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GRADE/GRAAD 12

MATHEMATICS P2/WISKUNDE V2

FEBRUARY/MARCH/FEBRUARIE/MAART 2015

MEMORANDUM

MARKS/PUNTE: 150

**This memorandum consists of 24 pages.
*Hierdie memorandum bestaan uit 24 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 the question, mark the crossed out version.
- Consistent accuracy applies in ALL aspects of the marking memorandum.
- Assuming answers/values in order to solve a problem is NOT acceptable.

NOTA:

- As 'n kandidaat 'n vraag TWEEKEER beantwoord, merk slegs die EERSTE poging.
- As 'n kandidaat 'n poging om die vraag te beantwoord, doodgetrek het en nie dit oorgedoen het nie, merk die doodgetrekte poging.
- Volgehoue akkuraatheid word in ALLE aspekte van die nasienmemorandum toegepas.
- Aanvaarding van antwoorde/waardes om 'n probleem op te los, is ONaanvaarbaar.

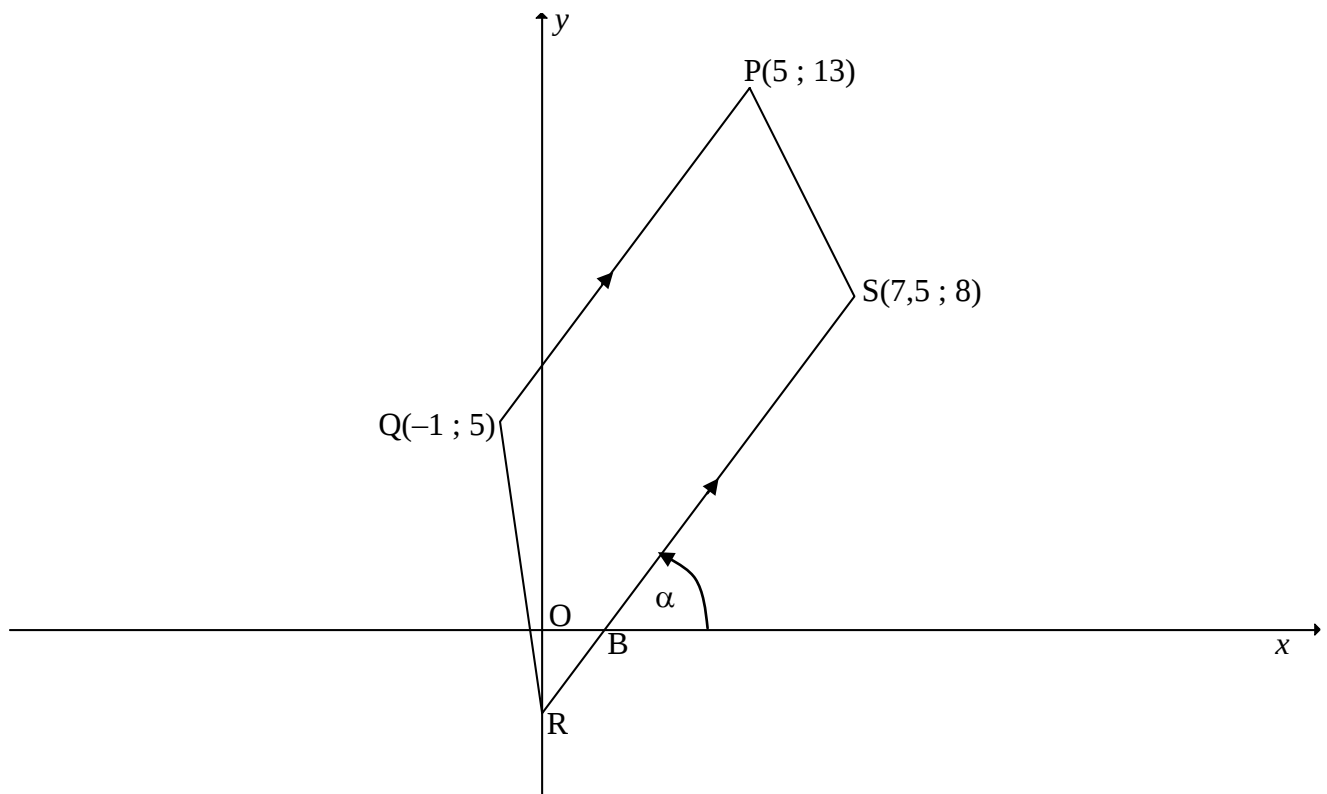
QUESTION/VRAAG 1

1.1	$\bar{x} = \frac{3310}{21}$ $= 157,62$ Answer only: Full marks slegs antw: volpunte	$\checkmark \frac{3310}{21}$ $\checkmark 157,62$ (2)
1.2	(131 ; 142,5 ; 151 ; 173 ; 189)	$\checkmark 131$ and/ en 189 $\checkmark 142,5$ $\checkmark 173$ $\checkmark 151$ (4)
1.3		$\checkmark$ box/mond $\checkmark$ whiskers/ snor (2)
1.4	positively skewed/positief skeef OR/OF skewed to the right/skeef na regs	$\checkmark$ answer/ antwoord (1)
1.5	$\sigma = 17,27$	$\checkmark \checkmark$ answer/ antwoord (2)
1.6.1	$\bar{x} = 157,62 + p$	$\checkmark$ answer (1)
1.6.2	$\sigma = 17,27$	$\checkmark$ answer/ antwoord (1)

[13]

