GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION

2015

MEMORANDUM

SUBJECT: MATHEMATICS P2/ WISKUNDE V2 (10612)

GAUTENG DEPARTMENT OF EDUCATION

PREPARATORY EXAMINATION – 2015

MATHEMATICS/*WISKUNDE*
(Second Paper/*Tweede Vraestel*)

MEMORANDUM

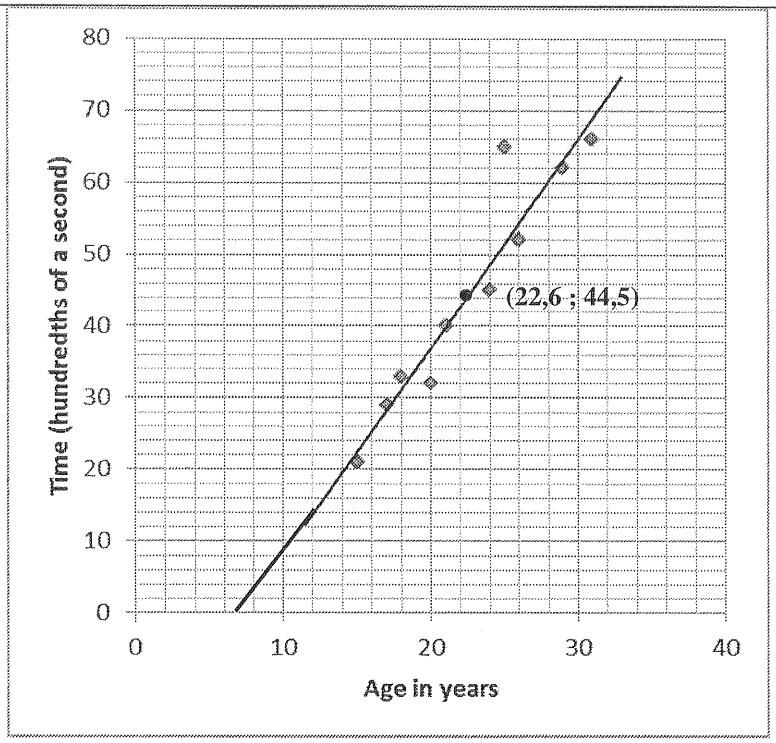
NOTE:

- If a candidate answered a QUESTION TWICE, mark the FIRST attempt ONLY.
- Consistent accuracy applies in ALL aspects of the memorandum.
- Penalise for rounding **only** in QUESTION 3.6
- Assuming answers/values in order to solve a problem is NOT ACCEPTABLE.
- S/R refers to STATEMENT as well as REASON

NOTA:

- *As 'n kandidaat 'n vraag TWEEKEER beantwoord, merk slegs die EERSTE poging.*
- *Volgehoue akkuraatheid word in ALLE aspekte van die nasienmemorandum toegepas.*
- *Penalisering vir afronding word* ***slegs*** *in vraag 3.6 toegepas.*
- *Aanvaarding van antwoorde/waardes om 'n probleem op te los, is ONAANVAARBAAR.*
- *S/R verwys na BEWERING sowel as die REDE.*

QUESTION / VRAAG 1

1.1		✓ $(\bar{x};\bar{y})$ (22,6 ; 44,5) ✓ line of best fit *beste paslyn/lyn van beste passing* (2)
1.2.1	25 years */25 jaar*	✓ answer / *antwoord* (1)
1.2.2	The reaction time according to the line of best fit for age 25 should be 51,46. The reaction time of this patient is ± 65. *Die reaksietyd volgens die lyn van beste passing vir die ouderdom van 25 moet 51,46 wees. Die reaksietyd vir hierdie pasiënt is ± 65.*	✓ answer / *antwoord* (1) **Any other valid explanation.** ***Enige ander geldige verduideliking***
1.3	A = –21,03 B = 2,90 $y = 2{,}90x - 21{,}03$	✓ A = –21,03 ✓ B = 2,90 ✓ $y = 2{,}90x - 21{,}03$ (3)
1.4	r = 0,95 very strong correlation / *baie sterk korrelasie*	✓ r = 0,95 ✓ very strong / strong *baie sterk / sterk* (2)
1.5	The 30 year olds have a higher reaction time on average. The interquartile range of this group is bigger (IQR = 15)than that of the 15 year olds(IQR=5). The reaction time of the 30 year olds varies more. *Die 30-jariges het gemiddeld 'n hoër reaksietyd. Die interkwartielvariasiewydte van hierdie groep is groter(IQR=15). as dié van die 15-jariges(IQR=5).. Die reaksietyd van die 30-jariges varieer meer.*	✓IOR ✓ for comments / *vir kommentaar* (2) **[11]**

