4,8$ $-2\sigma = -8,4$ $\sigma = 4,2$ OR $\bar{x} + 2\sigma = 9,2$ $13,20 + 2\sigma = 9,2$ $2\sigma = -4$ OR The interval is incorrect/meaningless because $13,20 < 9,2$ which is mean < upperlimit, therefore no further calculations can be done. / <i>Die gegewe interval is verkeerd / betekenisloos, want $13,20 < 9,2$, dit is die gemiddeld < boonste limiet. Dus kan geen verdere berekenings gemaak word nie.</i>	✓ ✓ equation/ <i>vergelyking</i> ✓ ✓ $\sigma = 4,2$ OR ✓ ✓ equation/ <i>vergelyking</i> ✓ ✓ $2\sigma = -4$ OR ✓ ✓ ✓ ✓ explanation/ <i>verduideliking</i> (4)
		[9]

QUESTION/VRAAG 3



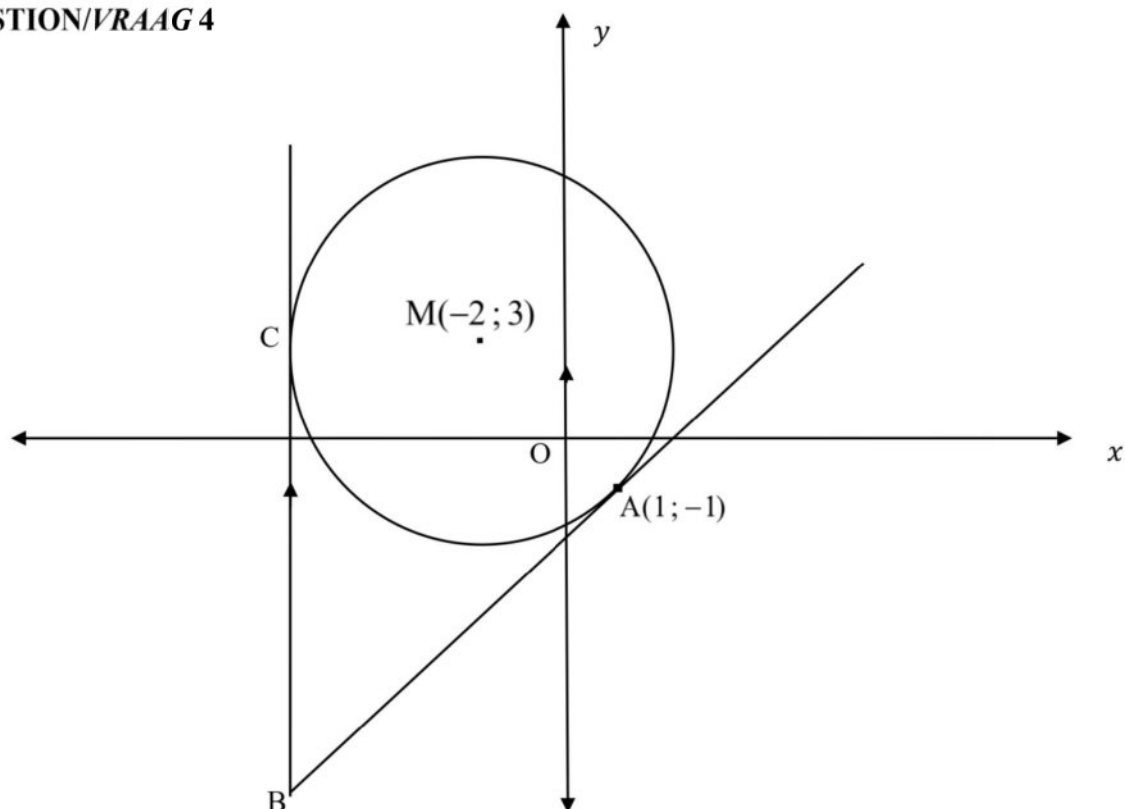
3.1	$m_{AB} = \tan 135^\circ = -1$	✓ $m_{AB} = \tan 135^\circ$ ✓ answer (2)
3.2	$m_{AB} = \frac{-2-4}{p-(-1)}$ $-1 = \frac{-6}{p+1}$ $p+1=6$ $p=5$	✓ correct substitution of A and B into gradient formula/korrekte substitusie van A en B in die gradiënt formule ✓ equate to/gelykstel aan -1 (2)
3.3	$\frac{5+x_c}{2} = 0 \quad \text{and/en} \quad \frac{-2+y_c}{2} = -4$ $x_c = -5 \quad \text{and/en} \quad y_c = -8+2$ $C(-5;-6) \quad y_c = -6$ <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> NOTE: Does not have to be in coordinate form <i>Let op: Dit is nie nodig om in koördinaatvorm te skryf nie.</i> </div>	✓ $x_c = -5$ ✓ $y_c = -6$ (2)