QUESTION/VRAAG 2

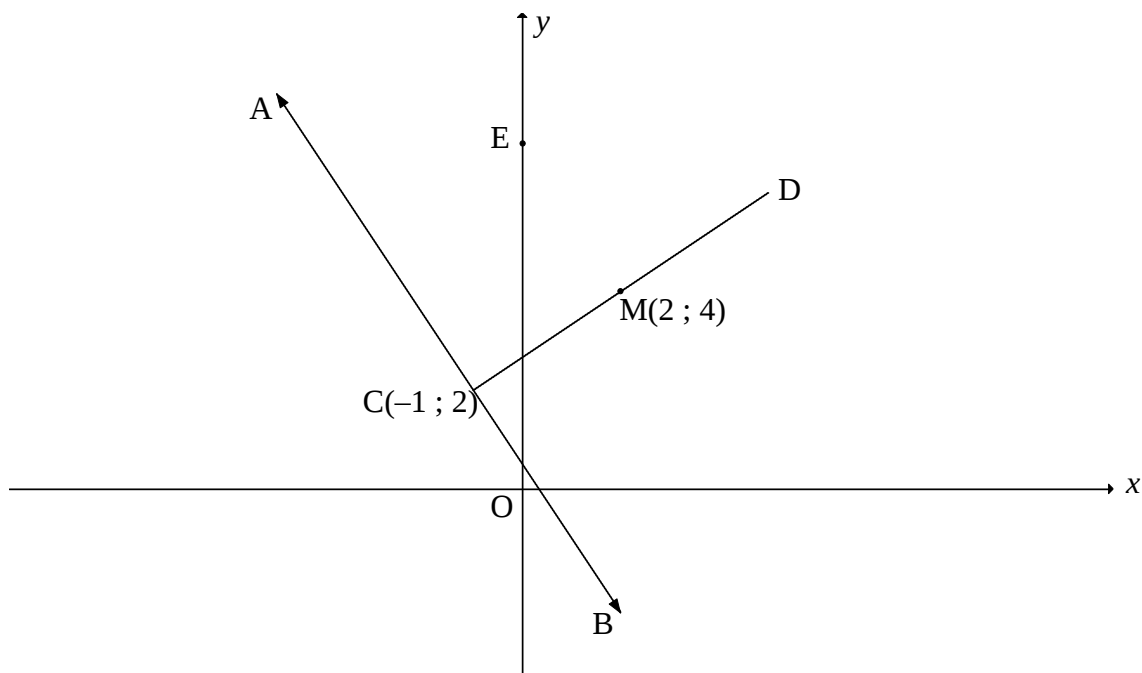
2.1	As the temperature increases, the sales of ice-creams increase/<i>Soos die temperatuur styg, neem die verkope toe.</i> OR/OF As the temperature decreases, the sales of ice-creams decrease/<i>Soos die temperatuur daal, neem die verkope af.</i>	✓ reason/<i>rede</i> (1) ✓ reason/<i>rede</i> (1)
2.2	The liveable temperature cannot keep on increasing/ <i>Die leefbare temperatuur kan nie aanhou styg nie.</i>	✓ reason/<i>rede</i> (1)
2.3	$a = -460,35$ $b = 30,09$ $\hat{y} = 30,09x - 460,35$ OR/OF $\hat{y} = -460,35 + 30,09x$ Answer only: Full marks <i>slegs antw: volpunte</i>	✓✓ $-460,35$ ✓ $30,09$ ✓ equation/<i>vgl</i> (4)
2.4	$r = 0,96$	✓ $0,96$ (1)
2.5	There is a <u>very strong</u> positive relationship (correlation)/ <i>Daar is 'n baie sterk positiewe verband (korrelasie).</i>	✓ very strong/<i>baie sterk</i> (1) [8]

QUESTION/VRAAG 3

3.1	$PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(5 + 1)^2 + (13 - 5)^2}$ $= 10$	✓ use of distance formula/ <i>gebruik afstandformule</i> ✓ correct subst into form/ <i>korrekte subst in formule</i> ✓ 10 (3)
3.2	$m_{PQ} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{13 - 5}{5 - (-1)}$ $= \frac{8}{6} = \frac{4}{3}$ Answer only: Full marks <i>slegs antw: volpunte</i>	✓ correct subst into gradient formula/ <i>korrekte subst in gradiëntformule</i> ✓ gradient/ <i>gradiënt</i> (2)

3.3	Equation of line RS/Vgl van lyn RS: $m_{RS} = m_{PQ} = \frac{4}{3} \quad (= \text{gradients, } \text{ lines/} = \text{gradiënte, } \text{ lyne})$ $y = mx + c$ $8 = \frac{4}{3}\left(\frac{15}{2}\right) + c$ $c = -2$ $y = \frac{4}{3}x - 2$ $\therefore 4x - 3y - 6 = 0$ OR/OF $y - y_1 = m(x - x_1)$ $y - 8 = \frac{4}{3}\left(x - \frac{15}{2}\right)$ $y = \frac{4}{3}x - 2$ $\therefore 4x - 3y - 6 = 0$	✓ $m_{RS} = \frac{4}{3}$ ✓ subst of S(7,5 ; 8) and m into eq /subst van S(7,5 ; 8) en m in vgl ✓ value of c /waarde van c or/of st form/st vorm ✓ equation/vgl (4)
3.4	B is the x-intercept of/is die x-afsnit van $y = \frac{4}{3}x - 2$ $0 = \frac{4}{3}x - 2$ $4x - 6 = 0$ $x = \frac{3}{2}$ OR/OF $4x - 3(0) - 6 = 0$ $4x - 6 = 0$ $x = \frac{3}{2}$	✓ $y = 0$ ✓ $x = \frac{3}{2}$ (2)
3.5	$\tan \alpha = \frac{4}{3}$ $\alpha = 53,13^\circ = \hat{O}\hat{B}\hat{R}$ (vert opp $\angle$s/regoorst $\angle$e) $\hat{O}\hat{R}\hat{B} = 180^\circ - (90^\circ + 53,13^\circ)$ ($\angle$s of Δ/ $\angle$e van Δ) $= 36,87^\circ$	✓ $\tan \alpha = \frac{4}{3}$ ✓ $53,13^\circ$ ✓ $36,87^\circ$ (3)
3.6	$BS = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{\left(\frac{15}{2} - \frac{3}{2}\right)^2 + (8 - 0)^2}$ $= 10$ PQ $\parallel$ BS and/en PQ = BS PQBS = parallelogram (1 pair opp sides = and $\parallel$ 1 pr tos sye = en $\parallel$) OR/OF midpoint of/midpt van QS: $\left(\frac{-1 + 7,5}{2}; \frac{5 + 8}{2}\right) = \left(\frac{13}{4}; \frac{13}{2}\right)$ midpoint of/midpt van PB: $\left(\frac{5 + 1,5}{2}; \frac{13 + 0}{2}\right) = \left(\frac{13}{4}; \frac{13}{2}\right)$ PQBS = parallelogram (diags bisect each other/hoekl halv mekaar) OR/OF	✓ correct subst into form/korrekte subst in formule ✓ BS = 10 ✓ BS = PQ ✓ reason/rede (4) ✓ $\left(\frac{-1 + 7,5}{2}; \frac{5 + 8}{2}\right)$ ✓ $\left(\frac{5 + 1,5}{2}; \frac{13 + 0}{2}\right)$ ✓ $\left(\frac{13}{4}; \frac{13}{2}\right)$ ✓ reason/rede (4)

