



# basic education

Department:  
Basic Education  
**REPUBLIC OF SOUTH AFRICA**

## NATIONAL SENIOR CERTIFICATE

**GRADE/GRAAD 11**

### MATHEMATICS P2/WISKUNDE V2

**NOVEMBER 2014**

**MEMORANDUM**

**MARKS/PUNTE: 150**

This memorandum consists of 16 pages.  
*Hierdie memorandum bestaan uit 16 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.

**LET WEL:**

- *Indien 'n kandidaat 'n vraag twee keer beantwoord, merk slegs die eerste poging.*
- *Indien 'n kandidaat 'n antwoord doodgetrek het, maar nie oorgedoen het nie, merk die doodgetrekte antwoord.*
- *Volgehoue akkuraatheid geld in ALLE aspekte van die memorandum.*
- *Aanname van antwoorde/waardes om 'n probleem op te los, is ONaanvaarbaar.*

**QUESTION/VRAAG 1**

1.1.1	$IQR(A) = 30 - 20$ $= 10$ <i><math>Q_3 - Q_1</math></i>	✓ 30 – 20 ✓ 10 (2)
1.1.2	Data of Supermarket A is skewed to the left/ <i>Data van Supermark A is skeef na links.</i> <b>OR</b> <i>Negatively skewed/negatief skeef</i>	✓ comment/kommentaar (1)
1.1.3	Range/ <i>Omvang</i> (B) $= 35 - 6$ $= 29$	✓ 35 – 6 ✓ 29 (2)
1.1.4	Supermarket A <ul style="list-style-type: none"> <li>• Supermarket A received 25 or more deliveries on more than 7 days whilst Supermarket B received 25 or more deliveries on less than 7 days/ <i>Supermark A het op meer as 7 dae 25 of meer aflewerings ontvang terwyl Supermark B op minder as 7 dae soveel aflewerings ontvang het.</i></li> </ul>	✓ correct choice/ <i>regte keuse</i> ✓ reason/rede (2)
1.2	$\bar{x} = 24,5$ $\frac{2x + 293}{14} = 24,5$ $2x + 293 = 343$ $2x = 50$ $x = 25$	✓ $\frac{2x + 293}{14}$ ✓ $2x + 293 = 343$ ✓ 25 (3) [10]

**QUESTION/VRAAG 2**

2.1	28 days/dae	✓ answ/antw (1)																		
2.2	12 days $\therefore \frac{12}{28} \times 100 = 42,86\%$ Accept/Aanvaar 12,5 days which is/dae, wat gelyk is aan 44,64% OR Accept/Aanvaar 13 days which is/dae, wat gelyk is aan 46,43%	✓ No. of days/getal dae  ✓ percentage/persentasie  (2)																		
2.3	<table border="1"> <thead> <tr> <th>Temperature, T, in degrees Celsius</th> <th>Frequency</th> </tr> </thead> <tbody> <tr> <td><math>19 \leq T &lt; 21</math></td> <td>2</td> </tr> <tr> <td><math>21 \leq T &lt; 23</math></td> <td>6</td> </tr> <tr> <td><math>23 \leq T &lt; 25</math></td> <td>9</td> </tr> <tr> <td><math>25 \leq T &lt; 27</math></td> <td>5</td> </tr> <tr> <td><math>27 \leq T &lt; 29</math></td> <td>4</td> </tr> <tr> <td><math>29 \leq T &lt; 31</math></td> <td>2</td> </tr> </tbody> </table>	Temperature, T, in degrees Celsius	Frequency	$19 \leq T < 21$	2	$21 \leq T < 23$	6	$23 \leq T < 25$	9	$25 \leq T < 27$	5	$27 \leq T < 29$	4	$29 \leq T < 31$	2	✓ 2 and/en 6  ✓ 9 and/en 5  ✓ 4 and/en 2  (3)				
Temperature, T, in degrees Celsius	Frequency																			
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2.4	<p style="text-align: center;"><b>FREQUENCY POLYGON</b></p> <table border="1"> <caption>Data points for Frequency Polygon</caption> <thead> <tr> <th>Average daily temperature (in degrees Celsius)</th> <th>Frequency</th> </tr> </thead> <tbody> <tr><td>18</td><td>0</td></tr> <tr><td>20</td><td>2</td></tr> <tr><td>22</td><td>6</td></tr> <tr><td>24</td><td>9</td></tr> <tr><td>26</td><td>5</td></tr> <tr><td>28</td><td>4</td></tr> <tr><td>30</td><td>2</td></tr> <tr><td>32</td><td>0</td></tr> </tbody> </table>	Average daily temperature (in degrees Celsius)	Frequency	18	0	20	2	22	6	24	9	26	5	28	4	30	2	32	0	✓ anchored at / geanker by (18 ; 0) and/en (32 ; 0) ✓ points at midpoints/ punte by middelpunte ✓ straight lines joining pts/ reguitlyne verbind punte ✓ all points plotted/ alle punte geplot (4) [10]
Average daily temperature (in degrees Celsius)	Frequency																			
18	0																			
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32	0																			