3.4	$m_{AC} = \frac{4 - (-6)}{-1 - (-5)} = \frac{10}{4} = \frac{5}{2}$ <p>Substitute/Vervang A(-1 ; 4)</p> $y - 4 = \frac{5}{2}(x - (-1)) \quad \text{OR/OR} \quad 4 = \frac{5}{2}(-1) + c$ $y = \frac{5}{2}x + \frac{5}{2} + 4 \quad 4 = \frac{-5}{2} + c$ $y = \frac{5}{2}x + \frac{13}{2} \quad c = 6\frac{1}{2}$ $y = \frac{5}{2}x + 6,5 \quad y = \frac{5}{2}x + 6\frac{1}{2}$	<p>✓ correct substitution of A and C into gradient formula/korrekte substitusie van A en C in die gradiënt formule</p> <p>✓ $m_{AC} = \frac{5}{2}$</p> <p>✓ subs of m and point A or C/vervang m en punt A of C</p> <p>✓ equation/vergelyking (4)</p>
3.5	$\tan \alpha = \frac{5}{2}$ $\alpha = 68,20^\circ$ $\hat{CAB} = 135^\circ - 68,20^\circ \quad (\text{Ext } \angle \text{ of } \Delta)$ $= 66,8^\circ$	<p>✓ $\tan \alpha = \frac{5}{2}$</p> <p>✓ $\alpha = 68,20^\circ$</p> <p>✓ answer/antwoord (3)</p>
3.6	<p>Subst./Vervang A (-1 ; 4) OF/OR Subst/Vervang B(5; -2)</p> $E : 4 = -1(-1) + c \quad \text{OR/OR} \quad y + 2 = -1(x - 5)$ $3 = c \quad y + 2 = -x + 5$ $y = -x + 3$ <p>E(0 ; 3) F(0 ; -4)</p> $\text{Area/Opp } \triangle BEF = \frac{1}{2} \times EF \times \perp h$ $= \frac{1}{2} \times 7 \times 5$ $= 17,5 \text{ square units/vierkante eenhede}$ <p>OR/OR</p> $E : 4 = -1(-1) + c$ $3 = c$ <p>E(0 ; 3) $\hat{FEB} = 45^\circ$</p> $BE^2 = (5 - 0)^2 + (-2 - 3)^2$ $BE = \sqrt{50}$ $\text{Area/Opp } \triangle BEF = \frac{1}{2} \times EF \times BE \times \sin \hat{FEB}$ $= \frac{1}{2} \times 7 \times \sqrt{50} \times \sin 45^\circ$ $= 17,5 \text{ square units / vierkante eenhede}$	<p>✓ value of c/waarde van c</p> <p>✓ \perp height/hoogte = 5</p> <p>✓ answer/antwoord (3)</p> <p>OR/OR</p> <p>✓ value of c/waarde van c</p> <p>✓ $BE = \sqrt{50}$</p> <p>✓ answer/antwoord (3)</p>

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	OR/OF $E: 4 = -1(-1) + c$ $3 = c$ $E(0; 3)$ $Area / Opp \Delta FQB = \frac{1}{2} \times 2 \times 5 = 5$ $Area / Opp \Delta EQB = \frac{1}{2} \times 5 \times 5 = 12,5$ $Area / Opp \Delta EFB = 5 + 12,5$ $= 17,5 \text{ square units / vierkante eenhede}$	OR/OF \checkmark value of c /waarde van c $\checkmark \perp \text{ height/hoogte} = 5$ \checkmark answer/antwoord (3)
3.7	$AK = 5\sqrt{5}$ $\sqrt{(t+1)^2 + (t-4)^2} = (5\sqrt{5})$ $t^2 + 2t + 1 + t^2 - 8t + 16 = 125$ $t^2 - 3t - 54 = 0$ $(t-9)(t+6) = 0$ $t = 9 \text{ (n.a) or/of } t = -6$ $K(-6; -6)$ <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> NOTE: Must be in coordinate form. <i>Let op: Moet in koördinaatvorm wees.</i> </div>	\checkmark substitute A and K into distance formula/ vervang A en K in die afstandformule \checkmark equating/gelykstelling \checkmark standard form/ standaardvorm \checkmark factors/faktore $\checkmark K(-6; -6)$ (5)
		[21]

