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Noordwes Departement van Onderwys
North West Department of Education
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.***

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:

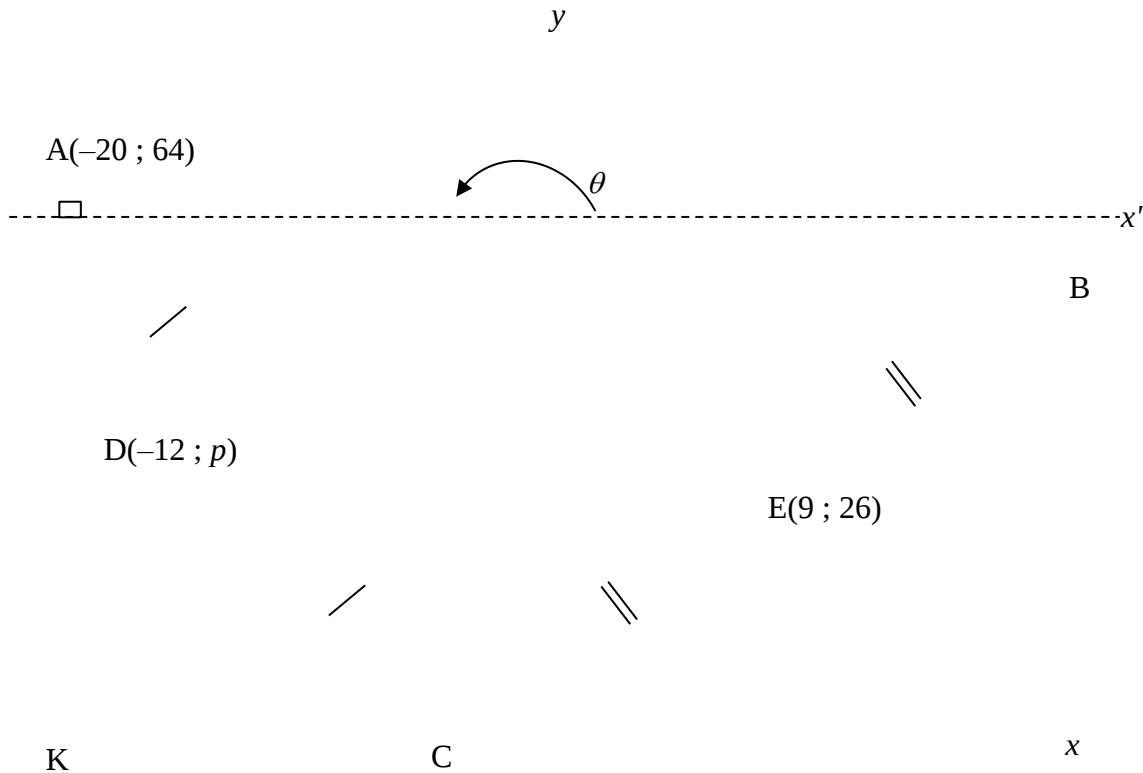
- *As 'n kandidaat 'n vraag TWEE KEER beantwoord, merk slegs die EERSTE poging.*
- *As 'n kandidaat 'n antwoord van 'n vraag doodtrek en nie oordoen nie, merk die doodgetrekte poging.*
- *Volgehoue akkuraatheid word in ALLE aspekte van die nasienriglyne toegepas. Hou op nasien by die tweede berekeningsfout.*
- *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]

