Province of the
EASTERN CAPE
EDUCATION

Iphondo leMpuma Kapa: Isebe leMfundo
Provinsie van die Oos Kaap: Department van Onderwys
Porafensie Ya Kapa Botjahabela: Lefapha la Thuto

NATIONAL SENIOR CERTIFICATE *NASIONALE SENIORSERTIFIKAAT*

GRADE/*GRAAD* 12

SEPTEMBER 2024

MATHEMATICS P2/*WISKUNDE V2* MARKING GUIDELINE/*NASIENRIGLYN*

MARKS/*PUNTE*: 150

This marking guideline consists of 17 pages.
Hierdie nasienriglyn bestaan uit 17 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 a question, mark the crossed out version.
- Consistency accuracy applies in ALL aspects of the Marking Guideline. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

GEOMETRY	
S	A mark for a correct statement (A statement mark is independent of a reason)
R	A mark for the correct reason. (A reason mark may only be awarded only if the statement is correct
S/R	Award a mark if a statement AND a reason are both correct

NOTA:

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

MEETKUNDE	
S	*'n Punt vir korrekte bewering* (*'n Punt vir 'n bewering is onafhanklik van die rede*)
R	*'n Punt vir 'n korrekte rede* (*'n Punt word slegs vir die rede toegeken as die bewering korrek is*)
S/R	*Ken 'n punt toe as die bewering EN rede beide korrek is*

QUESTION 1/*VRAAG* 1

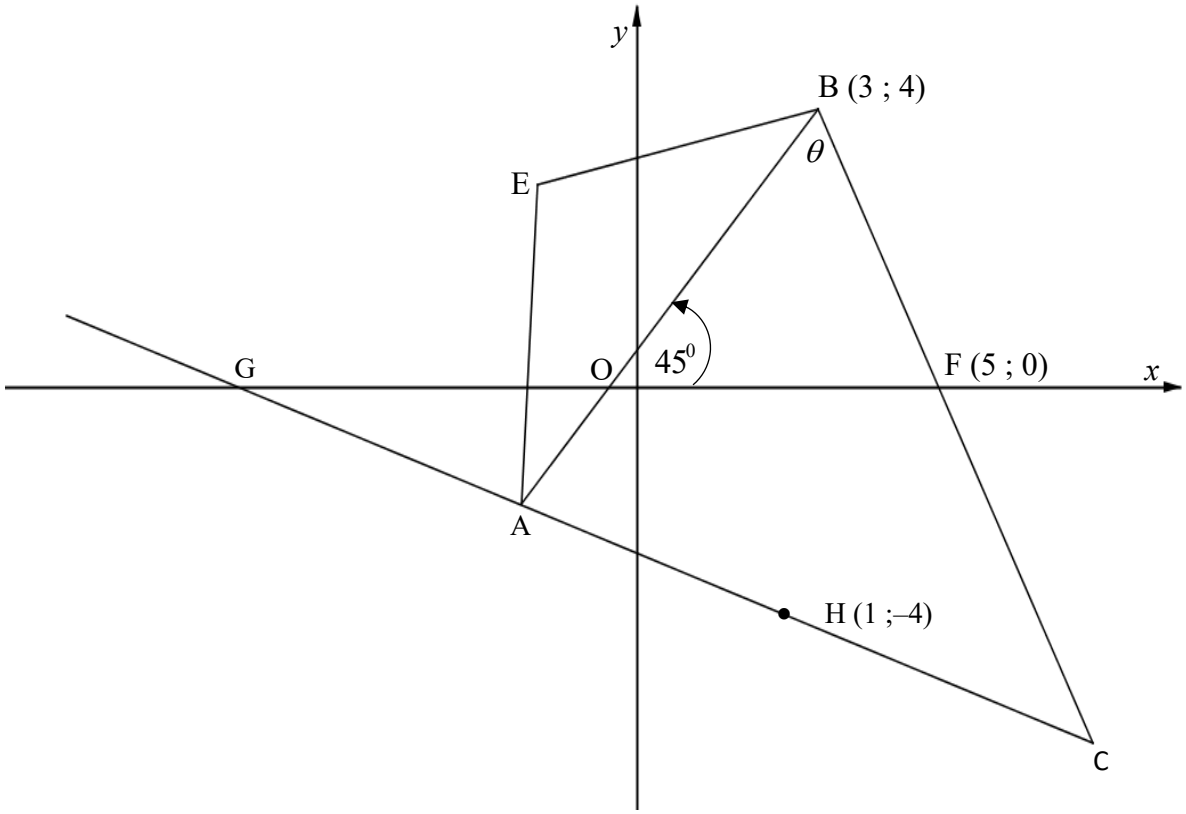
1.1	82 64 55 50 41 71 78 88 98 96 63 66 80 84 88		
1.1.1	88	✓ answer / *antwoord*	(1)
1.1.2	Range / *Omvang* $= 98 - 41 = 57$	✓ answer / *antwoord*	(1)
1.1.3	$\bar{x} = \frac{1104}{15}$ $= 73{,}60$	✓ 1104 ✓ answer / *antwoord*	(2)
1.1.4	$\sigma = 16{,}30$	✓ answer / *antwoord*	(1)
1.1.5	$\bar{x} - \sigma = 73{,}60 - 16{,}30$ $= 57{,}30$ $\therefore$ There were 3 truck drivers. *Daar was 3 trokbestuurders*	✓ $73{,}60 - 16{,}30$ ✓ $57{,}30$ ✓ answer / *antwoord*	(3)
1.2	let total mass of 8 people be x: *laat die totale massa van 8 mense x wees* : number of people to be added be k: *aantal mense wat by moet kom k wees* : $\frac{x}{8} = 75$ $x = 600$ $75k + 600 = 1000$ $\therefore k = \frac{1000 - 600}{75}$ $k = 5{,}333$ It will be approximately equal to 5 people *Dit sal ongeveer gelyk aan 5 mense wees*	✓ $\frac{x}{8} = 75$ ✓ mass of 8 people (600) *massa van 8 mense (600)* ✓ equation / *vergelyking* $(75k + 600 = 1\ 000)$ ✓ answer / *antwoord*	(4)
			[12]