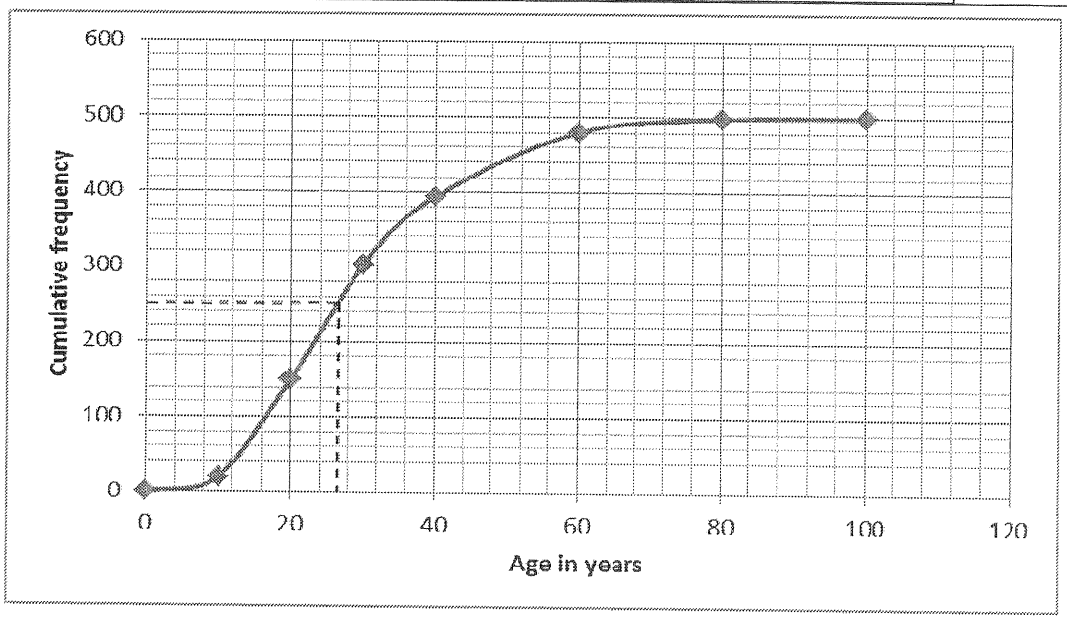
QUESTION / VRAAG 2

2.1

Age in years *Ouderdom in jare*	Number of people *Aantal mense*	Cumulative frequency *Kumulatiewe frekwensie*
$0 \leq A < 10$	20	20
$10 \leq A < 20$	130	150
$20 \leq A < 30$	152	302
$30 \leq A < 40$	92	394
$40 \leq A < 60$	86	480
$60 \leq A < 80$	18	498
$80 \leq A < 100$	2	500

✓all answers/ *alle antwoorde* (1)

2.2



✓plotting of points *plot van punte*
✓ joining of points *verbind van punte*
✓grounding point at (0 ; 0) *grond punt by (0 ; 0)* (3)

2.3.1 26 years old (accept 25 – 27)
26 jaar oud (aanvaar 25-27)

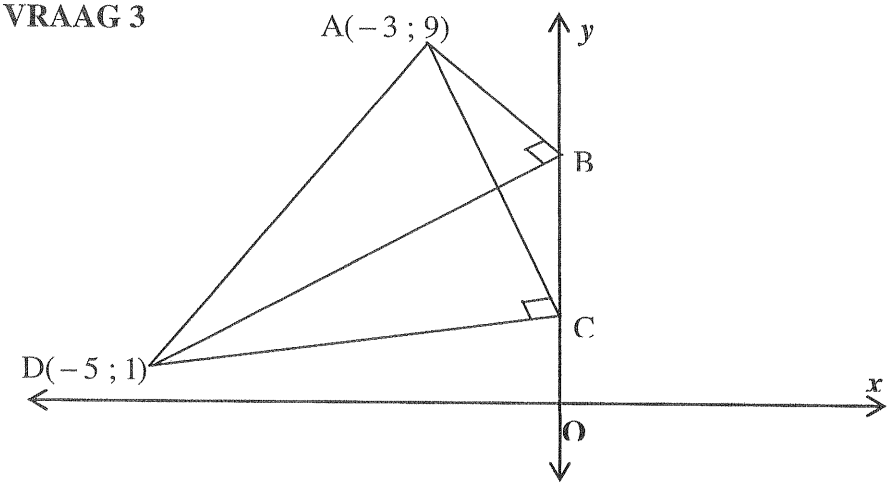
✓answer *antwoord* (1)

2.3.2 $\frac{90}{500} \times 100$
$= 18\%$ The percentage of people 16 and above 18 is 82%

Die persentasie mense 16 jaar en ouer is 82%

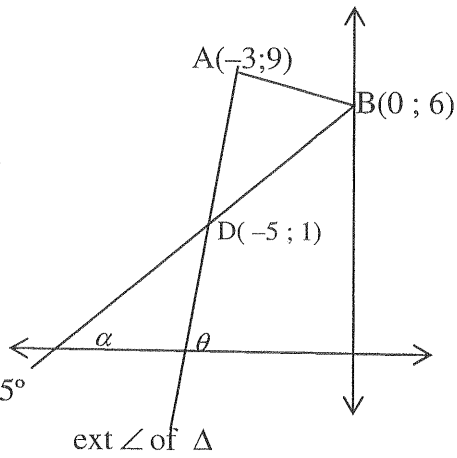
✓90
✓18%
✓82% (3)
[8]

