Education and Sport Development

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Lefapha la Thuto le Tlhabololo ya Metshameko
NORTH WEST PROVINCE

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 12

MATHEMATICS P2/*WISKUNDE V2*

SEPTEMBER 2019

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS/*PUNTE*: 150

This marking guideline consist of 18 pages./
Hierdie nasienriglyne bestaan uit 18 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 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.*

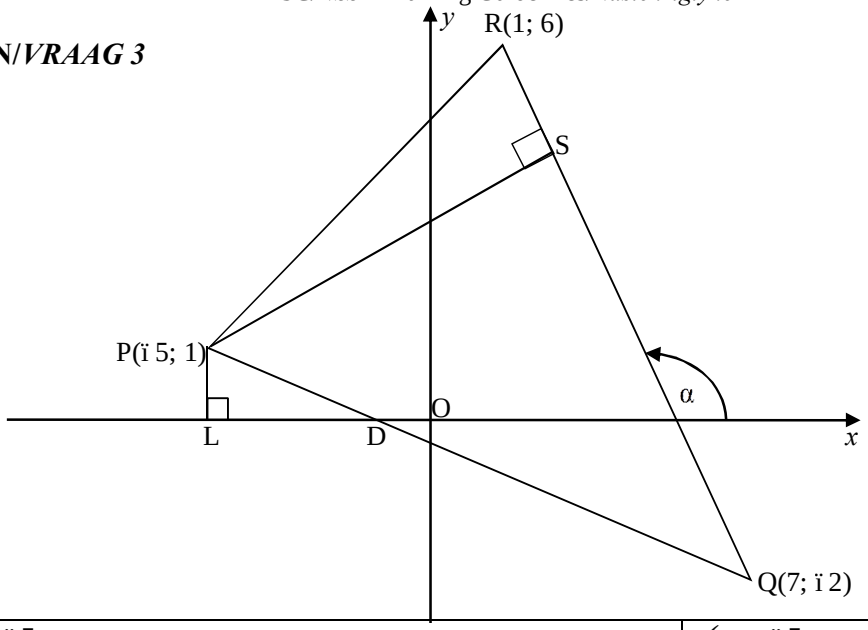
QUESTION/*VRAAG 1*

1.1	$k + 70 = 80$ $\therefore k = 10$	✓ $k + 70 = 80$ (1)
1.2	$80 - 7 = p$ **OR / *OF*** $63 + 10 = p$ $\therefore p = 73$ $\therefore p = 73$	✓ 73 (1)
1.3	$\overline{x} = \frac{75\times 2 + 105\times 16 + 135\times 28 + 165\times 17 + 195\times 10 + 225\times 7}{80}$ $= \frac{11940}{80}$ $\therefore \overline{x} = 149,25$ Answer only: Full Marks	✓midpoints/ *middelwaardes* ✓ ÷ 80 ✓answer/*antwoord* (3)
1.4.1	$\overline{x} + \sigma = 186,89$ $\sigma = 37,64$ Answer only: Full Marks	✓method/*metode* ✓answer/*antwoord* (2)
1.4.2	$q = \overline{x} - \sigma_x$ $q = 149,25 - 37,64$ $q = 111,61$	✓answer/*antwoord* (1)
1.5	value of / *waarde van* $m = 3$ seconds / *sekondes* average time elapsed of day 2 will be 3 seconds less / *gemiddelde tydsverloop van dag* 2 *is* 3 *sekondes* min *der* $\overline{x}_{\text{day}/dag\,2} = 146,25$	✓ $m = 3$ ✓ $\overline{x}_{\text{day}/dag\,2} = 146,25$ (2)
		[10]

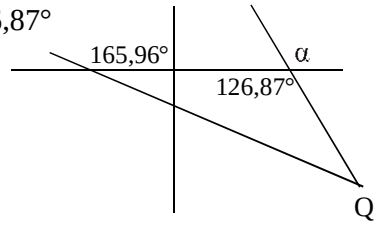
QUESTION/*VRAAG 2*

2.1	(68 ; 19)	✓ (68 ; 19) (1)
2.2	$\hat{y} = a + bx$ $a = 7,35$ and / *en* $b = 0,98$ $\therefore \hat{y} = 7,35 + 0,98x$	✓ $a = 7,35$ ✓ $b = 0,98$ ✓ equation/ *vergelyking* (3)
2.3	$\hat{y} = 7,35 + 0,98(83)$ $\hat{y} = 88,69\%$ **OR / *OF*** $\hat{y} = 88,35\%$ (calculator / *sakrekenaar*)	✓ substitute 83 into eq. / *vervang 83 in vgl.* ✓ 88,69 (2) ✓✓ 88,35% (2)
2.4	$r = 0.96$ $\therefore$ Very strong positive correlation / *Baie Sterk positiewe korrelasie*	✓ $r = 0.96$ ✓Very strong / *Baie sterk* (2)
2.5	If the data points were to be plotted on a scatter plot diagram, the new plotted points will be shifted downwards with the same constant value. Hence the line of best fit will also shift downwards with the new plotted points, but the slope of the line will remain unchanged. Therefore it has NO influence on the gradient/ *As die datapunte op 'n spreidiagram geplot moet word, sal die nuwe datapunte afwaarts geskuif word met dieselfde konstante waarde. Vervolgens sal die paslyn ook saam met die nuwe datapunte afwaarts skuif, maar die helling van die lyn sal onveranderd bly. Dus sal dit GEEN invloed op die helling hê nie.*	✓New data points and line of best fit shifted downwards/*Nuwe datapunte en paslyn word afwaarts geskuif* ✓No influence on gradient/*Geen invloed op helling* (2) **[10]**