QUESTION 2/*VRAAG* 2

TEST A / *TOETS A*	39	33	35	44	37	40	24	31	30	5
TEST B / *TOETS B*	41	45	48	40	47	42	37	44	43	24

2.1	(44 ; 40)	✓ 44 in TEST A / *TOETS A*	(1)
2.2	$a = 25{,}48$ $b = 0{,}49$ $y = 25{,}48 + 0{,}49x$	✓ $a = 25{,}48$ ✓ $b = 0{,}49$ ✓ $y = 25{,}48 + 0{,}49x$	(3)
2.3	$y = 25{,}48 + 0{,}49(14)$ $= 32$	✓correct substitution / *korrekte vervanging* ✓ answer / *antwoord*	(2)
2.4	$r = 0{,}79$ Strong positive correlation *Sterk positiewe korrelasie*	✓ $r = 0{,}79$ ✓comment / *kommentaar (opmerking)*	(2)
			[8]

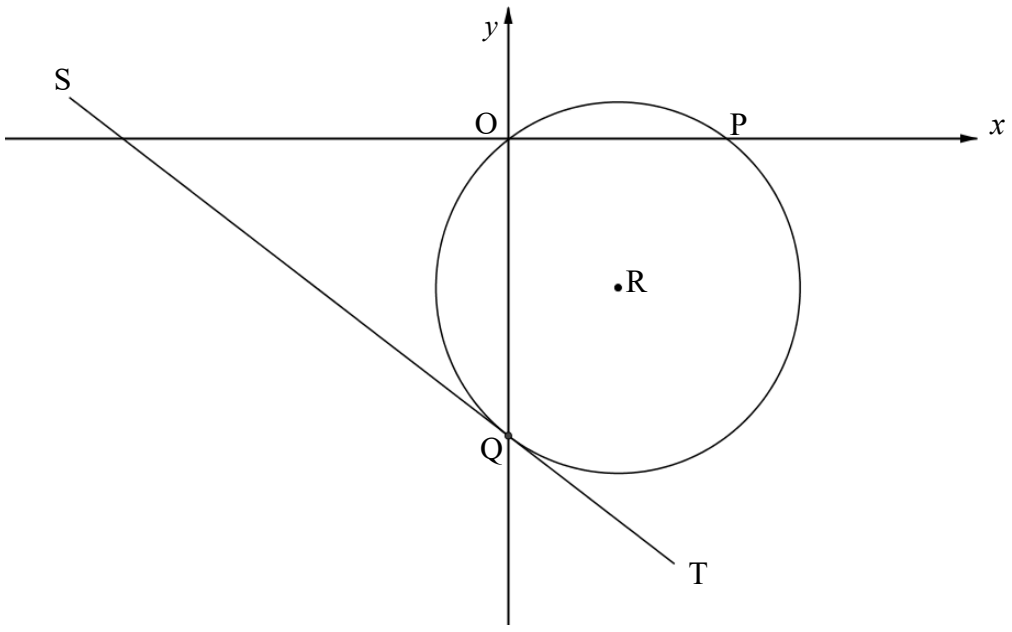
QUESTION 3/*VRAAG* 3



3.1	$BF = \sqrt{(3-5)^2 + (4-0)^2}$ $= \sqrt{20}$	✓ correct substitution *korrekte vervanging* ✓ answer / *antwoord*	(2)
3.2	$m_{BF} = \frac{4-0}{3-5}$ $= -2$	✓ correct substitution *korrekte vervanging* ✓ answer / *antwoord*	(2)
3.3	$\tan\alpha = -2$ $\alpha = 116,57^\circ$ $\theta = 116,57^\circ - 45^\circ = 71,57^\circ$ $[ext\angle of\ a\Delta]$	✓ $\tan\alpha = m_{BF} = -2$ ✓ $\alpha = 116,57^\circ$ ✓ $\theta = 71,57^\circ$	(3)
3.4	$\tan 45^\circ = m_{AB} = 1$ $m_{HF} = \frac{1-5}{-4-0}$ $= 1$ $\therefore HF \parallel AB$ $[m_{AB} = m_{HF} = 1]$	✓ $m_{AB} = 1$ ✓ correct substitution/ *korrekte vervanging* ✓ $m_{HF} = 1$ ✓ Reason /*Rede* [$m_{AB} = m_{HF}$]	(4)

