education

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NORTH WEST PROVINCE

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 12

MATHEMATICS P2/*WISKUNDE V2*

SEPTEMBER 2020

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/*PUNTE*: 150

These marking guidelines consist of 20 pages./
Hierdie nasienriglyne bestaan uit 20 bladsye.

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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 has not redone the question, mark the crossed out version.
- Consistent accuracy applies in ALL aspects of the marking memorandum. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

NOTA:

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

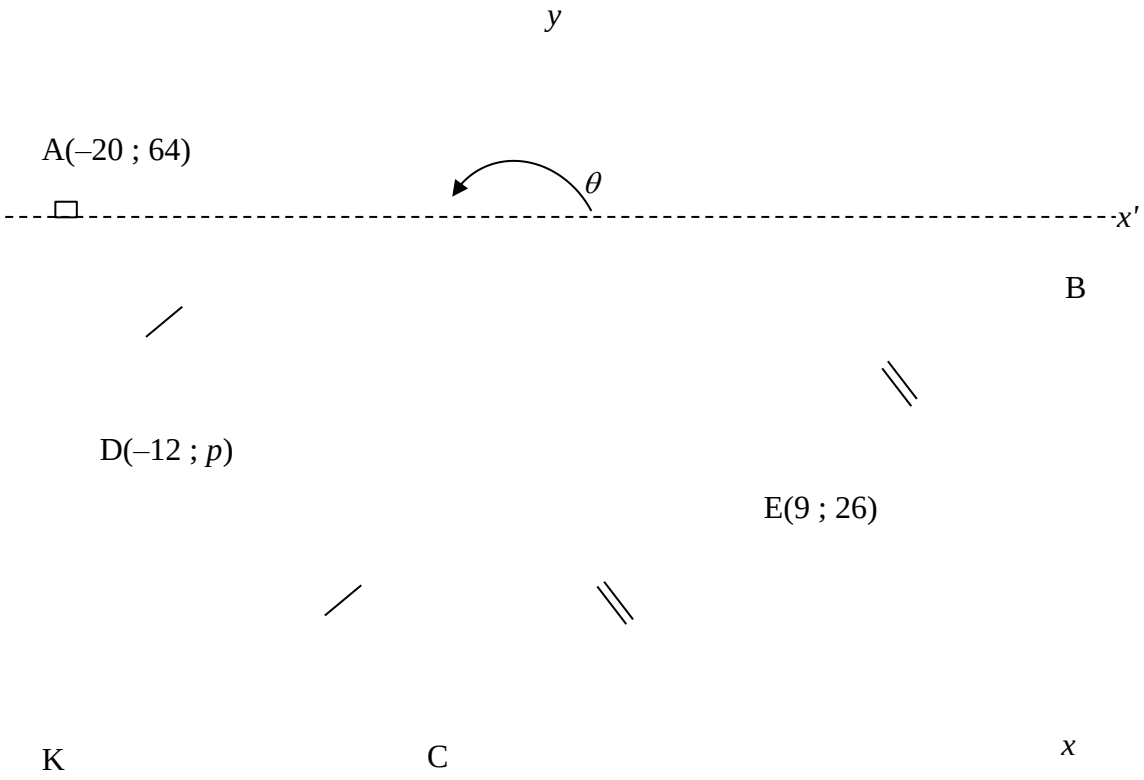
QUESTION/*VRAAG 1*

1.1	$\frac{k + 19 + 2k + 32 + 49 + 57 + 66}{7} = 37,43$ $\frac{3k + 223}{7} = 37,43$ $3k = 39,01$ $\therefore k = 13$	✓ method/*metode* ✓ $3k = 39,01$ (2)
1.2	$\sigma_x = 18,63$ Answer only: Full Marks	✓✓18,63 (2)
1.3	$\bar{x} + p\sigma_x = 57$ $37,43 + p(18,63) = 57$ $p = 1,05$	✓method/*metode* ✓ subst./*vervang* 37,43 and/*en* 18,63 ✓answer/*antwoord* (3)
1.4.1	38	✓answer/*antwoord* (1)
1.4.2	$19 + y = 30$ $y = 11$	✓answer/*antwoord* (1) **[9]**

QUESTION/*VRAAG 2*

2.1	$\hat{y} = a + bx$ $a = -106,95$ and / *en* $b = 14,76$ $\therefore \hat{y} = -106,95 + 14,76x$	✓ a = –106,95 ✓ b = 14,76 ✓ equation/ *vergelyking* (3)
2.2	r = 0,94	✓ r = 0,94 (1)
2.3	$\hat{y} = -106,95 + 14,76(32)$ $\hat{y} = 365,37$ visitors / *besoekers* **OR**/***OF*** $32\hat{y} = 365,22$ $\therefore$ 365 people are predicted / *mense word voorspel* $\therefore$ Yes, accept the prediction / *Ja, aanvaar die voorspelling*.	✓substitute 32 into eq. / *vervang 32 in vgl.* ✓365,37 / 365,22 ✓ Yes/*Ja* (3)
2.4	The **Madiba** swimming pool. The daily maximum temperatures (independent variable) remained the same. The slope of $\hat{y} = k + 12,85x$ is less steaper, which means the y-values for the Cronje swimming pool are smaller. This result in less visitors for the Cronje swimming pool/ *Die **Madiba**-swembad. Die daaglikse maksimum temperature (onafhanklike veranderlike) bly dieselfde. Die helling van $\hat{y} = k + 12,85x$ is minder steiler, wat beteken dat die y-waardes vir die Cronje-swembad kleiner is. Dit het tot gevolg dat die Cronje-swembad minder besoekers het.*	✓Madiba ✓slope less steaper/ *helling minder steiler* ✓y-values for Cronje swimming pool are smaller/*y-waardes vir Cronje-swembad is kleiner* (3) **[10]**