$m_{QB} = \frac{5-0}{-1-1,5} = \frac{5}{-2,5} = -2$ $m_{PS} = \frac{13-8}{5-7,5} = \frac{5}{-2,5} = -2$ $m_{QB} = m_{PS}$ $\therefore QB \parallel PS$ $PQ \parallel BS$ PQBS = parallelogram (both pairs opp sides $\parallel$/beide pr tos sye $\parallel$) OR/OF $BS = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{\left(\frac{15}{2} - \frac{3}{2}\right)^2 + (8-0)^2} \quad \therefore PQ = BS$ $= 10$ $QB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(-1-1,5)^2 + (5-0)^2} = \sqrt{(2,5)^2 + (5)^2} = \frac{5\sqrt{5}}{2} \text{ or } 5,59$ $PS = \sqrt{(5-7,5)^2 + (13-8)^2} = \sqrt{(2,5)^2 + (5)^2} = \frac{\sqrt{125}}{2} \text{ or } 5,59$ $QB = PS$ PQBS = parallelogram (both pairs opp sides $=$/ beide pr tos sye $=$)	✓ m_{QB} ✓ m_{PS} ✓ $QB \parallel PS$ ✓ reason/rede (4) ✓ correct subst into form/korrekte subst in formule ✓ $PQ = 10$ ✓ $QB = PS$ ✓ reason/rede (4) [18]
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QUESTION/VRAAG 4

4.1.1	$\text{Radius} = \sqrt{(2+1)^2 + (4-2)^2}$ $r = \sqrt{13}$ Equation of circle/vgl van sirkel: $(x-2)^2 + (y-4)^2 = 13$ OR/OF $(x-2)^2 + (y-4)^2 = r^2$ $(-1-2)^2 + (2-4)^2 = r^2$ $r^2 = 13$ $\therefore (x-2)^2 + (y-4)^2 = 13$	$\checkmark \sqrt{(2+1)^2 + (4-2)^2}$ or/of $\sqrt{13}$ $\checkmark (x-2)^2 + (y-4)^2$ $\checkmark 13$ (3)
4.1.2	At/by D: $\frac{-1+x_D}{2} = 2$ $-1+x_D = 4$ $x_D = 5$ D(5 ; 6) OR/OF By inspection/deur inspeksie: D(5 ; 6)	$\frac{2+y_D}{2} = 4$ $2+y_D = 8$ $y_D = 6$ $\checkmark x - \text{value/waarde}$ $\checkmark y - \text{value/waarde}$ (2) $\checkmark x - \text{value/waarde}$ $\checkmark y - \text{value/waarde}$ (2)

4.1.3	$m_{MC} = \frac{4-2}{2+1} = \frac{2}{3}$ $m_{AB} \times m_{MC} = -1 \quad (\text{Tangent } \perp \text{ radius/raaklyn } \perp \text{ radius})$ $m_{AB} = -\frac{3}{2}$ $y - y_1 = m(x - x_1) \quad \text{OR/OF} \quad y = mx + c$ $y - 2 = -\frac{3}{2}(x + 1)$ $y = -\frac{3}{2}x + \frac{1}{2}$	$\checkmark m_{MC} = \frac{4-2}{2+1} = \frac{2}{3}$ $\checkmark m_{AB} \times m_{MC} = -1$ $\checkmark m_{AB} = -\frac{3}{2}$ $\checkmark \text{subst } m \text{ and } (-1 ; 2) \text{ into eq /subst } m \text{ en } (-1 ; 2) \text{ in vgl}$ $\checkmark \text{eq in standard form/ vgl in st vorm}$ (5)
4.1.4	At/by E: $(0-2)^2 + (y-4)^2 = 13$ $(y-4)^2 = 9$ $y-4 = \pm 3$ $y = 7 \text{ or } y = 1$ $E(0 ; 7)$ OR/OF At/by E: $(0-2)^2 + (y-4)^2 = 13$ $4 + y^2 - 8y + 16 = 13$ $y^2 - 8y + 7 = 0$ $(y-7)(y-1) = 0$ $y = 7 \text{ or } y = 1$ $E(0 ; 7)$	$\checkmark x = 0$ $\checkmark \text{simplification/ vereenvoudiging}$ $\checkmark y - \text{values/waardes}$ $\checkmark E(0 ; 7)$ (4) $\checkmark x = 0$ $\checkmark \text{simplification/ vereenvoudiging}$ $\checkmark y - \text{values/waardes}$ $\checkmark E(0 ; 7)$ (4)
4.1.5	$m_{EM} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{4-7}{2-0}$ $= -\frac{3}{2}$ $m_{AB} = -\frac{3}{2}$ $\therefore EM \parallel AB \quad (m_{EM} = m_{AB})$	$\checkmark m_{EM} = -\frac{3}{2}$ $\checkmark \text{reason/rede}$ (2)

4.2	The centres of the circles are / <i>Die middelpunte van die sirkels is</i> $P(-2 ; 4)$ and / <i>en</i> $Q(5 ; -1)$ $QP^2 = (-2 - 5)^2 + (4 - (-1))^2$ $QP = \sqrt{74} \approx 8,60 \text{ units}$ $r_M + r_p = 5 + 3$ $= 8$ $\therefore r_M + r_p < QP$ $\therefore \text{The two circles do not intersect/Die twee sirkels sny nie}$	✓ both centres/albei <i>Midpte</i> ✓ QP ✓ correct subst into form/<i>korrekte subst</i> <i>in formule</i> ✓ distance between 2 centres/<i>afstand</i> <i>tussen 2 midpte</i> ✓✓ $r_M + r_p < QP$ (6) [22]
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QUESTION/VRAAG 5

