



Province of the  
**EASTERN CAPE**  
EDUCATION

**NATIONAL  
SENIOR CERTIFICATE  
*NASIONALE  
SENIOR SERTIFIKAAT***

**GRADE/GRAAD 12**

**SEPTEMBER 2020**

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

**MARKS/PUNTE: 150**


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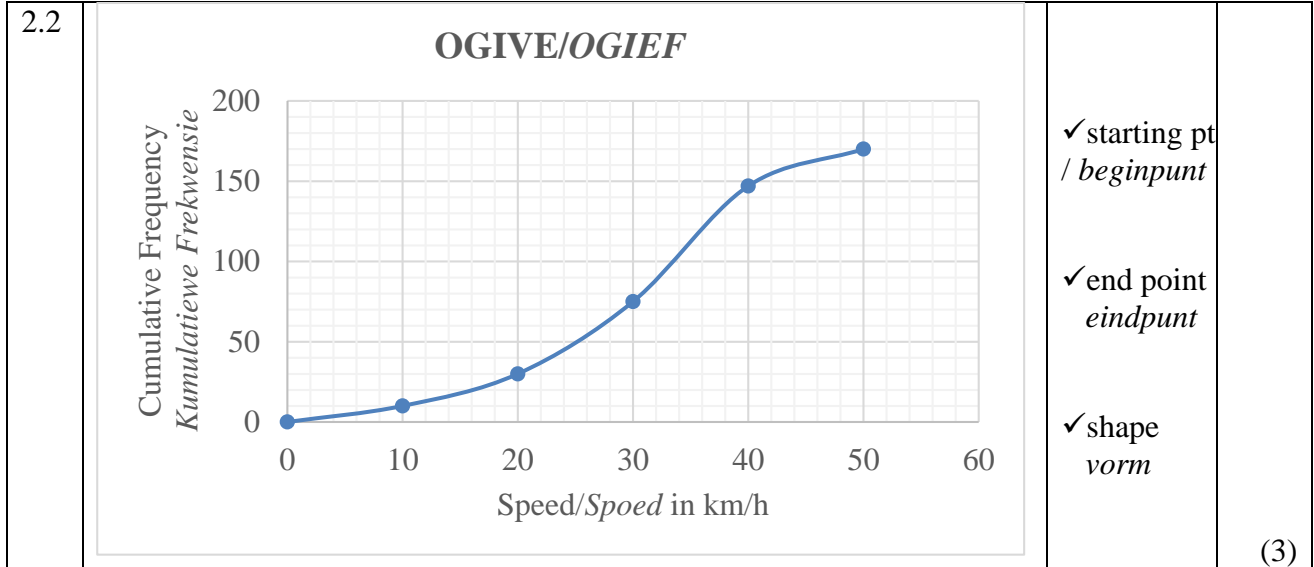
This marking guideline consists of 13 pages.  
*Hierdie nasienriglyn bestaan uit 13 bladsye.*

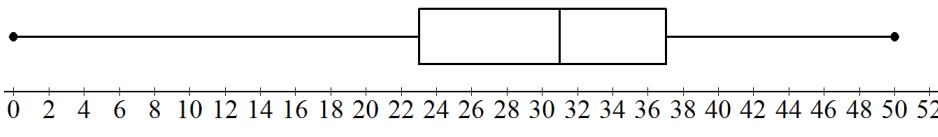
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| QUESTION 1/VRAAG 1 |  |  |             |
|--------------------|--|--|-------------|
| 1.1                | $a = -4,1536$<br>$b = 0,958$<br>$y = -4,1536 + 0,958x$<br><div style="border: 1px solid black; padding: 2px; display: inline-block;">Answer Only: Full Marks</div> | $\checkmark a = -4,1536$<br>$\checkmark b = 0,958$<br>$\checkmark y = -4,1536 + 0,958x$  | (3)         |
| 1.2                | $r = 0,98$   | $\checkmark r = 0,98$  | (1)         |
| 1.3                | Very strong positive correlation/<br><i>Baie sterk positiewe korrelasie</i>  | $\checkmark$ answer / <i>antwoord</i>  | (1)         |
| 1.4                | $y = -4,1536 + 0,958(51)$<br>$y = 45\%$<br><div style="border: 1px solid black; padding: 2px; display: inline-block;">Answer Only: Full Marks</div>                | $\checkmark$ substitution / <i>vervanging</i><br>$\checkmark$ answer / <i>antwoord</i>   | (2)         |
| 1.5                | $\bar{x} = 60,8$<br>Standard deviation / <i>Standaardafwyking</i> = 17, 51<br>$(60,8 - 17,51 ; 60,8 + 17,51)$<br>$(43,29 ; 78,31)$<br>6 learners / <i>leerders</i> | $\checkmark$ Standard deviation/<br><i>Standaardafwyking</i> = 17, 51<br><br>$\checkmark (43,29 ; 78,31)$<br>$\checkmark$ 6 learners / <i>leerders</i> | (3)         |
|                    |  |  | <b>[10]</b> |