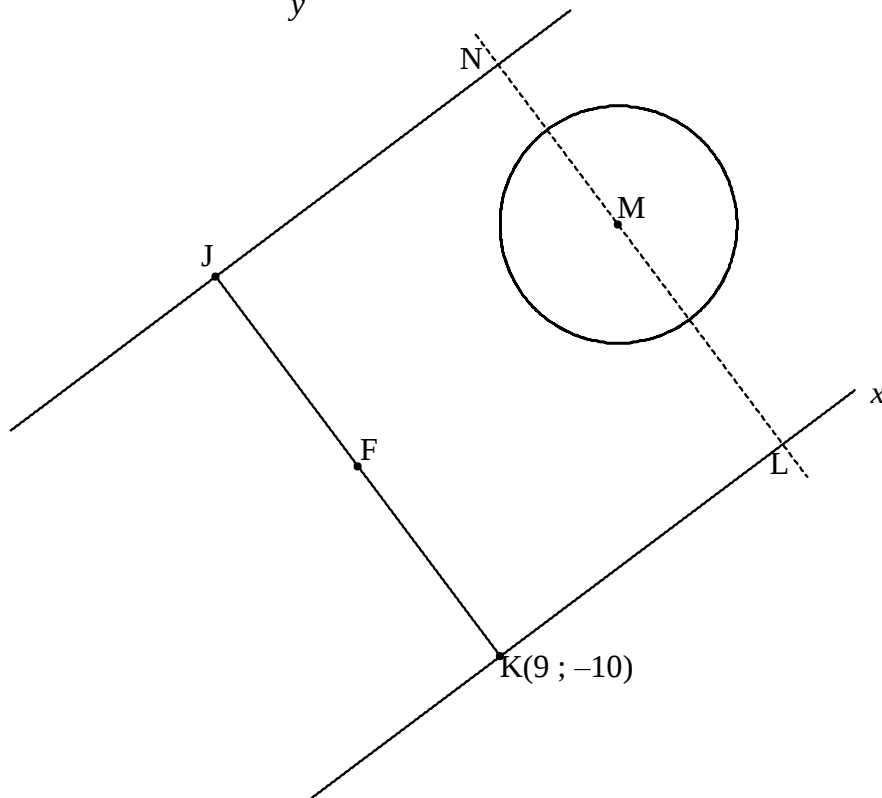
QUESTION/VRAAG 2

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 steeper, 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 steeper/ 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)

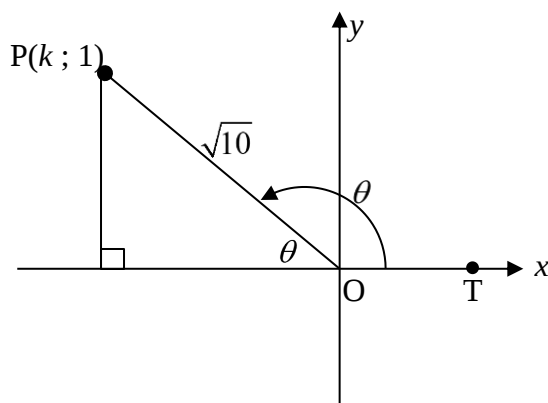
3.5	$m_{DE} = \frac{26-32}{9+12}$ $= -\frac{2}{7}$ $m_{AB} = m_{DE} = -\frac{2}{7} \text{ [DE AB midpt.th / middelpuntstelling]}$ Through the point / Deur die punt $(-20;64)$ $y-64 = -\frac{2}{7}(x+20)$ $y-64 = -\frac{2}{7}x - \frac{40}{7}$ $\therefore y = -\frac{2}{7}x + \frac{408}{7}$	✓ method gradient/metode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

QUESTION/VRAAG 4
y

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

4.5	$m_{JK} = \frac{6+10}{-3-9}$ $= -\frac{4}{3}$ $\therefore m_{JN} = \frac{3}{4} \text{ [rad } \perp \text{ tangent / rad } \perp \text{ raaklyn]}$ $y - 6 = \frac{3}{4}(x + 3)$ $y - 6 = \frac{3}{4}x + \frac{9}{4}$ $\therefore y = \frac{3}{4}x + \frac{33}{4}$	$\checkmark m_{JK} = -\frac{4}{3}$ $\checkmark m_{JN} = \frac{3}{4}$ $\checkmark$ correct subst. into eq. / korrekte vervanging in vgl. (3)
4.6	Eq. of / vgl. van NL $y - (\sqrt{104} - 2) = -\frac{4}{3}(x - 14)$ $y - \sqrt{104} + 2 = -\frac{4}{3}x + \frac{56}{3}$ $\therefore y = -\frac{4}{3}x + \frac{50}{3} + \sqrt{104}$ 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 $\therefore p = 8,94$	$\checkmark$ Correct subst into eq. / korrekte vervanging in vgl. $\checkmark$ eq. of / vgl. van NL $\checkmark$ equate eqs. / stel vgl. gelyk $\checkmark$ simplify / vereenvoudig $\checkmark$ 8,94 $\checkmark$ conclude / lei af $p = 8,94$ (6) [19]