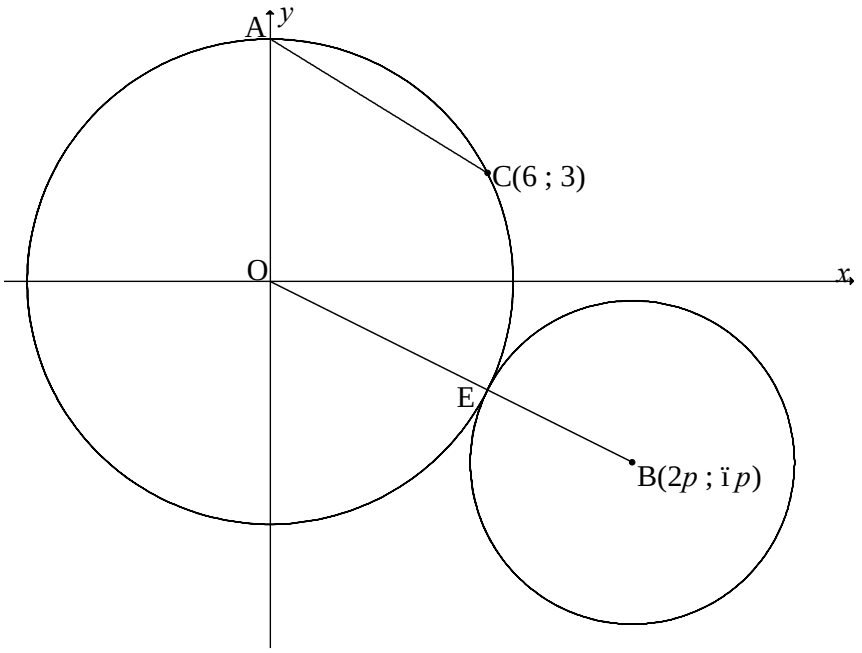
QUESTION/*VRAAG 3*



3.1	$x = ï 5$	✓ $x = ï 5$ (1)
3.2	$m_{QR} = \frac{-2-6}{7-1}$ $= \frac{-8}{6}$ $= -\frac{4}{3}$	✓Method/*Metode* ✓Answer/*Antwoord* (2)
3.3	PS ⊥ QR $\therefore m_{PS} \times m_{QR} = -1$ $\therefore m_{PS} = \frac{3}{4}$ Through the point / *Deur die punt* $(-5;1)$ $y-1 = \frac{3}{4}(x+5)$ $y = \frac{3}{4}x + \frac{15}{4} + 1$ $\therefore y = \frac{3}{4}x + \frac{19}{4}$	✓ $m_{PS} \times m_{QR} = -1$ [PS ⊥ QR] ✓ $m_{PS} = \frac{3}{4}$ ✓Subst./*Vervang* $(-5;1)$ ✓ $y = \frac{3}{4}x + \frac{19}{4}$ (4)
3.4	$m_{PQ} = \frac{1-(-2)}{-5-7}$ $= \frac{3}{-12}$ $= -\frac{1}{4}$ $\tan P\hat{D}O = \frac{-1}{4}$ $\therefore P\hat{D}O = -14{,}04° + 180° = 165{,}96°$	✓ $m_{PQ} = -\frac{1}{4}$ ✓ $\tan P\hat{D}O = \frac{-1}{4}$ ✓165,96° (3)

3.5	$\tan\alpha = \frac{-4}{3}$ $\therefore \alpha = -53{,}13° + 180° = 126{,}87°$  $165{,}96° = 126{,}87° + P\hat{Q}R$ $\therefore P\hat{Q}R = 39.09°$	✓ $\tan\alpha = \frac{-4}{3}$ ✓ $\alpha = 126{,}87°$ ✓ $165{,}96° = 126{,}87° + P\hat{Q}R$ ✓39.09° (4)
3.6	$\frac{\text{area }\Delta PRS}{\text{area }\Delta PQS} = \frac{RS}{QS} = \frac{4}{16} = \frac{1}{4}$ [same height ; same base/*dieselfde hoogte* ; *dieselfde basis*] $\therefore$ RS = a and / *en* QS = $4a$ Length of QR / *Lengte van QR* : $d_{QR} = \sqrt{(1-7)^2 + (6-(-2))^2}$ $d_{QR} = \sqrt{100} = 10$ units / *eenhede* $a + 4a = 10$ $\therefore 5a = 10$ $\therefore a = 2$ Length of QS / *Lengte van QS* $= 4(2) = 8$ units / *eenhede* **OR/*OF*** $QR^2 = (1-7)^2 + (6-(-2))^2$ $QR = 10$ $\frac{\text{area }\Delta PQS}{\text{area }\Delta PQR} = \frac{\frac{1}{2}PQ.QS.\sin Q}{\frac{1}{2}PQ.QR.\sin Q}$ $\frac{16x^2}{20x^2} = \frac{QS}{10}$ $\frac{4}{5} = \frac{QS}{10}$ $SQ = \frac{4}{5}(10)$ $= 8$ units / *eenhede*	✓✓ $\frac{\text{area }\Delta PRS}{\text{area }\Delta PQS} = \frac{1}{4}$ ✓Method/*Metode* ✓ $d_{QR} = 10$ ✓ QS = 8 (5) ✓Method/*Metode* ✓QR = 10 ✓✓ $\frac{\text{area }\Delta PQS}{\text{area }\Delta PQR} = \frac{4}{5}$ ✓Answer/*Antwoord* (5) **[19]**