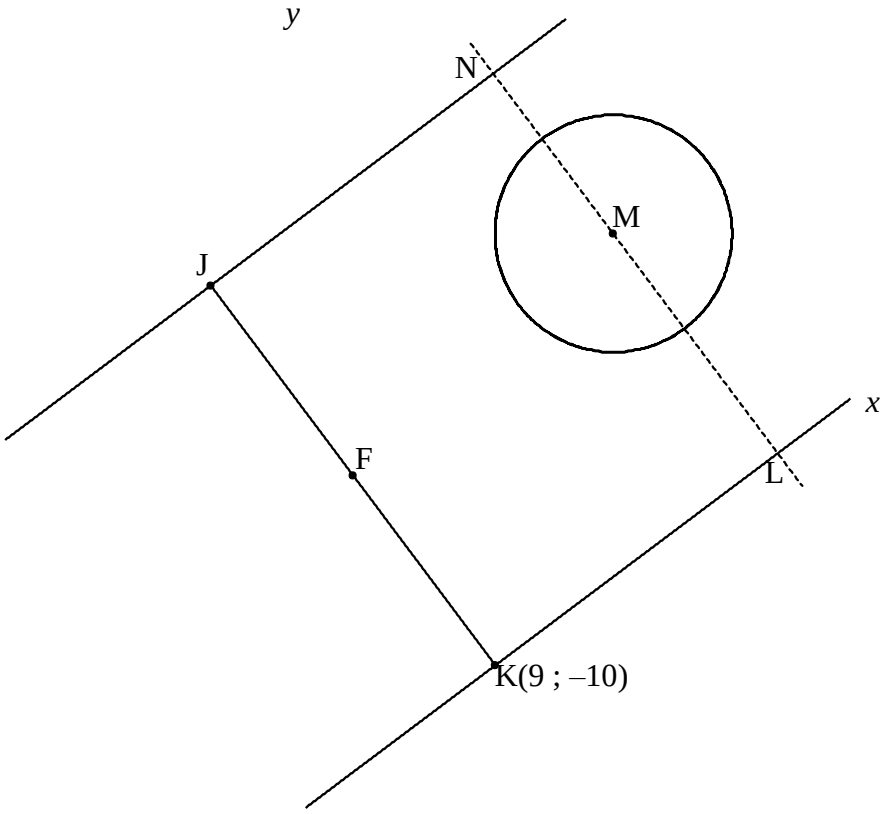
QUESTION/*VRAAG 3*



3.1	$x = -20$	✓ $x = -20$ (1)
3.2	$-20 + 16 = -4$ $\therefore C(-4;0)$	✓ $C(-4;0)$ (1)
3.3	$AC^2 = (64)^2 + (16)^2$ **OR** / ***OF*** $d_{AC} = \sqrt{(-20+4)^2 + (64-0)^2}$ $= 4352$ $= 65,97$ units / *eenhede*	✓method/*metode* ✓65,97 (2)
3.4	$\frac{64+0}{2} = p$ $\therefore p = 32$	✓ $\frac{64+0}{2}$ (1)

3.5	$m_{DE} = \frac{26-32}{9+12}$ $= -\frac{2}{7}$ $m_{AB} = m_{DE} = -\frac{2}{7}$ [DE || AB midpt.th / *middelpuntstelling*] Through the point / *Deur die punt* $(-20;64)$ $y-64 = -\frac{2}{7}(x+20)$ $y - 64 = -\frac{2}{7}x - \frac{40}{7}$ $\therefore y = -\frac{2}{7}x + \frac{408}{7}$	✓method gradient/*metode gradiënt* ✓ $m_{DE} = -\frac{2}{7}$ ✓ $m_{AB} = -\frac{2}{7}$ ✓Subst./*Vervang* $(-20;64)$ ✓ $y = -\frac{2}{7}x + \frac{408}{7}$ (5)
3.6	$m_{AB} = \tan\theta$ see / *sien* diagram $\tan\theta = -\frac{2}{7}$ $\tan^{-1}\left(-\frac{2}{7}\right) = \theta$ $\therefore \theta = -15,95° + 180°$ $\theta = 164,05°$ $164,05° = K\hat{A}B + 90°$ $\therefore K\hat{A}B = 74,05°$	✓ $\tan\theta = \frac{-2}{7}$ ✓$-15,95°$ ✓$164,05°$ ✓method/*metode* ✓answer/*antwoord* (5)
3.7	$C\hat{A}B = 74,05° - 38,67°$ $= 35,38°$ coordinates of / *koör di nate van* $B(22;52)$ $d_{AB} = \sqrt{(22+20)^2 + (52-64)^2}$ $= 6\sqrt{53}$ Area $\Delta ABC = \frac{1}{2}AC.AB\sin C\hat{A}B$ $= \frac{1}{2}(65,97).\left(6\sqrt{53}\right)\sin 35,38°$ $= 834,22$ units^2 / *eenhede*^{2}	✓ $C\hat{A}B = 35,38°$ ✓$x = 22$ ✓$y = 52$ ✓$6\sqrt{53}$ ✓correct use of area rule/*korrekte gebruik van oppv.reël* ✓answer/*antwoord* (6) **[21]**

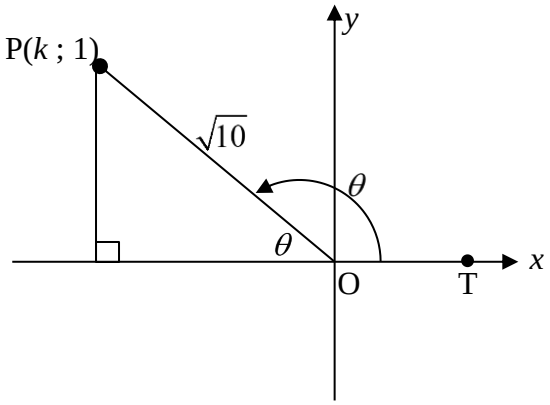
QUESTION/*VRAAG 4*



4.1	$r = 5$	✓$r = 5$ (1)
4.2	$x^2 - 6x + (-3)^2 + y^2 + 4y + (2)^2 = 87 + 9 + 4$ $(x-3)^2 + (y+2)^2 = 100$ $\therefore$ F$(3;-2)$ Answer only: Full Marks	✓method/*metode* ✓$x = 3$ ✓$y = -2$ (3)
4.3	$r^2 = 87 + (-3)^2 + (2)^2 = 100$ $\therefore r = 10$	✓$r^2 = 100$ (can also be shown in 4.2/ *kan ook in* 4.2 *gewys word*) ✓$r = 10$ (2)
4.4	FM = 15 units/*eenhede* $d_{FM} = \sqrt{(14-3)^2 + (h+2)^2} = 15$ $11^2 + (h+2)^2 = 225$ $(h+2)^2 = 104$ $h = \pm\sqrt{104} - 2$ $\therefore h = \sqrt{104} - 2$ (see / *sien* diagram)	✓FM = 15 ✓subst. into distance formulae /*vervang in afstandsformule* ✓square both sides /*kwadreer beide kante* ✓$(h+2)^2 = 104$ (4)