3.5	Kite / *Vlieër*	✓ answer / *antwoord*	(1)
3.6	$\frac{HC}{AH}=\frac{FC}{BF}$ [line/*lyn* ‖ to one side of a Δ / *aan een sy van* Δ] $\frac{2}{1}=\frac{FC}{2\sqrt{5}}$ $FC=4\sqrt{5}$ $BC=4\sqrt{5}+2\sqrt{2}=6\sqrt{5}$ $AC=6\sqrt{5}$ [adj.sides of a kite / *aangr.sye van vlieër*]	✓ correct ratio / *korrekte verhouding* ✓correct substitution *korrekte vervanging* ✓ FC ✓ AC = BC	(4)
3.7	$\hat{B}=\hat{A}=71,57^\circ$ [∠s opp = sides / *∠e teenoor = sye*] $\therefore \hat{C}=36,87^\circ$ Area of/*van* AOFC = Area of/*van* ΔABC – Area of/*van* ΔOBF $=\frac{1}{2}\times 6\sqrt{5}\times 6\sqrt{5}\times \sin 36,87^\circ -12$ $=42$	✓ $\hat{C}=36,87^\circ$ ✓ Area of/*van* ΔABC ✓answer / *antwoord*	(3)
			[19]

QUESTION 4/*VRAAG* 4

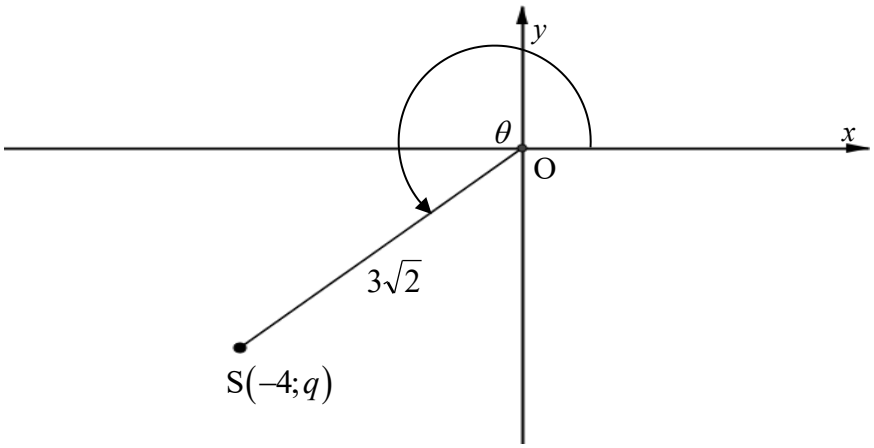


4.1.1	$y=-\frac{3}{4}(0)-8$ $=-8$ $Q(0\ ;-8)$	✓$x=0$ ✓ y- coordinate / *y-koördinaat*	(2)

4.1.2	$m_{QR}=\frac{4}{3}$ [tan ⊥ rad / *raakl ⊥ rad*] $y+8=\frac{4}{3}(x-0)$ $y=\frac{4}{3}x-8$	✓ m_{QR} ✓substituting m_{QR} and $Q(0\,;-8)$ *vervanging* m_{QR} *en* $Q(0\,;-8)$ ✓ equation / *vergelyking*	(3)
4.1.3	$\frac{4}{3}x-8=0$ $x=6$ $P(6;0)$	✓ $y=0$ ✓ $x=6$	(2)
4.1.4	$x_R=\frac{0+6}{2}$; $y_R=\frac{-8+0}{2}$ $x_R=3$; $y_R=-4$	✓ correct substitution *korrekte vervanging* ✓ $x_R=3$ ✓ $y_R=-4$	(3)
4.1.5	$r^2=(0-3)^2+(-8+4)^2$ $=25$ $(x-3)^2+(y+4)^2=25$	✓ correct substitution *korrekte vervanging* ✓ $r^2=25$ ✓ equation / *vergelyking*	(3)
4.1.6	$k=-4+5$ or / *of* $k=-4-5$ $k=1$ or / *of* $k=-9$	✓ method / *metode* ✓ $k=1$ ✓ $k=-9$	(3)
4.2	$(x-\sin\theta)^2+(y+2\sin\theta)^2=-2+\sin^2\theta+4\sin^2\theta$ $r^2=-2+5\sin^2\theta$ For any value of θ maximum of $\sin^2\theta=1$ *Vir enige waarde van* θ *is maksimum van* $\sin^2\theta=1$ $\therefore\ r=\sqrt{-2+5(1)}$ $=\sqrt{3}$	✓ $(x-\sin\theta)^2+(y+2\sin\theta)^2$ ✓ $r^2=-2+5\sin^2\theta$ ✓ maximum of $\sin^2\theta=1$ *maksimum van* $\sin^2\theta=1$ ✓ $r=\sqrt{-2+5(1)}$ ✓ answer / *antwoord*	(5)
			[21]