QUESTION/*VRAAG 4*



4.1	$x^2 + y^2 = r^2$ $(6)^2 + (3)^2 = r^2$ $r^2 = 45$ $\therefore x^2 + y^2 = 45$	✓$r^2 = 45$ ✓ answer/*antwoord* (2)
4.2	$A\left(0; \sqrt{45}\right)$	✓0 ✓$\sqrt{45}$ (2)
4.3	$m_{AC} = \frac{3-\sqrt{45}}{6-0}$ $= \frac{3-3\sqrt{5}}{6}$ $= \frac{1-\sqrt{5}}{2}$ Through the point / *Deur die punt* $\left(0; \sqrt{45}\right)$ $y = \frac{1-\sqrt{5}}{2}x + \sqrt{45}$	✓Method/*Metode* ✓ $m_{AC} = \frac{1-\sqrt{5}}{2}$ ✓Equation/*Vergelyking* (3)
4.4	$-\sqrt{45} < k < \sqrt{45}$ or / *of* $-3\sqrt{5} < k < 3\sqrt{5}$ alternative notation / *alternatiewe notasie* $k \in (-\sqrt{45}; \sqrt{45})$ or / *of* $k \in (-3\sqrt{5}; 3\sqrt{5})$	✓$-\sqrt{45}$ and / *en* $\sqrt{45}$ ✓Correct notation/ *Korrekte notasie* (2)
4.5.1	$(x-2p)^2 + (y+p)^2 = 20$	✓$(x-2p)^2 + (y+p)^2$ ✓ 20 (2)

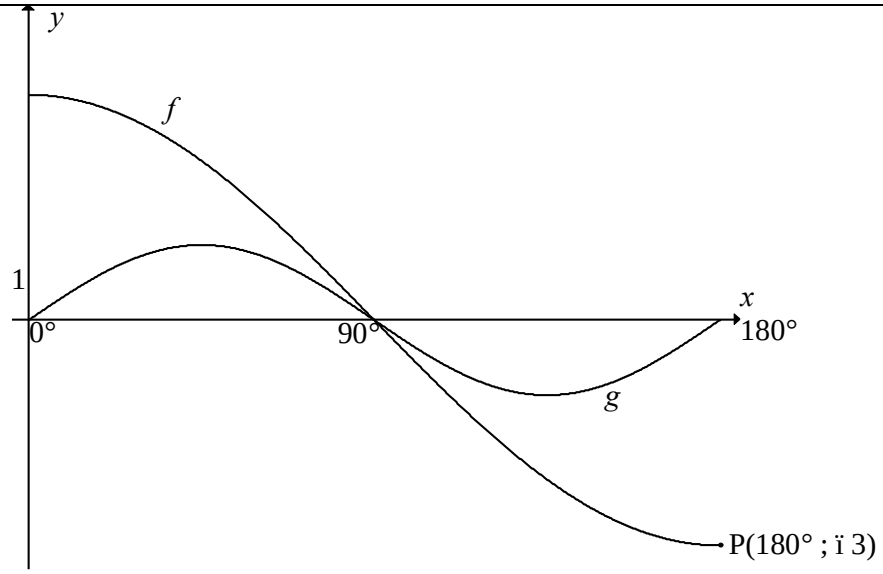
4.5.2	$d_{OB} = \sqrt{45} + \sqrt{20}$ $= 5\sqrt{5}$ or / *of* $\sqrt{125}$ $OB^2 = (2p)^2 + (p)^2$ [Pythagoras] $\left(5\sqrt{5}\right)^2 = 4p^2 + p^2$ $125 = 5p^2$ $25 = p^2$ $\therefore p = \pm 5$ But according / *Maar volgens diagram* $p > 0$ $\therefore p = 5$	✓ $d_{OB} = \sqrt{45} + \sqrt{20}$ ✓ $d_{OB} = 5\sqrt{5}$ ✓ $OB^2 = (2p)^2 + (p)^2$ ✓ $p^2 = 25$ ✓ $p = 5$ (5)
4.6	$x^2 + 4x\cos\theta + y^2 + 8y\sin\theta = -3$ $x^2 + 4x\cos\theta + \left(2\cos\theta\right)^2 + y^2 + 8y\sin\theta + \left(4\sin\theta\right)^2 =$ $-3 + \left(2\cos\theta\right)^2 + \left(4\sin\theta\right)^2$ $\therefore r^2 = -3 + 4\cos^2\theta + 16\sin^2\theta$ $r^2 = -3 + 4\cos^2\theta + 16\left(1 - \cos^2\theta\right)$ $r^2 = -3 + 4\cos^2\theta + 16 - 16\cos^2\theta$ $r^2 = 13 - 12\cos^2\theta$ For / *vir* $13 - 12\cos^2\theta$ to be a maximum / *om 'n maksimum te wees*: $\cos^2\theta$ needs to be a minimum / *moet 'n minimum wees* minimum of / *van* $\cos^2\theta = 0$ $\therefore r^2 = 13 - 12(0) = 13$ $\therefore r = \sqrt{13}$ **OR / *OF*** $r^2 = -3 + 4\left(1 - \sin^2\theta\right) + 16\sin^2\theta$ $r^2 = -3 + 4 - 4\sin^2\theta + 16\sin^2\theta$ $r^2 = 1 + 12\sin^2\theta$ For / *vir* $1 + 12\sin^2\theta$ to be a maximum / *om 'n maksimum te wees*: maximum of / *maksimum van* $\sin^2\theta = 1$ $\therefore r^2 = 1 + 12(1) = 13$ $\therefore r = \sqrt{13}$	✓ Complete the square/*Voltooi die vierkant* ✓ $r^2 = -3 + 4\cos^2\theta + 16\sin^2\theta$ ✓ $16\left(1 - \cos^2\theta\right)$ ✓ $r^2 = 13 - 12\cos^2\theta$ ✓ $\cos^2 = 0$ ✓ $r = \sqrt{13}$ ✓ $4\left(1 - \sin^2\theta\right)$ ✓ $r^2 = -3 + 4 - 4\sin^2\theta + 16\sin^2\theta$ ✓ $r^2 = 1 + 12\sin^2\theta$ ✓ $\sin^2\theta = 1$ ✓ $r = \sqrt{13}$ (6) **[22]**