QUESTION / VRAAG 3



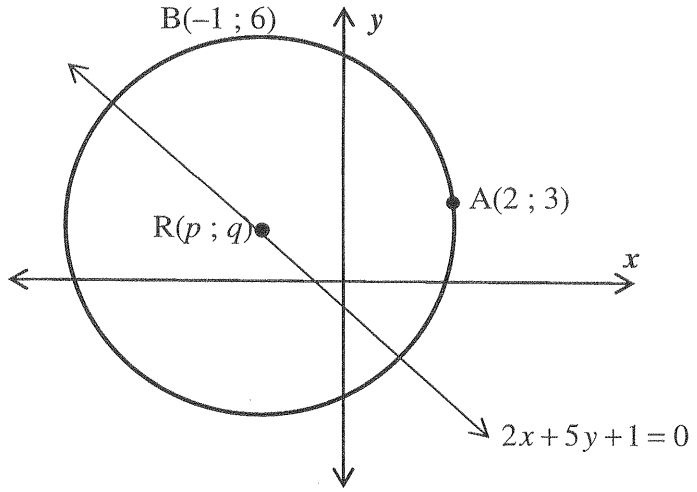
3.1	$M\left(\frac{-3-5}{2};\frac{9+1}{2}\right)$ $M(-4;5)$	✓ $x = -4$ ✓ $y = 5$ (2)
3.2	$AM^2 = (-4+3)^2 + (5-9)^2$ **OR/OF** $DM^2 = (-5+4)^2 + (1-5)^2$ $= 1 + 16$ $= 1 + 16$ $= 17$ $= 17$ $\therefore r = \sqrt{17}$ **OR/OF** $AD^2 = (-5+3)^2 + (1-9)^2$ $= 4 + 64$ $= 68$ $\therefore AD = \sqrt{68}$ $\therefore \text{radius} = \frac{\sqrt{68}}{2}$ $= \sqrt{17}$	✓correct substitution into distance formula *korrekte vervanging in afstand formule* ✓ $r = \sqrt{17}$ ✓correct substitution into distance formula *korrekte vervanging in afstand formule* ✓ $r = \sqrt{17}$ (2)
3.3	Yes, the circle will pass through point C *Ja, die sirkel gaan deur punt C* $\hat{B} = \hat{C} = 90°$, AD is the diameter line subtends equal $\angle^s$. $\hat{B} = \hat{C} = 90°$, AD die middellyn *lynstuk onderspan gelyke* $\angle^e$	✓yes / *ja* ✓reason / *rede* (2)

3.4	B(0 ; y) $m_{AB} \times m_{BD} = -1$ $\left(\frac{9-y}{-3-0}\right)\left(\frac{1-y}{-5-0}\right) = -1$ $(9-y)(1-y) = -15$ $9-10y+y^2 = -15$ $y^2-10y+24 = 0$ $(y-6)(y-4) = 0$ $\therefore y = 6 \text{ or } y = 4 \qquad \therefore B(0;6)$ **OR/OF** $AB^2 + BD^2 = AD^2$ $(9-y)^2+(-3-0)^2+(-5-0)^2+(1-y)^2 = (-5+3)^2+(1-9)^2$ $81-18y+y^2+9+25+1-2y+y^2 = 4+64$ $2y^2-20y+48 = 0$ $y^2-10y+24 = 0$ $(y-6)(y-4) = 0$ $y = 6 \text{ or } y = 4$ $\therefore B(0;6)$	✓ $m_{AB} \times m_{BD} = -1$ ✓ $\left(\frac{9-y}{-3-0}\right)$ / $\left(\frac{1-y}{-5-0}\right)$ ✓ standard form *standaardvorm* ✓ factors / faktore ✓ B(0 ; 6) (5) ✓ $(9-y)^2+(-3-0)^2+$ $(-5-0)^2+(1-y)^2$ ✓ $(-5+3)^2+(1-9)^2$ ✓ standard form/ *Standaardvorm* ✓ factors / faktore ✓ B(0 ; 6) (5)
3.5	$m_{AB} = \frac{9-6}{-3-0}$ $= -1$ $m_{\parallel} = -1$ $y - y_1 = m(x - x_1)$ $y - 1 = -1(x+5)$ $y - 1 = -x - 5$ $y = -x - 4$ **OR/OF** $y = -x + c$ $-5 = -1 + c$ $c = -4$ $y = -x - 4$	✓ $m_{\parallel} = -1$ ✓ substitution of (–1 ; 5) *vervanging van* (–1 ; 5) ✓ $y = -x - 4$ (3)

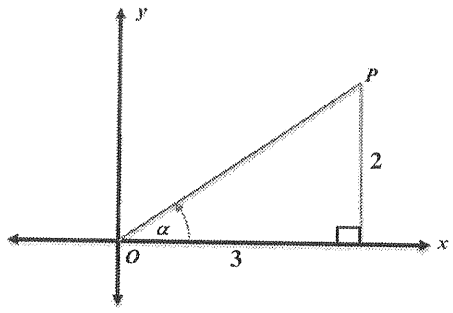
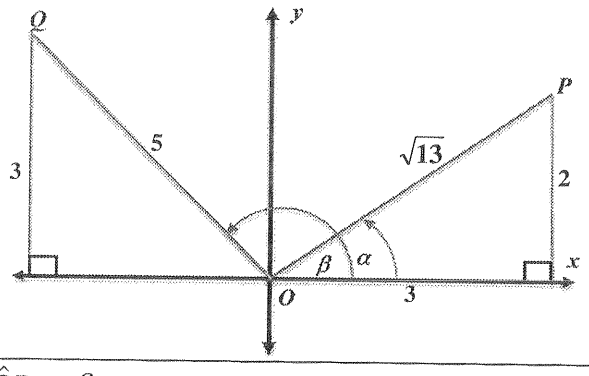
3.6	$m_{AD} = \frac{1-9}{-5+3} = 4$ $\tan\theta = 4$ $\theta = 76°$ $m_{DB} = \frac{1-6}{-5-0}$ $= 1$ $\tan\alpha = 1$ $= 45°$ $B\hat{D}A = 76° - 45°$ $= 31°$ ext $\angle$ of Δ  **OR/OF** $AB^2 = (-3-0)^2 + (9-6)^2$ $AB = \sqrt{18}$ $BD^2 = (-5-0)^2 + (1-6)^2$ $BD = \sqrt{50}$ $\tan B\hat{D}A = \frac{\sqrt{18}}{\sqrt{50}} = 0,6$ $B\hat{D}A = 31°$	✓ $m_{AD} = \frac{1-9}{-5+3} = 4$ ✓ $\tan\theta = 4$ ✓ $76°$ ✓ $\tan\alpha = 1$ ✓ $45°$ ✓ $31°$ (–1 if NOT rounded) $31°$ (–1 as NIE afgerond) ✓ $(-3-0)^2 + (9-6)^2$ ✓ $AB = \sqrt{18}$ ✓ $(-5-0)^2 + (1-6)^2$ ✓ $BD = \sqrt{50}$ ✓ using a correct trig ratio *gebruik korrekte trig verh* ✓ $31°$ (–1 if NOT rounded) $31°$ (–1 as NIE afgerond) (6) **[20]**