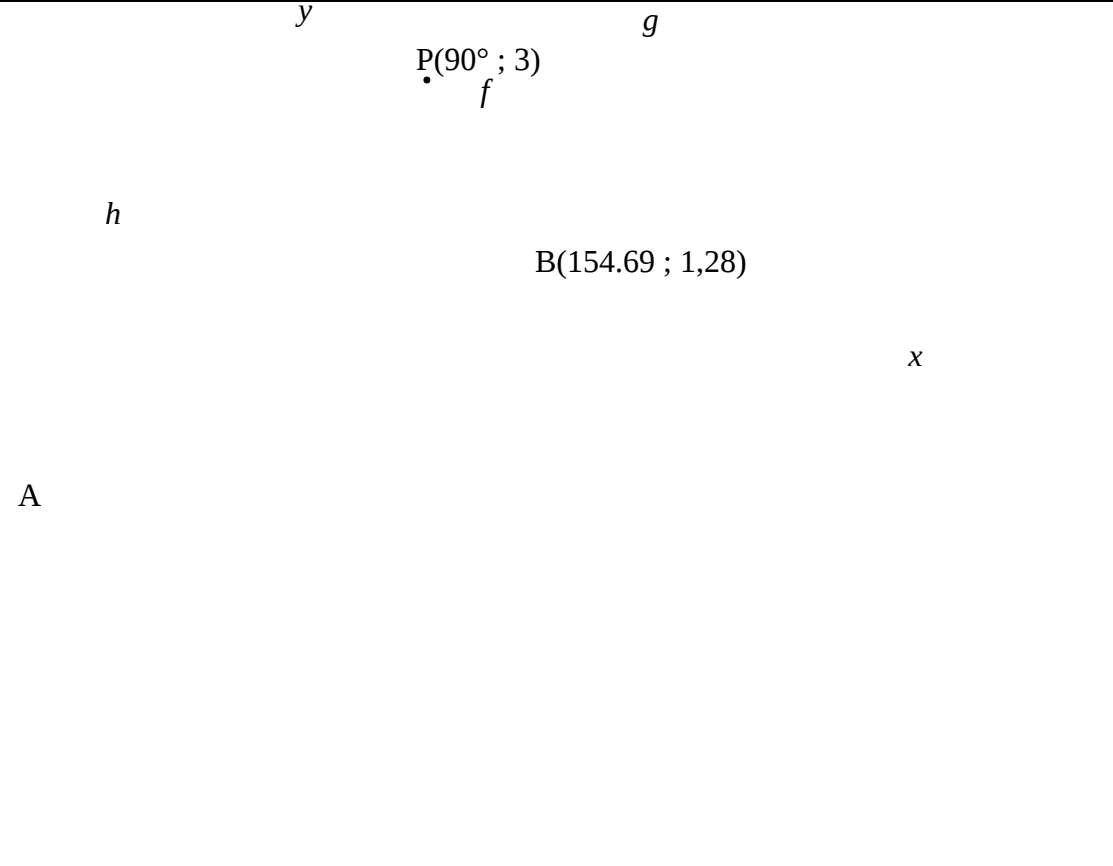
QUESTION/VRAAG 5

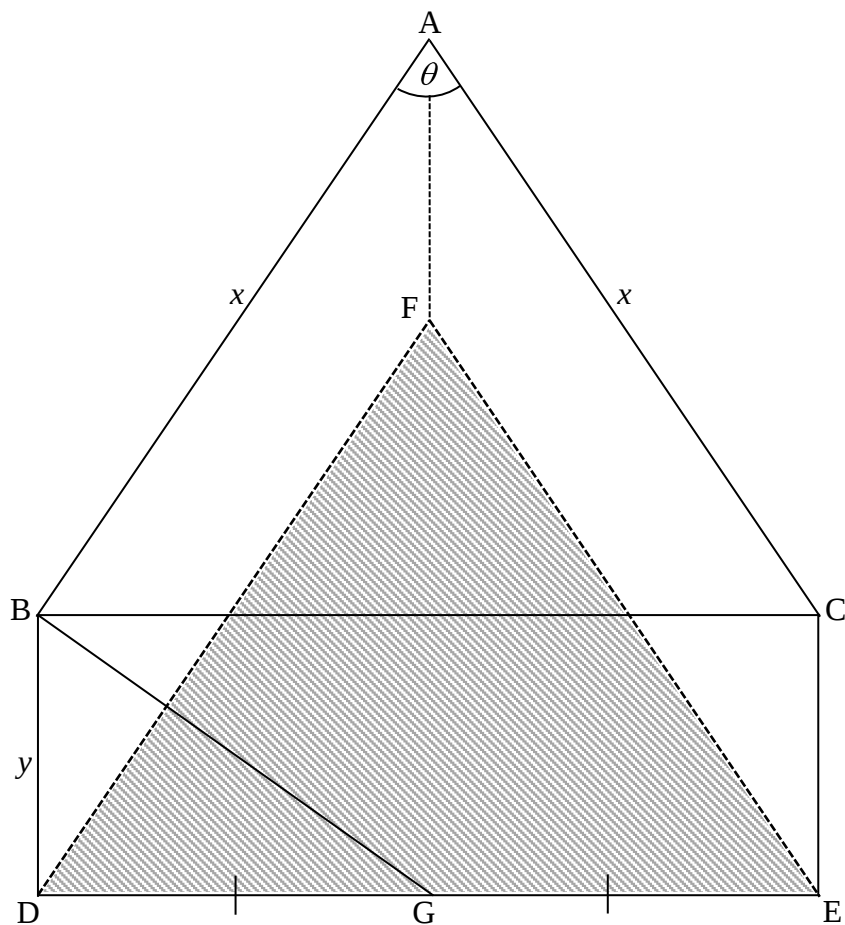


5.1.1	$k^2 + 1^2 = (\sqrt{10})^2$ $k^2 = 9$ $k = \pm 3$ $k = -3$ (according to / volgens diagram)	✓Pythagoras ✓ $k = -3$ (2)
5.1.2 (a)	$-\cos \theta$ $= -\left(\frac{-3}{\sqrt{10}}\right)$ $= \frac{3}{\sqrt{10}}$	✓ $\frac{3}{\sqrt{10}}$ or / of $\frac{3\sqrt{10}}{10}$ (1)
5.1.2 (b)	$\sqrt{1 - \sin(180^\circ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