4.5	$m_{JK} = \frac{6+10}{-3-9}$ $= -\frac{4}{3}$ $\therefore m_{JN} = \frac{3}{4}$ [rad $\perp$ tangent / *rad* $\perp$ *raaklyn*] $y - 6 = \frac{3}{4}(x+3)$ $y - 6 = \frac{3}{4}x + \frac{9}{4}$ $\therefore y = \frac{3}{4}x + \frac{33}{4}$	✓ $m_{JK} = -\frac{4}{3}$ ✓ $m_{JN} = \frac{3}{4}$ ✓correct subst. into eq. / *korrekte vervanging in vgl.* (3)
4.6	Eq. of / *vgl. van* NL $y - \left(\sqrt{104} - 2\right) = -\frac{4}{3}(x - 14)$ $y - \sqrt{104} + 2 = -\frac{4}{3}x + \frac{56}{3}$ $\therefore y = -\frac{4}{3}x + \frac{50}{3} + \sqrt{104}$ Min. x – value of intersection will be at N / *Min. x – waarde van snyding is by N* $-\frac{4}{3}x + \frac{50}{3} + \sqrt{104} = \frac{3}{4}x + \frac{33}{4}$ $-\frac{4}{3}x - \frac{3}{4}x = \frac{33}{4} - \frac{50}{3} - \sqrt{104}$ $-\frac{25x}{12} = -18,614705...$ $x = 8,94$ min.x -value of point of contact is p / min. x – *waarde vir raakpunt is p* $\therefore p = 8,94$	✓Correct subst into eq. / *korrekte vervanging in vgl.* ✓ eq. of / *vgl. van* NL ✓ equate eqs. / *stel vgls. gelyk* ✓ simplify / *vereenvoudig* ✓ 8,94 ✓ conclude /*lei af p* = 8,94 (6) **[19]**

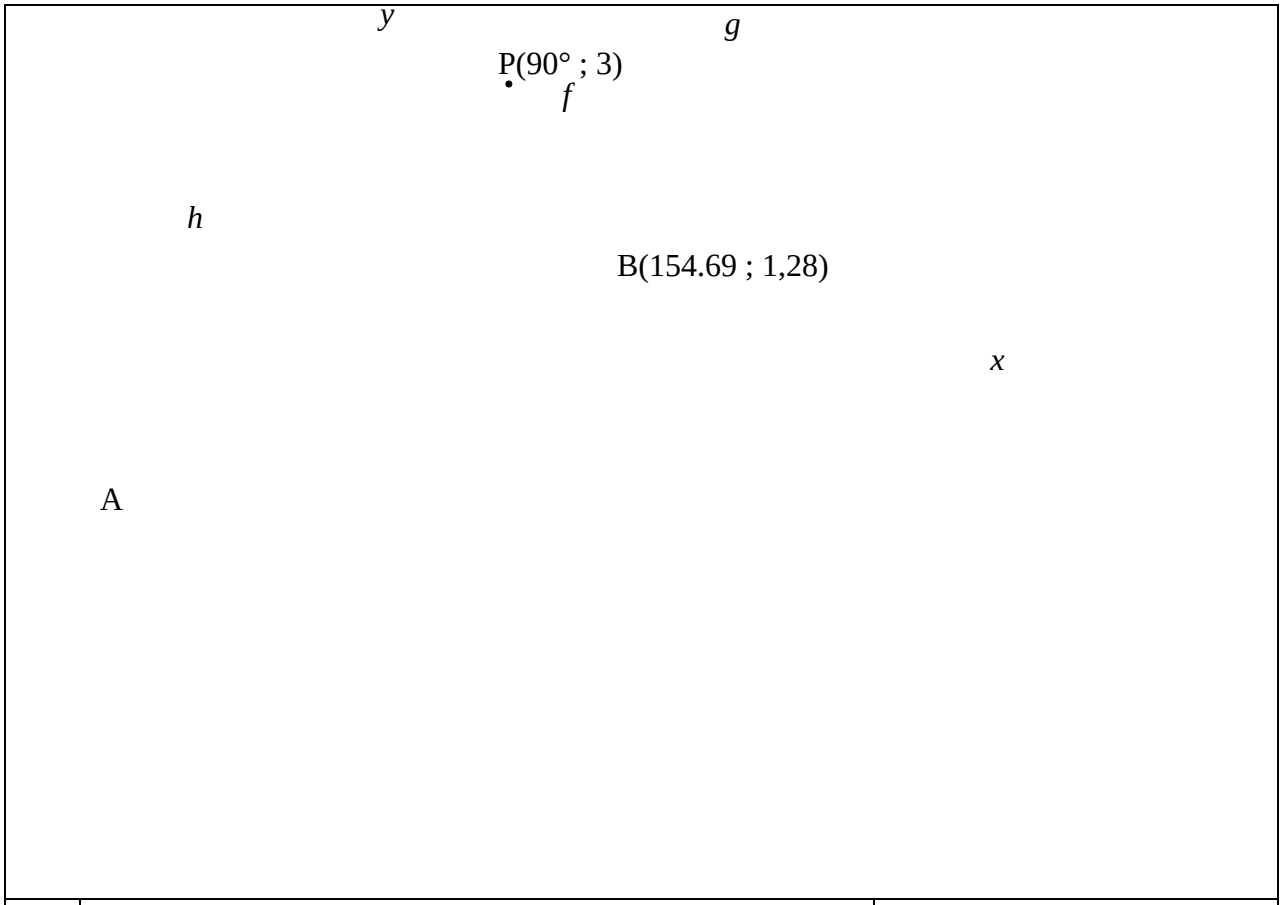
QUESTION/*VRAAG 5*



5.1.1	$k^2 + 1^2 = \left(\sqrt{10}\right)^2$ $k^2 = 9$ $k = \pm 3$ $k = -3$ (according to / *volgens* diagram)	✓Pythagoras ✓$k = -3$ (2)
5.1.2 (a)	$-\cos\theta$ $= -\left(\frac{-3}{\sqrt{10}}\right)$ $= \frac{3}{\sqrt{10}}$	 ✓ $\frac{3}{\sqrt{10}}$ or / *of* $\frac{3\sqrt{10}}{10}$ (1)
5.1.2 (b)	$\sqrt{1-\sin(180° + \theta).\sin(360° - \theta)}$ $= \sqrt{1-(-\sin\theta).(-\sin\theta)}$ **OR/*OF*** $= \sqrt{1 - \sin^2\theta}$ $= \sqrt{\cos^2\theta}$ $= \cos\theta$ $= \frac{-3}{\sqrt{10}}$ or / *of* $\frac{-3\sqrt{10}}{10}$ $\sqrt{1-\left(-\frac{1}{\sqrt{10}}\right)\left(-\frac{1}{\sqrt{10}}\right)}$ $= \sqrt{1-\frac{1}{10}}$ $= \sqrt{\frac{9}{10}}$ $= \frac{-3}{\sqrt{10}}$ or / *of* $\frac{-3\sqrt{10}}{10}$	✓ $\sin(180° + \theta) = -\sin\theta$ ✓ $\sin(360° - \theta) = -\sin\theta$ ✓ $1 - \sin^2\theta = \cos^2\theta$ **OR/*OF*** $\sin\theta = \frac{1}{\sqrt{10}}$ ✓ $\frac{-3}{\sqrt{10}}$ or / *of* $\frac{-3\sqrt{10}}{10}$ (4)