**QUESTION/VRAAG 3**

3.1	$\begin{aligned} m_{AC} &= \frac{12+9}{-9+3} \\ &= \frac{21}{-6} \\ &= -\frac{7}{2} \end{aligned}$	<ul style="list-style-type: none"> <li>✓ substitution into gradient formula/ subst in gradiënt-formule</li> <li>✓ <math>-\frac{7}{2}</math></li> </ul> <p>(2)</p>
3.2	$\begin{aligned} m_{RNS} &= m_{AC} = -\frac{7}{2} \quad (\text{parallel lines}/\text{parallele lyne}) \\ y &= -\frac{7}{2}x \end{aligned}$	<ul style="list-style-type: none"> <li>✓ gradients equal/ gradiënte gelyk</li> <li>✓ equation/vgl</li> </ul> <p>(2)</p>
3.3	$\begin{aligned} NB^2 &= (5\sqrt{5})^2 \\ (a-9)^2 + (7-9)^2 &= 125 \\ a^2 - 18a + 81 + 4 - 125 &= 0 \\ a^2 - 18a - 40 &= 0 \\ (a-20)(a+2) &= 0 \\ a \neq 20 \quad \therefore \quad a &= -2 \end{aligned}$	<ul style="list-style-type: none"> <li>✓ subst into distance formula/subst in afstandformule</li> <li>✓ st form/st vorm</li> <li>✓ factors/faktore</li> <li>✓ answ/antw</li> </ul> <p>(4)</p>
3.4	$\begin{aligned} \tan \alpha &= m_{AC} = -\frac{7}{2} \\ \alpha &= 180^\circ - 74,05^\circ \\ &= 105,95^\circ \\ \\ \tan \beta &= m_{BC} = \frac{3}{2} \\ \beta &= 56,31^\circ \\ \\ \therefore \theta &= 105,95^\circ - 56,31^\circ \\ &= 49,64^\circ \end{aligned}$	<ul style="list-style-type: none"> <li>✓ <math>\tan \alpha = -\frac{7}{2}</math></li> <li>✓ <math>\alpha = 105,95^\circ</math></li> <li>✓ <math>\tan \beta = \frac{3}{2}</math></li> <li>✓ <math>\beta = 56,31^\circ</math></li> <li>✓ <math>\theta = 49,64^\circ</math></li> </ul> <p>(5) [13]</p>

**QUESTION/VRAAG 4**

4.1	<p>Perimeter/Omtrek ABCD = <math>4 \times AD</math> (sides of rhombus all equal/sye van ruit almal gelyk)</p> $AD = \sqrt{(3+8)^2 + (9-6)^2}$ $= \sqrt{130} \text{ OR/OF } 11,40$ <p>Perimeter/Omtrek = <math>4\sqrt{130}</math> OR/OF 45,61</p>	<ul style="list-style-type: none"> <li>✓ subst into distance form/ subst in afstandformule</li> <li>✓ <math>\sqrt{130}</math> OR/OF 11,40</li> <li>✓ <math>4\sqrt{130}</math> OR/OF 45,61</li> </ul> <p>(3)</p>
4.2	$m_{BD} = 3$ $m_{AC} \times m_{BD} = -1$ (diagonals of a rhombus/hoeklyne van ruit) $\therefore m_{AC} = -\frac{1}{3}$ $y - y_1 = m(x - x_1)$ $y - 6 = -\frac{1}{3}(x + 8)$ $y = -\frac{1}{3}x - \frac{8}{3} + \frac{18}{3}$ OR/OF $y = -\frac{1}{3}x + \frac{10}{3}$ $y = mx + c$ $6 = -\frac{1}{3}(-8) + c$ $\frac{10}{3} = c$ $y = -\frac{1}{3}x + \frac{10}{3}$	<ul style="list-style-type: none"> <li>✓ <math>m_{BD} = 3</math></li> <li>✓ <math>m_{AC} = -\frac{1}{3}</math></li> <li>✓ subst into correct form/subt in korrekte formule</li> <li>✓ answer/antw</li> </ul> <p>(4)</p>
4.3	<p>At/By K:</p> $3x = -\frac{1}{3}x + \frac{10}{3}$ $9x = -x + 10$ $10x = 10$ $x = 1$ $y = 3(1) = 3$ $K(1 ; 3)$ <p>OR/OF</p> $y = 3x$ $x + 3(3x) = 10$ $10x = 10$ $x = 1$ $y = 3(1) = 3$ $K(1 ; 3)$ <p>OR/OF</p> $x = -3y + 10$ $3(-3y + 10) - y = 0$ $-9y + 30 - y = 0$ $-10y = -30$ $y = 3$ $x = -3(3) + 10$ $x = 1$ $K(1 ; 3)$	<p>A(-8; 6) C(10; 0)</p> <p>K(<math>\frac{-8+10}{2}; \frac{6+0}{2}</math>)</p> <p>K(1; 3)</p> <p>of</p> <p>gelyktydige vgl.</p> <p><math>-\frac{1}{3}x + \frac{10}{3} = 3x</math></p> <p><math>-x + 10 = 9x</math></p> <p><math>10 = 10x</math></p> <p><math>x = 1</math></p> <p><math>y = 3(1)</math></p> <p><math>y = 3</math></p> <p>K(1; 3)</p> <ul style="list-style-type: none"> <li>✓ equate equations/stel vglgs gelyk</li> <li>✓ <math>x = 1</math></li> <li>✓ <math>y = 3</math></li> <li>✓ subst of/subst van <math>y = 3x</math> into <math>x + 3y = 10</math></li> <li>✓ <math>x = 1</math></li> <li>✓ <math>y = 3</math></li> </ul> <p>(3)</p> <ul style="list-style-type: none"> <li>✓ subst of/subst van <math>x = -3y + 10</math> into <math>3x - y = 0</math></li> <li>✓ <math>y = 3</math></li> <li>✓ <math>x = 1</math></li> </ul> <p>(3)</p>