QUESTION/*VRAAG 5*

5.1.1	$\frac{\sin(180°-70°).\tan 60°}{\cos 180°.\tan(180°+70°).\sin 20°}$ $\frac{\sin 70°.\tan 60°}{(-1)\tan 70°.\sin 20°}$ $\frac{\sin 70°.\sqrt{3}}{(-1).\frac{\sin 70°}{\cos 70°}.\cos 70°}$ $=-\sqrt{3}$	✓ $\sin 70°$ ✓ $\cos 180°$ ✓ $\tan 70°$ ✓ $\sin 20°$ ✓ $\frac{\sin 70°}{\cos 70°}$ ✓ $\sin 20° = \cos 70°$ ✓ $-\sqrt{3}$ (7)
5.1.2	$1-2\sin^2 22,5°$ $\cos 2(22,5°)$ $\cos 45°$ $=\frac{1}{\sqrt{2}}$ $=\frac{\sqrt{2}}{2}$	✓ $1-2\sin^2 22,5°$ ✓ $\cos 2(22,5°)$ ✓ $\cos 45°$ ✓ $\frac{1}{\sqrt{2}}$ (4)
5.2.1	$\sin^2 x=0$ and where / *en waar* $\tan x$ is undefined / *ongedefinieerd* $\therefore \sin x=0$ $\therefore x=0°$ or / *of* $x=180°$ or / *of* $x=90°$	✓ $x=0°$ ✓ $x=180°$ ✓ $x=90°$ (3)
5.2.2	LHS / *LK* $\frac{\cos 2x.\tan x}{\sin^2 x}$ $=\frac{\left(\cos^2 x-\sin^2 x\right)\left(\frac{\sin x}{\cos x}\right)}{\sin^2 x}$ $=\left(\cos^2 x-\sin^2 x\right)\left(\frac{\sin x}{\cos x}\right)\left(\frac{1}{\sin^2 x}\right)$ $=\frac{\cos^2 x-\sin^2 x}{\sin x\cos x}$ $=\frac{\cos^2 x}{\sin x\cos x}-\frac{\sin^2 x}{\sin x\cos x}$ $=\frac{\cos x}{\sin x}-\frac{\sin x}{\cos x}$ $=\frac{\cos x}{\sin x}-\tan x=$ RHS / *RK*	✓ $\cos 2x=\cos^2 x-\sin^2 x$ ✓ $\tan x=\frac{\sin x}{\cos x}$ ✓ $\frac{\cos^2 x-\sin^2 x}{\sin x\cos x}$ ✓ $\frac{\cos^2 x}{\sin x\cos x}-\frac{\sin^2 x}{\sin x\cos x}$ ✓ $\frac{\cos x}{\sin x}-\frac{\sin x}{\cos x}$ (5)

	OR/*OF*	
	LHS / *LK* $\frac{\cos 2x.\tan x}{\sin^2 x}$ $=\frac{\left(\cos^2 x-\sin^2 x\right)\left(\frac{\sin x}{\cos x}\right)}{\sin^2 x}$ $=\frac{\cos x.\sin x}{\sin^2 x}-\frac{\frac{\sin^3 x}{\cos x}}{\sin^2 x}$ $=\frac{\cos x}{\sin x}-\frac{\sin x}{\cos x}$ $=\frac{\cos x}{\sin x}-\tan x=$ RHS / *RK*	✓ $\cos 2x=\cos^2 x-\sin^2 x$ ✓ $\tan x=\frac{\sin x}{\cos x}$ ✓ $\frac{\cos x.\sin x}{\sin^2 x}$ ✓ $\frac{\frac{\sin^3 x}{\cos x}}{\sin^2 x}$ ✓ $\frac{\cos x}{\sin x}-\frac{\sin x}{\cos x}$ (5) **[19]**