QUESTION / VRAAG 4

4.1.1	$x^2 + y^2 - 2x + 6y = 0$ $(x-1)^2 - 1 + (y+3)^2 - 9 = 0$ $(x-1)^2 + (y+3)^2 = 1 + 9$ $(x-1)^2 + (y+3)^2 = 10$ $\therefore$ centre : $(1;-3)$ $\therefore$ radius : $\sqrt{10}$	✓ $(x-1)^2 - 1$ ✓ $(y+3)^2 - 9$ ✓ $(1;-3)$ ✓ $\sqrt{10}$ (4)
4.1.2	$m_{\text{radius}} = \frac{-3+4}{1+2}$ $= \frac{1}{3}$ $\therefore m_r \times m_t = -1$ $\therefore m_t = -3$ equation of tangent / vergelyking van raaklyn $y + 4 = -3(x+2)$ OR $y = -3x + c$ $y + 4 = -3x - 6$ $-4 = -3(-2) + c$ $y = -3x - 10$ $\therefore c = -10$ $y = -3x - 10$	✓ $m_r = \frac{1}{3}$ ✓ $m_t = -3$ ✓ substitution of (–2; –4) *vervanging van* (–2; –4) ✓ $y = -3x - 10$ (4)

		
4.2.1	RA = RB $RA^2 = RB^2$ $(p-2)^2+(q-3)^2=(p+1)^2+(q-6)^2$ $p^2-4p+4+q^2-6q+9=p^2+2p+1+q^2-12q+36$ $-6p+6q=24$ $\therefore p-q=-4$	✓ $RA^2 = RB^2$ ✓ $(p-2)^2+(q-3)^2$ ✓ $(p+1)^2+(q-6)^2$ ✓ $-6p+6q=24$ (4)
4.2.2	$R(p;q)$ lies on the line / lê op die lyn $2x+5y+1=0$ $2p+5q=-1$ .....(1) $p-q=-4$ $p=q-4$.....(2) OR sub(1) into(2) / verv (1) in (2) $2p-2q=-8$.....(2) $2(q-4)+5q=-1$ $2q-8+5q=-1$ $7q=7$ $q=1$ sub q into equation(2) / verv q in vgl(2) $p=1-4$ $p=-3$ R(–3;1) radius=RA OR/OF radius=RB $RA^2=(-3-2)^2+(1-3)^2$ $=25+4$ $RA=\sqrt{29}$ $(x+3)^2+(y-1)^2=29$ $2p-2q=-8$....(2) $2p+5q=-1$.....(1) (2)–(1) $7q=7$ $q=1$ $RB^2=(-3+1)^2+(1-6)^2$ $=4+25$ $RB=\sqrt{29}$	✓ $2p+5q=-1$ ✓ $2(q-4)+5q=-1$ / $2p-2q=-8$ ✓ $q=1$ ✓ $p=-3$ ✓ RA^2 / RB^2 ✓ RA / RB = $\sqrt{29}$ ✓ $(x+3)^2+(y-1)^2=29$ (7) **[19]**

QUESTION / VRAAG 5

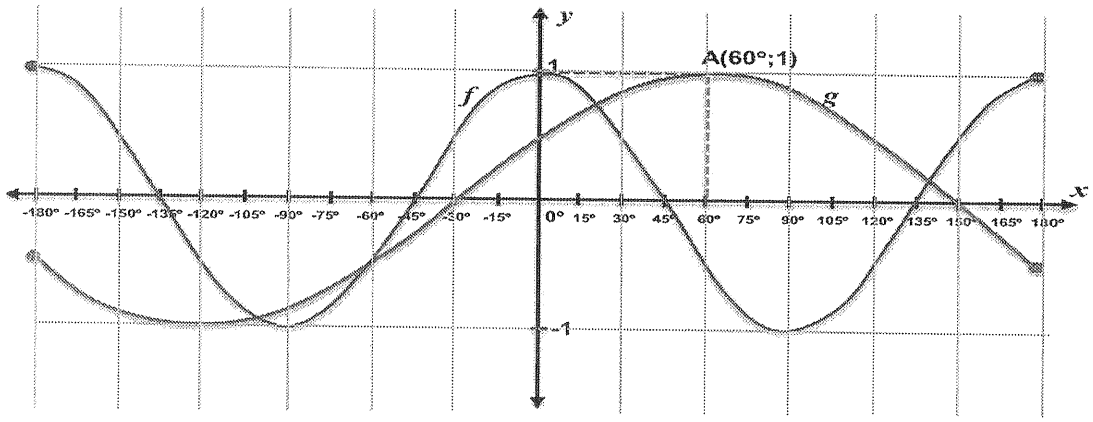
5.1.1	$3y-2x=0$ $3y=2x$ $y=\frac{2}{3}x$ $\tan\alpha=m$ $\tan\alpha=\frac{2}{3}$	✓ $y=\frac{2}{3}x$ ✓ $\tan\alpha=m$ (2)
5.1.2	 $OP^2=2^2+3^2$ *Pyth* $OP=\sqrt{13}$ $\sin\alpha=\frac{2}{\sqrt{13}}$ *or/of* $\frac{2\sqrt{13}}{13}$ (with rational denominator) (met rasionale noemer)	✓ $OP=\sqrt{13}$ ✓ $\sin\alpha=\frac{2}{\sqrt{13}}$ (2)
5.2.1		
	$Q\hat{O}P=\beta-\alpha$	✓ $\beta-\alpha$ (1)
5.2.2	$\sin Q\hat{O}P=\sin(\beta-\alpha)$ $=\sin\beta\cos\alpha-\cos\beta\sin\alpha$ $=\left(\frac{3}{5}\times\frac{3}{\sqrt{13}}\right)-\left(\frac{-4}{5}\times\frac{2}{\sqrt{13}}\right)$ $=\frac{17}{5\sqrt{13}}$	✓ $\sin(\beta-\alpha)$ $=\sin\beta\cos\alpha-\cos\beta\sin\alpha$ ✓ $\frac{3}{5}\times\frac{3}{\sqrt{13}}$ ✓ $\frac{-4}{5}\times\frac{2}{\sqrt{13}}$ ✓ $\frac{17}{5\sqrt{13}}$ (4) **[9]**