4.4	$\frac{x_B + 3}{2} = 1 \quad \frac{y_B + 9}{2} = 3$ $x_B + 3 = 2 \quad y_B + 9 = 6$ $x_B = -1 \quad y_B = -3$ $B(-1 ; -3)$ <p><b>OR/OF</b></p> $x_B = -1 \quad y_B = -3 \quad (\text{by translation/deur translasie})$ $B(-1 ; -3)$	<ul style="list-style-type: none"> <li>✓ <math>x</math> value/waarde</li> <li>✓ <math>y</math> value/waarde</li> </ul> (2)
4.5	$m_{AB} = \frac{6+3}{-8+1} = -\frac{9}{7}$ $m_{AD} = \frac{9-6}{3+8} = \frac{3}{11}$ $m_{AB} \times m_{AD} \neq -1$ <p>ABCD is not a square/ is nie 'n vierkant (B̂AD ≠ 90°)</p> <p><b>OR/OF</b></p> $C(10 ; 0)$ $BD^2 = (3 - (-1))^2 + (9 - (-3))^2$ $= 160$ $BD = 4\sqrt{10} \quad \text{OR/OF } 12,65$ $AC^2 = (-8 - 10)^2 + (6 - 0)^2$ $= 360$ $AC = 6\sqrt{10} \quad \text{OR/OF } 18,97$ <p>ABCD is not a square/is nie 'n vierkant (BD ≠ AC)</p>	<ul style="list-style-type: none"> <li>✓ subst into gradient formula/subst in gradiëntformule</li> <li>✓ gradient AB</li> <li>✓ gradient AD</li> <li>✓ ≠ -1</li> <li>✓ S/R</li> </ul> (5) <ul style="list-style-type: none"> <li>✓ C(10 ; 0)</li> <li>✓ subst into distance formula/subst in afstandformule</li> <li>✓ <math>4\sqrt{10}</math> OR 12,65</li> <li>✓ <math>6\sqrt{10}</math> OR 18,97</li> <li>✓ S/R</li> </ul> (5) [17]

**QUESTION/VRAAG 5**

5.1.1	$\cos 203^\circ = -\cos 23^\circ$ $= -p$	✓ reduction/herlei ✓ answer/antw (2)
5.1.2	$\sin 293^\circ = -\sin 67^\circ$ $= -\cos 23^\circ$ $= -p$	✓ reduction/herlei ✓ co-ratio/ko-verh ✓ answ/antw ito/v p (3)
5.2	$\frac{\sin(360^\circ - x) \cdot \tan(-x)}{\cos(180^\circ + x) \cdot (\sin^2 A + \cos^2 A)}$ $= \frac{(-\sin x)(-\tan x)}{(-\cos x)(1)}$ $= \frac{(-\sin x) \left( -\frac{\sin x}{\cos x} \right)}{-\cos x}$ $= -\frac{\sin^2 x}{\cos^2 x}$ $= -\tan^2 x$	✓ $-\sin x$ ✓ $-\tan x$ ✓ $-\cos x$ ✓ 1 ✓ $\left( -\frac{\sin x}{\cos x} \right)$ ✓ $-\tan^2 x$ (6)
5.3.1	$\text{LHS} = \frac{\cos^2 x + (1 + \sin x)^2}{(1 + \sin x) \cdot \cos x}$ $= \frac{\cos^2 x + 1 + 2\sin x + \sin^2 x}{(1 + \sin x) \cdot \cos x}$ $= \frac{1 + 1 + 2\sin x}{(1 + \sin x) \cdot \cos x}$ $= \frac{2(1 + \sin x)}{(1 + \sin x) \cdot \cos x}$ $= \frac{2}{\cos x}$ $= \text{RHS}$	✓ numerator/teller ✓ denominator/noemer ✓ multiplication/vermenigvuldiging ✓ identity/identiteit ✓ fact/faktor numerator/teller (5)
5.3.2	Undefined if/ongedefinieerd as: $\sin x = -1$ or $\cos x = 0$ $\therefore x = 90^\circ ; 270^\circ$	✓ $90^\circ$ ✓ $270^\circ$ (2)
5.4	$\sin 2x = 4 \cos 2x$ $\tan 2x = 4$ $2x = 75,96^\circ + k \cdot 180^\circ$ $x = 37,98^\circ + k \cdot 90^\circ; k \in \mathbb{Z}$	✓ $\tan 2x = 4$ ✓ $75,96^\circ$ ✓ $37,98^\circ$ ✓ $k \cdot 90^\circ$ ✓ $k \in \mathbb{Z}$ (5)