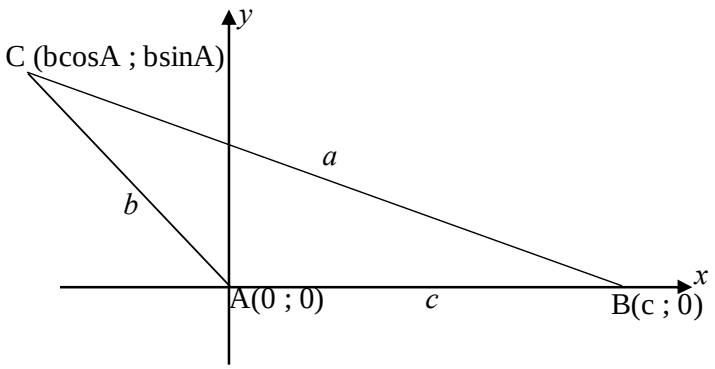
QUESTION/*VRAAG 6*



6.1	$a = 3$ and/*en* $b = 2$	✓$a = 3$ ✓$b = 2$ (2)
6.2	360°	✓360° (1)
6.3	$2 \le y \le 4$ or / *of* $y \in [2;4]$	✓ values/*waardes* 2 and/*en* 4 ✓ notation / *notasie.* (2)
6.4	$0° < x < 45°$ or / *of* $90° < x < 135°$ alternative notation / *alternatiewe notasie* $x \in (0°;45°) \cup (90°;135°)$	✓ 0° and/*en* 45° ✓ 90° and/*en* 135° ✓ notation / *notasie* (3)
6.5	$y = \cos^2 x - \sin^2 x$ $y = \cos 2x$ to coincide with g / *om saam te val met* g : $y = \sin(90° + 2x)$ $y = \sin 2(x + 45°)$ $\therefore q = 45°$	✓ $y = \cos 2x$ ✓ $\sin(90 + 2x)$ ✓ 45° (3) **[11]**

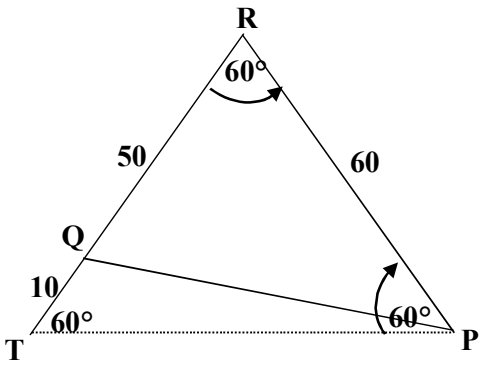
QUESTION/*VRAAG 7*

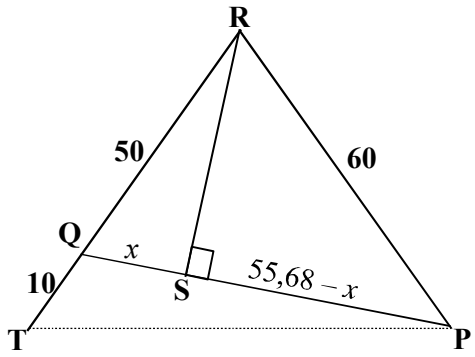
7.1



Coordinates of /*Koördinate van* B(c ; 0)	✓ coordinates of / *koördinate van B*
$BC = a = \sqrt{(b\cos A - c)^2 - (b\sin A - 0)^2}$	✓ correct subst. into distance formula / *korrekte vervanging in afstandsformule*
$\therefore a^2 = b^2\cos^2 A - 2bc\cos A + c^2 + b^2\sin^2 A$	✓ $b^2\cos^2 A - 2bc\cos A + c^2 + b^2\sin^2 A$
$= b^2(\cos^2 A + \sin^2 A) - 2bc\cos A + c^2$	✓ $b^2(\cos^2 A + \sin^2 A)$
$= b^2(1) + c^2 - 2bc\cos A$	
$= b^2 + c^2 - 2bc\cos A$	(4)

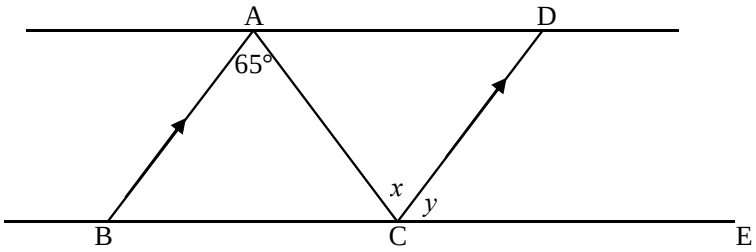
7.2



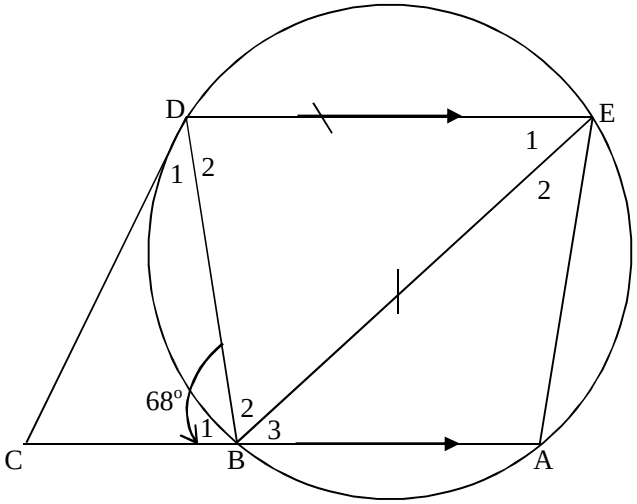
7.2.1	$\hat{R} = \hat{T} = \hat{P} = 60°$ $QT = 10$ and / *en* $QR = 50$ $PQ^2 = 60^2 + 50^2 - 2(50)(60)\cos 60°$ $= 3100$ **OR / *OF*** $PQ^2 = 10^2 + 60^2 - 2(10)60)\cos 60°$ $= 3100$ $\therefore PQ = 55,68$	✓ 60° ✓ 10 or/*of* 50 ✓ correct subst in cosine-rule/ *korrekte vervanging in cosreël* ✓ 3100 (4)
7.2.2	 S is the nearest to R where RS is the perpendicular heigt / *S is die naaste aan R waar RS die loodregte hoogte is.* Let / *Laat* $QS = x$ $\therefore PS = 55,68 - x$ $\left(50^2 - x^2\right) = \left(60^2 - \left[55,68 - x\right]^2\right) = RS^2$ $2500 - x^2 = 3600 - 3100,26 + 111,36x - x^2$ $2000,26 = 111,36x$ $\therefore x = 17,96$ units / *eenhede*	✓ Diagram ✓ Pythagoras ✓ Simplify / *vereenvoudig* ✓ answer / *antwoord* (4) **[12]**