## QUESTION 2/VRAAG 2

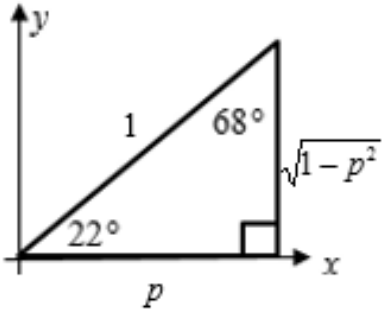

| 2.1                    |   |   |                                       |   |                 |    |    |                  |           |    |                  |    |           |                  |    |            |                  |           |     |   |     |
|------------------------|--|---|---------------------------------------|---|-----------------|----|----|------------------|-----------|----|------------------|----|-----------|------------------|----|------------|------------------|-----------|-----|---|-----|
|                        | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Speed/Speed<br/>( km/h)</th> <th style="text-align: center;">Frequency<br/><i>Frekwensie</i><br/>(f)</th> <th style="text-align: center;">Cumulative Frequency<br/><i>Kumulatiewe Frekwensie</i></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><math>0 &lt; x \leq 10</math></td> <td style="text-align: center;">10</td> <td style="text-align: center;">10</td> </tr> <tr> <td style="text-align: center;"><math>10 &lt; x \leq 20</math></td> <td style="text-align: center;"><b>20</b></td> <td style="text-align: center;">30</td> </tr> <tr> <td style="text-align: center;"><math>20 &lt; x \leq 30</math></td> <td style="text-align: center;">45</td> <td style="text-align: center;"><b>75</b></td> </tr> <tr> <td style="text-align: center;"><math>30 &lt; x \leq 40</math></td> <td style="text-align: center;">72</td> <td style="text-align: center;"><b>147</b></td> </tr> <tr> <td style="text-align: center;"><math>40 &lt; x \leq 50</math></td> <td style="text-align: center;"><b>23</b></td> <td style="text-align: center;">170</td> </tr> </tbody> </table> | Speed/Speed<br>( km/h)                                | Frequency<br><i>Frekwensie</i><br>(f) | Cumulative Frequency<br><i>Kumulatiewe Frekwensie</i> | $0 < x \leq 10$ | 10 | 10 | $10 < x \leq 20$ | <b>20</b> | 30 | $20 < x \leq 30$ | 45 | <b>75</b> | $30 < x \leq 40$ | 72 | <b>147</b> | $40 < x \leq 50$ | <b>23</b> | 170 | $\checkmark$ freq column /<br><i>frek. kolom</i><br><br>$\checkmark$ cum freq column<br><i>kum frek kolom</i> | (2) |
| Speed/Speed<br>( km/h) | Frequency<br><i>Frekwensie</i><br>(f)  | Cumulative Frequency<br><i>Kumulatiewe Frekwensie</i> |                                       |   |                 |    |    |                  |           |    |                  |    |           |                  |    |            |                  |           |     |   |     |
| $0 < x \leq 10$        | 10   | 10  |                                       |   |                 |    |    |                  |           |    |                  |    |           |                  |    |            |                  |           |     |   |     |
| $10 < x \leq 20$       | <b>20</b>  | 30  |                                       |   |                 |    |    |                  |           |    |                  |    |           |                  |    |            |                  |           |     |   |     |
| $20 < x \leq 30$       | 45   | <b>75</b>   |                                       |   |                 |    |    |                  |           |    |                  |    |           |                  |    |            |                  |           |     |   |     |
| $30 < x \leq 40$       | 72   | <b>147</b>  |                                       |   |                 |    |    |                  |           |    |                  |    |           |                  |    |            |                  |           |     |   |     |
| $40 < x \leq 50$       | <b>23</b>  | 170   |                                       |   |                 |    |    |                  |           |    |                  |    |           |                  |    |            |                  |           |     |   |     |