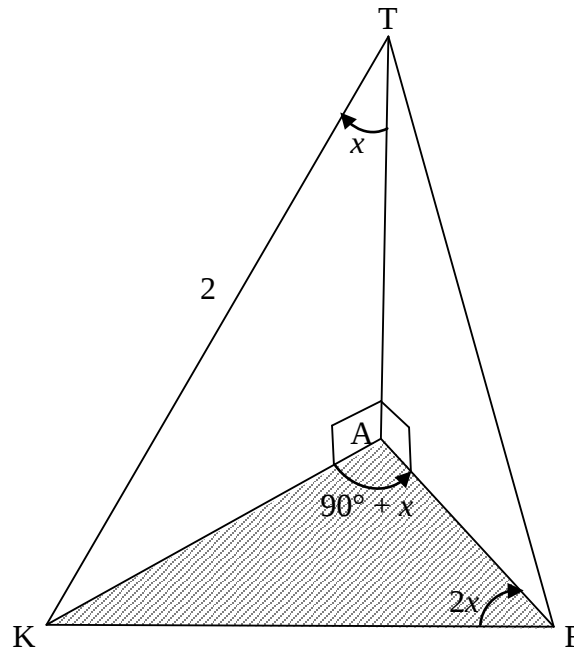
5.1	$x^2 + y^2$ $= (3 \sin \theta)^2 + (3 \cos \theta)^2$ $= 9 \sin^2 \theta + 9 \cos^2 \theta$ $= 9(\sin^2 \theta + \cos^2 \theta)$ $= 9(1)$ $= 9$	✓ simpl/vereenv ✓ CF/GF = 9 ✓ answer/antw (3)
5.2	$\sin(540^\circ - x) \cdot \sin(-x) - \cos(180^\circ - x) \cdot \sin(90^\circ + x)$ $\sin(180^\circ - x) \cdot \sin(-x) - \cos(180^\circ - x) \cdot \sin(90^\circ + x)$ $= (\sin x)(-\sin x) - (-\cos x)(\cos x)$ $= -\sin^2 x + \cos^2 x$ $= \cos 2x$	✓ $\sin(540^\circ - x) = \sin x$ ✓ $\sin(-x) = -\sin x$ ✓ $\cos(180^\circ - x) = -\cos x$ ✓ $\sin(90^\circ + x) = \cos x$ ✓ $-\sin^2 x + \cos^2 x$ ✓ $\cos 2x$ (6)
5.3.1	$OT = \sqrt{x^2 + p^2}$ $\sin \alpha = \frac{y_T}{OT}$ $= \frac{p}{\sqrt{x^2 + p^2}}$ $\frac{p}{\sqrt{x^2 + p^2}} = \frac{p}{\sqrt{1 + p^2}}$ $x^2 = 1$ $x = -1$ OR/OF (P lies in 3 rd quadrant) $x^2 + y^2 = r^2$ $x^2 + p^2 = (\sqrt{1 + p^2})^2$ $x^2 + p^2 = 1 + p^2$ $x^2 = 1$ $x = -1$ (P lies in 3 rd quadrant)	✓ $OT = \sqrt{x^2 + p^2}$ ✓ $\sin \alpha = \frac{y_T}{OT}$ ✓ $x^2 = 1$ (3) ✓ $x^2 + y^2 = r^2$ ✓ subst ✓ $x^2 = 1$ (3)
5.3.2	$\cos(180^\circ + \alpha)$ $= -\cos \alpha$ $= -\left(\frac{-1}{\sqrt{1 + p^2}}\right)$ $= \frac{1}{\sqrt{1 + p^2}}$	✓ $-\cos \alpha$ ✓ answer/antw (2)