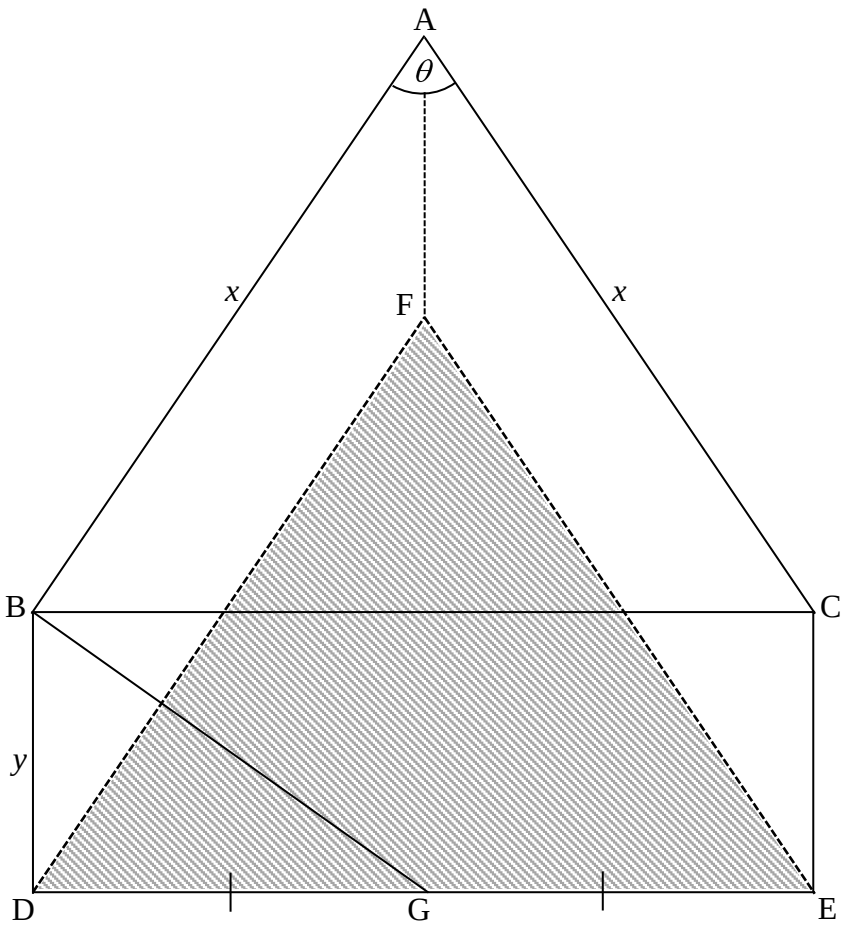
5.1.3	$\frac{1}{2}\times\left[2\sin\left(\frac{\theta}{2}-15°\right).\cos\left(\frac{\theta}{2}-15°\right)\right]$ $=\frac{1}{2}\sin(\theta-30°)$ $=\frac{1}{2}[\sin\theta.\cos30°-\sin30°.\cos\theta]$ $=\frac{1}{2}\left[\frac{1}{\sqrt{10}}.\frac{\sqrt{3}}{2}-\frac{1}{2}.\frac{-3}{\sqrt{10}}\right]$ $=\frac{1}{2}\left[\frac{\sqrt{3}}{2\sqrt{10}}+\frac{3}{2\sqrt{10}}\right]$ $=\frac{1}{2}\left[\frac{\sqrt{3}+3}{2\sqrt{10}}\right]$ $=\frac{\sqrt{3}+3}{4\sqrt{10}}$	✓manipulation / *manipulasie* ✓ $\sin(\theta-30°)$ ✓expansion of identity/ *uitbreiding van identiteit* ✓ $\sin\theta.\cos30°=\frac{1}{\sqrt{10}}.\frac{\sqrt{3}}{2}$ ✓ $\sin30°.\cos\theta=\frac{1}{2}.\frac{-3}{\sqrt{10}}$ (5)
5.2.1	$d\in[-1;1]$ or / *of* $-1\leq d\leq1$	✓critical values/*kritiese waardes* ✓*notation*/notasie (2)
5.2.2	$\sin(\theta+60°)=\sin\theta.\cos60°+\sqrt{\frac{3}{8}}$ $\sin\theta.\cos60°+\sin60°.\cos\theta=\sin\theta.\cos60°+\sqrt{\frac{3}{8}}$ $\sin60°.\cos\theta=\sqrt{\frac{3}{8}}$ $\frac{\sqrt{3}}{2}.\cos\theta=\frac{\sqrt{3}}{2\sqrt{2}}$ $\cos\theta=\frac{1}{\sqrt{2}}$ $\theta=\pm45°+n.360°$	✓LHS expansion / *LK uitbreiding* ✓ $\sin60°.\cos\theta=\sqrt{\frac{3}{8}}$ ✓ $\sin60°=\frac{\sqrt{3}}{2}$ ✓ $\cos\theta=\frac{1}{\sqrt{2}}$ ✓$m=45°$ (5)
5.3	$\sin(m-m)=\sin0=0$ $\therefore A=2^0$ $=1$	✓$\sin0$ ✓2^0 ✓1 (3) **[22]**

QUESTION/*VRAAG 6*



6.1	$a = 3$ and/*en* $b = \frac{1}{3}$	✓$a = 3$ ✓$b = \frac{1}{3}$ (2)
6.2	540°	✓540° (1)
6.3	A(–154,69° ; –1,28)	✓ –154,69° ✓ –1,28 (2)
6.4	$\tan\frac{1}{3}x = \frac{3}{2}$ $\frac{1}{3}x = 56,3099°...$ $x = 168,93°$ vertical dist./*vertikale afst.* = tan56,31°– 3sin168,93° vertical distance / *vertikale afs* $\tan d = \frac{t+5}{2}$	✓ $g(x) = h(x)$ ✓ 56,3099° ✓ 168,93° ✓ $\frac{t+5}{2}$ (4) **[9]**