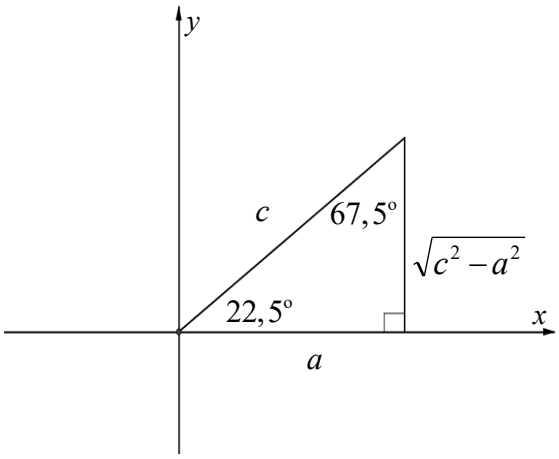
QUESTION 5/*VRAAG* 5

5.1

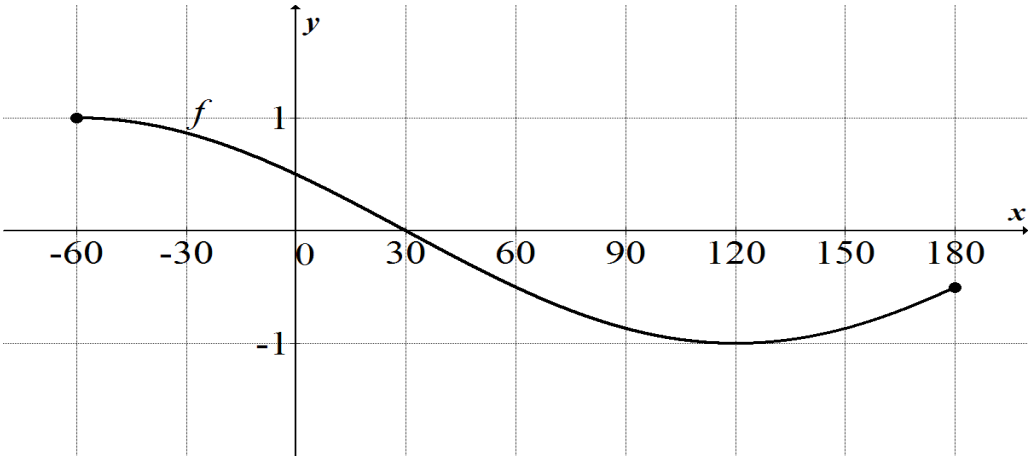


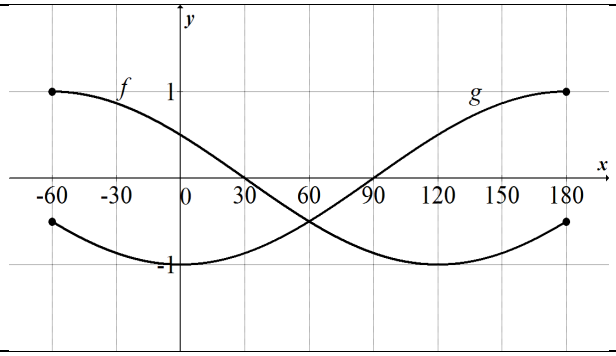
5.1.1	$q=-\sqrt{\left(3\sqrt{2}\right)^2-(-4)^2}$ *Pyth* $=-\sqrt{2}$	✓ correct substitution/ *korrekte vervanging* ✓ answer / *antwoord*	(2)
5.1.2	$\sin(\theta+45^\circ)=\sin\theta.\cos 45^\circ+\cos\theta\sin 45^\circ$ $=\frac{-\sqrt{2}}{3\sqrt{2}}.\frac{\sqrt{2}}{2}+\left(\frac{-4}{3\sqrt{2}}\right).\frac{\sqrt{2}}{2}$ $=\frac{-1-2\sqrt{2}}{3\sqrt{2}}$	✓ expansion / *vergelyking* ✓ ratios of / *verhoudings van* $\sin\theta$ & $\cos\theta$ ✓ special angles / *spesiale hoeke* ✓ answer / *antwoord*	(4)
5.1.3	$\cos(2\theta-360^\circ)=\cos 2\theta$ $=2\cos^2\theta-1$ $=2\left(\frac{-4}{3\sqrt{2}}\right)^2-1$ $=\frac{7}{9}$	✓ $\cos 2\theta$ ✓ identity / *identiteit* ✓ ratio of / *verhouding van* $\cos\theta$ ✓ answer / *antwoord*	(4)
5.2	$\frac{\sin(90^\circ-\theta).\cos 480^\circ+\cos(180^\circ-\theta).\tan 45^\circ}{\cos\theta.\sin 390^\circ-\tan 180^\circ}$ $=\frac{\cos\theta.(-\cos 60^\circ)+(-\cos\theta)(\tan 45^\circ)}{\cos\theta(\sin 30^\circ)-\tan 180^\circ}$ $=\frac{-\frac{1}{2}\cos\theta-\cos\theta(1)}{\cos\theta\left(\frac{1}{2}\right)-0}$ $=\frac{-\frac{3}{2}\cos\theta}{\frac{1}{2}\cos\theta}$ $=-3$	✓ $\cos\theta$ ✓ $-\cos 60^\circ$ ✓ $\sin 30^\circ$ ✓ special angles / *spesiale hoeke* ✓ answer / *antwoord*	(5)