QUESTION / VRAAG 6

6.1	$\dfrac{\cos(40°-x).\cos x-\sin(40°-x).\sin x}{\sin 205°.\cos 25°}$ $=\dfrac{\cos(40°-x+x)}{-\sin 25°.\cos 25°}$ $=\dfrac{\cos(40°-x+x)}{-\frac{1}{2}(2\sin 25°.\cos 25°)}$ $=\dfrac{\cos 40°}{-\frac{1}{2}\sin 50°}$ $=\dfrac{\cos 40°}{-\frac{1}{2}\cos 40°}$ **OR/OF** $\dfrac{\sin 50°}{-\frac{1}{2}\sin 50°}$ $=-2$	✓ $\cos(40°-x+x)$ ✓ $-\sin 25°$ ✓ $-\frac{1}{2}\sin 50°$ ✓ $\sin 50°=\cos 40°$ or/*of* $\cos 40°=\sin 50°$ in numerator *in noemer* ✓ -2 (5)
6.2.1	LHS / LK $=\dfrac{\cos^2 x-\sin^2 x}{\cos x+\sin x}$ $=\dfrac{(\cos x-\sin x)(\cos x+\sin x)}{\cos x+\sin x}$ $=\cos x-\sin x$ $=$ RHS / RK	✓ $\cos 2x=\cos^2 x-\sin^2 x$ ✓ factorising */faktorisering* (2)
6.2.2	$\cos x\left(\dfrac{\cos 2x}{\cos x+\sin x}\right)=\dfrac{1}{2}$ $\cos x\,(\cos x-\sin x)=\dfrac{1}{2}$ $\cos^2 x-\cos x\sin x=\dfrac{1}{2}$ $2\cos^2 x-2\cos x\sin x=1$ $2\cos^2 x-1=2\cos x\sin x$ $\cos 2x=\sin 2x$	✓ $\cos x-\sin x$ ✓ $\cos^2 x-\cos x\sin x=\frac{1}{2}$ ✓ $2\cos^2 x-1=\cos 2x$ ✓ $2\cos x\sin x=\sin 2x$ (4)
6.2.3	$\cos x\left(\dfrac{\cos 2x}{\cos x+\sin x}\right)=\dfrac{1}{2}$ $\cos 2x=\sin 2x$ $\tan 2x=1$ $2x=45°+k.180°\quad;\ k\in Z$ $x=22{,}5°+k.90°\quad;\ k\in Z$ **OR/OF**	✓ $\tan 2x=1$ ✓ $2x=45°+k.180°$ ✓ $x=22{,}5°+k.90°\quad;\ k\in Z$ (3)

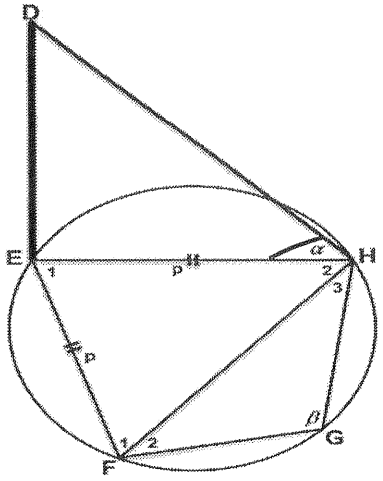
	$\cos 2x = \sin 2x$ $\cos 2x = \cos(90° - 2x)$ $2x = 90° - 2x + k.360°$ or $2x = 2x - 90° + k.360°$; $k \in Z$ $4x = 90° + k.360°$; $k \in Z$ $x = 22,5° + k.90°$; $k \in Z$	✓ $\cos 2x = \cos(90° - 2x)$ ✓ $4x = 90° + k.360°$ ✓ $x = 22,5° + k.90°$ (3)
6.3.1	Area $\Delta ABC = \frac{1}{2}mn \sin 4x$	✓ Area $\Delta ABC = \frac{1}{2}mn \sin 4x$ (2)
6.3.2	Max area *if* $\sin 4x = 1$ $4x = 90°$ $x = 22,5°$	✓ $\sin 4x = 1$ ✓ $x = 22,5°$ (2)
6.3.3	Right-angled triangle/*Reghoekige driehoek*	✓answer
		[18]