QUESTION/*VRAAG 7*

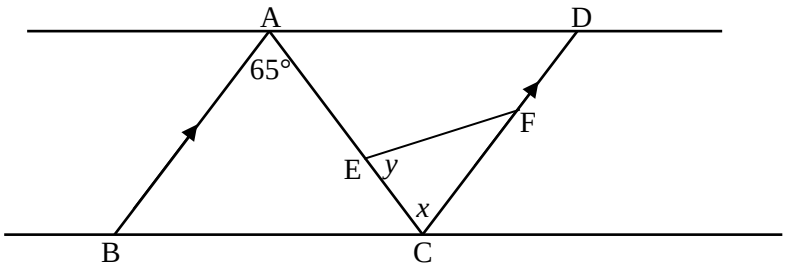


7.1	$BC^2 = AB^2 + AC^2 - 2AB.AC.\cos\theta$ $BC^2 = x^2 + x^2 - 2x.x.\cos\theta$ $BC^2 = 2x^2 - 2x^2\cos\theta$ $BC^2 = 2x^2(1 - \cos\theta)$ $BC = x\sqrt{2(1 - \cos\theta)}$	✓correct use of cosine-rule/*korrekte gebruik van cos-reël* ✓subst/*vervanging* ✓factorisation/ *faktorisering* (3)
7.2	$B\hat{D}G = 90°$	✓answer/*antwoord* (1)

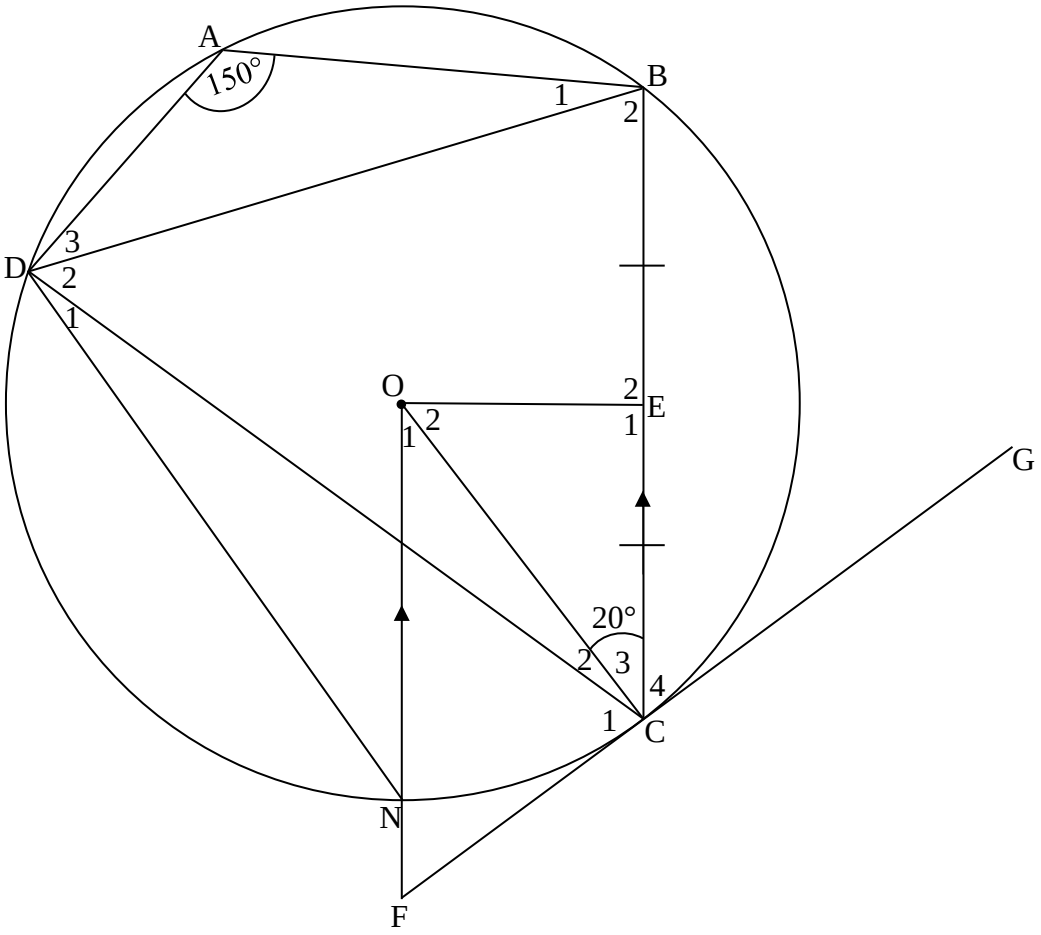
7.3	$\text{DG} = \frac{1}{2}\text{DE} = \frac{1}{2}\text{BC}$ $\text{BG}^2 = \text{BD}^2 + \text{DG}^2$ $= y^2 + \left(\frac{x\sqrt{2(1-\cos\theta)}}{2}\right)^2$ $= y^2 + \frac{x^2.2.(1-\cos\theta)}{4}$ $= y^2 + \frac{x^2(1-\cos\theta)}{2}$ $= \frac{2y^2 + x^2(1-\cos\theta)}{2}$ $\therefore \text{BG} = \sqrt{\frac{2y^2 + x^2(1-\cos\theta)}{2}}$	✓ $\text{DG} = \frac{1}{2}\text{BC}$ ✓subst./*vervanging* ✓ $y^2 + \frac{x^2(1-\cos\theta)}{2}$ (3)
7.4	Max. length of BG is where $1-\cos\theta$ is a max / *Maks. lengte van BG is waar* $1-\cos\theta$ *'n maks is* max value of / *maks. waarde van* $1-\cos\theta = 2$ $\text{BG}_{\text{max/}maks} = \sqrt{\frac{2y^2 + x^2(1-\cos\theta)}{2}}$ $= \sqrt{\frac{2\left(\frac{8}{3}\right)^2 + \left(\frac{15}{2}\right)^2(2)}{2}}$ $= \sqrt{\frac{2281}{36}}$ $= 7{,}96$ units / *eenhede*	✓$1-\cos\theta = 2$ ✓subst./*vervanging* ✓answer/*antwoord* (3) **[10]**

GEOMETRY/*MEETKUNDE*

Please read carefully through the following table before marking **QUESTION 8 – 10** /
*Lees asseblief sorgvuldig deur die volgende tabel alvorens **VRAAG 8 –10** nagesien word.*