5.3	$\text{LHS / } LK = \dfrac{\cos x}{\sin 2x} - \dfrac{\cos 2x}{2\sin x}$ $= \dfrac{2\sin x\cos x - \cos 2x\sin 2x}{2\sin 2x\sin x}$ $= \dfrac{\sin 2x - \cos 2x\sin 2x}{2\sin 2x\sin x}$ $= \dfrac{\sin 2x(1-\cos 2x)}{2\sin 2x\sin x}$ $= \dfrac{1-(1-2\sin^2 x)}{2\sin x}$ $= \dfrac{2\sin^2 x}{2\sin x}$ $= \sin x$	✓ simplification / *vereenvoudiging* ✓ $\sin 2x$ ✓ common factor / *gemene faktor* ✓ identity / *identiteit* $1-2\sin^2 x$ ✓ $\dfrac{2\sin^2 x}{\sin x}$	(5)
5.4.1	$\dfrac{\cos 60^\circ}{\sin x} - \dfrac{\sin 60^\circ}{\cos x} = 2$ $\dfrac{\cos 60^\circ\cos x - \sin 60^\circ\sin x}{\sin x\cos x} = 2$ $\cos(x+60^\circ) = 2\sin x\cos x$ $\cos(x+60^\circ) = \sin 2x$ $\cos(x+60^\circ) = \cos(90^\circ - x)$	✓ simplification / *vereenvoudiging* ✓ $\cos(x+60^\circ)$ ✓ $\sin 2x$	(3)
5.4.2	$\cos(x+60^\circ) = \cos(90^\circ - 2x)$ $x+60^\circ = \pm(90^\circ - 2x) + 360^\circ.k$ $x+60^\circ = 90^\circ - 2x + 360^\circ.k$ or / *of* $x+60^\circ = -90^\circ + 2x + 360^\circ.k$ $3x = 30^\circ + 360^\circ.k$ or / *of* $-x = -120^\circ + 360^\circ.k$ $x = 10^\circ + 120^\circ.k$ or / *of* $x = 120^\circ - 360^\circ.k,\ k \in \text{Z}$ **OR / *OF*** $x+60^\circ = 90^\circ - 2x + 360^\circ.k$ or / *of* $x+60^\circ = 360^\circ - 90^\circ + 2x + 360^\circ.k$ $3x = 30^\circ + 360^\circ.k$ or / *of* $-x = 240^\circ + 360^\circ.k$ $x = 10^\circ + 120^\circ.k$ or / *of* $x = -240^\circ - 360^\circ.k,\ k \in \text{Z}$	✓ $x+60^\circ = 90^\circ - 2x$ ✓ $\begin{bmatrix} 3x = 30^\circ + 360^\circ.k \\ \textit{or / of} \\ -x = -120^\circ + 360^\circ.k \end{bmatrix}$ ✓ $\begin{bmatrix} x = 10^\circ + 120^\circ.k \\ \textit{or / of} \\ x = 120^\circ - 360^\circ.k \end{bmatrix}$ ✓ $360^\circ.k,\quad k \in \text{Z}$	(4)

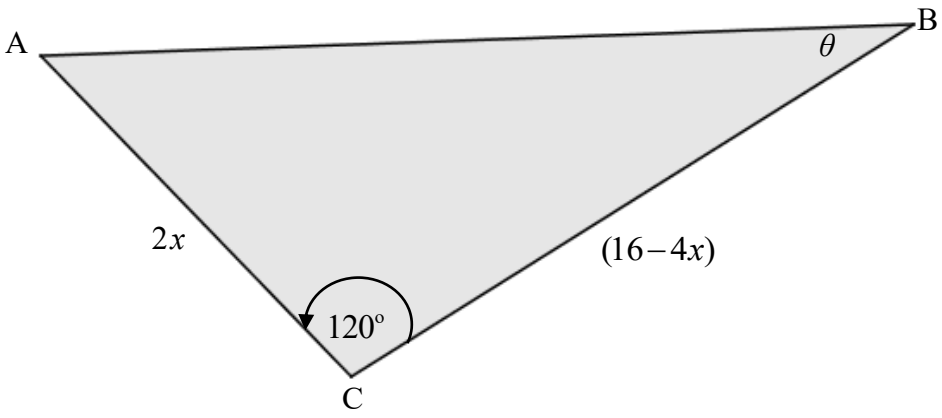
5.5	$y=\sqrt{c^2-a^2}$ Pyth Theorem / *Stelling*  $\frac{\sqrt{2}}{2}=\sin 45^\circ$ $=2\sin 22,5^\circ\cos 22,5^\circ$ $=2.\frac{\sqrt{c^2-a^2}}{c}.\frac{a}{c}$ $=2.\frac{\sqrt{a^2+b^2-a^2}}{c}.\frac{a}{c}$ $=\frac{2ab}{c^2}$	✓ $y=\sqrt{c^2-a^2}$ *Pyth Theorem / Stelling* **OR/*OF*** correct diagram/ *korrekte diagram* ✓ $\sin 45^\circ$ ✓ $2\sin 22,5^\circ.\cos 22,5^\circ$ ✓ substition / *vervanging* ✓ c^2 i.t.o./ *i.t.v* a^2 & b^2	(5)
			[32]