5.3.3	$\begin{aligned}\cos 2\alpha &= \cos^2 \alpha - \sin^2 \alpha \\ &= \left(\frac{-1}{\sqrt{1+p^2}} \right)^2 - \left(\frac{p}{\sqrt{1+p^2}} \right)^2 \\ &= \frac{1}{1+p^2} - \frac{p^2}{1+p^2} \\ &= \frac{1-p^2}{1+p^2}\end{aligned}$ OR/OF $\begin{aligned}\cos 2\alpha &= 1 - 2\sin^2 \alpha \\ &= 1 - 2 \left(\frac{p}{\sqrt{1+p^2}} \right)^2 \\ &= 1 - 2 \left(\frac{p^2}{1+p^2} \right) \\ &= 1 - \frac{2p^2}{1+p^2} \\ &= \frac{1+p^2-2p^2}{1+p^2} \\ &= \frac{1-p^2}{1+p^2}\end{aligned}$ OR/OF $\begin{aligned}\cos 2\alpha &= 2\cos^2 \alpha - 1 \\ &= 2 \left(\frac{-1}{\sqrt{1+p^2}} \right)^2 - 1 \\ &= 2 \left(\frac{1}{1+p^2} \right) - 1 \\ &= \frac{2}{1+p^2} - 1 \\ &= \frac{2-1-p^2}{1+p^2} \\ &= \frac{1-p^2}{1+p^2}\end{aligned}$	✓ expansion/ uitbreiding ✓✓ squaring each term/kwadreer elke term (3) ✓ expansion/ uitbreiding ✓ squaring/kwadring ✓ writing as single fraction/skryf as enkelterm (3) ✓ expansion/ uitbreiding ✓ squaring/kwadring ✓ writing as single fraction/skryf as enkelterm (3)
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5.4.1	The identity is undefined for/<i>die identiteit is ongedefinieerd as:</i> $2\sin^2 x = 0$ $\therefore \sin x = 0:$ $x = 0^\circ ; 180^\circ$ or/of $\tan x = \infty:$ $x = 90^\circ$ $\therefore x = 0^\circ ; 90^\circ ; 180^\circ$	✓ $x = 0^\circ$ ✓ $x = 90^\circ$ ✓ $x = 180^\circ$ (3)
5.4.2	LHS/LK = $\frac{2 \tan x - \sin 2x}{2 \sin^2 x}$ $= \frac{2 \left(\frac{\sin x}{\cos x} \right) - 2 \sin x \cos x}{2 \sin^2 x}$ $= \left(\frac{2 \sin x - 2 \sin x \cos^2 x}{\cos x} \right) \times \frac{1}{2 \sin^2 x}$ $= \frac{2 \sin x (1 - \cos^2 x)}{\cos x} \times \frac{1}{2 \sin^2 x}$ $= \frac{2 \sin x (\sin^2 x)}{\cos x} \times \frac{1}{2 \sin^2 x}$ $= \frac{\sin x}{\cos x}$ $= \tan x$ $= \text{RHS/RK}$ OR/OF LHS/LK = $\frac{2 \tan x - \sin 2x}{2 \sin^2 x}$ $= \frac{2 \left(\frac{\sin x}{\cos x} \right) - 2 \sin x \cos x}{2 \sin^2 x} \times \frac{\cos x}{\cos x}$ $= \frac{2 \sin x - 2 \sin x \cos^2 x}{2 \sin^2 x \cos x}$ $= \frac{2 \sin x (1 - \cos^2 x)}{2 \sin^2 x \cos x}$ $= \frac{2 \sin x \cdot \sin^2 x}{2 \sin^2 x \cos x}$ $= \frac{\sin x}{\cos x}$ $= \tan x$ $= \text{RHS/RK}$	✓ $\frac{\sin x}{\cos x}$ ✓ $2 \sin x \cdot \cos x$ ✓ simplify numerator/ <i>vereenv teller</i> ✓ factorising/<i>fakt</i> ✓ $1 - \cos^2 x = \sin^2 x$ ✓ simplify to/<i>vereenv</i> <i>na</i> $\frac{\sin x}{\cos x}$ (6) ✓ $\frac{\sin x}{\cos x}$ ✓ $2 \sin x \cdot \cos x$ ✓ simpl/<i>vereenv</i> ✓ factorising/<i>fakt</i> ✓ $1 - \cos^2 x = \sin^2 x$ ✓ simplify to /<i>vereenv</i> <i>na</i> $\frac{\sin x}{\cos x}$ (6) [26]

QUESTION/VRAAG 6

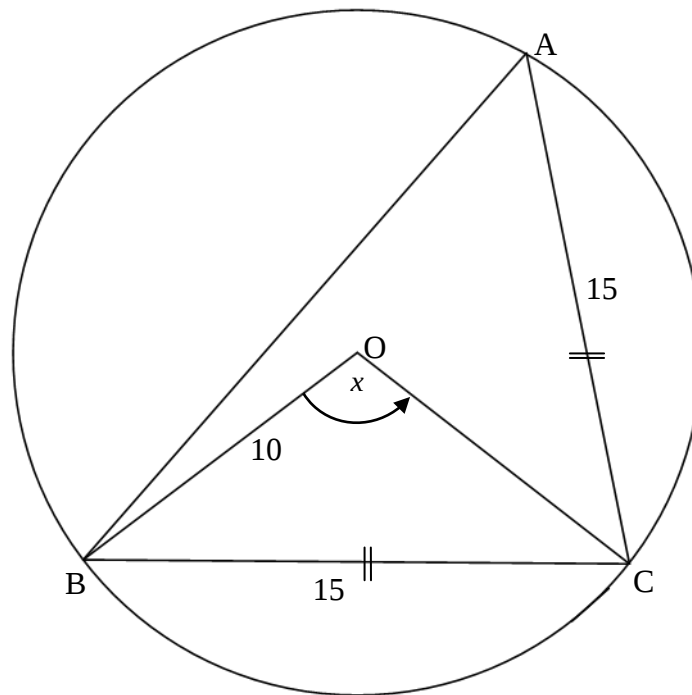
6.1



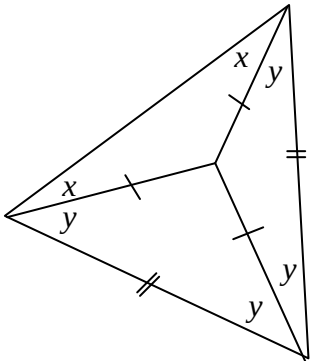
6.1.1	In $\triangle TAK$: $\frac{AK}{KT} = \sin \hat{KTA}$ $AK = KT \cdot \sin x$ $= 2 \sin x$ OR/OF $\frac{\sin \hat{KTA}}{AK} = \frac{\sin \hat{KAT}}{KT}$ $\frac{\sin 90^\circ}{2} = \frac{\sin x}{AK}$ $AK = 2 \sin x$	✓ correct trig ratio/ korrekte trigverh. ✓ answer/antw (2) ✓ correct subst into sine rule/korrekte subst in sin-reël ✓ answer/antw (2)
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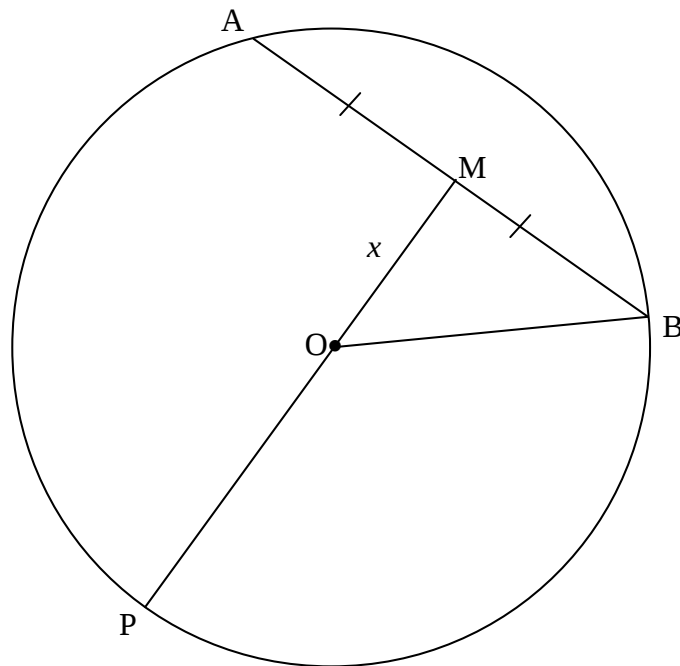
6.1.2	In $\triangle AKF$: $\frac{KF}{\sin \hat{K}AF} = \frac{AK}{\sin \hat{A}FK}$ $\frac{KF}{\sin(90^\circ + x)} = \frac{AK}{\sin 2x}$ $KF = \frac{AK \cdot \sin(90^\circ + x)}{\sin 2x}$ $= \frac{2 \sin x \cdot \cos x}{2 \sin x \cdot \cos x}$ $= 1$ OR/OF In $\triangle AKF$: $\frac{KF}{\sin \hat{K}AF} = \frac{AK}{\sin \hat{A}FK}$ $\frac{KF}{\sin(90^\circ + x)} = \frac{AK}{\sin 2x}$ $KF = \frac{AK \cdot \sin(90^\circ + x)}{\sin 2x}$ $= \frac{AT \cdot \tan x \cdot \cos x}{2 \sin x \cdot \cos x}$ $= \frac{2 \cos x \cdot \frac{\sin x}{\cos x} \cdot \cos x}{2 \sin x \cdot \cos x}$ $= 1$ $\cos x = \frac{AT}{2}$ $\therefore AT = 2 \cos x$	✓ using sine rule/ <i>gebruik sin-reël</i> ✓ correct subst into sine rule/<i>korrekte subst in sin-reël</i> ✓ $\sin(90^\circ + x) = \cos x$ ✓ $2 \sin x \cdot \cos x$ ✓ 1 (5) ✓ using sine rule/ <i>gebruik sin-reël</i> ✓ correct subst into sine rule/<i>korrekte subst in sin-reël</i> ✓ $\sin(90^\circ + x) = \cos x$ ✓ $2 \sin x \cdot \cos x$ ✓ 1 (5)
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6.2