	The order in which the candidate answer a geometry question must follow logically/ *Die volgorde waarin 'n kandidaat 'n meetkundevraag beantwoord moet logies volg.* **Example/*Voorbeeld*** Given/*Gegee* AB ∥ CD and/*en* $E\hat{F}D = 115°$  The candidate first need to calculate *x* BEFORE he/she can calculate *y/Die kandidaat moet eerste vir x bereken VOORDAT hy/sy vir y kan bereken.*
S	A mark for a correct statement (A statement mark is independent of a reason)
	'n Punt vir 'n korrekte bewering *('n Punt vir 'n bewering is onafhanklik van die rede)*
R	A mark for the correct reason (A reason mark may only be awarded if the statement is correct)
	'n Punt vir 'n korrekte rede *('n Punt word slegs vir die rede toegeken as die bewering korrek is)*
S/R	Award a mark if the statement AND reason are both correct (Both MUST be correct to get one mark)
	Ken 'n punt toe as die bewering EN rede beide korrek is *(Beide MOET korrek wees om een punt te kry)*

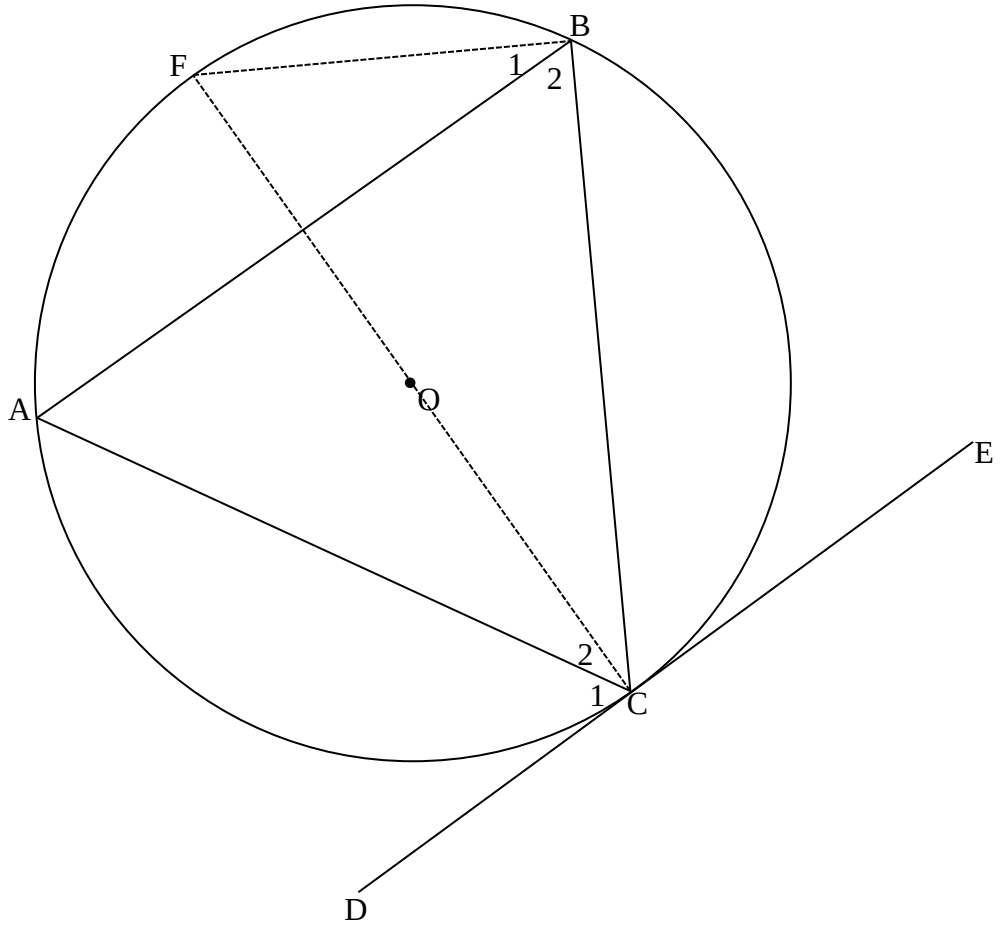
QUESTION/*VRAAG 8*



8.1.1	$\hat{O}_1 = 20°$ [alt ∠s / *verwiss ∠e*; OF ‖ BC]	✓S/R (1)
8.1.2	$\hat{D}_1 = 10°$ [∠ at centre = 2 × ∠circumference / *midtpt∠ = 2 × omtrek∠*]	✓S✓R (2)
8.1.3	$\hat{C}_2 = 10°$ [opp∠s of cyclic quad / *teenoorst.∠e van kvh*]	✓S✓R (2)
8.1.4	$\hat{C}_4 = 70°$ [rad ⊥ tangent / *rad ⊥ raaklyn*] $\hat{D}_2 = \hat{C}_4 = 70°$ [tan – chord.th / *raaklyn – koordst.*]	✓S✓R ✓S✓R (4)

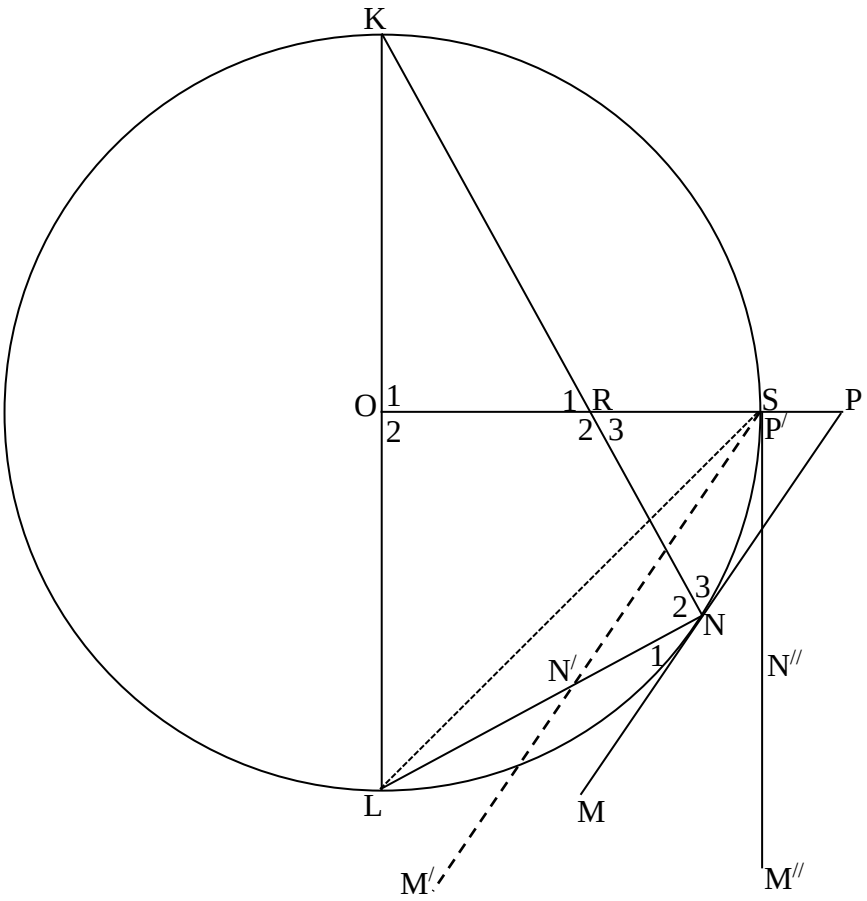
8.2	$OE \perp BC$ $[\text{midpt.}\square, \text{midpt. chord} / \textit{midpt.}\square, \textit{midpt. koord}]$	✓S✓R
	$\therefore$ OE is the perpendicular height of trapezium OECF / *OE is die loodregte hoogte van trapesium OECF*	
	$\frac{1}{2}(OF + EC) \times OE = \frac{3}{4}y^2 - x^2$ $\frac{1}{2}(\sqrt{3}y + 2x) \times OE = \frac{3}{4}y^2 - x^2$ $\left(\frac{\sqrt{3}}{2}y + x\right) \times OE = \frac{3}{4}y^2 - x^2$ $OE = \frac{\left(\frac{\sqrt{3}}{2}y - x\right)\left(\frac{\sqrt{3}}{2}y + x\right)}{\left(\frac{\sqrt{3}}{2}y + x\right)}$	✓area formulae trapezium/ *oppv. formule trapesium* ✓factors RHS / *faktore RK*
	$\therefore OE = \frac{\sqrt{3}}{2}y - x$	✓answer/ *antwoord* (5) **[14]**