|                             |  |  |             |
|-----------------------------|--|--|-------------|
| 2.3                         | $Q_1 = 23$ (accept / <i>aanvaar</i> 22 – 24)<br>Median / <i>Mediaan</i> = 31 (accept / <i>aanvaar</i> 30 – 32)   | ✓ $Q_1$<br>✓ Median<br><i>Mediaan</i>  | (2)         |
| 2.4                         |    | ✓ for / <i>vir</i><br>$Q_3 = 37$<br>(accept / <i>aanvaar</i> 36 – 38)<br>✓ correct shape / <i>korrekte vorm</i>                    | (2)         |
| 2.5                         | $170 - 110 = 60$ cyclists / <i>fietsryers</i><br>(accept / <i>aanvaar</i> 59 – 61)   | ✓ answer / <i>antwoord</i>   | (1)         |
|                             |  |  | <b>[10]</b> |
| <b>QUESTION 3 / VRAAG 3</b> |  |  |             |
| 3.1                         | $m_{QR} = \frac{-2 - (-4)}{0 - 6} = -\frac{1}{3}$  | ✓ substitution / <i>vervanging</i><br>✓ answer / <i>antwoord</i>   | (2)         |
| 3.2                         | $m_{PQ} = 3$<br>$m_{PQ} \times m_{QR} = 3 \times \frac{-1}{3} = -1$<br>$\therefore \hat{PQR} = 90^\circ$   | ✓ $m_{PQ} = 3$<br>✓ $m_{PQ} \times m_{QR} = 3 \times \frac{-1}{3} = -1$  | (2)         |
| 3.3                         | Sub/Verv: $y = -x + 2$ into/in $3x - y - 2 = 0$<br>$\therefore 3x - (-x + 2) - 2 = 0$<br>$3x + x - 2 - 2 = 0$<br>$4x = 4$<br>$x = 1$<br>$y = 1$<br>$\therefore P(1;1)$   | ✓ substitution / <i>vervanging</i><br>✓ $x$ - coordinate / $x$ - <i>koördinaat</i><br>✓ $y$ - coordinate / $y$ - <i>koördinaat</i> | (3)         |
| 3.4                         | $QR = \sqrt{(0 - 6)^2 + (-2 - (-4))^2}$<br>$QR = 2\sqrt{10}$ <b>OR/OF</b> $\sqrt{40}$ <b>OR/OF</b> 6, 32<br><div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">Answer Only: Full Marks</div> | ✓ substitution in correct <i>f</i><br><i>vervanging in korrekte f</i><br>✓ answer / <i>antwoord</i>                                | (2)         |