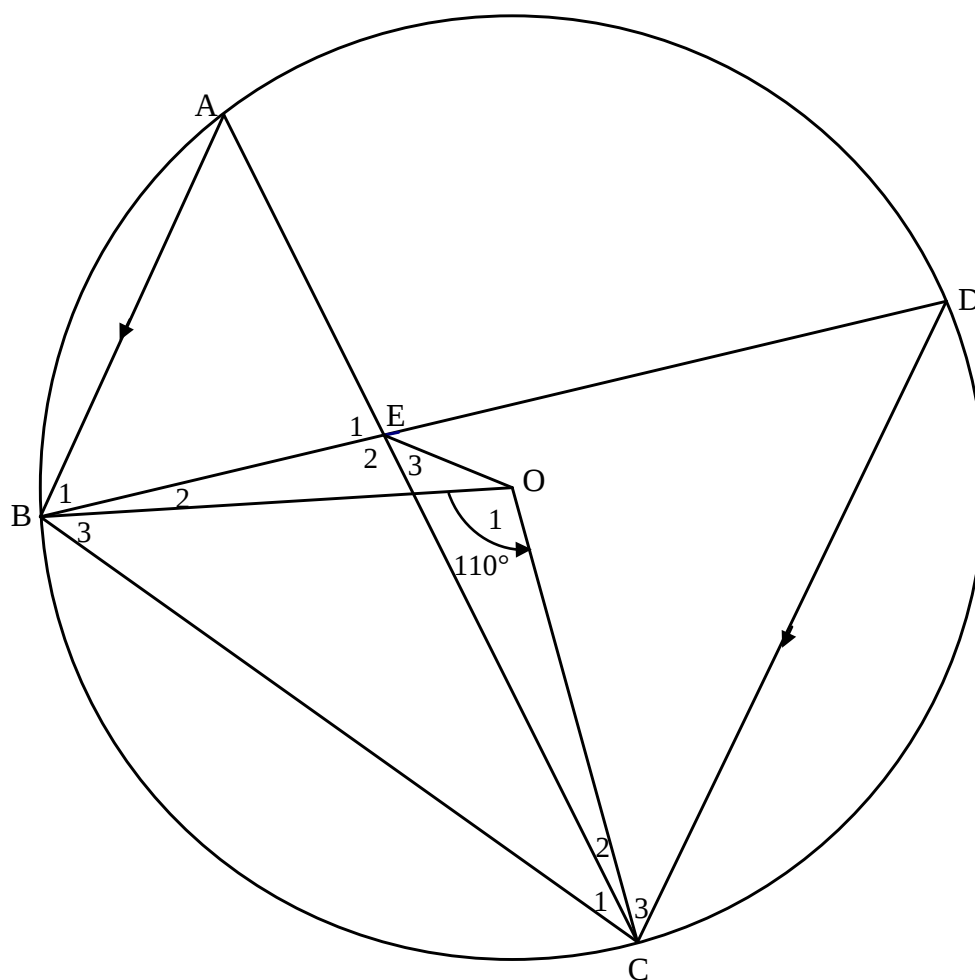
6.2.1	In $\triangle BOC$: $BC^2 = BO^2 + CO^2 - 2 \cdot BO \cdot CO \cdot \cos x$ $15^2 = 10^2 + 10^2 - 2(10)(10) \cdot \cos x$ $200 \cos x = -25$ $\cos x = -0,125$ $x = 180^\circ - 82,82^\circ$ $= 97,18^\circ$ OR/OF Draw a line $OD \perp BC$: $BD = DC$ (line from centre $\perp$ on chord) $\triangle OBD \equiv \triangle OCD$ (90°; h; s) $\sin \frac{x}{2} = \frac{7,5}{10}$ $\frac{x}{2} = 48,59^\circ$ $\therefore x = 97,18^\circ$	✓ using cosine rule/ gebruik cos-reël ✓ correct subst/ korrekte subst ✓ $\cos x = -0,125$ ✓ $97,18^\circ$ (4) ✓ S/R ✓ correct ratio/ korrekte verh ✓ value of/waarde van $\frac{x}{2}$ ✓ $97,18^\circ$ (4)
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6.2.2	$\hat{BAC} = 48,59^\circ$ ($\angle$ at centre = $2 \times \angle$ at circ / $\angle$ by midpt = $2 \times \angle$ omt) $\hat{ABC} = \hat{BAC} = 48,59^\circ$ ($\angle$'s opp equal sides / $\angle$e teenoor = sye) $\therefore \hat{ACB} = 82,82^\circ$ (sum of $\angle$s of Δ / som van $\angle$e van Δ) OR/OF $\hat{ACB} = \frac{1}{2} \hat{AOB}$ ($\angle$ at centre = $2 \times \angle$ at circle) $\quad \quad \quad (\angle$ by midpt = $2 \times \angle$ omt) $\quad \quad \quad = \frac{1}{2} [360^\circ - 2(97,18^\circ)]$ $\quad \quad \quad = 82,82^\circ$ OR/OF $\hat{OCB} = \frac{1}{2} (180^\circ - 97,18^\circ)$ ($\angle$'s opp equal sides; sum of $\angle$s of Δ) $\quad \quad \quad = 41,41^\circ$ ($\angle$e teenoor = sye; som van $\angle$e van Δ)  $\hat{ACB} = 2(41,41^\circ)$ $\quad \quad \quad = 82,82^\circ$	$\checkmark$ S $\checkmark$ S $\checkmark 82,82^\circ$ (3) OR/OF $\checkmark$ S $\checkmark$ S $\checkmark 82,82^\circ$ (3) $\checkmark$ S $\checkmark 82,82^\circ$ (3)
6.2.3	Area/Oppervlakte ΔABC $= \frac{1}{2} (BC)(AC) \sin \hat{ACB}$ $= \frac{1}{2} (15)(15)(\sin 82,82^\circ)$ $= 111,62 \text{ cm}^2$	$\checkmark$ correct subst into area rule / <i>korrekte subst in opp-reël</i> $\checkmark 111,62 \text{ cm}^2$ (2) [16]