5.5.1	$\begin{aligned}x^2 + y^2 &= r^2 \\x^2 + (\sqrt{3})^2 &= 2^2 \\x^2 &= 1 \\x &= \pm 1 \\x = 1 &\quad (\text{since P lies in the 1st quadrant/aangesien P in die 1ste kwadrant lê})\end{aligned}$	✓ subst ✓ $x = 1$ (2)
5.5.2	$\begin{aligned}\sin P\hat{O}T &= \frac{\sqrt{3}}{2} \\P\hat{O}T &= 60^\circ \\P\hat{O}T + \alpha &= 90^\circ \\ \alpha &= 90^\circ - 60^\circ \\&= 30^\circ\end{aligned}$	✓ correct ratio/ korrekte verh ✓ $60^\circ$  ✓ answer/antw (3)
5.5.3	$\begin{aligned}\sin(-30^\circ) &= \frac{b}{20} \\b &= 20 \sin(-30^\circ) \\b &= -10 \\ \cos(-30^\circ) &= \frac{a}{20} \\a &= 20 \cos(-30^\circ) \\a &= 10\sqrt{3} \quad \text{OR/OF } 17,32 \\Q(10\sqrt{3}; -10) &\quad \text{OR/OF } Q(17,32; -10)\end{aligned}$	✓ correct ratio/ korrekte verh ✓ $b = 20 \sin(-30^\circ)$ ✓ $b = -10$  ✓ correct ratio/ korrekte verh ✓ $a = 10\sqrt{3}$ OR17,32 (5)
<b>OR/OF</b>		
	$\begin{aligned}OQ^2 &= 400 \\a^2 + b^2 &= 400 \\PQ^2 &= 2^2 + 20^2 \\PQ^2 &= 404 \\(a-1)^2 + (b-\sqrt{3})^2 &= 404 \\a^2 - 2a + 1 + b^2 - 2\sqrt{3}b + 3 &= 404 \\400 - 2a + 4 - 2\sqrt{3}b &= 404 \\2a &= -2\sqrt{3}b \\a &= -\sqrt{3}b \\(-\sqrt{3}b)^2 + b^2 &= 400 \\4b^2 &= 400 \\b^2 &= 100 \\b &= -10 \quad (b < 0) \\a &= -\sqrt{3}(-10) \\a &= 10\sqrt{3} \\\therefore Q(10\sqrt{3}; -10) &\end{aligned}$	✓ subst into distance formula/subst in afstandformule ✓ subst into distance formula/subst in afstandformule  ✓ $a = -\sqrt{3}b$  ✓ $b = -10$  ✓ $a = 10\sqrt{3}$ OR17,32 (5) [33]

**QUESTION/VRAAG 6**

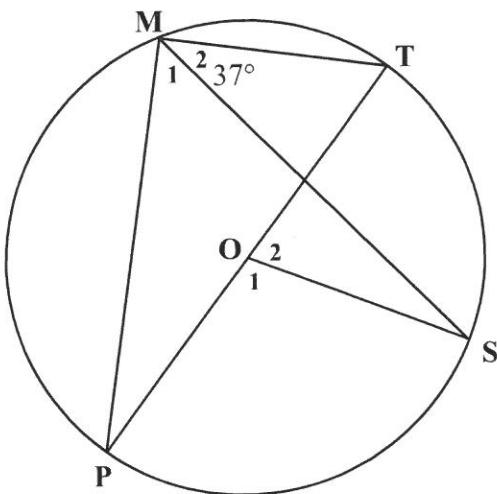
6.1	$a = 1$ $b = 2$ $p = 45^\circ$	✓ $a = 1$ ✓ $b = 2$ ✓ $p = 45^\circ$ (3)
6.2	$x \in (-90^\circ; 0^\circ)$  <b>OR/OF</b> $-90^\circ < x < 0^\circ$  <b>OR/OF</b> between $-90^\circ$ and $0^\circ$ /tussen $-90^\circ$ en $0^\circ$	✓ extreme values/ uiterste waardes ✓ correct notation/ korrekte notasie (2) ✓ extreme values/ uiterste waardes ✓ correct notation/ korrekte notasie (2) ✓ extreme values/ uiterste waardes ✓ correct notation/ korrekte notasie (2)
6.3	$f(2x) = \cos 2(2x) = \cos 4x$ $\therefore$ period/periode = $90^\circ$	✓ $\cos 4x$ ✓ $90^\circ$ (2)
6.4	$h(x) = 3\cos 2x - 1$ Minimum value/waarde = $-4$	✓ ✓ $-4$ (2)
6.5	move $45^\circ$ to the left and then reflect about the $x$ -axis/ skuif $45^\circ$ na links en reflekteer dan om die $x$ -as  <b>OR/OF</b>  The graph of $g$ must be moved $135^\circ$ to the right/ Die grafiek van $g$ moet $135^\circ$ na regs beweeg.	✓ $45^\circ$ left/links ✓ reflection $x$ -axis/ refleksie om $x$ -as  ✓ ✓ $135^\circ$ right/regs (2) [11]