|            |   |  |             |
|------------|---|--|-------------|
| <p>3.5</p> | <p>PR is the diameter (angle subtended by diameter = <math>90^\circ</math>) / <i>PR is die middellyn (hoek onderspan deur middellyn = <math>90^\circ</math>)</i></p> <p>Midpoint of / <i>Middelpunt van</i> PR <math>\left(\frac{7}{2}; -\frac{3}{2}\right)</math></p> <p><math>PR = \sqrt{(1-6)^2 + (1+4)^2}</math></p> <p><math>PR = \sqrt{50}</math></p> <p><math>r = \frac{\sqrt{50}}{2}</math></p> <p><math>\left(x - \frac{7}{2}\right)^2 + \left(x + \frac{3}{2}\right)^2 = \left(\frac{\sqrt{50}}{2}\right)^2</math></p> <p style="text-align: center;"><b>OR/OF</b></p> <p><math>(x - 3,5)^2 + (x + 1,5)^2 = \left(\frac{\sqrt{50}}{2}\right)^2</math></p> | <p>✓ for the statement PR is the diameter / <i>vir stelling PR is die middellyn</i></p> <p>✓✓ Midpoint of PR / <i>Middelpunt van PR</i></p> <p>✓ for the radius / <i>vir die radius</i></p> <p>✓ equation / <i>vergelyking</i></p>   | <p>(5)</p>  |
| <p>3.6</p> | <p><math>\tan \hat{P}NX = -1</math></p> <p><math>\therefore \hat{P}NX = 135^\circ</math></p> <p><math>\tan \hat{P}MX = 3</math></p> <p><math>\therefore \hat{P}MX = 71,57^\circ</math></p> <p><math>\theta = 135^\circ - 71,57^\circ = 63,43^\circ</math></p>   | <p>✓ <math>\tan \hat{P}NX = -1</math></p> <p>✓ <math>\therefore \hat{P}NX = 135^\circ</math></p> <p>✓ <math>\tan \hat{P}MX = 3</math></p> <p>✓ <math>\therefore \hat{P}MX = 71,57^\circ</math></p> <p>✓ answer / <i>antwoord</i></p> | <p>(5)</p>  |
| <p>3.7</p> | <p><math>A = \frac{1}{2} \times PQ \times QR</math></p> <p><math>A_{\Delta PQR} = \frac{1}{2} \times \sqrt{10} \times \sqrt{40}</math></p> <p><math>A_{\Delta PQR} = 10</math> square units / <i>vierkante eenhede</i></p> <p style="text-align: center;"><b>OR/OF</b></p> <p><math>A_{\Delta PQR} = \frac{1}{2} \times PQ \times PR \times \sin 63,43^\circ</math></p> <p><math>A_{\Delta PQR} = \frac{1}{2} \times \sqrt{10} \times \sqrt{50} \times \sin 63,43^\circ</math></p> <p><math>A_{\Delta PQR} = 10</math> square units / <i>vierkante eenhede</i></p>  | <p>✓ formula / <i>formule</i></p> <p>✓ <math>\sqrt{10}</math></p> <p>✓ answer / <i>antwoord</i></p>  | <p>(3)</p>  |
|            |   |  | <p>[22]</p> |

| QUESTION 4 / VRAAG 4 |  |   |
|----------------------|--|---|
| 4.1                  | $x^2 - 6x + y^2 - 4y + 9 = 0$<br>$x^2 - 6x + 9 + y^2 - 4y + 4 = -9 + 9 + 4$<br>$(x - 3)^2 + (y - 2)^2 = 4$<br>C(3;2) and / en $r = 2$  | ✓ completing square<br><i>voltooiing van vierkant</i><br>✓ standard form /<br><i>standaardvorm</i><br>✓ 3<br>✓ 2  |
| 4.2                  | $m_{\text{tan}} = -2$<br>$m_{\text{BV}} = \frac{1}{2}$<br>$y - 2 = \frac{1}{2}(x - 3)$<br>$y = \frac{1}{2}x + \frac{1}{2}$   | ✓ $m_{\text{BV}} = \frac{1}{2}$<br>✓ substitution / <i>vervanging</i><br>✓ answer / <i>antwoord</i>   |
| 4.3                  | $y = 4$  | ✓ answer / <i>antwoord</i>  |
| 4.4                  | TA = 4 units / <i>eenhede</i><br>TB = TA (tangents from the same point)<br><i>(raaklyne vanaf dieselfde punt)</i><br>TB = 4 units / <i>eenhede</i>   | ✓ length of TA / <i>lengte van TA</i><br>✓ S ✓ R<br>✓ answer / <i>antwoord</i>  |
| 4.5                  | T(-1;4)<br>$y = -2x + k$<br>$4 = -2(-1) + k$<br>$k = 2$  | ✓ substitution / <i>vervanging</i><br>✓ answer / <i>antwoord</i>  |
| 4.6                  | $\tan \hat{S}TA = -2$<br>$\hat{S}TA = 116,57^\circ$<br>$\therefore \hat{A}CB = 116,57^\circ$ (ext. angle of a c.q.)<br><i>(buitehoek van koordevierhoek)</i><br><br><b>OR/OF</b><br>Draw/Trek: CE    OX ; then/dan<br>$\tan \hat{V}CE = \frac{1}{2}$<br>$\therefore \hat{V}CE = 26,57^\circ$<br>$\therefore \hat{A}CB = 180^\circ - (90^\circ - 26,57^\circ) = 116,57^\circ$<br><i>(∠s on straight line / ∠e op reguitlyn)</i> | ✓ $\tan \hat{S}TA = -2$<br>✓ $\hat{S}TA = 116,57^\circ$<br>✓ answer / <i>antwoord</i><br>✓ reason / <i>rede</i><br><br><b>OR/OF</b><br>✓ $\tan \hat{V}CE = \frac{1}{2}$<br>✓ $\therefore \hat{V}CE = 26,57^\circ$<br>✓ answer / <i>antwoord</i><br>✓ reason / <i>rede</i> |
|                      |  | [18]  |