QUESTION/VRAAG 4

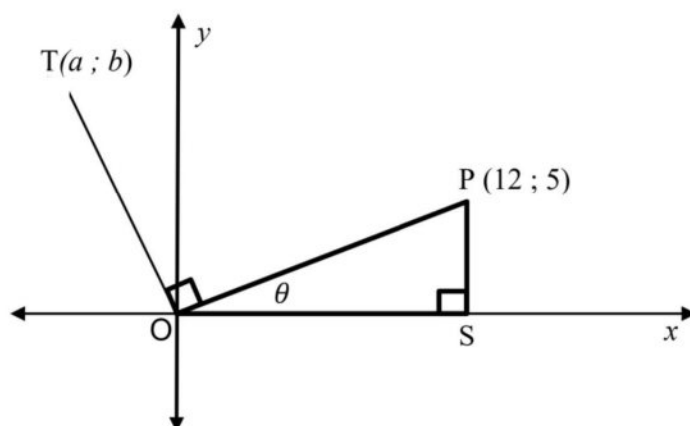


4.1	$(x+2)^2 + (y-3)^2 = r^2$ $(1+2)^2 + (-1-3)^2 = r^2$ $9+16 = r^2$ $\therefore (x+2)^2 + (y-3)^2 = 25$ <p>OR/OF</p> $AM = \sqrt{(-2-1)^2 + (3+1)^2}$ $AM = \sqrt{9+16}$ $r = 5$ $\therefore r^2 = 25$ $\therefore (x+2)^2 + (y-3)^2 = 25$	<p>✓ subs of M and A into the distance formula/ vervang M en A in die afstandformule</p> <p>✓ $r^2 = 25$</p> <p>✓ equation/vergelyking</p> <p>OR/OF</p> <p>✓ subs of M and A into the distance formula/ vervang M en A in die afstandformule</p> <p>✓ $r^2 = 25$</p> <p>✓ equation/vergelyking (3)</p>
4.2	<p>C(-2-5; 3) (by symmetry/deur simmetrie)</p> <p>C(-7; 3)</p>	<p>✓ $x_c = -7$</p> <p>✓ $y_c = 3$ (2)</p>

4.3	$m_{AM} = \frac{3 - (-1)}{-2 - 1} = -\frac{4}{3}$ $m_{AB} = \frac{3}{4} \quad (\text{radius} \perp \text{tangent/raaklyn})$ $y - (-1) = \frac{3}{4}(x - 1) \quad (\text{subst./vervang } A(1; -1))$ $y = \frac{3}{4}x - \frac{3}{4} - 1$ $y = \frac{3}{4}x - \frac{7}{4}$	✓ subs A and M into gradient formula/ vervang A en M in die gradiënt formule ✓ $m_{\text{radius}} = -\frac{4}{3}$ ✓ $m_{\text{tangent}} = \frac{3}{4}$ ✓ substitute m and A/vervang m en A ✓ equation/vergelyking (5)
4.4	$B(-7; y_B)$ subs./vervang $B(-7; y_B)$ into eqn of AB/in die vergelyking van AB $y_B = \frac{3}{4}(-7) - \frac{7}{4}$ $y_B = -7$ $B(-7; -7)$ $BC = 10 \text{ units/eenhede}$	✓ subs./vervang $x = -7$ ✓ $y_B = -7$ ✓ $BC = 10$ (3)
4.5	$(x-1)^2 + (y+1)^2 = 1$	✓ LHS/LK ✓ RHS/RK (2)
4.6	$r_2 - r_1 < MN < r_2 + r_1$ $1 < p + 2 < 9 \text{ or/of } 1 < -2 - p < 9$ $-1 < p < 7 \text{ or/of } 3 < -p < 11$ $-1 < p < 7 \text{ or/of } -11 < p < -3$ OR/OF Two circles will touch when:/ Twee sirkels sal sny indien: Distance between centre/Afstand tussen middelpunte = $r_1 + r_2$ or /of distance between centres/ Afstand tussen middelpunte = $r_2 - r_1$ $\sqrt{(p+2)^2 + (3-3)^2} = 4+5 \text{ or / of } \sqrt{(p+2)^2 + (3-3)^2} = 5-4$ $(p+2)^2 = 9^2 \text{ or / of } (p+2)^2 = 1$ $p+2 = \pm 9 \text{ or / of } p+2 = \pm 1$ $p = \pm 9 - 2 \text{ or / of } p = -2 \pm 1$ $p = -11 \text{ or / of } p = 7 \text{ or / of } p = -3 \text{ or / of } p = -1$ Two circles intersect in two different points if / twee sirkels sny in twee verskillende punte as $-11 < p < -3 \text{ or } -1 < p < 7$	✓ value of 1 and 9 (Sum and difference of radii)/Waarde van 1 en 9 (som en verskil van radiusse) ✓✓ $-1 < p < 7$ ✓✓ $-11 < p < -3$ (5) OR/OF ✓ value of 1 and 9 (Sum and difference of radii)/Waarde van 1 en 9 (som en verskil van radiusse) ✓✓ $-1 < p < 7$ ✓✓ $-11 < p < -3$ (5)
		[20]