QUESTION 6/*VRAAG* 6



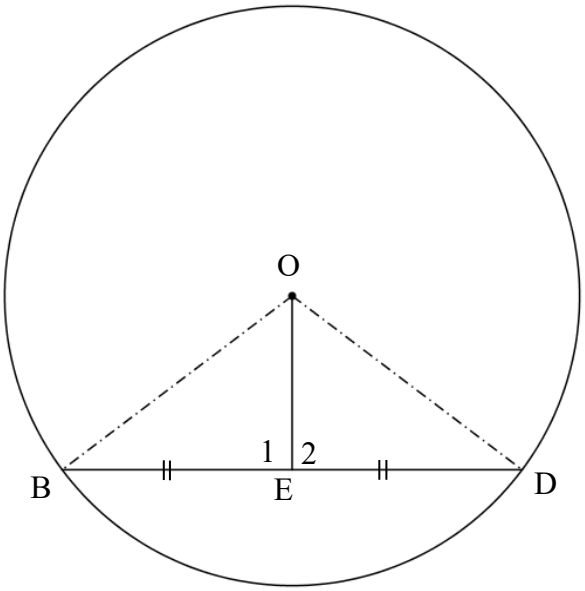
6.1	Period / *Periode* is 360°	✓ answer / *antwoord*	(1)
6.2	Min value / *waarde* = -1	✓answer / *antwoord*	(1)
6.3	$-1 \le y \le 1$ $-1+1 \le y \le 1+1$ $0 \le y \le 2$	✓correct critical values *korrekte kritieke waardes* ✓ correct notation / *korrekte notasie*	(2)
6.4	$120^\circ < x < 180^\circ$	✓ correct critical values *korrekte kritieke waardes* ✓correct notation / *korrekte notasie*	(2)
6.5	$g(x) = -\sin(x - 30^\circ - 60^\circ)$ $= -\sin(x - 90^\circ)$ $= -\cos x$	✓$-(-\sin x - 30^\circ - 60^\circ)$ ✓ $\sin(x - 90^\circ)$ ✓$-\cos x$	(3)
6.6		✓ intercepts with the axes *afsnitte met die asse* ✓ turning points / *draaipunte* ✓ shape / *vorm*	(3)
			[12]

QUESTION 7 / *VRAAG* 7



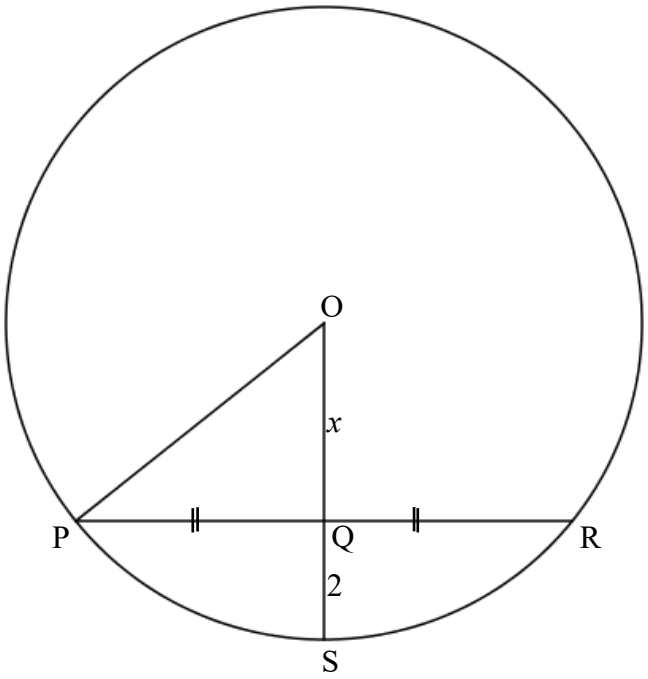
7.1	$A\,of\ \Delta ABC = \frac{1}{2}\times 2x\times(16-4x)\times\sin 120^\circ$ $=(16x-4x^2)\times\sin 60^\circ$ $=8\sqrt{3}x-2\sqrt{3}x^2$	✓correct substitution / *korrekte vervanging* ✓ $\sin 60^\circ$ ✓ answer / *antwoord*	(3)
7.2	$A'=0$ $8\sqrt{3}-4\sqrt{3}x=0$ $x=2$	✓ derivative / *afgeleide* = 0 ✓ $8\sqrt{3}-4\sqrt{3}x$ ✓answer / *antwoord*	(3)
			[6]