| QUESTION 5/VRAAG 5 |  |   |     |
|--------------------|--|---|-----|
| 5.1.1              | $\cos 158^\circ$ $= -\cos 22^\circ$ $= -p$    | $\checkmark -\cos 22^\circ$ $\checkmark -p$   | (2) |
| 5.1.2              | $\sin 112^\circ$ $= \sin(90^\circ + 22^\circ)$ $= \cos 22^\circ$ $= p$   | $\checkmark \cos 22^\circ$ $\checkmark p$   | (2) |
| 5.1.3              | $\sin 38^\circ$ $= \sin(60^\circ - 22^\circ)$ $= \sin 60^\circ \cos 22^\circ - \cos 60^\circ \sin 22^\circ$ $= \frac{\sqrt{3}}{2} p - \frac{1}{2} \sqrt{1-p^2}$  | $\checkmark \sin(60^\circ - 22^\circ)$ $\checkmark \text{expansion / uitbreiding}$ $\checkmark \frac{\sqrt{3}}{2} p \quad \checkmark \frac{1}{2} \sqrt{1-p^2}$  | (4) |
| 5.2                | $\sin P = \sin 2P$ $\sin P - \sin 2P = 0$ $\sin P - 2\sin P \cos P = 0$ $\sin P(1 - 2\cos P) = 0$ $\sin P = 0 \text{ or/of } \cos P = \frac{1}{2}$ $P \in [0^\circ; 60^\circ; 180^\circ; 300^\circ; 360^\circ]$ <p style="text-align: center;"><b>OR/OF</b></p> $P = 2P + 360^\circ k \text{ or/of } P = 180^\circ - 2P + 360^\circ k ,$ $P \in \mathbb{Z}$ $P = -360^\circ k \quad \text{or/of} \quad 3P = 180^\circ + 360^\circ k$ $P = 60^\circ + 120^\circ k$ $P \in [0^\circ; 60^\circ; 180^\circ; 300^\circ; 360^\circ]$ |  $\checkmark \text{standard form / standaardvorm}$ $\checkmark \text{expansion / uitbreiding}$ $\checkmark \text{factorisation / faktorisering}$ $\checkmark \text{all correct values of } P$ $\text{alle korrekte waardes van } P$ $\checkmark P = 2P + 360^\circ k$ $\checkmark P = 180^\circ - 2P + 360^\circ k$ $\checkmark P = 60^\circ + 120^\circ k$ $\checkmark \text{all correct values of } P$ $\text{alle korrekte waardes van } P$ | (4) |
| 5.3                | $A + B + C = 180^\circ$ $A + B = 180^\circ - C$ $\cos(A + B) = \cos(180^\circ - C)$ $\cos(A + B) = -\cos C$  | $\checkmark A + B = 180^\circ - C$ $\checkmark \cos(A + B) = \cos(180^\circ - C)$   | (2) |