**QUESTION/VRAAG 7**

7.1.1	$A\hat{C}B = 180^\circ - 150^\circ = 30^\circ$ $\frac{AB}{\sin 30^\circ} = \frac{6}{\sin 110^\circ}$ $AB = 3,19m$	✓ $30^\circ$ ✓ subst into sine rule/ <i>subst in sin-reël</i> ✓ $AB = 3,19$ (3)
7.1.2	Area $\Delta ABC$ : $= \frac{1}{2} \cdot AB \cdot BC \cdot \sin B$ $= \frac{1}{2} \times 3,19 \times 6 \times \sin 40^\circ$ $= 6,15m^2$	✓ subst into correct form/ <i>subst in  korrekte formule</i> ✓ 6,15 (2)
7.1.3	Volume of pyramid = $\frac{1}{3}$ area of base $\times \perp$ height $= \frac{1}{3} \times 6,15 \times 8$ $= 16,4m^3$	✓ correct formula/ <i>korrekte formule</i> ✓ subst ✓ answer/ <i>antw</i> (3)
7.2	radius of base/ <i>radius van basis</i> : $\frac{r}{h} = \tan 36^\circ$ $r = 2 \tan 36^\circ = 1,45m$  slant height/ <i>skuinshoogte</i> : $\frac{S}{h} = \frac{1}{\cos 36^\circ}$ $S = \frac{2}{\cos 36^\circ} = 2,47m$  $SA = \pi(2\tan 36^\circ)^2 + \pi(2\tan 36^\circ) \left( \frac{2}{\cos 36^\circ} \right)$ $= 17,92 m^2$	✓ $\frac{r}{h} = \tan 36^\circ$ ✓ $r = 2 \tan 36^\circ = 1,45$  ✓ $\frac{l}{h} = \frac{1}{\cos 36^\circ}$ ✓ $S = \frac{2}{\cos 36^\circ} = 2,47$ ✓ subst into correct form/ <i>subst in  korrekte formule</i> ✓ answer/ <i>antw</i> (6)
	<b>OR/OF</b>  Surface area of cone = area of base + area of curved surface <i>buite-opp van keël</i> = <i>opp van basis</i> + <i>opp van geboë opp</i> $= \pi r^2 + \pi r S$ $= \pi(1,45)^2 + \pi(1,45)(2,47)$ $= 17,86m^2$	✓ subst into correct form/ <i>subst in  korrekte formule</i> ✓ answer/ <i>antw</i> (6) [14]

