



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE/GRAAD 12

MATHEMATICS P2/WISKUNDE V2

FEBRUARY/MARCH/FEBRUARIE/MAART 2016

MEMORANDUM

MARKS: 150

PUNTE: 150

**This memorandum consists of 21 pages./
*Hierdie memorandum bestaan uit 21 bladsye.***

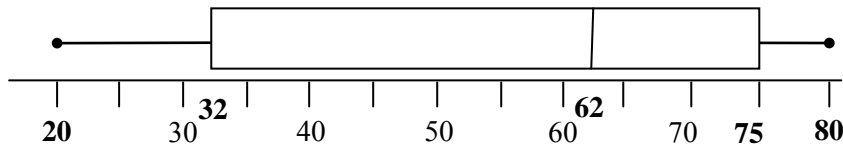
NOTE:

- If a candidate answers a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an attempt of a question and did not redo 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.

LET WEL:

- Indien 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.
- Indien 'n kandidaat 'n antwoord doodgetrek en nie oorgedoen het nie, sien die doodgetrekte poging na.
- Volgehoue akkuraatheid word in ALLE aspekte van die memorandum toegepas. Hou op nasien by die tweede berekeningsfout.
- Om antwoorde/waardes om 'n probleem op te los, te veronderstel, word NIE toegelaat NIE.

QUESTION/VRAAG 1

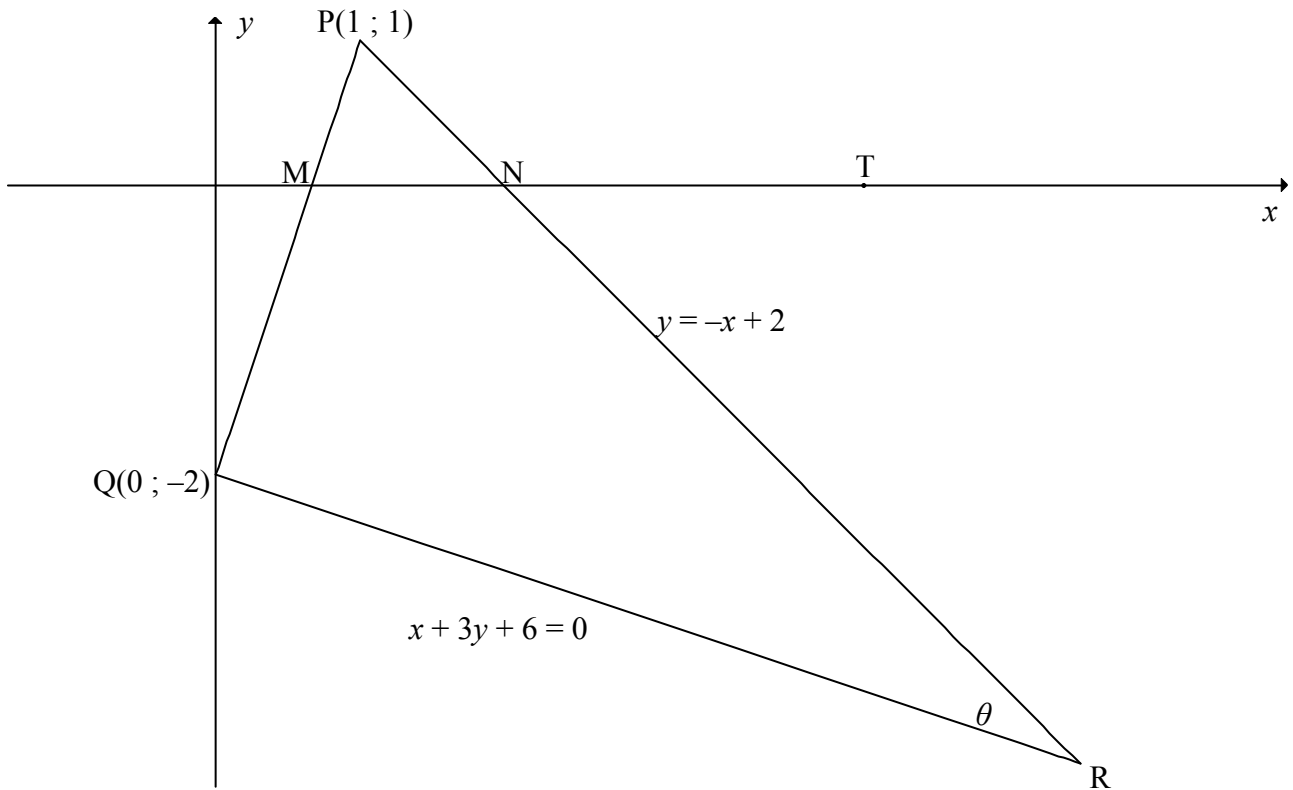


1.1	The data is skewed to the left/ <i>Die data is skeef na links.</i> OR/OF The data is negatively skewed/ <i>Die data is negatief skeef.</i>	✓ answ/antw ✓ answ/antw (1)									
1.2	Range/ <i>Omvang</i> = 80 – 20 = 60	✓ max. – min. ✓ answ/antw (2)									
1.3	25% of the learners failed/ <i>van die leerdere het gedruip</i>	✓ ✓ answ/antw (2)									
1.4	$54 = \frac{445 + T_4}{9}$ $T_4 = 41$ <table border="1" data-bbox="336 1115 1082 1196" style="margin-left: auto; margin-right: auto;"> <tr> <td style="background-color: #cccccc;">20</td> <td style="background-color: #cccccc;">28</td> <td style="background-color: #cccccc;">36</td> <td style="background-color: #cccccc;">41</td> <td style="background-color: #cccccc;">62</td> <td style="background-color: #cccccc;">69</td> <td style="background-color: #cccccc;">75</td> <td style="background-color: #cccccc;">75</td> <td style="background-color: #cccccc;">80</td> </tr> </table>	20	28	36	41	62	69	75	75	80	✓ 20 ✓✓ 41 ✓ 62 ✓ 75 ✓ 80 (6) [11]
20	28	36	41	62	69	75	75	80			