QUESTION/VRAAG 7

7.1	MB = 10 cm	✓ answer/antw (1)
7.2	line from centre to midpoint of chord is perpendicular to chord/lyn vanaf midpt na midpt van koord is loodreg op koord OR/OF line from centre bisects chord/lyn vanaf midpt halveer koord	✓ answer/antw (1) ✓ answer/antw (1)
7.3	$\frac{MP}{OM} = \frac{5}{2}$ $\frac{x + OP}{x} = \frac{5}{2}$ $2x + 2OP = 5x$ $OP = \frac{3x}{2}$ OR/OF $\frac{OP}{OM} = \frac{3}{2}$ $OP = \frac{3x}{2}$	$\checkmark \frac{x + OP}{x} = \frac{5}{2}$ $\checkmark OP = \frac{3x}{2}$ $\checkmark \frac{OP}{OM} = \frac{3}{2}$ $\checkmark OP = \frac{3x}{2}$

7.4	$OM^2 + MB^2 = OB^2$ $x^2 + 10^2 = \left(\frac{3x}{2}\right)^2$ $4x^2 + 400 = 9x^2$ $5x^2 = 400$ $x^2 = 80$ $x = 8,94 \text{ or } 4\sqrt{5} \text{ or } \sqrt{80}$	✓ subst into/subst Pythagoras ✓ $4x^2 + 400 = 9x^2$ ✓ answer/antw (3) [7]
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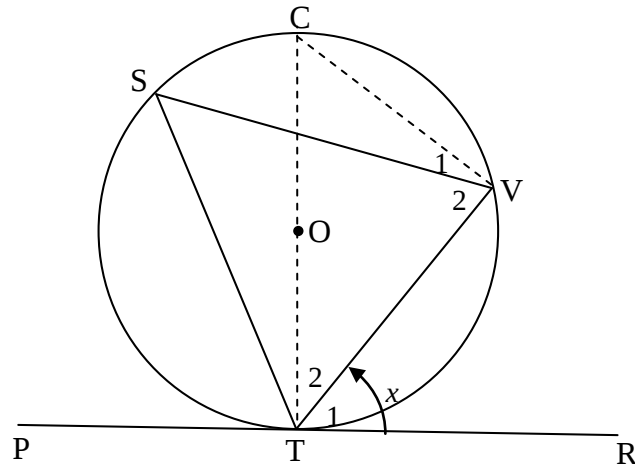
QUESTION/VRAAG 8

8.1.1	$\hat{D} = \frac{1}{2} \hat{O}_1 = 55^\circ$ ($\angle$ at centre = $2 \times \angle$ at circ / $\angle$ by midpt = $2 \times \angle$ by omt)	✓S ✓R (2)
8.1.2	$\hat{A} = \frac{1}{2} \hat{O}_1 = 55^\circ$ ($\angle$ at centre = $2 \times \angle$ at circ / $\angle$ by midpt = $2 \times \angle$ by omt)	✓S ✓R (2)
	OR/OF	
	$\hat{A} = \hat{D} = 55^\circ$ ($\angle$ s in same segment / $\angle$ e in dieselfde segment)	✓S ✓R (2)
8.1.3	$\hat{B}_1 = \hat{D} = 55^\circ$ (alternate $\angle$ s / verwiss $\angle$ e; $AB \parallel DC$)	✓S ✓R
	$\hat{E}_2 = \hat{B}_1 + \hat{A}$ (ext $\angle$ of Δ = sum of opp $\angle$ s / buite $\angle$ v Δ = som v tos $\angle$ e)	✓R
	$= 55^\circ + 55^\circ$	
	$\hat{E}_2 = 110^\circ$	✓ answer/antw (4)
8.2	$\hat{E}_2 = \hat{O}_1 = 110^\circ$ (proven in / bewys in 8.1.3)	✓S
	BEOC is a cyclic quadrilateral (equal $\angle$ s subtended by line / gelyke $\angle$ e onderspan deur lyn)	✓R (2)
		[10]

QUESTION/VRAAG 9

9.1	the interior opposite angle/ <i>die teenoorstaande binnehoek</i> .	✓ answer/antw (1)
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9.2