QUESTION 8/*VRAAG* 8



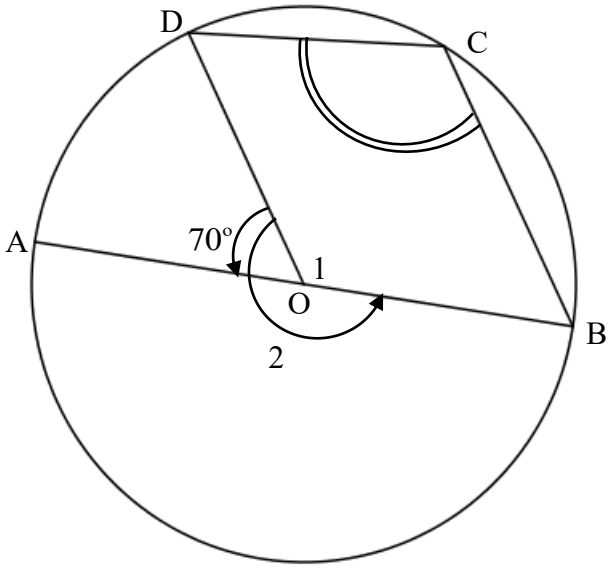
8.1	Construction: Draw DO and OB Proof: In ΔODE and ΔOEB $DE = EB$ [given] $OD = OB$ [radii] $OE = OE$ [common] $\therefore \Delta ODE \equiv \Delta OEB$ [SSS] $\hat{E}_1 + \hat{E}_2 = 180^\circ$ [∠s on str line] $\therefore \hat{E}_1 = \hat{E}_2 = 90^\circ$ [$\Delta ODE \equiv \Delta OEB$] *Konstruksie:* Trek DO en OB *Bewys*: In ΔODE *en* ΔOEB $DE = EB$ [*gegee*] $OD = OB$ [*radiusse*] $OE = OE$ [*gemeen*] $\therefore \Delta ODE \equiv \Delta OEB$ [SSS] $\hat{E}_1 + \hat{E}_2 = 180^\circ$ [∠*e op reguitlyn*] $\therefore \hat{E}_1 = \hat{E}_2 = 90^\circ$ [$\Delta ODE \equiv \Delta OEB$]	✓ construction ✓ first statement (radii) ✓ other 2 statements ✓ reason for congruency ✓ R ✓ *konstruksie* ✓ *eerste stelling* (*radiusse*) ✓ *ander* 2 *stellings* ✓ *rede vir kongruensie* ✓ R	(5)

8.2



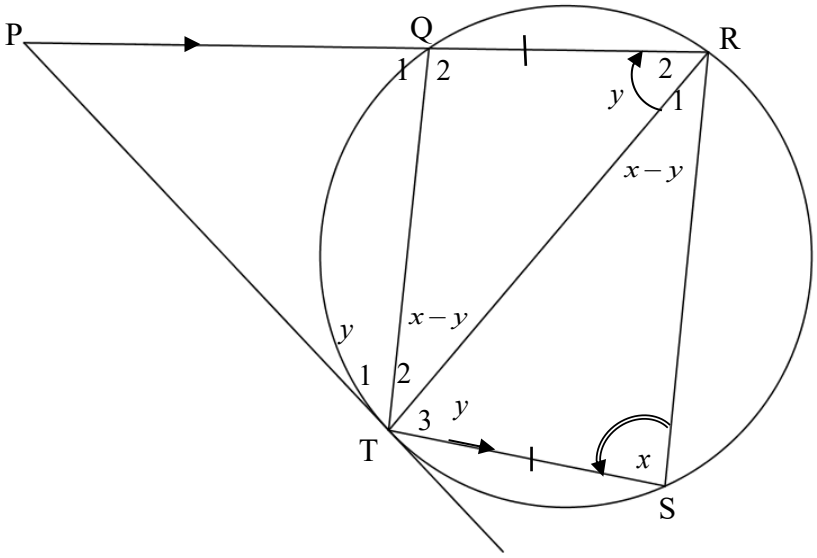
8.2.1	$O\hat{Q}P = 90^{o}$ [line from centre to the midpoint] [*lyn vanaf middelpunt van sirkel na middelpunt van koord*]	✓S ✓R	(2)
8.2.2	$PQ = 4$ $OP^2 = PQ^2 + OQ^2$ [*Pyth*] $(x+2)^2 = 4^2 + x^2$ $x^2 + 4x + 4 = 16 + x^2$ $4x = 12$ $x = 3$ $OP = OS = 5$ [radii / *radiusse*]	✓ PQ ✓ substitution into Pythagoras *vervanging in Pythagoras* ✓ simplification / *vereenvoudiging* ✓ *x*-value /*x–waarde* ✓ PO	(5)
			[12]