QUESTION / VRAAG 7



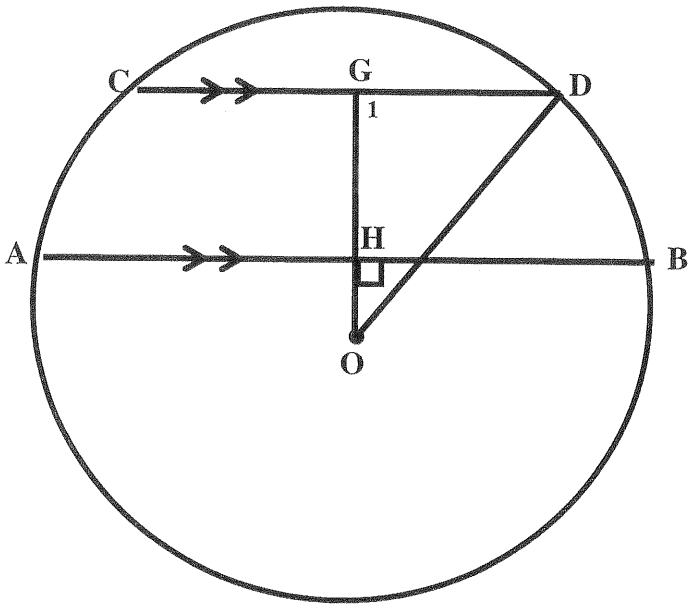
7.1	$\sin(60° - \theta) = 1$ $60° - \theta = 90°$ $\theta = -30°$	✓ $\theta = -30°$ (1)
7.2	period / periode $= \frac{360°}{2}$ $= 180°$	✓180° (1)
7.3	$-2 \le y \le 0$ of / or $[-2;0]$	✓ $-2 \le y \le 0$ (1)
7.4	$45° < x < 135°$ or/or $150° < x \le 180°$	✓ 45° and 135° ✓150° and 180° ✓ ALL inequalities correct *ALLE ongelykhede korrek* ***Subtract 1 mark for extra intervals*** ***Trek 1 punt af vir ekstra intervalle*** (3)
7.5	$90° < x < 150°$	✓90° and/en 150° ✓inequalities / *ongelykhede* (2) **[8]**

QUESTION / VRAAG 8

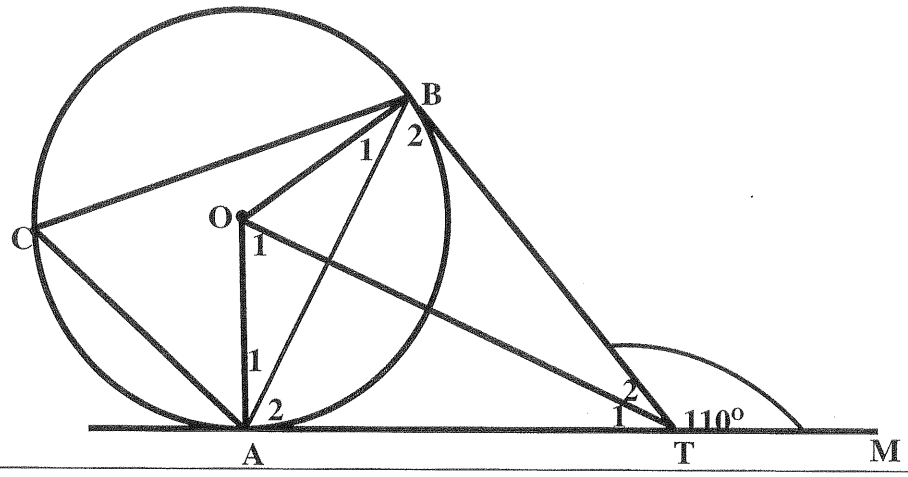


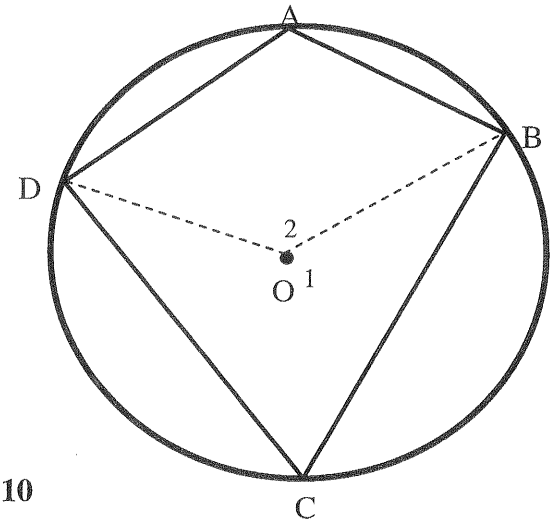
8.1	$\frac{DE}{p} = \tan\alpha$ $DE = p\tan\alpha$	✓ $p\tan\alpha$ (1)
8.2.1	$\hat{E}_1 = 180° - \beta$ (opp $\angle^s$ of cyclic quad *teenoorst.* $\angle^e$ *van kvh*) $\hat{F}_1 = \hat{H}_2$ ($\angle^s$ opp equal sides; EH = EF $\angle^e$ *teenoor gelyke sye*) $\hat{F}_1 + \hat{H}_2 = 180° - (180° - \beta)$ ($\angle^s$ of Δ/$\angle^e$ *van* Δ) $= \beta$ $\hat{F}_1 = \hat{H}_2 = \frac{1}{2}\beta$	✓ $\hat{E}_1 = 180° - \beta$ with reason/met rede ✓ $\hat{F}_1 = \hat{H}_2$ with reason/met rede ✓ $\hat{F}_1 + \hat{H}_2 = \beta$ (3)
8.2.2	In ΔEFH $\frac{p}{\sin\frac{1}{2}\beta} = \frac{FH}{\sin(180° - \beta)}$ $p = \frac{FH.\sin\frac{1}{2}\beta}{\sin\beta}$ $= \frac{FH.\sin\frac{1}{2}\beta}{2\sin\frac{1}{2}\beta.\cos\frac{1}{2}\beta}$ $= \frac{FH}{2\cos\frac{1}{2}\beta}$	✓substitution in sine rule *vervanging in sinus formule* ✓ $p = \frac{FH.\sin\frac{1}{2}\beta}{\sin\beta}$ ✓ $\sin\beta = 2\sin\frac{1}{2}\beta.\cos\frac{1}{2}\beta$ (3)
8.2.3	$FH^2 = p^2 + p^2 - 2p^2\cos(180° - \beta)$ $= 2p^2 + 2p^2\cos\beta$ $= 2p^2(1 + \cos\beta)$ $FH = p\sqrt{2(1 + \cos\beta)}$	✓substitution in cosine rule *vervanging in kosinus reël* ✓ $2p^2 + 2p^2\cos\beta$ ✓ $2p^2(1 + \cos\beta)$ (3) **[10]**