QUESTION/VRAAG 2

<p>2.1</p>	$\text{Mean/Gemiddelde} = \frac{2(15) + 8(25) + \dots + 2(85)}{60} = \frac{3080}{60}$ <p>= 51,33 messages per day/<i>boodskappe per dag</i></p>	<p>✓ 3 080 ✓ $\frac{3080}{60}$ ✓ <i>answ/antw</i> (3)</p>
<p>2.2</p>	<p style="text-align: center;">OGIVE/OGIEF</p>	<p>✓ grounding at (10 ; 0) ✓ plotting at upper limits ✓ plotting cumulative <i>f</i> ✓ smooth shape of curve ✓ <i>geanker by</i> (10 ; 0) ✓ <i>stip by boonste limiete</i> ✓ <i>plot kumulatiewe f</i> ✓ <i>gladde vorm van kurwe</i> (4)</p>
<p>2.3</p>	<p>Number of days/<i>Getal dae</i> = 60 – 46 (see on graph above/<i>sien op grafiek hierbo</i>) = 14 days/<i>dae</i></p> <p style="text-align: center;">OR/OF</p> <p>Number of days/<i>Getal dae</i> = $2 + 3 + \frac{1}{2} \times 18 = 14$ days/<i>dae</i></p>	<p>✓ 46 (accept 45 – 49) ✓ <i>answ/antw</i> (accept 11 – 15) (2)</p> <p>✓ add correct values/<i>tel korrekte waardes by</i> ✓ <i>answ/antw</i> (2) [9]</p>

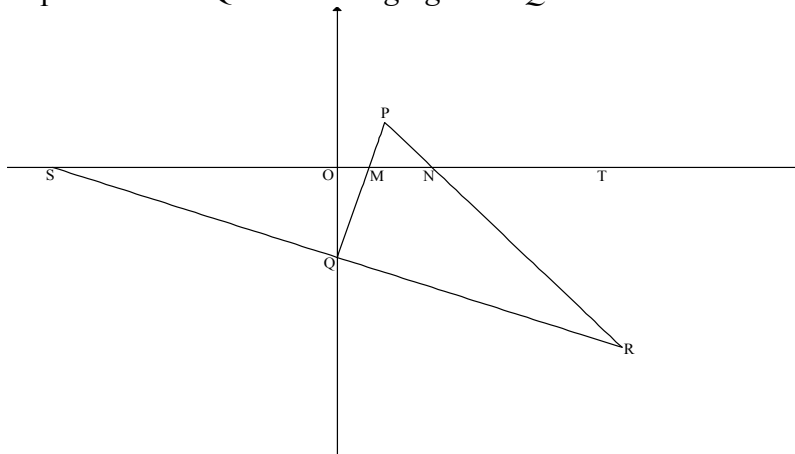
QUESTION/VRAAG 3



3.1	$m_{PQ} = \frac{1 - (-2)}{1 - 0}$ $= 3$	✓ subst (1 ; 1) & (0 ; -2) ✓ answ/antw (2)
3.2	$QR: y = -\frac{1}{3}x - 2$ $\therefore m_{QR} = -\frac{1}{3}$ $m_{PQ} \times m_{QR} = 3 \times -\frac{1}{3}$ $= -1$ $\therefore PQ \perp QR \quad \therefore \hat{PQR} = 90^\circ$	✓ $m_{QR} = -\frac{1}{3}$ ✓ $m_{PQ} \times m_{QR} = -1$ (2)

<p>3.3</p>	$-\frac{1}{3}x - 2 = -x + 2$ $\frac{2}{3}x = 4$ $x = 6$ $y = -4$ $\therefore R(6; -4)$	<p>✓ equating/gelyk stel</p> <p>✓ x-value/waarde</p> <p>✓ y-value/waarde</p> <p>(3)</p>
<p>3.4</p>	$PR = \sqrt{(1-6)^2 + (1-(-4))^2}$ $= \sqrt{50} = 5\sqrt{2}$ <p style="text-align: center;">OR/OF</p> $PR^2 = (1-6)^2 + (1-(-4))^2$ $= 50$ $\therefore PR = \sqrt{50} = 5\sqrt{2}$	<p>✓ subst into/in distance formula/afstandsformule</p> <p>✓ answ/antw in surd form/wortelvorm</p> <p>(2)</p> <p>✓ subst into/in distance formula/afstandsformule</p> <p>✓ answ/antw in surd form/wortelvorm</p> <p>(2)</p>
<p>3.5</p>	<p>PR is a diameter/ 'n middellyn [chord subtends/kd onderspan 90°]</p> <p>Centre of circle/Midpt v sirkel: $\left(\frac{1+6}{2}; \frac{1-4}{2}\right)$</p> $= \left(3\frac{1}{2}; -1\frac{1}{2}\right)$ $r = \frac{\sqrt{50}}{2} \text{ OR } \frac{5\sqrt{2}}{2} \text{ OR } 3,54$ $\therefore \left(x - \frac{7}{2}\right)^2 + \left(y + \frac{3}{2}\right)^2 = \frac{50}{4} \text{ OR } \frac{25}{2} \text{ OR } 12,5$	<p>✓✓ S</p> <p>✓✓ $\left(3\frac{1}{2}; -1\frac{1}{2}\right)$</p> <p>✓ r-value/waarde</p> <p>✓ answ/antw</p> <p>(6)</p>
<p>3.6</p>	<p>m of/van radius = -1</p> <p>∴ m of/van tangent/raaklyn = 1</p> <p>Equation of tangent/Vgl van raaklyn:</p> $y - y_1 = (x - x_1) \qquad y = x + c$ $y - 1 = x - 1 \qquad \text{OR/OF} \qquad 1 = 1 + c$ $\therefore y = x \qquad y = x$	<p>✓ m of tang/rkl</p> <p>✓ subst m & P(1 ; 1) into/in eq of line/vgl v lyn</p> <p>✓ answ/antw</p> <p>(3)</p>
<p>3.7</p>	$\tan \hat{PNT} = m_{PR} = -1$ $\therefore \hat{PNT} = 135^\circ$ $\tan \hat{PMT} = m_{PQ} = 3$ $\therefore \hat{PMT} = 71,57^\circ$ $\hat{P} = 63,43^\circ \qquad \text{[ext } \angle \text{ of } \Delta \text{ /buite } \angle \text{ v } \Delta]$ $\therefore \theta = 26,57^\circ \qquad \text{[sum of } \angle \text{ s in } \Delta \text{ /som v } \angle \text{ e in } \Delta]$ <p style="text-align: center;">OR/OF</p>	<p>✓ $\tan \hat{PNT} = -1$</p> <p>✓ $\hat{PNT} = 135^\circ$</p> <p>✓ $\hat{PMT} = 71,57^\circ$</p> <p>✓ $\hat{P} = 63,43^\circ$</p> <p>✓ answ/antw</p> <p>(5)</p>