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

QUESTION/VRAAG 6

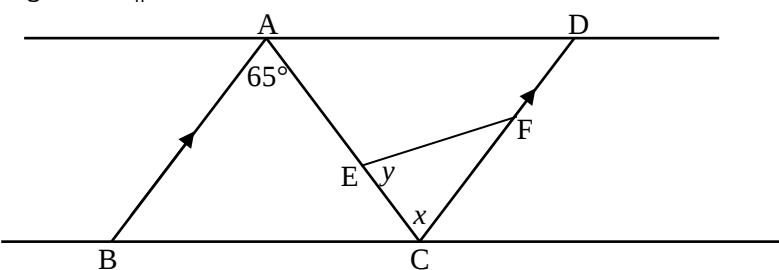
		
6.1	$a = 3$ and/en $b = \frac{1}{3}$	$\checkmark a = 3$ $\checkmark b = \frac{1}{3}$ (2)
6.2	540°	$\checkmark 540^\circ$ (1)
6.3	$A(-154,69^\circ; -1,28)$	$\checkmark -154,69^\circ$ $\checkmark -1,28$ (2)
6.4	$\tan \frac{1}{3}x = \frac{3}{2}$ $\frac{1}{3}x = 56,3099^\circ \dots$ $x = 168,93^\circ$ vertical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