QUESTION / VRAAG 9



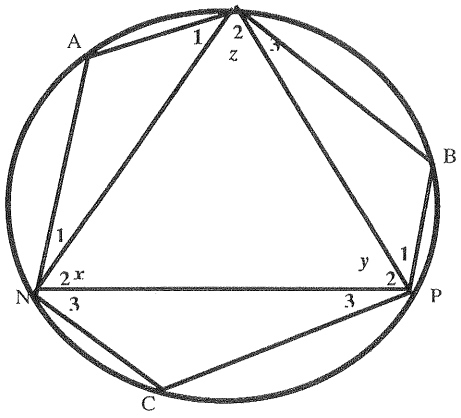
S/R	Statement and reason S/R *Bewering en rede*	
9.1.1	(a) AB ‖ CD corr. $\angle^s$ equal / *ooreenk* $\angle^e$ *gelyk* (b) line from centre ⊥ to chord /*Midpt. O ; Midpt. koord* (c) Radius	✓reason / *rede* ✓reason / *rede* ✓reason / *rede* (3)
9.1.2	Join OB / *Verbind OB* HB = 12 and/*en* GD = 5 (line from centre ⊥ to chord / *Midpt. O ; Midpt. koord)* In Δ OHB $(OH)^2 = (OB)^2 - (BH)^2$ $\hat{H} = 90^\circ$ (Pyth) $= (13)^2 - (12)^2$ $= 25$ $OH = 5$ In Δ OGD $(OG)^2 = (OD)^2 - (GD)^2$ $= (13)^2 - (5)^2$ $= 144$ $OG = 12$ $GH = OG - OH$ $= 12 - 5$ $= 7$	✓ S/R ✓ Pythagoras ✓OH = 5 ✓OG = 12 ✓ GH = 7 (5)

9.2.1	Tangents from same point / Tans from common pt *Raaklyne vanuit dies. punt*  	✓ reason /*rede* (1)
9.2.1	$\hat{B}_1 + \hat{B}_2 = 90°$ (tan ⊥ *rad / raaklyn* ⊥ radius) $\hat{A}_1 + \hat{A}_2 = 90°$ (tan ⊥ *rad / raaklyn* ⊥ radius) ∴ AOBT is a cyclic quadrilateral/*is 'n koordevierhoek* (*opposite ∠' s* supplementary/oorstaande ∠'e suppl)	✓ S/R ✓ S/R ✓R (3)
9.2.2	OA = OB (radii) $\hat{T}_1 = \hat{T}_2$ (equal chords subtend equal angels/ *gelyke hoeke onderspan deur gelyke koorde*	✓ OA = OB (radii) ✓ R (2)
9.2.3	$\hat{A}_2 + \hat{B}_2 = 110°$ (ext ∠ of Δ / buite ∠ van Δ) But $\hat{A}_2 = \hat{B}_2$ (∠'s opp equal sides / ∠^{e} teenoor gelyke sye) $\hat{A}_2 = 55°$ or $\hat{B}_2 = 55°$ $\hat{A}_2 = \hat{B}_2 = \hat{C} = 55°$ (tan chord / ∠ *tussen raaklyn en koord* **OR/OF** $\hat{O}_1 + \hat{O}_2 = 110°$ (ext ∠ of cycl quad/buite ∠ van *kvh*) $\hat{O}_1 + \hat{O}_2 = 2\hat{C}$ (∠ at centre = 2x∠at circ /midpts∠ = 2xomtreks∠) $\hat{C} = 55°$	✓S/R ✓ S/R ✓ $\hat{C} = 55°$ ✓ S/R (4) ✓ S/R ✓S ✓R ✓ $\hat{C} = 55°$ (4) **[17]**