QUESTION/VRAAG 5

5.1



5.1.1	$\tan \theta = \frac{5}{12}$	✓ answer/antwoord (1)
5.1.2	$r^2 = 5^2 + 12^2$ $r = 13$ $\sin \theta = \frac{5}{13}$	✓ value of/waarde van r ✓ answer/antwoord <div style="border: 1px solid black; padding: 5px; display: inline-block;"> Answer only: Full marks Slegs antwoord: Volpunte </div> (2)
5.1.3	$\cos(90^\circ + \theta) = \frac{a}{19,5}$ $-\sin \theta = \frac{a}{19,5}$ $-\frac{5}{13} = \frac{a}{19,5}$ $a = \frac{-5 \times 19,5}{13}$ $a = -7,5$	✓ ratio/verhouding ✓ $-\sin \theta$ ✓ substitute/vervang $\sin \theta$ ✓ value of/waarde van a (4)
5.2	$\frac{\sin(360^\circ - 2x) \cdot \sin(-x)}{\sin(90^\circ + x)} + 2 \cos^2(180^\circ + x)$ $= \frac{(-\sin 2x) \cdot (-\sin x)}{\cos x} + 2 \cos^2 x$ $= \frac{(-2 \sin x \cdot \cos x) \cdot (-\sin x)}{\cos x} + 2 \cos^2 x$ $= 2 \sin^2 x + 2 \cos^2 x$ $= 2(\sin^2 x + \cos^2 x)$ $= 2$	✓ $-\sin 2x$ ✓ $-\sin x$ ✓ $\cos x$ ✓ $2 \cos^2 x$ ✓ $\sin 2x = 2 \sin x \cdot \cos x$ ✓ answer/antwoord (6)

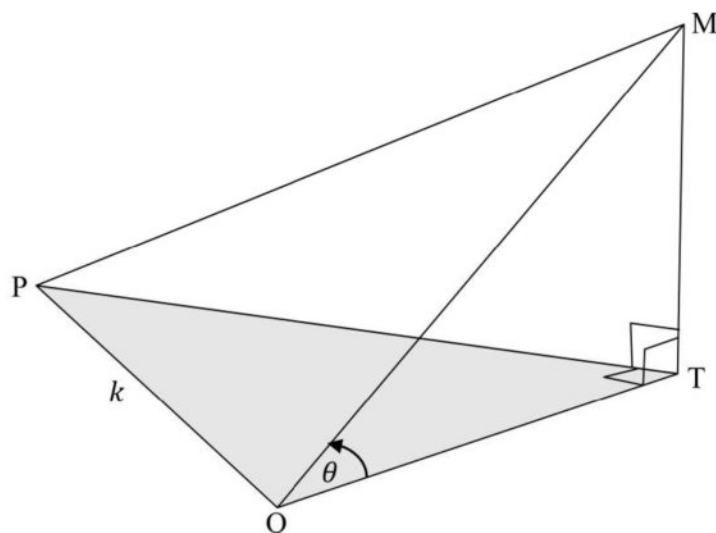
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5.3	$\cos 42^\circ = 2 \cos^2 21^\circ - 1$ $\sqrt{k} = 2 \sin^2 69^\circ - 1$ $\frac{\sqrt{k} + 1}{2} = \sin^2 69^\circ$	✓ double angle expansion/ <i>dubbelhoek uitbreiding</i> ✓ co-function/ <i>ko-funksie</i> ✓ answer/ <i>antwoord</i> (3)
5.4.1	$\begin{aligned} \text{LHS/LK} &= \frac{\sin 5x \cdot \cos 3x - \cos 5x \cdot \sin 3x}{\tan 2x} - 1 \\ &= \frac{\sin(5x - 3x)}{\sin 2x} - 1 \\ &\quad \cos 2x \\ &= \cos 2x - 1 \\ &= (1 - 2 \sin^2 x) - 1 \\ &= -2 \sin^2 x \\ &= \text{RHS} \end{aligned}$	✓ $\sin(5x - 3x)$ ✓ $\tan 2x = \frac{\sin 2x}{\cos 2x}$ ✓ $\cos 2x - 1$ ✓ double angle identity/ <i>dubbelhoek identiteit</i> (4)
5.4.2	Undefined if/ <i>Ongedefinieërd as</i> $\tan 2x = 0$ $x = 0^\circ$ or/ <i>of</i> $\tan 2x$ is undefined if/ <i>ongedefinieërd as</i> $2x = 90^\circ$ $x = 45^\circ$	✓ $x = 0^\circ$ ✓ $x = 45^\circ$ (2)
5.5.1	$\begin{aligned} f(x) &= 2 \cos x - \sin^2 x \\ &= 2 \cos x - (1 - \cos^2 x) \\ &= 2 \cos x - 1 + \cos^2 x \\ &= \cos^2 x + 2 \cos x + 1 - 1 - 1 \\ &= (\cos x + 1)^2 - 2 \end{aligned}$	✓ identity/ <i>identiteit</i> ✓ completing the square/ <i>voltooi die vierkant</i> (2)
5.5.2	Maximum of/ <i>Maksimum van</i> $\cos x = 1$ Max. of/ <i>Maks. van</i> $(\cos x + 1)^2$ is $(1 + 1)^2 = 4$ Max. of/ <i>Maks. van</i> $(\cos x + 1)^2 - 2$ is 2	✓ Max. of/ <i>Maks. van</i> $\cos x = 1$ ✓ answer/ <i>antwoord</i> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Answer only: Full marks Slegs antwoord: Volpunte </div> (2)
		[26]