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.*

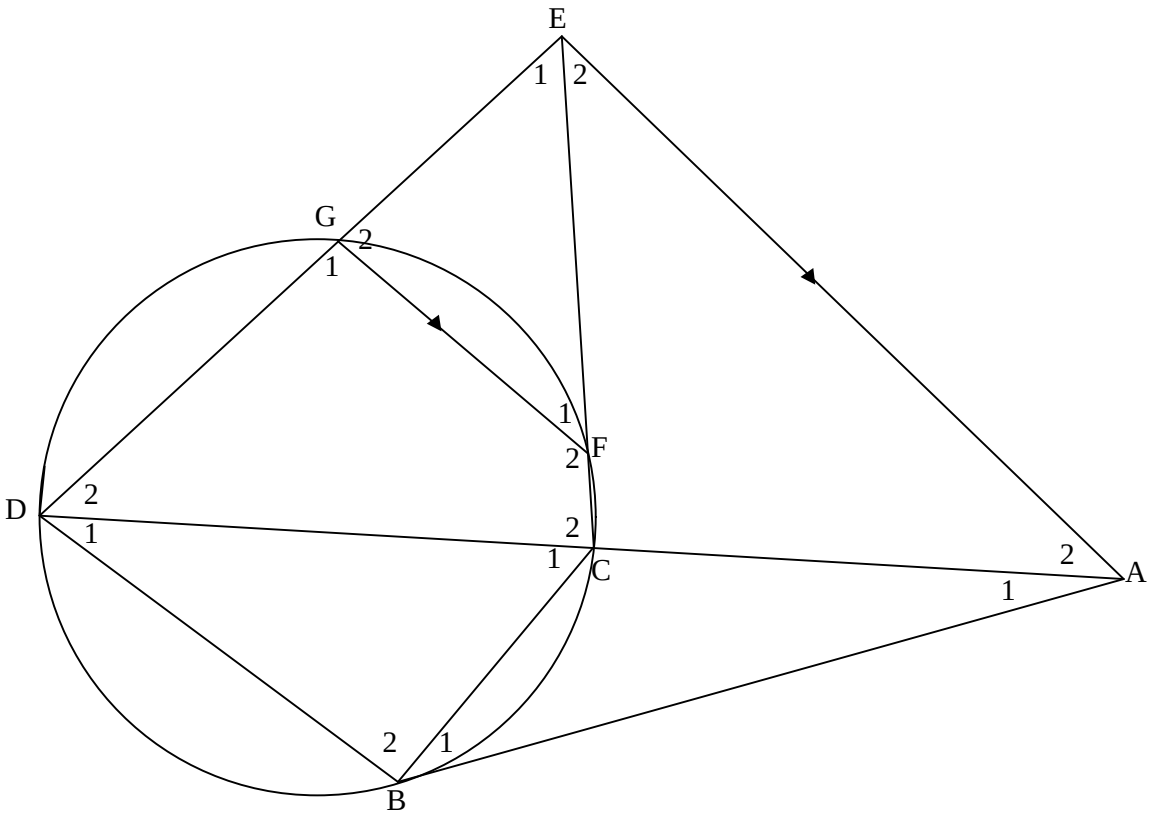
	The order in which the candidate answer a geometry question must follow logically/ *Die volgorde waarin 'n kandidaat 'n meetkundevraag beantwoord moet logies volg.* **Example/*Voorbeeld*** Given/*Gegee* AB || CD and/*en* AĈE = 105°  The candidate first need to calculate *x* BEFORE he/she can calculate *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
	Ken ón punt toe as die bewering EN rede beide korrek is

QUESTION/*VRAAG 8*



8.1.1	$D\hat{E}A = 68°$ [ext.∠ cyclic quad / *buite∠ van kvh*]	✓S✓R (2)
8.1.2	$\hat{A} = 112°$ [co-interior ∠s / *ko – binne ∠e; DE // CA*]	✓S/R (1)
8.1.3	$\hat{D}_2 = 68°$ [opp∠s of cyclic quad / *teenoorst.∠e van kvh*] **OR/*OF*** $\hat{D}_2 = 68°$ [alt ∠s / *verwiss ∠e; DE // CA*]	✓S✓R ✓S✓R (2)
8.1.4	$\hat{E}_2 = 68°$ [*∠s opp. = sides / ∠e teenoor = sye*]	✓S/R (1)
8.1.5	$\hat{E}_1 = 44°$ [sum of ∠s of Δ/*som van binne∠e van* Δ] $\hat{D}_1 = 44°$ [tangent chord theorem / *raaklyn – koordstelling*]	✓S/R ✓S✓R (3)
8.2	$\hat{C} = 68°$ [sum of ∠s of Δ/*som van binne∠e van* Δ] But / *maar* $\hat{E}_1 = 68°$ [given / *gegee*] DC = DB [sides opp. = ∠s / *sye teenoor = ∠e*] ∴ ΔBDC is isosceles / *gelykbenig*	✓S/R ✓S/R (2)
8.3	$\hat{D}_2 = \hat{C} = 68°$ ∴ DE is a tangent / '*n raaklyn* [converse tangent chord theorem / *omgekeerde raaklyn – koordstelling*]	✓S ✓R (2) **[13]**