Extrapolation of RQ to S/Verlenging van RQ na S:



$$\tan \hat{PNT} = m_{PR} = -1$$

$$\therefore \hat{SNR} = 135^\circ$$

$$\tan \hat{NSR} = m_{RS} = -\frac{1}{3}$$

$$\therefore \hat{NSR} = 18,43^\circ$$

$$\theta = 180^\circ - (135^\circ + 18,43^\circ) \quad [\text{sum of } \angle\text{s in } \Delta/\text{som v } \angle\text{e in } \Delta]$$

$$= 26,57^\circ$$

OR/OF

$$PQ^2 = 1^2 + 3^2 = 10$$

$$PQ = \sqrt{10}$$

$$\therefore \sin \theta = \frac{PQ}{PR} = \frac{\sqrt{10}}{\sqrt{50}} = \frac{1}{\sqrt{5}}$$

$$\therefore \theta = 26,57^\circ$$

OR/OF

$$QR^2 = 6^2 + 2^2 = 40$$

$$QR = 2\sqrt{10}$$

$$\therefore \cos \theta = \frac{2\sqrt{10}}{\sqrt{50}} = \frac{2}{\sqrt{5}}$$

$$\therefore \theta = 26,57^\circ$$

OR/OF

$$\checkmark \tan \hat{PNT} = -1$$

$$\checkmark \hat{SNR} = 135^\circ$$

$$\checkmark \tan \hat{NSR} = -\frac{1}{3}$$

$$\checkmark \hat{NSR} = 18,43^\circ$$

\checkmark answ/antw

(5)

\checkmark subst into/in

distance formula/
afstandsformule

\checkmark distance/afst PQ

\checkmark correct trig ratio/
korrekte trig vhl

\checkmark correct trig eq/
korrekte trig vgl

\checkmark answ/antw

(5)

\checkmark subst into/in

distance formula/
afstandsformule

\checkmark distance/afst PQ

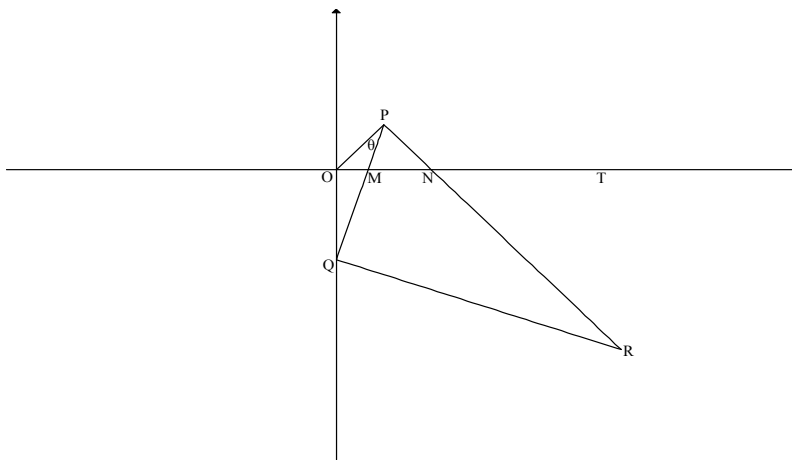
\checkmark correct trig ratio/
korrekte trig vhl

\checkmark correct trig eq/
korrekte trig vgl

\checkmark answ/antw

(5)

$$\begin{aligned} \tan \theta &= \frac{m_{RQ} - m_{PR}}{1 + m_{RQ} \cdot m_{PR}} \\ &= \frac{-\frac{1}{3} - (-1)}{1 + (-\frac{1}{3})(-1)} \\ &= \frac{1}{2} \\ \therefore \theta &= 26,57^\circ \end{aligned}$$



tangent OP goes through the origin/raakl OP gaan deur oorsprong
 $\widehat{POM} = 45^\circ$
 $\widehat{OPM} = \theta = \widehat{P}$ [tan-chord theorem/raakl-kdst]
 $\tan \widehat{PMT} = m_{PQ} = 3$
 $\therefore \widehat{PMT} = 71,57^\circ$
 $\therefore \theta + 45^\circ = 71,57^\circ$ [ext \angle of Δ /buite- \angle v Δ]
 $\therefore \theta = 26,57^\circ$

✓ correct formula/
 korrekte formule

✓ $m_{RQ} = -\frac{1}{3}$

✓ correct subst/
 subst korrek

✓ $\tan \theta = \frac{1}{2}$

✓ $\theta = 26,57^\circ$

(5)