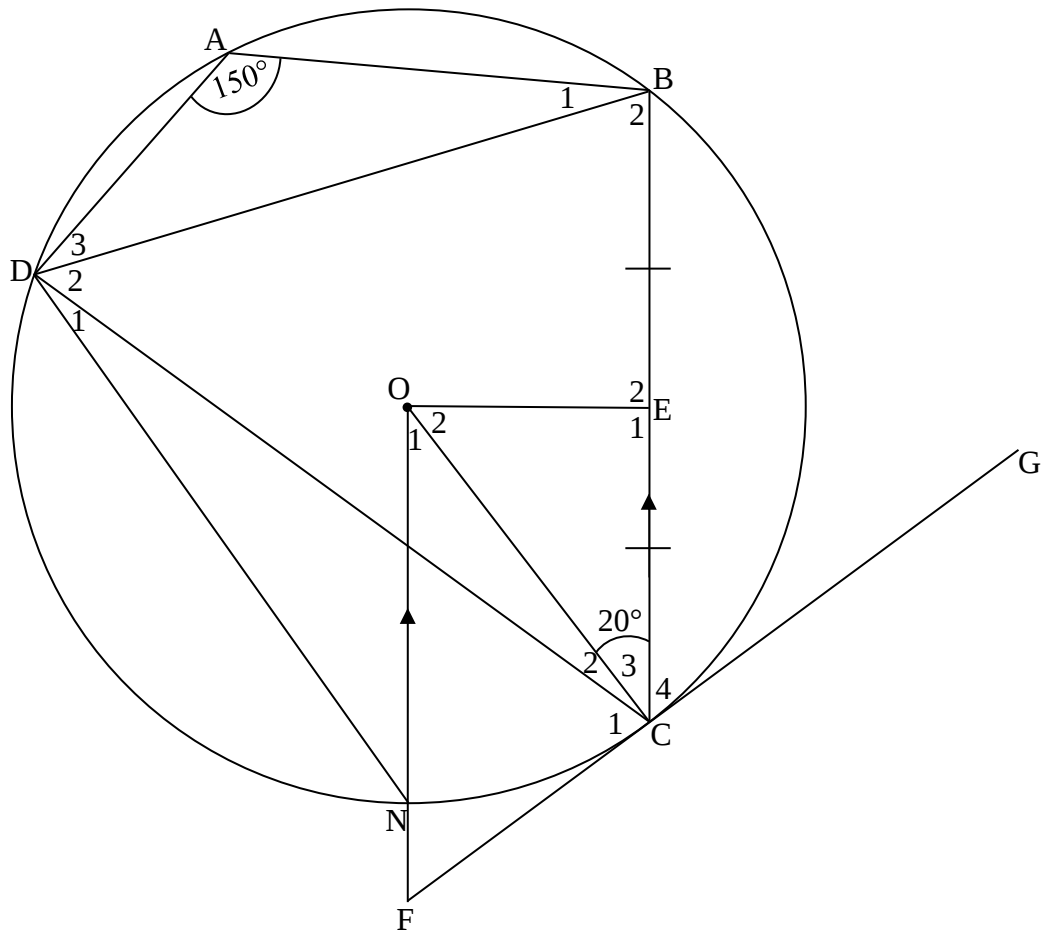
QUESTION/VRAAG 7

7.1	$BC^2 = AB^2 + AC^2 - 2AB \cdot AC \cdot \cos \theta$ $BC^2 = x^2 + x^2 - 2x \cdot x \cdot \cos \theta$ $BC^2 = 2x^2 - 2x^2 \cos \theta$ $BC^2 = 2x^2(1 - \cos \theta)$ $BC = x\sqrt{2(1 - \cos \theta)}$	✓ correct use of cosine-rule/ <i>korrekte gebruik van cos-reël</i> ✓ subst/vervanging ✓ factorisation/ <i>faktorisering</i> (3)
7.2	$\hat{BDG} = 90^\circ$	✓ answer/ <i>antwoord</i> (1)