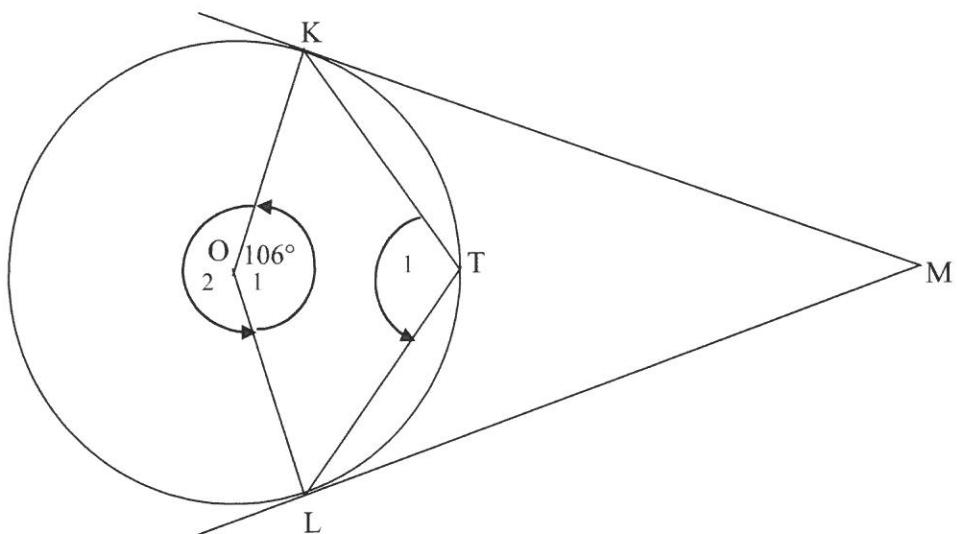
**QUESTION/VRAAG 8**

8.1

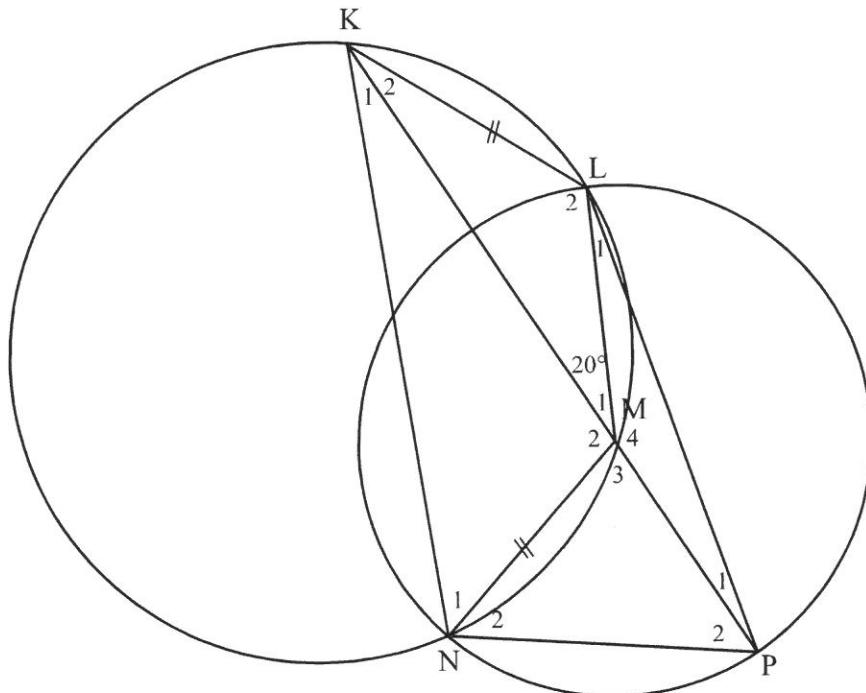


8.1.1	$\hat{M}_1 + \hat{M}_2 = 90^\circ$ ( $\angle$ in semi circle/ $\angle$ in halfsirkel <b>or/of</b> diameter subtends right $\angle$ /midlyn onderspan regte $\angle$ / <b>or/of</b> $\angle \frac{1}{2} \odot$ ) $\hat{M}_1 = 53^\circ$ <b>OR/OF</b> $\hat{O}_2 = 74^\circ$ ( $\angle$ at centre/midpt = $2 \times \angle$ at circum/by omtrek) $\hat{O}_1 = 106^\circ$ ( $\angle$ s on a str line/ $\angle$ e op reguitlyn) $\hat{M}_1 = 53^\circ$ ( $\angle$ at centre/midpt = $2 \times \angle$ at circum/by omtrek)	<span style="color: green;">✓</span> S/R <span style="color: green;">✓</span> S (2)
8.1.2	$\hat{O}_1 = 2 \times \hat{M}_1$ ( $\angle$ at centre/midpt = $2 \times \angle$ at circum/by omtrek) $\hat{O}_1 = 106^\circ$ <b>OR/OF</b> $\hat{O}_2 = 74^\circ$ ( $\angle$ at centre/midpt = $2 \times \angle$ at circum/by omtrek) $\hat{O}_1 = 106^\circ$ ( $\angle$ s on a str line/ $\angle$ e op reguitlyn)	<span style="color: green;">✓</span> S/R <span style="color: green;">✓</span> S (2)

8.2



8.2.1	$\hat{O}_2 = 360^\circ - 106^\circ = 254^\circ$ ( $\angle$ s round a pt or $\angle$ s in a rev) $(\angle e om 'n pt of \angle e omw)$ $\hat{T}_1 = \frac{1}{2} \times \hat{O}_2$ ( $\angle$ at centre/midpt = $2 \times \angle$ at circum/by omtrek) $= 127^\circ$	✓ S ✓ S ✓ R (3)
8.2.2	$KO = OL$ (radii equal/radiusse gelyk) $KM = ML$ (Tans from common/same pt/rklyne van dies pt) $\therefore KOLM$ is a kite (adj sides of quad are =/aangr sye v vh =)	✓ S ✓ S/R ✓ S/R (3)
8.2.3	$O\hat{K}M = 90^\circ$ (tan/rkl $\perp$ radius or/of tan/rkl $\perp$ diam/midlyn) $O\hat{L}M = 90^\circ$ (tan/rkl $\perp$ radius or/of tan/rkl $\perp$ diam/midlyn) $O\hat{K}M + O\hat{L}M = 180^\circ$ $OKML = \text{cyc quad/kdvh}$ $(\text{opp } \angle \text{s quad supp or converse opp } \angle \text{s of cyclic quad}) /$ $(\text{tos } \angle \text{e vierh supp of omgek tos } \angle \text{e van kdvh})$	✓ S/R ✓ S ✓ R (3)
8.2.4	$\hat{M} + \hat{O}_1 = 180^\circ$ (opp $\angle$ s of cyclic quad/tos $\angle$ e van kdvh) $\hat{M} = 74^\circ$	✓ R ✓ S (2) [15]

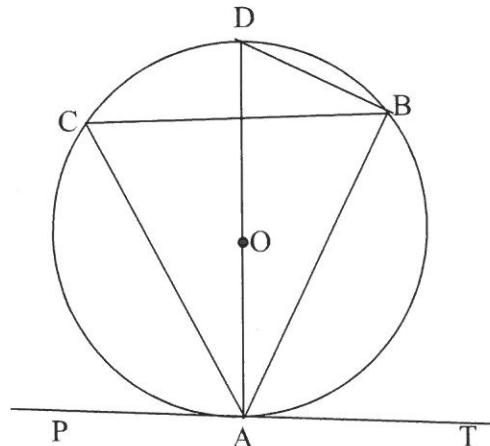
**QUESTION/VRAAG 9**

9.1	$N\hat{K}M = \hat{K}_1 = 20^\circ$ (equal chords; equal $\angle$ s) (gelyke koorde; gelyke $\angle$ e)	✓ S ✓ R (2)
9.2	Alternate $\angle$ s are equal/verwiss $\angle$ e gelyk	✓ R (1)
9.3	$NM = LM$ (radii) $NM = KL$ (given/gegee) $\therefore KL = LM$	✓ S ✓ S (2)
9.4.1	$M\hat{K}L = \hat{K}_2 = 20^\circ$ ( $\angle$ s/e opp equal sides/to gelyke sye) $K\hat{L}M = \hat{L}_2 = 140^\circ$ ( $\angle$ s sum in $\Delta$ / $\angle$ e som in $\Delta$ ) $K\hat{N}M = \hat{N}_1 = 180^\circ - 140^\circ = 40^\circ$ (opp $\angle$ s of cyclic quad/ tos $\angle$ e van kdvh)	✓ S/R ✓ S ✓ S ✓ R (4)
9.4.2	$K\hat{M}N = \hat{M}_2 = 180^\circ - (20^\circ + 40^\circ) = 120^\circ$ ( $\angle$ s sum in $\Delta$ / $\angle$ e som in $\Delta$ ) $L\hat{M}N = \hat{M}_1 + \hat{M}_2 = 20^\circ + 120^\circ = 140^\circ$ $L\hat{P}N = \hat{P}_1 + \hat{P}_2 = 70^\circ$ ( $\angle$ at centre = $2 \times \angle$ at circumference) ( $\angle$ by midpt = $2 \times \angle$ by omtrek)	✓ S ✓ S ✓ R (3) [12]