QUESTION/VRAAG 6

6.1	$\cos(x - 30^\circ) + 2\sin x = 0$ $\cos x \cos 30^\circ + \sin x \sin 30^\circ + 2\sin x = 0$ $\frac{\sqrt{3}}{2} \cos x + \frac{1}{2} \sin x + 2\sin x = 0$ $\sqrt{3} \cos x + \sin x + 4\sin x = 0$ $5\sin x = -\sqrt{3} \cos x$ $\tan x = -\frac{\sqrt{3}}{5}$	✓ expansion of compound angle/ <i>uitbreiding van saamgestelde hoek</i> ✓ special angles/ <i>spesiale hoeke</i> ✓ simplification/ <i>vereenvoudiging</i> ✓ $5\sin x = -\sqrt{3} \cos x$	(4)	
6.2	$\tan x = \frac{-\sqrt{3}}{5}$ ref. angle/ <i>verwys. hoek</i> = $19,106^\circ$ $x = 160,89^\circ + k \cdot 180^\circ; k \in \mathbb{Z}$ $x = -19,11^\circ$ or/of $x = 160,89^\circ$ OR/OF $\tan x = \frac{-\sqrt{3}}{5}$ $x = -19,11^\circ + k \cdot 180^\circ; k \in \mathbb{Z}$ $x = -19,11^\circ$ or $x = 160,89^\circ$	✓ ref angle/ <i>verwys. hoek</i> ✓ $x = -19,11^\circ$ ✓ $x = 160,89^\circ$ OR/OF ✓ $x = -19,11^\circ + k \cdot 180^\circ; k \in \mathbb{Z}$ ✓ $x = -19,11^\circ$ ✓ $x = 160,89^\circ$	(3)	
6.3.1	Amplitude = 2	✓ answer/ <i>antwoord</i>	(1)	
6.3.2				
	✓ both <i>x</i> -intercepts/ <i>albei x-afsnitte</i> ✓ turning points/ <i>draaipunte</i> $(-150^\circ; -1)$, $(30^\circ; 1)$, $(210^\circ; -1)$ ✓ shape/ <i>vorm</i>			(3)
6.3.3	(a) $x \in (-19,11^\circ; 160,89^\circ)$ or $-19,11^\circ < x < 160,89^\circ$	✓ Correct intervals/ <i>korrekte intervale</i> ✓ Correct notations/ <i>korrekte notasies</i>	(2)	
	(b) $x = 180^\circ$	✓ answer	(1)	
[14]				

QUESTION/VRAAG 7



7.1	$\text{Area / Opp} = \frac{1}{2} \times k \times 2k \times \sin \hat{P}Q$ $2k^2 \cdot \sin \theta \cos \theta = \frac{1}{2} \times k \times 2k \times \sin \hat{P}Q$ $k^2 \cdot \sin 2\theta = k^2 \times \sin \hat{P}Q$ $\sin 2\theta = \sin \hat{P}Q$ $\hat{P}Q = 2\theta$	✓ subs in area rule/vervang in opp. reël ✓ area of/van $\Delta MPQ = k^2 \times \sin \hat{P}Q$ $\checkmark 2k^2 \cdot \sin \theta \cdot \cos \theta = k^2 \sin 2\theta$
7.2	$MQ^2 = k^2 + (2k)^2 - 2(k)(2k) \cos 2\theta$ $MQ^2 = k^2 + 4k^2 - 4k^2 \cos 2\theta$ $= 5k^2 - 4k^2 \cos 2\theta$ $= 5k^2 - 4k^2 (1 - 2 \sin^2 \theta)$ $= 5k^2 - 4k^2 + 8k^2 \sin^2 \theta$ $= k^2 + 8k^2 \sin^2 \theta$ $= k^2 (1 + 8 \sin^2 \theta)$ $MQ = k \sqrt{1 + 8 \sin^2 \theta}$	✓ correct subst into cosine rule/korrekte substitusie in die cos reël $\checkmark 5k^2 - 4k^2 \cos 2\theta$ $\checkmark \cos 2\theta = 1 - 2 \sin^2 \theta$ $\checkmark k^2 (1 + 8 \sin^2 \theta)$
7.3	$MQ = 139,5 \sqrt{1 + 8 \sin^2 42^\circ}$ $MQ = 298,6045..$ $\frac{MT}{MQ} = \sin \theta$ $MT = 298,6045.. \times \sin 42^\circ$ $MT = 199,805..$ $MT \approx 200 \text{ m}$	✓ value of/waarde van MQ ✓ ratio/verhouding $\checkmark MT = 200 \text{ m}$
		[10]