✓ $\widehat{POM} = 45^\circ$
 ✓ R

✓ $\widehat{PMT} = 71,57^\circ$

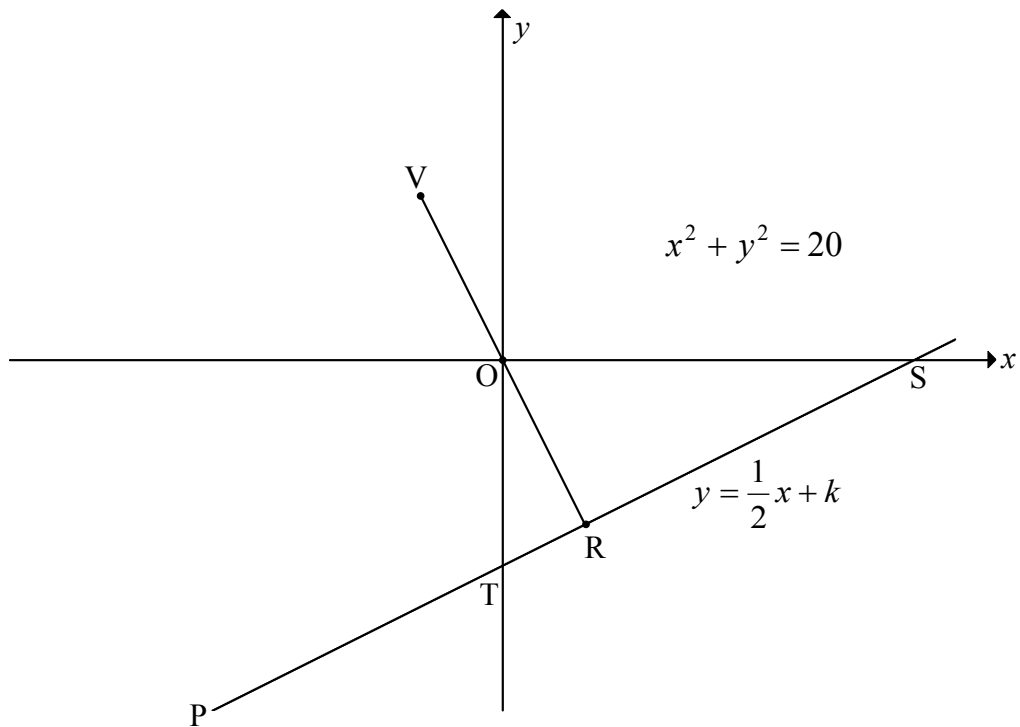
✓ S

✓ $\theta = 26,57^\circ$

(5)

[23]

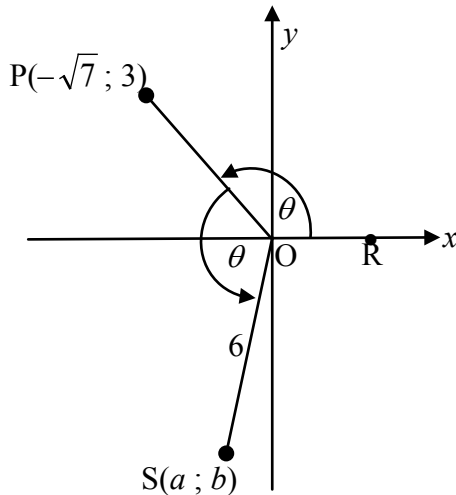
QUESTION/VRAAG 4



<p>4.1</p>	<p>OR \perp TR [radius \perp tangent/raakl] $\therefore m_{TR} \times m_{OR} = -1$ $\therefore m_{OR} = -2$ $\therefore y = -2x$</p>	<p>\checkmarkS/R \checkmarkm of/van OR \checkmarkequation/vgl (3)</p>
<p>4.2</p>	<p>$x^2 + (-2x)^2 = 20$ $x^2 + 4x^2 = 20$ $5x^2 - 20 = 0$ $x^2 - 4 = 0$ $(x + 2)(x - 2) = 0$ $\therefore x = 2$ $y = -2(2) = -4$ $\therefore R(2 ; -4)$</p>	<p>\checkmarksubst eq of OR into circle eq/ subst vgl OR in sirkelvgl \checkmarkst. form/st. vorm \checkmarkx-value/waarde \checkmarky-value/waarde (4)</p>

4.3	<p>Subst R(2 ; -4) into the equation of/in vgl van PRS:</p> $-4 = \frac{1}{2}(2) + k$ $k = -5$ $\therefore OT = 5$ $0 = \frac{1}{2}x - 5$ $x = 10$ $\therefore OS = 10$ $\text{Area/Oppervlakte} = \frac{1}{2} OS \cdot OT$ $= \frac{1}{2}(10)(5)$ $= 25 \text{ sq units/vk eenh}$	<p>✓ correct subst/ korrekte subst</p> <p>✓ value of k</p> <p>✓ y = 0 ✓ x-intercept/afsnit</p> <p>✓ correct subst into area form/ subst korrek in opp-formule</p> <p>✓ answ/antw</p> <p style="text-align: right;">(6)</p>
4.4	$0 = \frac{x_v + 2}{2} \quad \text{and/en} \quad 0 = \frac{y_v - 4}{2}$ $\therefore V(-2 ; 4)$ $T(0 ; -5) \quad \dots \text{ from/van 4.3}$ $VT = \sqrt{(-2 - 0)^2 + (4 - (-5))^2}$ $= \sqrt{4 + 81}$ $= \sqrt{85}$	<p>✓ x-value/waardeV ✓ y-value/waardeV</p> <p>✓ subst of points V and T into distance formula/ subst punte V en T in afst-form</p> <p>✓ answ/antw</p> <p style="text-align: right;">(4) [17]</p>

QUESTION/VRAAG 5



5.1.1	$\tan \theta = -\frac{3}{\sqrt{7}}$	✓ answ/antw (1)
5.1.2	$\sin(-\theta) = -\sin \theta$ $OP^2 = (-\sqrt{7})^2 + 3^2$ $OP^2 = 16$ $OP = 4$ $\sin(-\theta) = -\frac{3}{4}$	✓ reduction/ reduksie ✓ OP = 4 ✓ answ/antw (3)
5.1.3	$\frac{a}{6} = \cos 2\theta$ $a = 6(1 - 2\sin^2 \theta)$ $= 6 - 12\left(\frac{3}{4}\right)^2$ $= \frac{24}{4} - \frac{27}{4}$ $= -\frac{3}{4}$ <p style="text-align: center;">OR/OF</p> $\frac{a}{6} = \cos 2\theta$ $a = 6(2\cos^2 \theta - 1)$ $= 12\left(\frac{-\sqrt{7}}{4}\right)^2 - 6$ $= \frac{21}{4} - \frac{24}{4}$ $= -\frac{3}{4}$ <p style="text-align: center;">OR/OF</p>	✓ trig ratio/verh ✓ expansion/ uitbreiding ✓ $\sin \theta = \frac{3}{4}$ ✓ answ/antw (4) ✓ trig ratio/verh ✓ expansion/ uitbreiding ✓ $\cos \theta = \frac{-\sqrt{7}}{4}$ ✓ answ/antw (4)