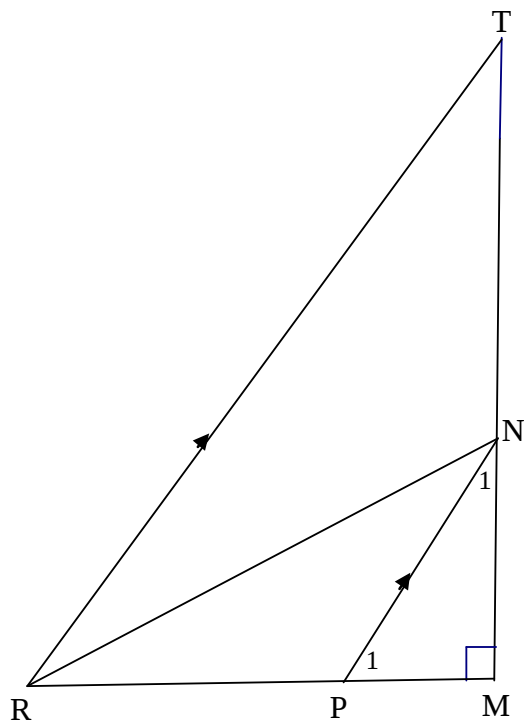


Construction: Draw diameter CT and join CV.

Konstruksie: Trek middellyn CT en verbind CV.

$\hat{V}_1 + \hat{V}_2 = 90^\circ$	$\angle$ in semi-circle/ $\angle$ in halfsirkel	✓ S ✓ R
$\hat{T}_2 = 90^\circ - x$	Tangent $\perp$ diameter/radius/raaklyn $\perp$ middellyn/radius	✓ R
$\therefore \hat{C} = x$	Sum of the angles of triangle/Som van die hoeke van 'n driehoek	✓ S
$\therefore \hat{S} = x$	$\angle$'s same segment/ $\angle$ e in dieselfde segment	✓ R
$\therefore \hat{VTR} = \hat{S}$		(5)

9.3.3(b)	$\hat{T}_2 = \hat{S}_2 = 80^\circ$ (ext $\angle$ of cyclic quad/ <i>buite</i> $\angle$ van koordevh) $V + \hat{W}_4 = \hat{T}_2$ (ext $\angle$ of Δ / <i>buite</i> $\angle$ van Δ) $\therefore \hat{V} = 50^\circ$	$\checkmark$ S $\checkmark$ R $\checkmark$ S $\checkmark$ S (4)
9.3.4	In ΔRVW and/en ΔRWS : $\hat{R}_2 = \hat{R}_3 = 30^\circ$ (proven/bewys in 9.3.1) $\hat{V} = \hat{W}_2 = 50^\circ$ (proven/bewys in 9.3.3) $V\hat{W}R = \hat{S}_1$ (3rd $\angle$ in Δ) $\therefore \Delta RVW \parallel \Delta RWS$ ($\angle\angle\angle$) $\therefore \frac{WR}{RV} = \frac{RS}{WR}$ ($\Delta RVW \parallel \Delta RWS$) $\therefore WR^2 = RV \cdot RS$	$\checkmark$ using the correct Δ s/ <i>gebruik korrekte Δe</i> $\checkmark$ S $\checkmark$ S $\checkmark$ R (3rd $\angle$ in Δ) or ($\angle\angle\angle$) $\checkmark$ S (5) [22]

QUESTION/VRAAG 10

10.1.1	corresponding $\angle$ s/ooreenkomstige $\angle$ e; $PN \parallel RT$	✓ answer/antw (1)
10.1.2	$\angle$; $\angle$; $\angle$ OR/OF $\angle$; $\angle$	✓ answer/antw (1)
10.2	$\frac{PM}{RM} = \frac{PN}{RT} \quad (\triangle PNM \parallel \triangle RTM)$ $= \frac{PN}{3PN}$ $= \frac{1}{3}$	✓ S ✓ S (2)
10.3	$\frac{PM}{RM} = \frac{1}{3} \quad \therefore \frac{RP}{RM} = \frac{2}{3}$ $RN^2 - PN^2 = (RM^2 + NM^2) - (PM^2 + NM^2) \quad (\text{Pyth})$ $= RM^2 - PM^2$ $= \left(\frac{3}{2}RP\right)^2 - \left(\frac{1}{2}RP\right)^2$ $= \frac{9}{4}RP^2 - \frac{1}{4}RP^2$ $= 2RP^2$ OR/OF	✓ Use of Pyth. for RN^2 and PN^2 ✓ $RM = \frac{3}{2}RP$ ✓ $PM = \frac{1}{2}RP$ ✓ $\frac{9}{4}RP^2$ & $\frac{1}{4}RP^2$ (4)

	$ \begin{aligned} RN^2 - PN^2 &= (RM^2 + NM^2) - (PM^2 + NM^2) \quad (\text{Pyth}) \\ &= RM^2 - PM^2 \\ &= (3PM)^2 - PM^2 \\ &= 8PM^2 \\ &= 2(2PM)^2 \\ &= 2RP^2 \end{aligned} $ OR/OF $ \begin{aligned} RN^2 - PN^2 &= (RM^2 + NM^2) - (PM^2 + NM^2) \quad (\text{Pyth}) \\ &= RM^2 - PM^2 \\ &= (RP + PM)^2 - PM^2 \\ &= RP^2 + 2RP \cdot PM + PM^2 - PM^2 \\ &= RP^2 + 2RP \cdot \frac{1}{2} RP \\ &= 2RP^2 \end{aligned} $	$\checkmark$ Use of Pyth. for RN^2 and PN^2 $\checkmark$ $RM = RP + PM$ $\checkmark$ $(3PM)^2 - PM^2$ $\checkmark$ $RP = 2PM$ (4) $\checkmark$ Use of Pyth. for RN^2 and PN^2 $\checkmark$ $RM = RP + PM$ $\checkmark$ expansion/ <i>uitbreiding</i> $\checkmark$ $PM = \frac{1}{2} RP$ (4) [8]
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TOTAL/TOTAAL: 150