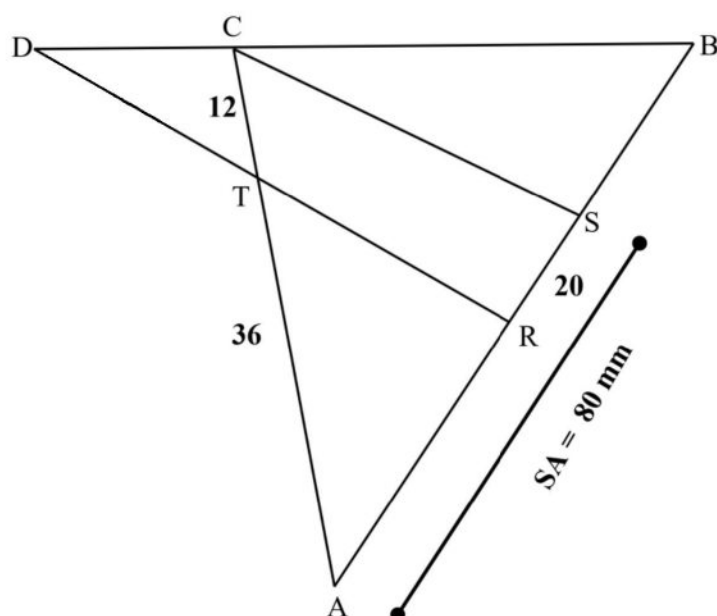
1 mark penalty for incorrect rounding/ Penaliseer met 1 punt vir verkeerde afronding

QUESTION/VRAAG 8

8.1		
8.1.1	$\hat{S}_1 = 10^\circ$ $\angle \text{centre} = 2 \times \angle \text{at circumference/midpt}$ $\angle = 2 \times \text{omtrek } \angle$	\checkmark S \checkmark R (2)
8.1.2	$\hat{R}_3 = 20^\circ$ Alt \angle 's/Verwis. \angle^e , RQ//YO	\checkmark S/R (1)
8.1.3	$\hat{P} = 150^\circ$ opposite \angle 's of cyclic quad/teenoorst. \angle^e van koordevierhoek	\checkmark S \checkmark R (2)
8.1.4	$\hat{R}_3 + \hat{R}_4 = 90^\circ$ $\hat{R}_4 = 90^\circ - 20^\circ = 70^\circ$ $\hat{S}_2 = \hat{R}_4 = 70^\circ$ OR/OF $\hat{R}_1 + \hat{R}_2 = 90^\circ$ $\hat{R}_1 = 80^\circ$ $\hat{Q}_2 = 80^\circ$ $\hat{S}_2 = 70^\circ$	radius \perp tangent/raaklyn tan chord theorem/raaklyn koord stelling OR/OF radius \perp tangent/raaklyn tan chord theorem/raaklyn koord stelling sum of \angle 's in a triangle/binne \angle^e van 'n driehoek \checkmark R \checkmark S \checkmark S \checkmark R OR/OF \checkmark R \checkmark S \checkmark S /R \checkmark S (4)

8.2	$\hat{T}_1 = 90^\circ$ $\hat{O}_2 = 70^\circ$ $\hat{R}_4 = \hat{O}_2 = 70^\circ$ $\therefore XRY$ is a tangent/ 'n raaklyn $\hat{R}_1 + \hat{R}_2 = 90^\circ$ $\hat{T}_1 = 90^\circ$ $O\hat{R}Y = \hat{T}_1$ $\therefore XRY$ is a tangent/ 'n raaklyne	line from centre to midpoint of chord/lyn <i>vanaf middelpunt tot middelpunt van koord</i> sum of \angle^s in a triangle/binne \angle^e van 'n driehoek converse tan chord theorem/omgekeerde raaklyn koord stelling OR/OF radius \perp tangent/raaklyn line from centre to midpoint of chord/lyn <i>vanaf middelpunt tot middelpunt koord</i> converse tan chord theorem/omgekeerde raaklyn koord stelling	✓S/R ✓S ✓R (3) ✓S ✓S/R ✓R (3)
		[12]	