GEOMETRY/MEETKUNDE

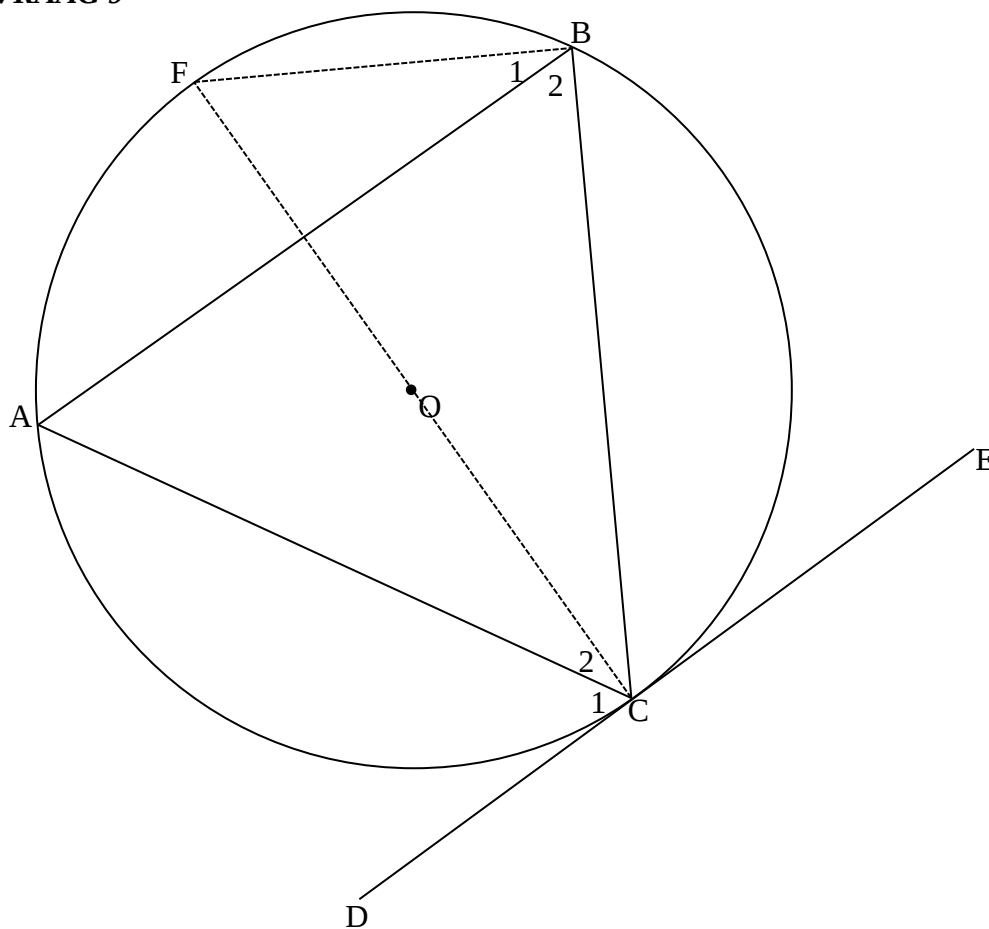
Please read carefully through the following table before marking **QUESTION 8 – 10** /
 Lees asseblief sorgvuldig deur die volgende tabel alvorens **VRAAG 8 –10** nagesien word.

	The order in which the candidate answer a geometry question must follow logically/ <i>Die volgorde waarin 'n kandidaat 'n meetkundevraag beantwoord moet logies volg.</i> Example/Voorbeeld Given/Gegee $AB \parallel CD$ and/en $\hat{EFD} = 115^\circ$  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)
	<i>'n Punt vir 'n korrekte bewering ('n Punt vir 'n bewering is onafhanklik van die rede)</i>
R	A mark for the 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 (Both MUST be correct to get one mark)
	<i>Ken 'n punt toe as die bewering EN rede beide korrek is (Beide MOET korrek wees om een punt te kry)</i>