QUESTION/*VRAAG 9*



9.1	Construction: Draw diameter CF and connect F with B/ *Konstruksie: Trek middellyn CF en verbind F met B* $\hat{C}_1 + \hat{C}_2 = 90°$ [rad ⊥ tangent / *rad ⊥ raaklyn*] $\hat{B}_1 + \hat{B}_2 = 90°$ [∠ in $\frac{1}{2}$] $\therefore \hat{C}_1 + \hat{C}_2 = \hat{B}_1 + \hat{B}_2 = 90°$ but / *maar* $\hat{B}_1 = \hat{C}_2$ [∠s in the same seg. / *∠e in dies. seg.*] $\therefore \hat{C}_1 = \hat{B}_2$ $\therefore A\hat{C}D = A\hat{B}C$	✓ constr/ *konstr* ✓ S/R ✓ S/R ✓ S/R ✓ S/R (5)

9.2

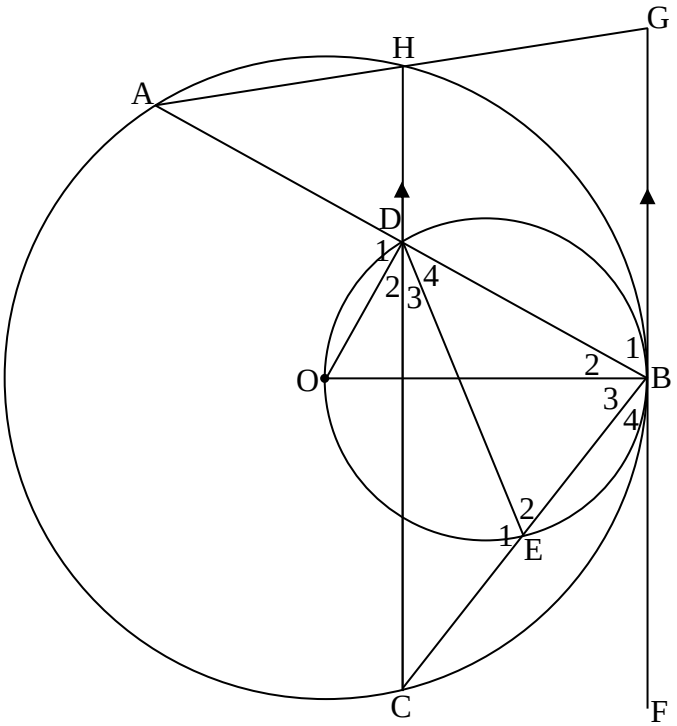


9.2.1	OR = 6	✓ 6 (1)
9.2.2	$OR^2 = 36$ $\therefore KR^2 - KO^2 = OR^2$ $\therefore OR \perp KL$ [converse Pythagoras / *omgekeerde Pythagoras*]	✓S ✓R (2)
9.2.3	$\hat{N}_2 = 90°$ [$\angle$ *in* $\frac{1}{2}\square$] $\therefore ORNL$ is a cyclic quad / *is 'n kvh* [converse opp.$\angle$s of cyclic quad / *omgekeerde teenoorst.$\angle$e kvh*] **OR/*OF*** [converse ext.$\angle$ cyclic quad / *omgekeerde buite$\angle$ kvh*]	✓ S ✓R ✓R (3)

9.2.4	If / *As* $M^{//}N^{//}P^{/}$ touches the circle / *die sirkel raak*:
	$M^{//}N^{//}P^{/} \perp OP^{/}$ [rad $\perp$ tangent / *rad $\perp$ raaklyn*]
	
	If $M^{/}N^{/}P^{/} \parallel MNP$ and $P^{/}$ coincide with S, then $L\hat{S}M^{/} < 90°$ /
	As $M^{/}N^{/}P^{/} \parallel MNP$ en $P^{/}$ val saam met S, dan is $L\hat{S}M^{/} < 90°$
		✓S/R
		
		✓ S

	$L\hat{O}S = 90°$ [from / *uit* 9.2.2] $\therefore L\hat{O}S \neq L\hat{S}M$ $\therefore M'N'P'$ is not a tangent to circle through L, O and S [converse tan-chord th. not true] *$\therefore M'N'P'$ is nie 'n raaklyn aan sirkel deur L, O en S nie* [*omgekeerde raaklyn – koordst. nie waar nie*]	✓S ✓S/R (4) **[15]**

QUESTION/*VRAAG* 10



10.1.1	alt ∠s / *verwiss ∠e*; HC || GF	✓ R (1)
10.1.2	tan-chord.th/*raaklyn-koordst.*	✓ R (1)
10.2.1	In ΔDBE and / *en* ΔDBC $\hat{B} = \hat{B}$ [common / *gemeenskaplik*] $\hat{D}_4 = \hat{C}$ [both / *beide* = $\hat{B}_4$] $\hat{E}_2 = C\hat{D}B$ [sum of ∠s of Δ / *som van ∠e van* Δ] $\therefore \Delta BDE \text{ ||| } \Delta BCD$ [∠ ∠ ∠] **OR/*OF***	✓S/R ✓S/R ✓S/R