QUESTION/*VRAAG 9*

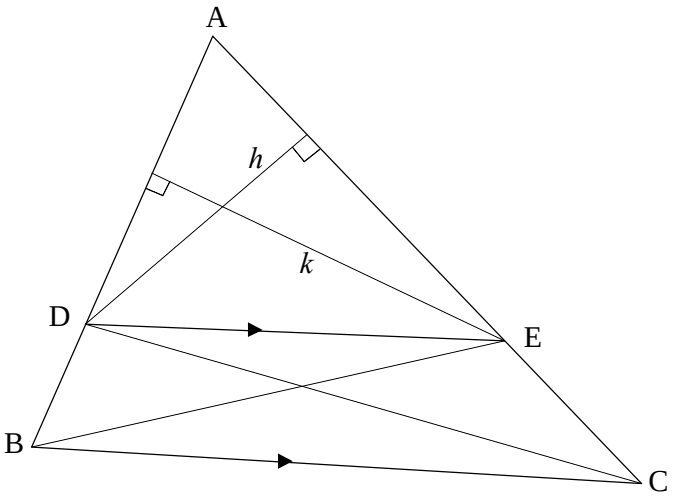


9.1	tangent-chord theorem / *raaklyn-koordstelling*	✓ R (1)
9.2	In ΔABC and/*en* ΔADB: $\hat{A}_1 = \hat{A}_1$ [common/*gemeenskaplik*] $\hat{B}_1 = \hat{D}_1$ [proven/*bewys* in 9.1] ∴ ΔABC ||| ΔADB [∠ ; ∠ ; ∠] **OR/*OF*** In ΔABC and/*en* ΔADB: $\hat{A}_1 = \hat{A}_1$ [common/*gemeenskaplik*] $\hat{B}_1 = \hat{D}_1$ [proven/*bewys* in 9.1] $B\hat{C}A = A\hat{B}D$ [∠s of Δ = 180°/*∠e van* Δ = 180°] ∴ ΔABC ||| ΔADB	✓S ✓ S ✓ R ✓S ✓S ✓S (3)

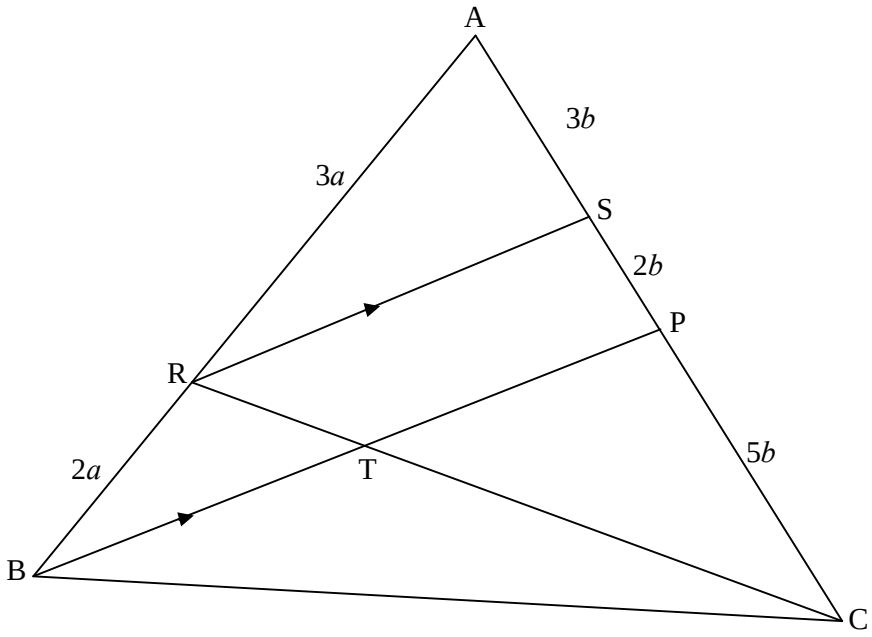
9.3	$\hat{E}_2 = \hat{F}_1$ [alternate ∠s/ *verwiss ∠e* ; EA || GF] $\hat{F}_1 = \hat{D}_2$ [ext ∠ of cyc quad DGFC/*buite ∠ v kdvh DGFC*] $\therefore \hat{E}_2 = \hat{D}_2$	✓ S ✓R ✓ S ✓R (4)
9.4	In ΔAEC and/*en* ΔADE: $\hat{A}_2 = \hat{A}_2$ [common/*gemeenskaplik*] $\hat{E}_2 = \hat{D}_2$ [proven/*bewys* in 9.3] $\therefore$ ΔAEC ||| ΔADE [∠ ; ∠ ; ∠] $\therefore \frac{AE}{AD} = \frac{AC}{AE}$ [from ||| Δs / *uit* ||| Δ*e*] $\therefore AE^2 = AD \times AC$ $\therefore AE = \sqrt{AD \times AC}$ **OR/*OF*** In ΔAEC and/*en* ΔADE: $\hat{A}_2 = \hat{A}_2$ [common/*gemeenskaplik*] $\hat{E}_2 = \hat{D}_2$ [proven/*bewys* in 9.3] $A\hat{C}E = A\hat{E}D$ [∠s of Δ = 180°/*∠e van* Δ = 180°] $\therefore$ ΔAEC ||| ΔADE $\therefore \frac{AE}{AD} = \frac{AC}{AE}$ [from ||| Δs / *uit* ||| Δ*e*] $\therefore AE^2 = AD \times AC$ $\therefore AE = \sqrt{AD \times AC}$	✓S ✓ S ✓ R ✓ S ✓ S ✓S ✓S ✓ S ✓ S ✓ S (5)
9.5	$\frac{AB}{AD} = \frac{AC}{AB}$ [from |||Δs / uit ||| Δ*e*] from/*van* 9.2 $AB^2 = AD \times AC$ $= AE^2$ [from/*van* 9.4] $\therefore AB = AE$	✓S ✓S ✓S (3) **[16]**