**QUESTION/VRAAG 10**

10.1

Construction: Draw diameter AD and join DB.  
*Konstruksie: Trek middellyn AD en verbind DB*



Proof/Bewys:

$$\hat{B}AT + \hat{D}AB = 90^\circ \quad (\text{tangent/rklyn } \perp \text{ radius})$$

$$\hat{D}BC + \hat{C}BA = 90^\circ \quad (\angle \text{ in semi circle/halfsirkel})$$

$$\hat{D}AB + \hat{A}DB = 90^\circ \quad (\angle \text{s/e of/van } \Delta)$$

$$\hat{B}AT = \hat{A}DB$$

$$\hat{B}CA = \hat{A}DB \quad (\angle \text{s in same segment/}\angle \text{e in dies segment})$$

$$\hat{B}AT = \hat{B}CA$$

✓ construction/  
*konstruksie*

✓ S ✓ R  
✓ S ✓ R

✓ S/R

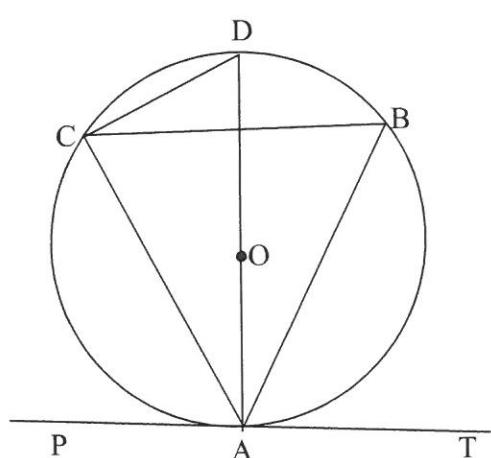
(6)

**OR/OF**

Construct diameter AD and join DC.

*Kontrueer middellyn AD en verbind DC.*

✓ construction/  
*konstruksie*



Proof/Bewys:

$$\hat{B}AT + \hat{D}AB = 90^\circ \quad (\text{tangent/rklyn } \perp \text{ radius})$$

$$\hat{D}CB + \hat{B}CA = 90^\circ \quad (\angle \text{ in semi circle/halfsirkel})$$

$$\hat{B}CA = 90^\circ - \hat{D}CB$$

$$\hat{D}AB = 90^\circ - \hat{B}AT$$

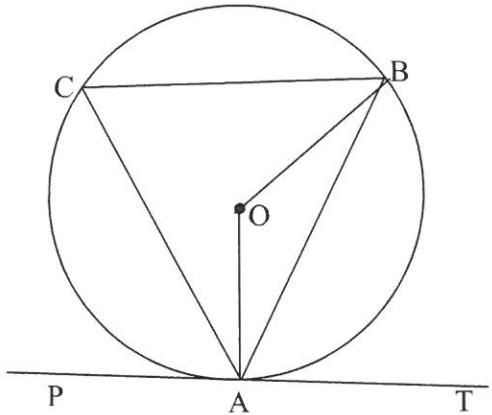
$$\hat{D}CB = \hat{D}AB \quad (\angle \text{s in same segment/}\angle \text{e in dies segment})$$

$$\hat{B}AT = \hat{B}CA$$

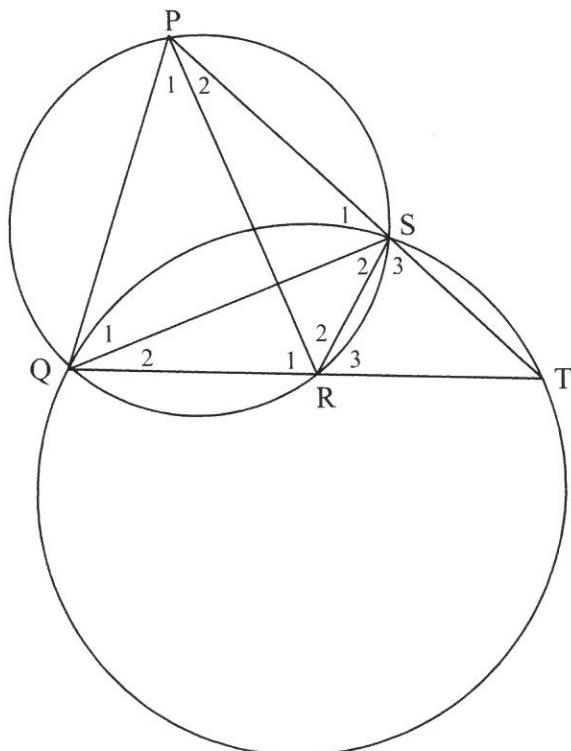
✓ S ✓ R  
✓ S ✓ R

✓ S/R

(6)