	$\frac{a}{6} = \cos 2\theta$ $a = 6(\cos^2 \theta - \sin^2 \theta)$ $= 6 \left[\left(\frac{-\sqrt{7}}{4} \right)^2 - \left(\frac{3}{4} \right)^2 \right]$ $= 6 \left(-\frac{2}{16} \right)$ $= -\frac{3}{4}$	<p>✓ trig ratio/verh</p> <p>✓ expansion/ uitbreiding</p> <p>✓ $\cos \theta = \frac{-\sqrt{7}}{4}$ &</p> <p>$\sin \theta = \frac{3}{4}$</p> <p>✓ answ/antw</p> <p>(4)</p>
5.2.1	$\frac{4 \sin x \cos x}{2 \sin^2 x - 1} = \frac{2(2 \sin x \cos x)}{-(1 - 2 \sin^2 x)}$ $= \frac{2 \sin 2x}{-\cos 2x}$ $= -2 \tan 2x$	<p>✓ $2 \sin 2x$</p> <p>✓ $-\cos 2x$</p> <p>✓ answ/antw</p> <p>(3)</p>
5.2.2	$\frac{4 \sin 15^\circ \cos 15^\circ}{2 \sin^2 15^\circ - 1} = -2 \tan 2(15^\circ)$ $= -2 \tan 30^\circ$ $= -2 \left(\frac{1}{\sqrt{3}} \right)$ $= -\frac{2}{\sqrt{3}} \text{ OR/OF } -\frac{2\sqrt{3}}{3}$	<p>✓ $-2 \tan 2(15^\circ)$</p> <p>✓ answ/antw</p> <p>(2)</p> <p>[13]</p>

QUESTION/VRAAG 6

<p>6.1</p>	$\sin(x + 60^\circ) + 2\cos x = 0$ $\sin x \cos 60^\circ + \cos x \sin 60^\circ + 2\cos x = 0$ $\frac{1}{2}\sin x + \frac{\sqrt{3}}{2}\cos x + 2\cos x = 0$ $\frac{1}{2}\sin x = -2\cos x - \frac{\sqrt{3}}{2}\cos x$ $\sin x = -4\cos x - \sqrt{3}\cos x$ $\sin x = \cos x(-4 - \sqrt{3})$ $\frac{\sin x}{\cos x} = \frac{\cos x(-4 - \sqrt{3})}{\cos x}$ $\therefore \tan x = -4 - \sqrt{3}$	<p>✓ expansion/uitbreiding</p> <p>✓ special angle values/ spesiale \angle-waardes</p> <p>✓ simpl/vereenv</p> <p>✓</p> <p>$\sin x = \cos x(-4 - \sqrt{3})$</p> <p>(4)</p>
<p>6.2</p>	$\tan x = -4 - \sqrt{3}$ $\tan x = -(4 + \sqrt{3})$ <p>ref $\angle = 80,10^\circ$ $x = -80,1^\circ$ or/of $99,9^\circ$</p>	<p>✓ $80,10^\circ$</p> <p>✓ $99,90^\circ$</p> <p>✓ $-80,1^\circ$</p> <p>(3)</p>
<p>6.3.1</p>		<p>✓ $(30^\circ ; 1)$</p> <p>✓ $(-60^\circ ; 0)$</p> <p>✓ shape/vorm</p> <p>(3)</p>
<p>6.3.2</p>	$\therefore \sin(x + 60^\circ) > -2\cos x$ $x \in (-80,10^\circ ; 99,90^\circ) \text{ OR/OF } -80,10^\circ < x < 99,90^\circ$	<p>✓ ✓ critical values/ kritiese waardes</p> <p>✓ notation/notasie</p> <p>(3)</p> <p>[13]</p>