|   |   |  |             |
|---|---|--|-------------|
| 5.4   | $\frac{\cos^2 x - \cos x - \sin^2 x}{2 \sin x \cos x + \sin x} = \frac{1}{\tan x} - \frac{1}{\sin x}$ $\text{LHS} / \text{LK} = \frac{\cos^2 x - \cos x - \sin^2 x}{2 \sin x \cos x + \sin x}$ $= \frac{\cos^2 x - \cos x - (1 - \cos^2 x)}{\sin x(2 \cos x + 1)}$ $= \frac{2 \cos^2 x - \cos x - 1}{\sin x(2 \cos x + 1)}$ $= \frac{(2 \cos x + 1)(\cos x - 1)}{\sin x(2 \cos x + 1)}$ $= \frac{\cos x}{\sin x} - \frac{1}{\sin x} = \frac{1}{\tan x} - \frac{1}{\sin x} = \text{RHS} / \text{RK}$ | <ul style="list-style-type: none"> <li>✓ <math>1 - \cos^2 x</math></li> <li>✓ <math>\sin x(2 \cos x + 1)</math></li> <li>✓ <math>2 \cos^2 x - \cos x - 1</math></li> <li>✓ <math>(2 \cos x + 1)(\cos x - 1)</math></li> <li>✓ <math>\frac{\cos x}{\sin x} - \frac{1}{\sin x}</math></li> </ul>   | (5)         |
| 5.5   | $4 + 7 \cos \theta + \cos 2\theta = 0$ $4 + 7 \cos \theta + 2 \cos^2 \theta - 1 = 0$ $2 \cos^2 \theta + 7 \cos \theta + 3 = 0$ $(2 \cos \theta + 1)(\cos \theta + 3) = 0$ $\cos \theta = -\frac{1}{2} \quad \text{or/of} \quad \cos \theta = -3 \text{ (N/A)}$ $\theta = 120^\circ + 360^\circ.k \quad \text{or/of} \quad \theta = 240^\circ + 360^\circ.k, x \in \mathbb{Z}$   | <ul style="list-style-type: none"> <li>✓ <math>2 \cos^2 - 1</math></li> <li>✓ standard form / <i>standaardvorm</i></li> <li>✓ factors / <i>faktore</i></li> <li>✓ <math>\cos \theta = -\frac{1}{2}</math> or/of <math>\cos \theta = -3</math></li> <li>✓ <math>\theta = 120^\circ + 360^\circ.k</math></li> <li>✓ <math>\theta = 240^\circ + 360^\circ.k</math></li> </ul> | (6)         |
|  |   |  | <b>[25]</b> |