<p><b>OR/OF</b></p> <p>Construction: Draw radii OA and OB.  <i>Konstruksie: Trek radiusse OA en OB.</i></p>  <p>Proof/Bewys:</p> <table border="0"> <tr> <td><math>O\hat{A}B + B\hat{A}T = 90^\circ</math></td> <td>(tangent/rklyn <math>\perp</math> radius)</td> <td style="text-align: right;"><math>\checkmark</math> S <math>\checkmark</math> R</td> </tr> <tr> <td><math>O\hat{A}B = 90^\circ - B\hat{A}T</math></td> <td></td> <td style="text-align: right;"><math>\checkmark</math> S</td> </tr> <tr> <td><math>O\hat{B}A = 90^\circ - B\hat{A}T</math></td> <td>(<math>\angle</math>s opp = sides/<math>\angle</math>e to = sye)</td> <td style="text-align: right;"><math>\checkmark</math> S</td> </tr> <tr> <td><math>A\hat{O}B = 180^\circ - 2(90^\circ - B\hat{A}T)</math></td> <td>(<math>\angle</math>s/e of/van <math>\Delta</math>)</td> <td style="text-align: right;"><math>\checkmark</math> S</td> </tr> <tr> <td><math>A\hat{O}B = 2B\hat{A}T</math></td> <td></td> <td style="text-align: right;"><math>\checkmark</math> S/R</td> </tr> <tr> <td><math>A\hat{O}B = 2C\hat{A}</math></td> <td>(<math>\angle</math> at centre = <math>2 \times \angle</math> at circumference/</td> <td></td> </tr> <tr> <td><math>B\hat{A}T = B\hat{C}A</math></td> <td><math>\angle</math> by midpt = <math>2 \times \angle</math> by omtrek)</td> <td></td> </tr> </table>	$O\hat{A}B + B\hat{A}T = 90^\circ$	(tangent/rklyn $\perp$ radius)	$\checkmark$ S $\checkmark$ R	$O\hat{A}B = 90^\circ - B\hat{A}T$		$\checkmark$ S	$O\hat{B}A = 90^\circ - B\hat{A}T$	( $\angle$ s opp = sides/ $\angle$ e to = sye)	$\checkmark$ S	$A\hat{O}B = 180^\circ - 2(90^\circ - B\hat{A}T)$	( $\angle$ s/e of/van $\Delta$ )	$\checkmark$ S	$A\hat{O}B = 2B\hat{A}T$		$\checkmark$ S/R	$A\hat{O}B = 2C\hat{A}$	( $\angle$ at centre = $2 \times \angle$ at circumference/		$B\hat{A}T = B\hat{C}A$	$\angle$ by midpt = $2 \times \angle$ by omtrek)		<p style="text-align: right;"><math>\checkmark</math> construction/  <i>konstruksie</i></p> <p style="text-align: right;">(6)</p>
$O\hat{A}B + B\hat{A}T = 90^\circ$	(tangent/rklyn $\perp$ radius)	$\checkmark$ S $\checkmark$ R																				
$O\hat{A}B = 90^\circ - B\hat{A}T$		$\checkmark$ S																				
$O\hat{B}A = 90^\circ - B\hat{A}T$	( $\angle$ s opp = sides/ $\angle$ e to = sye)	$\checkmark$ S																				
$A\hat{O}B = 180^\circ - 2(90^\circ - B\hat{A}T)$	( $\angle$ s/e of/van $\Delta$ )	$\checkmark$ S																				
$A\hat{O}B = 2B\hat{A}T$		$\checkmark$ S/R																				
$A\hat{O}B = 2C\hat{A}$	( $\angle$ at centre = $2 \times \angle$ at circumference/																					
$B\hat{A}T = B\hat{C}A$	$\angle$ by midpt = $2 \times \angle$ by omtrek)																					

10.2



10.2.1(a)	Tan chord theorem/rklyn-koordstelling	✓ R (1)
10.2.1(b)	∠s in same segment/ ∠e in dieselfde segment	✓ R (1)
10.2.2	$\hat{R}_1 = \hat{P}_2 + \hat{T}$ (ext ∠ of Δ/ buite ∠ v Δ) $\hat{P}_2 = \hat{Q}_2$ (from/vanaf 10.2.1(b)) $\hat{Q}_1 = \hat{T}$ (from/vanaf 10.2.1(a)) $\therefore \hat{Q}_1 + \hat{Q}_2 = \hat{P}_2 + \hat{T}$ $\therefore \hat{Q}_1 + \hat{Q}_2 = \hat{R}_1$ $\therefore PQ = PR$ (sides opp = ∠s/sye to = ∠e) $\therefore \Delta PQR = \text{isosceles triangle/gelykbenige driehoek}$	✓ S ✓ S ✓ S/R (4)
10.2.3	$\hat{R}_2 = \hat{Q}_1$ (∠s in same segment/∠e in dies segment) $\hat{T} = \hat{Q}_1$ (from/vanaf 10.2.1(a)) $\hat{R}_2 = \hat{T}$ PR is a tangent to circle RST at R (converse tan chord th) PR is 'n rklyn aan sirkel RST by R (omgekeerde rkl-kdst)	✓ S/R ✓ S ✓ R (3)
<b>OR/OF</b>		
	$\hat{P}_1 = 180^\circ - (\hat{Q}_1 + \hat{Q}_2 + \hat{R}_1)$ (∠s/e of/van Δ) $\hat{R}_2 = \hat{Q}_1$ (∠s in same segment/∠e in dies segment) $\hat{Q}_1 = \hat{T}$ (from/vanaf 10.2.1(a)) $\therefore \hat{R}_2 = \hat{T}$	✓ S ✓ S/R ✓ R (3)

**TOTAL/TOTAAL:** **150**