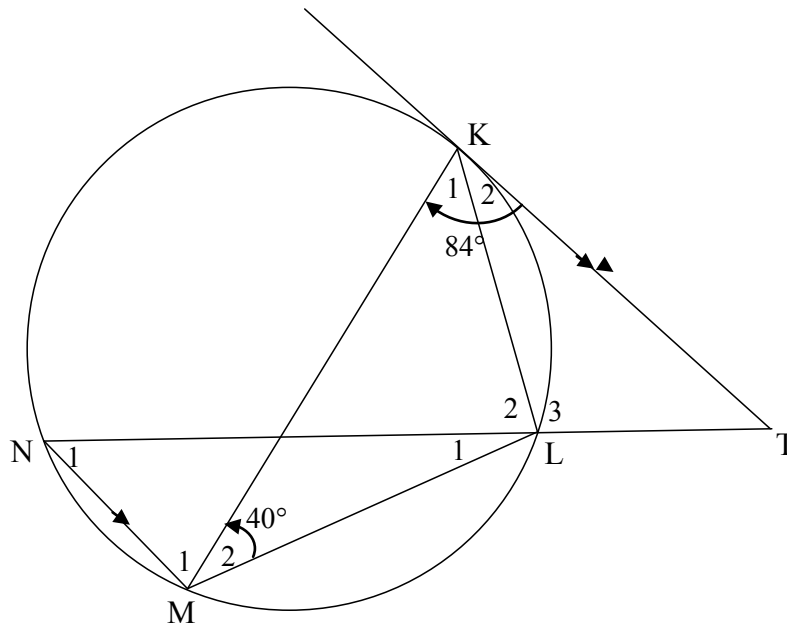
QUESTION/VRAAG 7

7.1.1	Area of/Oppervlakte van $\Delta PQR = \frac{1}{2} PQ \cdot QR \cdot \sin \hat{Q}$ $= \frac{1}{2} x(20 - 4x)(\sin 60^\circ)$ $= 10x - 2x^2 \left(\frac{\sqrt{3}}{2} \right)$ $= 5\sqrt{3}x - \sqrt{3}x^2$	✓ subst into area rule/ <i>subst in opp-reël</i> ✓ subst & simpl/ <i>subst en vereenv</i> (2)
7.1.2	For maximum area/Vir maksimum opp: $(\text{Area } \Delta PQR)' = 0$ $5\sqrt{3} - 2\sqrt{3}x = 0$ $2\sqrt{3}x = 5\sqrt{3}$ $\therefore x_{\max} = \frac{5}{2}$ or $2\frac{1}{2}$ or/of 2,5 OR/OF $x_{\max} = -\frac{b}{2a}$ $= -\frac{5\sqrt{3}}{2(-\sqrt{3})} = \frac{5}{2}$ or $2\frac{1}{2}$ or 2,5 OR/OF $5\sqrt{3}x - \sqrt{3}x^2 = 0$ $\sqrt{3}x(5 - x) = 0$ $\therefore x = 0$ or 5 $\therefore x_{\max} = \frac{0+5}{2} = \frac{5}{2}$ or/of 2,5	✓ $(\text{Area } \Delta PQR)' = 0$ $5\sqrt{3} - 2\sqrt{3}x$ ✓ answ/antw (3) ✓ formula/e ✓ subst ✓ answ/antw (3) ✓ x-intercepts/ <i>x-afsnitte</i> ✓ subst ✓ answ/antw (3)
7.1.3	$RP^2 = QP^2 + QR^2 - 2 \cdot QP \cdot QR \cdot \cos Q$ $= 10^2 + 2,5^2 - 2(10)(2,5) \cos 60^\circ$ $= 81,25$ $\therefore RP = 9,01$	✓ subst into cosine <i>rule/in cos-reël</i> ✓ simpl/vereenv ✓ answ/antw (3)

<p>7.2</p>	<p>In $\triangle ABC$: $\sin \beta = \frac{h}{AB}$ $\therefore AB = \frac{h}{\sin \beta}$</p> <p>In $\triangle ABD$: $AB = BD$ and/en $\hat{A}DB = 90^\circ - \beta$ [\angles of/v $\triangle = 180^\circ$] $\frac{\sin 2\beta}{AD} = \frac{\sin(90^\circ - \beta)}{AB}$ $AD = \frac{AB \cdot \sin 2\beta}{\sin(90^\circ - \beta)}$ $= \frac{h}{\sin \beta} \times \frac{2 \sin \beta \cdot \cos \beta}{\cos \beta}$ $= 2h$</p> <p>OR/OF</p> <p>In $\triangle ABC$: $\sin \beta = \frac{h}{AB}$ $\therefore AB = \frac{h}{\sin \beta}$</p> <p>In $\triangle ABD$: $AB = BD$ $AD^2 = AB^2 + AB^2 - 2AB \cdot AB \cdot \cos 2\beta$ $= \left(\frac{h}{\sin \beta}\right)^2 + \left(\frac{h}{\sin \beta}\right)^2 - 2\left(\frac{h}{\sin \beta}\right)^2 \cdot \cos 2\beta$ $= \left(\frac{h}{\sin \beta}\right)^2 + \left(\frac{h}{\sin \beta}\right)^2 - 2\left(\frac{h}{\sin \beta}\right)^2 (1 - 2 \sin^2 \beta)$ $= \left(\frac{h}{\sin \beta}\right)^2 + \left(\frac{h}{\sin \beta}\right)^2 - 2\left(\frac{h}{\sin \beta}\right)^2 + 4h^2$ $= 4h^2$ $\therefore AD = 2h$</p> <p>OR/OF</p> <p>Split isosceles triangle ABQ into two congruent triangles AEB and DEB. Then $\triangle ABC \equiv \triangle BAE$ ($AB = AC$, $\hat{A}BE = \hat{B}AC = \beta$, h) $\therefore AE = ED = BC = h$ $\therefore AD = 2h$</p>	<p>✓ AB ito h and/en β</p> <p>✓ $\hat{A}DB = 90^\circ - \beta$</p> <p>✓ correct subst into cosine rule/subst <i>korrek in cos-reël</i></p> <p>✓ AD as subject/ <i>onderwerp</i></p> <p>✓ expansion/uitbrei</p> <p>✓ $\sin(90^\circ - \beta)$ $= \cos \beta$</p> <p>✓ answer ito h</p> <p>(7)</p> <p>✓ AB ito h and/en β</p> <p>✓ correct subst into cosine rule/subst <i>korrek in cos-reël</i></p> <p>✓ expansion/uitbrei</p> <p>✓ multiplication/ <i>vermenigv</i></p> <p>✓ simpl/vereenv</p> <p>✓ answer ito h</p> <p>(7)</p> <p>(7)</p>
		[15]