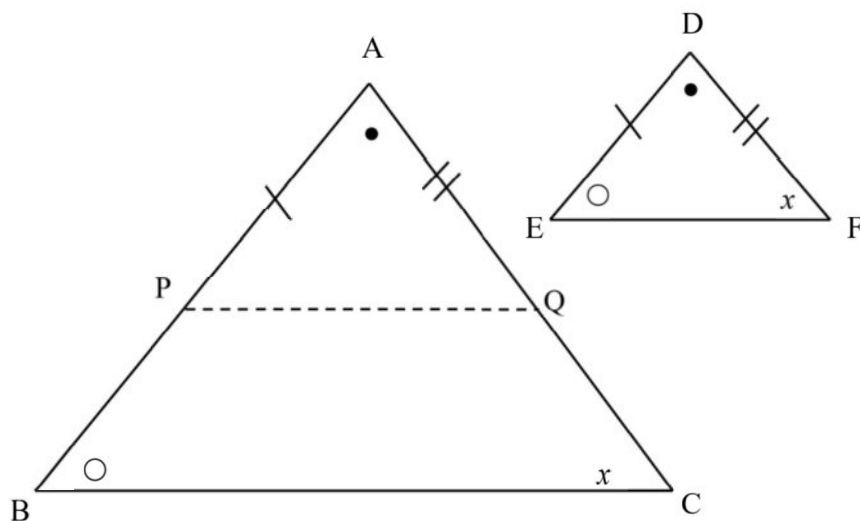
QUESTION/VRAAG 9



9.1	$\frac{CT}{TA} = \frac{12}{36} = \frac{1}{3}$ $\frac{SR}{RA} = \frac{20}{60} = \frac{1}{3}$ $\therefore \frac{CT}{TA} = \frac{SR}{RA}$ $\therefore CS \parallel TR$ <p>line divides the sides of Δ in proportion/lyn verdeel die sye van die Δ in verhouding</p> <p>OR/OF</p> $\frac{SR}{SA} = \frac{20}{80} = \frac{1}{4}$ $\frac{CT}{CA} = \frac{12}{48} = \frac{1}{4}$ $\therefore \frac{CT}{CA} = \frac{SR}{SA}$ $\therefore CS \parallel TR$ <p>line divides the sides of Δ in proportion/lyn verdeel die sye van die Δ in verhouding</p>	<p>✓S</p> <p>✓S</p> <p>✓R (3)</p> <p>✓S</p> <p>✓S</p> <p>✓R (3)</p>
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10612/23

9.2	$\frac{AR}{RB} = \frac{2}{3}$ $\frac{60}{RB} = \frac{2}{3}$ $RB = 90 \text{ mm}$ $\therefore SB = 70 \text{ mm}$ $\frac{BS}{SR} = \frac{BC}{CD} \quad \text{proportion theorem/eweredigheidstelling CS TR}$ $\frac{70}{20} = \frac{2x}{\frac{1}{2}x + 1}$ $40x = 35x + 70$ $x = 14 \text{ mm}$ <p>OR/OF</p> $2k = 60$ $\therefore k = 30$ $\therefore 3k = 90$ $\frac{SR}{RB} = \frac{DC}{DB} \quad \text{prop. theorem/eweredigheidstelling CS TR}$ $\frac{20}{90} = \frac{\frac{1}{2}x + 1}{\frac{5}{2}x + 1}$ $5x + 2 = \frac{9}{2}x + 9$ $\frac{1}{2}x = 7$ $\therefore x = 14 \text{ mm}$	<p>✓S</p> <p>✓value of/waarde van RB</p> <p>✓S ✓R</p> <p>✓substitution/ substitusie</p> <p>✓answer/antwoord (6)</p> <p>✓value of/waarde van k</p> <p>✓value of/waarde van 3k</p> <p>✓S ✓R</p> <p>✓substitution/ substitusie</p> <p>✓answer/antwoord (6)</p>
		[9]