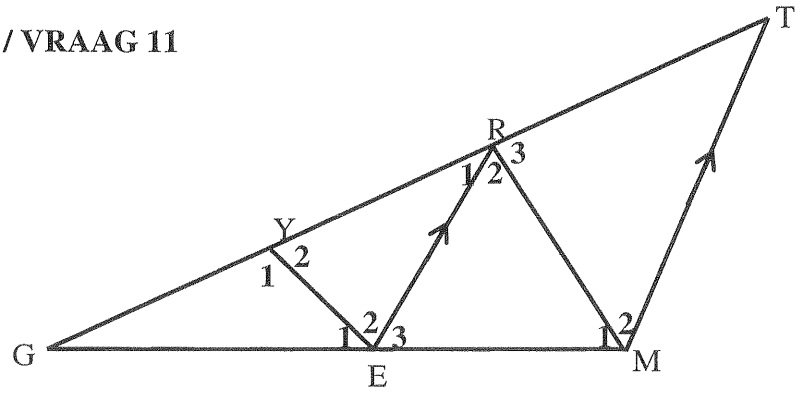
QUESTION / VRAAG 10

10.1	Construction: Join OD and OB *Konstruksie: Verbind* OD *en* OB $\hat{O}_1 = 2\hat{A}$ ($\angle$ at centre = 2 × $\angle$ at circumference / Midpts$\angle$ = 2 x Omtreks$\angle$) $\hat{O}_2 = 2\hat{C}$ ($\angle$ at centre = 2 × $\angle$ at circumference / Midpts$\angle$ = 2 x Omtreks$\angle$) $\hat{O}_1 + \hat{O}_2 = 360°$ ($\angle^s$ round a pt OR $\angle^s$ in a rev $\angle^e$om 'n punt OF omwenteling $2\hat{A} + 2\hat{C} = 360°$ $2(\hat{A} + \hat{C}) = 360°$ $\hat{A} + \hat{C} = 180°$ M	✓Construction / Konstruksie ✓ S/R ✓ S/R ✓ S/R ✓ $2\hat{A} + 2\hat{C} = 360°$ (5)



10.2.1	$\hat{A} = 180° - y$ $\hat{B} = 180° - x$ (opp $\angle^s$ of cyclic quad / teenoorst. $\angle^e$ van kvh) $\hat{C} = 180° - z$	✓ all 3 statements *al 3 bewerings* ✓ reason *rede* (2)
10.2.2	$(180° - y) + (180° - x) + (180° - z)$ $= 540° - (x + y + z)$ $= 540° - 180°$ (sum of $\angle$'s of $\Delta = 180°$) $= 360°$	✓ substitution of angles *vervanging van hoeke* ✓ simplification *vereenvoudiging* ✓ 180° ✓ answer / *antw* (4) **[11]**

QUESTION / VRAAG 11



11.1	$\hat{R}_2 = \hat{M}_2$ (alt$\angle$'s RE$\parallel$TM / verw. $\angle^e$; RE$\parallel$TM) $\hat{R}_1 = \hat{T}$ corr $\angle$'s RE$\parallel$TM / ooreenk. $\angle^e$ RE$\parallel$TM)	✓ (S) ✓ (R) ✓ (S) ✓ (R) (4)
11.2	$\frac{EM}{EG} = \frac{RT}{RG}$ (line $\parallel$ one side of Δ OR prop theorem; RE $\parallel$ TM (lyn $\parallel$ een sy van Δ) But / Maar RT = RM ($\angle^s$ opp equal sides ; $\hat{M}_2 = \hat{T}$ / $\angle^e$ teenoor gelyke sye ; $\hat{M}_2 = \hat{T}$) $\frac{EM}{EG} = \frac{RM}{RG}$	✓ (S) ✓ (R) ✓ (S) ✓ (R) (4)

11.3	In ΔGYE en ΔGER $\hat{G} = \hat{G}$ (common /gemeenskaplik) $\hat{E}_1 = \hat{R}_1$ (given /gegee) $\hat{Y}_1 = \hat{E}_1 + \hat{E}_2$ (3rd $\angle$ of Δ / 3e $\angle$ van Δ) $\Delta GYE \|\|\| \Delta GER$ ($\angle,\angle,\angle$)	✓ $\hat{G} = \hat{G}$ (S/R) ✓ $\hat{E}_1 = \hat{R}_1$ (S/R) ✓ $\hat{Y}_1 = \hat{E}_1 + \hat{E}_2$ (S/R) ✓ equiangular $\triangle$ /*gelykhoekige* $\triangle$ or/*of* $\angle,\angle,\angle$ (R) (4)

11.4	$\frac{EG}{EY} = \frac{RG}{RE} = \frac{YG}{EG}$ (equiang Δ's / $\Delta GYE \|\|\| \Delta GER$) $\therefore \frac{EG}{EY} = \frac{RG}{RE}$	✓ (R) equiang Δ's / $\Delta GYE \|\|\| \Delta GER$ gelykh Δ^e $\Delta GYE \|\|\| \Delta GER$ (1)
11.5.1	$(RG)^2 = (GM)^2 - (RM)^2$ $G\hat{R}M = 90°$ Pythag. $= (10)^2 - (6)^2$ $= 64$ $\therefore RG = 8$	✓ substitute into Pyth *vervang in Pyth* ✓ RG = 8 (2)
11.5.2	$\frac{GE}{GM} = \frac{GR}{GT}$ (line $\|\|$ one side of Δ OR prop theorem; RE $\|\|$ TM (lyn $\|\|$ *een sy van* Δ) $\frac{GE}{10} = \frac{8}{14}$ $GE = 5\frac{5}{7}$ or/of $\frac{40}{7}$ or/of 5,71units/eenhede	✓ $\frac{GE}{GM} = \frac{GR}{GT}$ /reason / rede ✓ GT = 14 ✓ substitution of values *vervanging van waardes* ✓ answer /*antwoord* (4) **[19]**

TOTAL/TOTAAL: 150