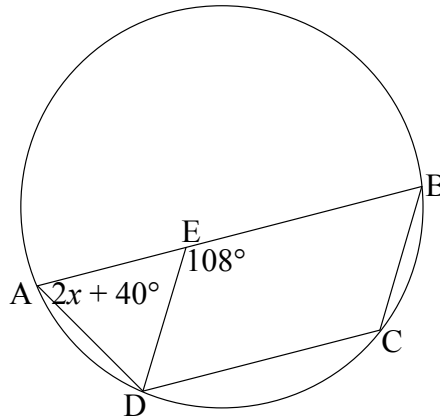
QUESTION/VRAAG 8

8.1



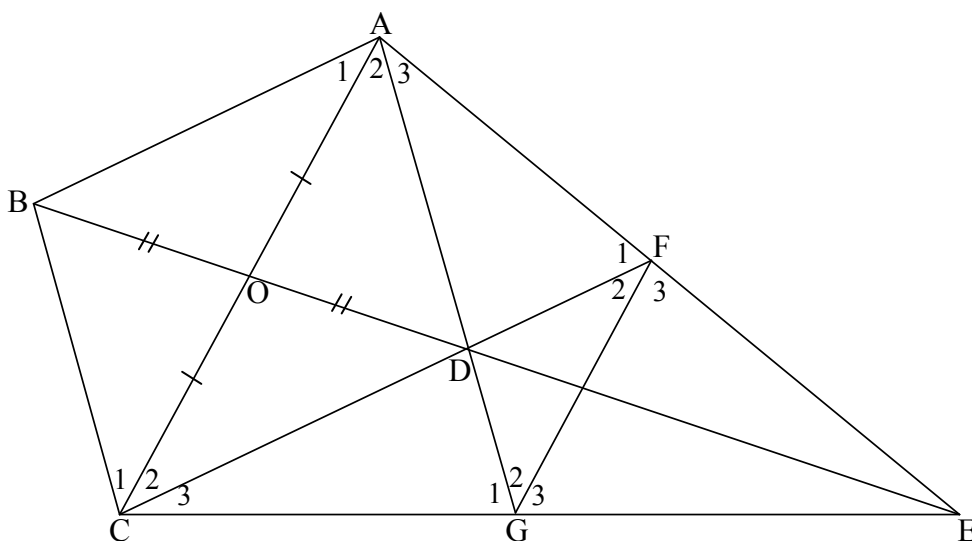
8.1.1	$\hat{K}_2 = \hat{M}_2 = 40^\circ$ [tan chord theorem/raakl-kdst]	✓S ✓R (2)
8.1.2	$\hat{N}_1 = \hat{K}_1$ [\angle s in the same seg/ \angle e in dies segm] $\hat{K}_1 = 84^\circ - 40^\circ = 44^\circ$ $\therefore \hat{N}_1 = 44^\circ$	✓S ✓R ✓S (3)
8.1.3	$\hat{T} = \hat{N}_1 = 44^\circ$ [alt/verw \angle s/e; KT NM]	✓S ✓R (2)
8.1.4	$\hat{L}_2 = \hat{K}_2 + \hat{T}$ [ext \angle of Δ /buite \angle v Δ] $= 40^\circ + 44^\circ$ $= 84^\circ$	✓R ✓S (2)
8.1.5	In ΔKLM : $44^\circ + 84^\circ + 40^\circ + \hat{L}_1 = 180^\circ$ [\angle s sum in Δ / \angle e som in Δ] $\therefore \hat{L}_1 = 12^\circ$	✓S (1)

8.2



8.2	$\hat{C} = 108^\circ$ $2x + 40^\circ + 108^\circ = 180^\circ$ $2x = 32^\circ$ $x = 16^\circ$ <p style="text-align: center;">OR/OF</p> $\hat{C} = 180^\circ - (2x + 40^\circ)$ $180^\circ - (2x + 40^\circ) = 108^\circ$ $2x = 32^\circ$ $x = 16^\circ$	<p>[opp \angles of \parallelm/tos \anglee v \parallelm] [opp \angles of cyc quad/tos \anglee v $kdvh$]</p> <p>✓S ✓R ✓S ✓R</p> <p>✓answ/antw</p> <p style="text-align: right;">(5)</p> <p>✓S ✓R ✓S ✓R</p> <p>✓answ/antw</p> <p style="text-align: right;">(5)</p> <p style="text-align: right;">[15]</p>
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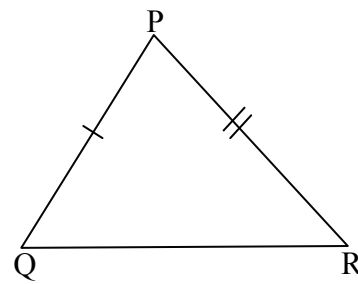
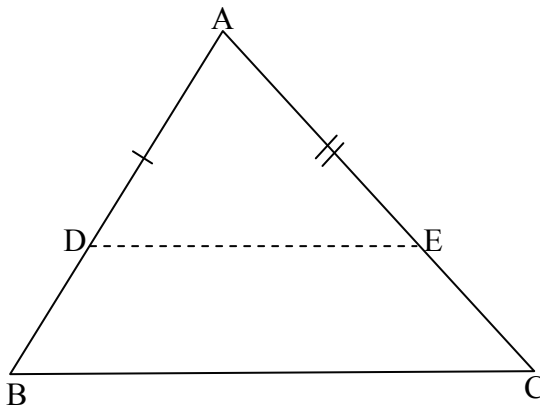
QUESTION/VRAAG 9



9.1	ABCD is a m [diags of quad bisect each other/ hoekl v vh halveer mekaar]	✓ R (1)
9.2	$\frac{ED}{DB} = \frac{FE}{AF}$ [Prop Th/Eweredigh st; DF BA] $\frac{ED}{DB} = \frac{GE}{CG}$ [Prop Th/Eweredigh st; DG BC]	✓ S ✓ R ✓ S ✓ R (4)
9.3	$\frac{FE}{AF} = \frac{GE}{CG}$ [proved/bewys] $\therefore AC \parallel FG$ [line divides two sides of Δ in prop/ lyn verdeel 2 sye van Δ eweredig] $\hat{C}_2 = \hat{F}_2$ [alt/verw \angle s/e; AC FG] $\hat{A}_1 = \hat{C}_2$ [alt/verw \angle s/e; AB CD] $\therefore \hat{A}_1 = \hat{F}_2$	✓ S ✓ S ✓ R ✓ S ✓ S (5)
9.4	$\hat{A}_1 = \hat{A}_2$ [diags of rhombus/hoekl v ruit] $\hat{A}_2 = \hat{F}_2$ [$\hat{A}_1 = \hat{F}_2$] $\therefore ACGF = \text{cyc quad/kdvh}$ [\angle s in the same seg =/ \angle e in dies segm =] OR/OF $\hat{C}_2 = \hat{A}_2$ [\angle s opp equal sides of rhombus/ \angle e to gelyke sye v ruit] $\hat{A}_2 = \hat{G}_2$ [alt/verw- \angle s/e; AC FG] $\therefore \hat{C}_2 = \hat{G}_2$ $\therefore ACGF$ is a cyc quad/kdvh [\angle s in the same seg =/ \angle e in dies segm =]	✓ S ✓ S ✓ R ✓ S ✓ S ✓ R (3) (3) [13]