10.1

NB: No construction/Geen konstruksie nie 0/6

✓ construction/
konstruksie

✓S ✓R

✓S

✓R

✓ S/R

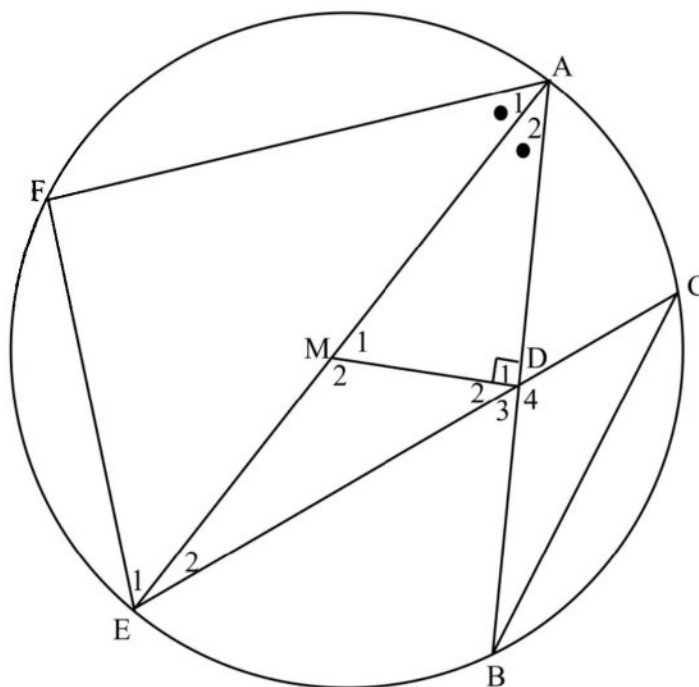
$$\therefore \triangle APQ \equiv \triangle DEF \quad \text{S}\angle\text{S}$$
$$A\hat{P}Q=\hat{E}$$
$$A\hat{P}Q=\hat{B} \quad [\hat{E}=\hat{B}]$$

$\therefore \text{PQ} \parallel \text{BC}$ corresponding angles are equal/ooreenk. hoeke is gelyk

$$\frac{AB}{AP} = \frac{AC}{AQ} \quad \text{line } \parallel \text{ to one side of } \Delta / \text{lyn } \parallel \text{ aan een sy van } \Delta$$
$$AP = DE \text{ and/en } AQ = DF$$
$$\therefore \frac{AB}{DE} = \frac{AC}{DF}$$

(6)

10.2



10.2.1	$\hat{F} = 90^\circ$ \angle in semi-circle/halwe sirkel In $\triangle AEF$ and/en $\triangle AMD$ $\hat{A}_1 = \hat{A}_2$ given/gegee $\hat{F} = \hat{D}_1 = 90^\circ$ proved/bewys $\therefore \triangle AEF \parallel \triangle AMD$ $\angle \angle \angle$	\checkmark S/R \checkmark S \checkmark S \checkmark R (4)
	OR/OF $\hat{F} = 90^\circ$ \angle in semi-circle/halwe sirkel In $\triangle AEF$ and/en $\triangle AMD$ $\hat{A}_1 = \hat{A}_2$ given/gegee $\hat{F} = \hat{D}_1 = 90^\circ$ proved/bewys $\hat{E}_1 = \hat{M}_1$ sum of \angle 's in \triangle /binne \angle e van \triangle $\therefore \triangle AEF \parallel \triangle AMD$	OR/OF \checkmark S/R \checkmark S \checkmark S \checkmark R (4)

10612/23

10.2.2	$\frac{AF}{AD} = \frac{AE}{AM}$ but/maar $AE = 2AM$ $\frac{AF}{AD} = \frac{2AM}{AM} = 2$	$\triangle AEF \parallel \triangle AMD$	\checkmark S/R \checkmark S \checkmark answer/antwoord (3)	
10.2.3	In $\triangle CDB$ and/en $\triangle ADE$ $\hat{C} = \hat{A}_2$ $\hat{D}_4 = \hat{E}DA$ $\triangle CDB \parallel \triangle ADE$ $\therefore \frac{CD}{AD} = \frac{DB}{DE}$ but/maar $AD = DB$ $\frac{CD}{AD} = \frac{AD}{DE}$ $\therefore AD^2 = CD \times DE$ OR/OF In $\triangle CDB$ and/en $\triangle ADE$ $\hat{C} = \hat{A}_2$ $\hat{D}_4 = \hat{E}DA$ $\hat{B} = \hat{E}_2$ $\triangle CDB \parallel \triangle ADE$ $\therefore \frac{CD}{AD} = \frac{DB}{DE}$ but/maar $AD = DB$ $\frac{CD}{AD} = \frac{AD}{DE}$ $\therefore AD^2 = CD \times DE$	\angle s in same segment/ \angle e in dieselfde segment vertically opposite \angle 's/regoorsaande \angle e $\angle \angle \angle$ line from centre \perp to chord/lyn vanaf midpt. \perp op koord line from centre \perp to chord/lyn vanaf midpt. \perp op koord	\checkmark identifying \triangle s/ identifiseer \triangle e \checkmark S/R \checkmark S \checkmark R \checkmark S \checkmark S/R OR/OF \checkmark identifying \triangle s/ identifiseer \triangle e \checkmark S/R \checkmark S \checkmark R \checkmark S \checkmark S/R	(6)
			[19]	

TOTAL/TOTAAL: 150