QUESTION/*VRAAG* 10

10.1



	Construction: Connect DC and BE and draw the altitudes k and h *Konstruksie: Verbind DC en BE en trek hoogtelyne k en h.*	✓ constr/ *konstr*
	$\frac{\text{Area } \triangle ADE}{\text{Area } \triangle BDE} = \frac{\frac{1}{2}\times AD\times k}{\frac{1}{2}\times BD\times k} = \frac{AD}{BD}$ $\frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEC} = \frac{\frac{1}{2}\times AE\times h}{\frac{1}{2}\times EC\times h} = \frac{AE}{EC}$ but/*maar*: Area ΔBDE = Area ΔDEC [DE common base/ *gemeenskaplike basis* with/*met* DE || BC] $\therefore \frac{\text{Area } \triangle ADE}{\text{Area } \triangle BDE} = \frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEC}$ $\therefore \frac{AD}{BD} = \frac{AE}{EC}$	✓S ✓S ✓S ✓R ✓conclusion/ *afleiding* (6)



10.2.1	$\frac{AS}{SP}=\frac{AR}{RB}$ [line || side of Δ/ *lyn* || *sy van* Δ] **OR/*OF*** [RS || BP] $=\frac{3}{2}$ $\frac{AS}{SC}=\frac{3}{7}$ [AP = PC]	✓S ✓R ✓$\frac{3}{2}$ ✓$\frac{3}{7}$ (4)
10.2.2	$\frac{RT}{TC}=\frac{SP}{PC}$ [line || side of Δ/ *lyn* || *sy van* Δ] **OR/*OF*** [RS || TP] $=\frac{2}{5}$	✓S ✓R ✓answer/*antwoord* (3)
10.2.3	$\frac{\text{Area of } \triangle RAS}{\text{Area of } \triangle RSC}=\frac{AS}{SC}=\frac{3}{7}$ [common height / *gemeenskaplike hoogte*]	✓$\frac{3}{7}$ ✓R (2)
10.2.4	$\frac{\text{Area } \triangle TPC}{\text{Area } \triangle RSC}=\frac{\frac{1}{2}TC.PC.\sin T\hat{C}P}{\frac{1}{2}RC.SC.\sin T\hat{C}P}$ $=\frac{TC}{RC}\times\frac{PC}{SC}$ $=\frac{5}{7}\times\frac{5}{7}$ $=\frac{25}{49}$	✓Correct subst into area rule/ *Korrekte vervang. in area-reël* ✓ $\frac{5}{7}$ ✓answer/*antwoord* (3) **[18]**

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)												
1.1	Frequency		1										
1.2	Cumulative Frequency	1											
1.3	Mean average				3								
1.4.1	Standard deviation						2						
1.4.2	Within standard deviation		1										
1.5	Adjusted mean average										2		
2	**Regression(Gr.12)**												
2.1	Outlier	1											
2.2	Regression line				3								
2.3	Application regr. Line				2								
2.4	Correlation Coefficient			2									
2.5	Application slope										2		
3	**Analytical (Gr.11)**												
3.1	Equation vertical line		1										
3.2	Gradient of line	2											
3.3	Equation of line							4					
3.4	Inclination					3							
3.5	Angle between straight ln							4					
3.6	Integrating geometry								5				
4	**Analytical(Gr.12)**												
4.1	Eq circle (0;0)		2										
4.2.	*y*-intercept		2										
4.3	Equation of line						3						
4.4	Roots opposite signs										2		

4.5.1	Eq. of circle midpt(a;b)		2										
4.5.2	Value of p								5				
4.6	Max length of radius												6
		KNOWLEDGE			**ROUTINE PROCEDURES**			**COMPLEX PROCEDURES**			**PROBLEM SOLVING**		
Question	Description	Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High
5	**Trigonometry**												
5.1.1	Reduction						7						
5.1.2	Double angles					4							
5.2.1	Undefined					3							
5.2.2	Identity								5				
6	**Trig Graphs**												
6.1	Parameters		2										
6.2	Period	1											
6.3	Range			2									
6.4	Integration interval								3				
6.5	Integration of parameters											3	
7	**2D/3D Trig**												
7.1	Formulae						4						
7.2.1	Application cos-rule							4					
7.2.3	Integration											4	
8	**Geometry**												
8.1	Ext angle cyclic quad			2									
8.2	Co-interior		1										
8.3	Opp. Angle Cyclic quads		2										
8.4	Angles of triangle		1										
8.5	Tangent-chord			3									
8.6	Isoceles				2								
8.7	Prove tangent					2							

		KNOWLEDGE			ROUTINE PROCEDURES			COMPLEX PROCEDURES			PROBLEM SOLVING		
Question	Description	Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High
9	**Geometry**												
9.1	Tangent problems	1											
9.2	Similar triangles				3								
9.3	From similar triangles						4						
9.4	Proportionality								5				
9.5	Conclusion							3					
10	**Geometry**												
10.1	Bookwork					6							
10.2.1	Ratio							4					
10.2.2	Ratio					3							
10.2.3	Ratio of areas						2						
10.2.4	Ratio of areas							3					
		6	15	9	13	21	22	22	23	0	6	7	6
	% Breakdown of cognitive levels		**30**	**20%**		**56**	**37,3%**		**45**	**30%**		**19**	**12,7%**
	Expected %			**20%**			**35%**			**30%**			**15%**