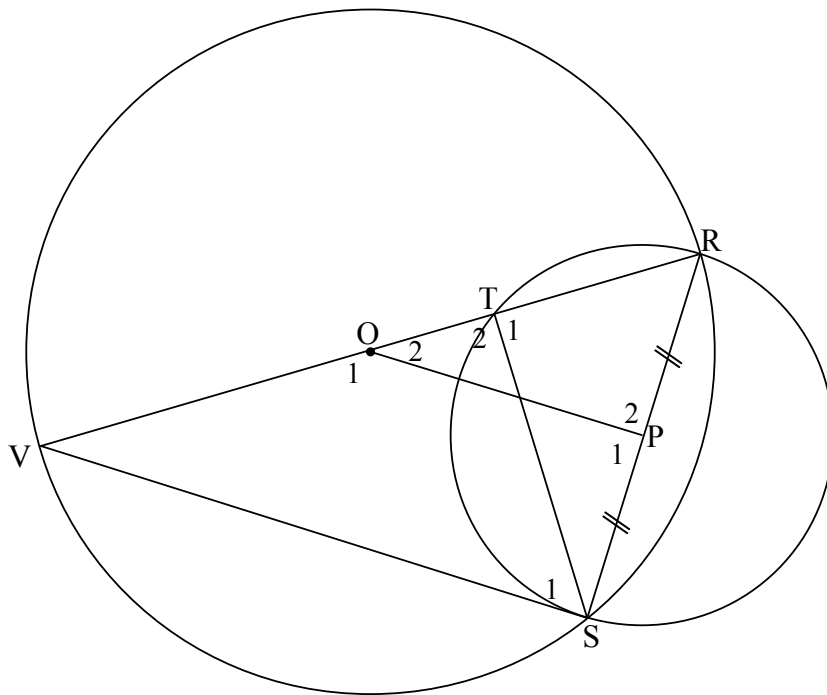
QUESTION/VRAAG 10

10.1



10.1.1	<p>In $\triangle ADE$ and/en $\triangle PQR$: $AD = PQ$ [construction/konstr] $\hat{A} = \hat{P}$ [given/gegee] $AE = PR$ [construction/konstr] $\therefore \triangle ADE \equiv \triangle PQR$ [S/S]</p>	<p>✓ all/al 3 S's/e ✓ reason/rede (2)</p>
10.1.2	<p>$\hat{ADE} = \hat{Q}$ [$\Delta s \equiv \therefore$ corres/ooreenk $\angle s/e =$] But $\hat{B} = \hat{Q}$ [given/gegee] $\therefore \hat{ADE} = \hat{B}$ $\therefore DE \parallel BC$ [corres/ooreenk $\angle s/e =$]</p>	<p>✓ $\hat{ADE} = \hat{Q}$ ✓ $\hat{ADE} = \hat{B}$ ✓ reason/rede (3)</p>
10.1.3	<p>$\frac{AB}{AD} = \frac{AC}{AE}$ [Prop Th/Eweredigh st; $DE \parallel BC$] But/Maar $AD = PQ$ and/en $AE = PR$ [construction/konstr] $\therefore \frac{AB}{PQ} = \frac{AC}{PR}$</p>	<p>✓ S/R ✓ S (2)</p>

10.2



10.2.1	line from centre to midpt of chord/ <i>lyn van midpt na midpt van koord</i>	✓ answ/antw (1)
10.2.2	<p>OP VS [Midpt Theorem/Midpt-stelling]</p> <p>In $\triangle ROP$ and/en $\triangle RVS$:</p> <p>$\hat{R} = \hat{R}$ [common/gemeen]</p> <p>$\hat{O}_2 = \hat{V}$ [corresp/ooreenk \angles/e; OP VS]</p> <p>$\therefore \triangle ROP \parallel \triangle RVS$ [\angle, \angle, \angle]</p> <p style="text-align: center;">OR/OF</p> <p>In $\triangle ROP$ and/en $\triangle RVS$:</p> <p>$\hat{P}_2 = \hat{S}_R$ [corresponding \angles/ ooreenkomstige \angle'e]</p> <p>$\hat{R} = \hat{R}$ [common/gemeen]</p> <p>$\therefore \triangle ROP \parallel \triangle RVS$ [\angle, \angle, \angle]</p>	<p>✓ S ✓ R</p> <p>✓ S</p> <p>✓ S & $\angle; \angle; \angle$</p> <p>OR/OF</p> <p>3 angles/hoeke (4)</p> <p>✓ S ✓ R</p> <p>✓ S</p> <p>✓ S & $\angle; \angle; \angle$</p> <p>OR/OF</p> <p>3 angles/hoeke (4)</p>

10.2.3	<p>In $\triangle RVS$ and/en $\triangle RST$: $\hat{V}\hat{S}R = \hat{S}\hat{T}R = 90^\circ$ [\angle in semi-circle/\angle in halfsirkel] \hat{R} is common/gemeen $\hat{V} = \hat{T}\hat{S}R$ $\therefore \triangle RVS \parallel \triangle RST$ [\angle, \angle, \angle]</p>	<p>✓ S ✓ R ✓ S & $\angle; \angle; \angle$ OR/OF 3 angles/hoeke (3)</p>
10.2.4	<p>In $\triangle RTS$ and/en $\triangle STV$: $\hat{R}\hat{T}S = \hat{V}\hat{T}S = 90^\circ$ [\angle s on straight line/\angle e op rt lyn] $\hat{R} = 90^\circ - \hat{T}\hat{S}R$ $= \hat{T}\hat{S}V$ $\hat{T}\hat{S}R = \hat{V}$ $\therefore \triangle RTS \parallel \triangle STV$ [\angle, \angle, \angle] $\therefore \frac{RT}{ST} = \frac{TS}{VT}$ $\therefore ST^2 = VT \cdot TR$</p>	<p>✓ $\triangle RTS$ & $\triangle STV$ ✓ S ✓ S ✓ S (with justification/met motivering) ✓ $\triangle RTS \parallel \triangle STV$ ✓ ratio/verh (6)</p>
		[21]

TOTAL/TOTAAL: 150