QUESTION 9/*VRAAG* 9



9.1	$\hat{O}_1 = 110^\circ$ [∠s on a str. line / *∠e op reguitlyn*] $\hat{O}_2 = 250^\circ$ [∠s around a point / *∠e om 'n punt*] $\therefore \hat{C} = 125^\circ$ [∠ at centre $= 2 \times$ ∠ at circumf] [*Middelpunts* $\angle = 2 \times$ *Omtreks* $\angle$]	✓ S/R ✓ S ✓ R ✓S ✓ R	(5)

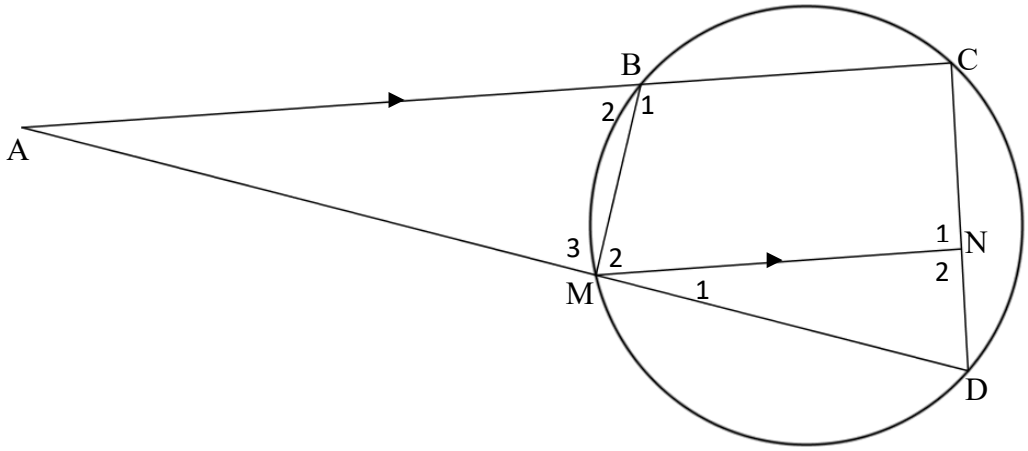
9.2



9.2.1	$\hat{T}_1 = y$ [tan chord theorem / *raaklyn koord Stelling*] $\hat{T}_3 = y$ [alt ∠s / *verw. ∠e*, PR||TS]	✓ S ✓ R ✓ S ✓ R	(4)
9.2.2	$\hat{T}_2 = \hat{R}_1$ [∠s subt by equal chords / *∠e onderspan deur gelyke koorde*]	✓ S ✓ R	(2)
9.2.3	$\hat{T}_2 = x - y$ [ext. ∠ of a Δ / *buite ∠ van 'n Δ*] $\hat{R}_1 = \hat{T}_2 = x - y$ [proved / *bewys*] $y + x - y + x = 180^\circ$ [∠s in ΔTRS / *∠e in ΔTRS*] $2x = 180^\circ$ $x = 90^\circ$ ∴ TR is the diameter of the circle [chord subt. 90°] *TR is die middellyn van die sirkel* [*koord onderspan* 90°]	✓ S ✓ S/R ✓ $x = 90^\circ$ ✓ R	(4)
			[15]

QUESTION 10 / *VRAAG* 10

AC = 36 units/*eenhede*, AD = 48 units/*eenhede* and/*en* BM = 24 units/*eenhede*



10.1	$\hat{A} = \hat{A}$ [common / *gemeen*] $\hat{B}_2 = \hat{D}$ [ext ∠ of a cylic quad / *buite ∠ van koordev.*] $\hat{M}_3 = \hat{C}$ [ext ∠ of a cylic quad / *buite ∠ van koordev.*] or / *of* [$3^{rd/de}$ ∠] $\Delta ABM \|\|\| \Delta ADC$ [∠∠∠]	✓S ✓S ✓R ✓ R 3rd angle/3^{de} *hoek* **OR/*OF*** ✓ R ∠∠∠	(4)
10.2	$\frac{BM}{DC} = \frac{AM}{AC}$ [||| Δs] but/*maar* AM = DC [given / *gegee*] $\frac{BM}{DC} = \frac{DC}{AC}$ $CD^2 = BM \times AC$	✓ S ✓R ✓ AM = DC	(3)
10.3	$CD^2 = 24 \times 36 = 864$ $\frac{CN}{CD} = \frac{AM}{AD}$ [line || to one side of a Δ] [*lyn aan een sy van 'n* Δ] $AM = CD$ $CN = \frac{CD^2}{AD}$ $= \frac{864}{48}$ $= 18$	✓ length of CD^2 *lengte van* CD^2 ✓ S ✓ R ✓ CN in terms of CD^2 CN *in terme van* CD^2 ✓ correct substitution *korrekte vervanging* ✓ length of CN *lengte van* CN	(6)
			[13]
		TOTAL/*TOTAAL*:	**150**