QUESTION/VRAAG 8

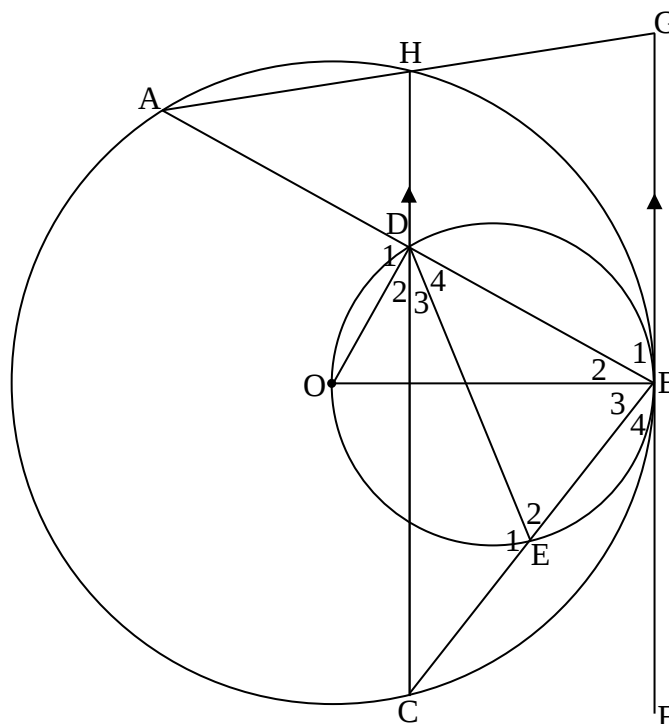
8.1.1	$\hat{O}_1 = 20^\circ$ [alt $\angle$ s / verwiss $\angle$ e; $OF \parallel BC$]	✓S/R (1)
8.1.2	$\hat{D}_1 = 10^\circ$ [$\angle$ at centre = $2 \times \angle$ circumference / midtpt $\angle = 2 \times$ omtrek $\angle$]	✓S✓R (2)
8.1.3	$\hat{C}_2 = 10^\circ$ [opp $\angle$ s of cyclic quad / teenoorst.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

8.2	$OE \perp BC$ [midpt. □ , midpt. chord / <i>midpt. □ , midpt. koord</i>] $\therefore$ OE is the perpendicular height of trapezium OECF / <i>OE is die loodregte hoogte van trapesium OECF</i> $\frac{1}{2}(OF + EC) \times OE = \frac{3}{4}y^2 - x^2$ $\frac{1}{2}(\sqrt{3}y + 2x) \times OE = \frac{3}{4}y^2 - x^2$ $\left(\frac{\sqrt{3}}{2}y + x\right) \times OE = \frac{3}{4}y^2 - x^2$ $OE = \frac{\left(\frac{\sqrt{3}}{2}y - x\right)\left(\frac{\sqrt{3}}{2}y + x\right)}{\left(\frac{\sqrt{3}}{2}y + x\right)}$ $\therefore OE = \frac{\sqrt{3}}{2}y - x$	✓S✓R ✓ area formulae trapezium/ oppv. formule trapesium ✓ factors RHS / faktore RK ✓ answer/ antwoord (5) [14]
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QUESTION/VRAAG 9

9.1	Construction: Draw diameter CF and connect F with B/ <i>Konstruksie: Trek middellyn CF en verbind F met B</i> $\hat{C}_1 + \hat{C}_2 = 90^\circ$ [rad $\perp$ tangent / rad $\perp$ raaklyn] $\hat{B}_1 + \hat{B}_2 = 90^\circ$ $\left[\angle \text{ in } \frac{1}{2} \square \right]$ $\therefore \hat{C}_1 + \hat{C}_2 = \hat{B}_1 + \hat{B}_2 = 90^\circ$ but / maar $\hat{B}_1 = \hat{C}_2$ [$\angle$s in the same seg. / $\angle$e in dies. seg.] $\therefore \hat{C}_1 = \hat{B}_2$ $\therefore \hat{ACD} = \hat{ABC}$	✓ constr/ konstr ✓ S/R ✓ S/R ✓ S/R ✓ S/R (5)
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	$\hat{L}\hat{O}\hat{S} = 90^\circ$ [from / uit 9.2.2] $\therefore \hat{L}\hat{O}\hat{S} \neq \hat{L}\hat{S}\hat{M}$ $\therefore M'N'P'$ 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]
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QUESTION/VRAAG 10

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

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

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

Question	Description	KNOWLEDGE			ROUTINE PROCEDURES			COMPLEX PROCEDURES			PROBLEM SOLVING		
		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					

		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%