	In ΔDBE and / *en* ΔDBC $\hat{B} = \hat{B}$ [common / *gemeenskaplik*] $\hat{D}_4 = \hat{C}$ [both / *beide* $= \hat{B}_4$] $\therefore \Delta BDE \text{ ||| } \Delta BCD$ [$\angle\angle\angle$]	✓S/R ✓S/R ✓R (3)
10.2.2	$\frac{AH}{AG} = \frac{AD}{AB} = \frac{1}{2}$ [prop.th/*eweredigheidst*. HC||GF] $\therefore$ AD = DB **OR/*OF*** OB $\perp$ FG [rad $\perp$ tangent / *rad* $\perp$ *raaklyn*] $\therefore$ OB is the diameter of the smaller circle / *OB is die middellyn van die kleiner sirkel* [converse tan $\perp$ rad / *omgekeerde rad* $\perp$ *raaklyn*] $O\hat{D}B = 90°$ [$\angle$ *in* $\frac{1}{2}$] $\therefore$ AD = DB [midpt , midpt.chord / *midpt* , *midpt.koord*]	✓S ✓R ✓S ✓S/R ✓S/R ✓S/R (3)
10.2.3	$\frac{BD}{BC} = \frac{DE}{CD} = \frac{BE}{BD}$ [from / *vanuit* Δ] $\therefore BD^2 = BC.BE$ but / *maar* $BD = \frac{AB}{2}$ [from / *vanuit* 10.2.2] $\left(\frac{AB}{2}\right)^2 = BD^2$ $\therefore \frac{AB^2}{4} = BD^2 = BC.BE$	✓S/R ✓ S ✓S ✓squaring/ *kwadrering* (4)
10.2.4	$AB = 2DB = 2(3) = 6$ units / *eenhede* $\frac{6^2}{4} = BC \times 2$ [from / *vanuit* 10.2.3] BC = 4,5 units / *eenhede* but / *maar* CE = BC − BE = 4,5 − 2 = 2,5 units / *eenhede* $\therefore$ CE : BC = 2,5 : 4,5 = 5 : 9	✓subst. / *vervanging* ✓ 4,5 ✓ 2,5 (3)

10.3	$\frac{\text{area }\Delta\text{AHD}}{\text{area }\Delta\text{HGB}} = \frac{\frac{1}{2}.\text{AH}.\text{HD}.\sin\hat{\text{AHD}}}{\frac{1}{2}.\text{HG}.\text{GB}.\sin\text{G}}$ [given/*gegee* AH = HG] $= \frac{\text{HD}.\sin\hat{\text{AHD}}}{\text{GB}.\sin\text{G}}$	✓area rule /*oppv.-reël*
	$\hat{\text{AHD}} = \hat{\text{G}}$ [corresp.∠s / *ooreenk.∠e* HC||GF]	✓S/R
	$\therefore \frac{\text{area }\Delta\text{AHD}}{\text{area }\Delta\text{HGB}} = \frac{\text{HD}}{\text{GB}}$	✓S
	but / *maar* $\text{HD} = \frac{1}{2}\text{GB}$ [midpt.th Δs / *midpt.st Δe*]	✓S ✓R
	$\therefore \frac{\text{area }\Delta\text{AHD}}{\text{area }\Delta\text{HGB}} = \frac{1}{2}$	✓S (6)

TOTAL/*TOTAAL*: 150

GRID-Analysis (According to BLOOMS TAXONOMY)													
		KNOWLEDGE			ROUTINE PROCEDURES			COMPLEXED PROCEDURES			PROBLEM SOLVING		
Question	Description	Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High
	Statistics(Gr.11) [9]												
1.1	Mean average						2						
1.2	Standard deviation						2						
1.3	Within standard deviation							3					
1.4.1	Adjusted range		1										
1.4.2	Adjusted lower quartile		1										
2	**Regression(Gr.12) [10]**												
2.1	Regression line				3								
2.2	Correlation Coefficient			1									
2.3	Application reg. line					3							
2.4	Application slope										3		
3	**Analytical (Gr.11) [21]**												
3.1	Equation vertical line		1										
3.2	Translation	1											
3.3	Distance			2									
3.4	Midpoint			1									
3.5	Equation of str line						5						
3.6	Angle + integr. geometry								5				
3.7	Area								6				
4	**Analytical(Gr.12) [19]**												
4.1	Length of radius	1											
4.2.	Centre of circle				3								
4.3	Radius from equation				2								
4.4	Integrating concepts							4					
4.5	Eq. of tangent							3					
4.6	Min.value of intersection										6		

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		KNOWLEDGE			ROUTINE PROCEDURES			COMPLEX PROCEDURES			PROBLEM SOLVING		
Question	Description	Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High
5	**Trigonometry [22]**												
5.1.1	Pythagoras			2									
5.1.2 (a)	Ratio		1										
5.1.2 (b)	Reduction + ratio						4						
5.1.3	Double angle								5				
5.2.1	Range			2									
5.2.2	General solution							5					
5.3	Problem										3		
6	**Trig Graphs [9]**												
6.1	Parameters		2										
6.2	Period	1											
6.3	Symmetry			2									
6.4	Vertical distance								4				
7	**2D/3D Trig [10]**												
7.1	cos-rule					3							
7.2.	Basic geometry	1											
7.3	Pythagoras					3							
7.4	Maxima										3		
8	**Geometry [14]**												
8.1.1	Alternating angles	1											
8.1.2	Angle at centre		2										
8.1.3	Opp. Angle Cyclic quads		2										
8.1.4	Tangents				4								
8.2	Integrating concepts							5					

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		KNOWLEDGE			ROUTINE PROCEDURES			COMPLEX PROCEDURES			PROBLEM SOLVING		
Question	Description	Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High
9	**Geometry [15]**												
9.1	Tan-chord theorem					5							
9.2.1	Ratios	1											
9.2.2	Converse Pythagoras			2									
9.2.3	Prove cyclic quad						3						
9.2.4	Problem										4		
10	**Geometry**												
10.1.1	Theory	1											
10.1.2.	Theory			1									
10.2.1	Similarity				3								
10.2.2	Proportionality						3						
10.2.3	Ratios						4						
10.2.4	Ratios				3								
10.3	Area ratio							6					
		7	10	13	18	14	23	26	20	0	19	0	0
	% Breakdown of cognitive levels		**30**	**20%**		**55**	**36,7%**		**46**	**30,7%**		**19**	**12,7%**
	Expected %			**20%**			**35%**			**30%**			**15%**

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