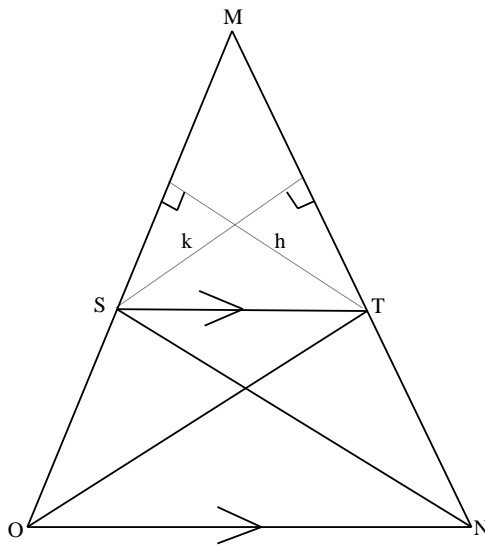
| QUESTION 6 / VRAAG 6 |   |  |            |
|----------------------|---|--|------------|
| 6.1                  | $b = \frac{1}{2}$   | ✓ answer /<br>antwoord   | (1)        |
| 6.2                  | A(30°;1)  | ✓ 30°<br>✓ 1   | (2)        |
| 6.3                  | $g(90^\circ) = \cos(90^\circ - 30^\circ)$<br>$= \cos 60^\circ$<br>$= \frac{1}{2}$<br>Q(90°; $\frac{1}{2}$ )   | ✓ 90°<br>✓ $\frac{1}{2}$   | (2)        |
| 6.4                  | $x = 160^\circ$   | ✓ $x = 160^\circ$  | (1)        |
| 6.5                  | $-1 \leq y \leq 3 \quad y \in R$ <b>OR/OF</b><br>$y \in [-1;3]$   | ✓ ✓ answer /<br>antwoord   | (2)        |
|                      |   |  | <b>[8]</b> |
| QUESTION 7 / VRAAG 7 |   |  |            |
| 7.1                  | $\hat{LNM} = 180^\circ - 2p$ (angles opp. = sides)<br>(hoeke teenoor gelyke sye)  | ✓ answer / antwoord<br>✓ reason / rede   | (2)        |
| 7.2                  | $\frac{LM}{\sin(180^\circ - 2p)} = \frac{d}{\sin p}$<br>$\frac{LM}{\sin 2p} = \frac{d}{\sin p}$<br>$LM = \frac{d \sin 2p}{\sin p}$                                  | ✓ for applying the sine rule<br>gebruik van sinusreël<br><br>✓ $\sin 2P$   | (2)        |
| 7.3                  | $\tan q = \frac{h}{LM}$<br>$h = LM \tan q$<br>$h = \frac{d \sin 2p}{\sin p} \cdot \tan q$<br>$h = \frac{2d \sin p \cos p \tan q}{\sin p}$<br>$h = 2d \cos p \tan q$ | ✓ $\tan q = \frac{h}{LM}$<br><br>✓ $h = \frac{d \sin 2p}{\sin p} \cdot \tan q$<br><br>✓ $h = \frac{2d \sin p \cos p \tan q}{\sin p}$ | (3)        |
|                      |   |  | <b>[7]</b> |

| QUESTION 8 / VRAAG 8 |  |  |             |
|----------------------|--|--|-------------|
| 8.1                  | bisects the chord / <i>halveer die koord</i>   | ✓ answer/antwoord  | (1)         |
| 8.2                  | $EB = 8 - y$<br>In $\triangle AEB$ : $10^2 = x^2 + (8 - y)^2 \dots\dots\dots(1)$<br>Eqn of the circle / <i>Verg. van die sirkel</i> :<br>$x^2 + y^2 = 64$<br>$x^2 = 64 - y^2 \dots\dots\dots(2)$<br>Subst./Verv. (2) into/in (1)<br>$100 = 64 - y^2 + 64 - 16y + y^2$<br>$100 = 128 - 16y$<br>$16y = 28$<br>$y = \frac{7}{4}$<br>$\therefore OE = \frac{7}{4}$ | ✓ for/vir EB<br>✓ Pythagoras in $\triangle AEB$<br><br>✓ equation of the circle<br><i>vergelyking van sirkel</i><br><br>✓ substitution<br><i>vervanging</i><br><br>✓ answer / antwoord | (5)         |
| 8.3                  | <b>Double</b> the size of <b>the angle</b> subtended by the same arc.<br><b>Dubbel</b> die grootte van <b>die hoek</b> wat deur dieselfde boog onderspan word.   | ✓ answer / antwoord  | (1)         |
| 8.4.1                | $\hat{O}_2 = 2\hat{B}_2$ ( $\angle$ at centre = $2 \times \angle$ at the circumf)<br>( <i>Middelpunts <math>\angle = 2 \times</math> Omtrekshoek</i> )   | ✓ statement / <i>stelling</i><br>✓ reason / <i>rede</i>  | (2)         |
| 8.4.2                | $\hat{C}_3 = \hat{D}_1 + \hat{D}_2$ ( $\angle$ s opp = sides) / ( <i><math>\angle</math>e teenoor = sye</i> )  | ✓ statement / <i>stelling</i><br>✓ reason / <i>rede</i>  | (2)         |
| 8.4.3                | $\hat{B}_1 + \hat{B}_2 = 180^\circ - (\hat{D}_1 + \hat{D}_2)$ (opp. $\angle$ s of a cyclic quad)<br>( <i>teenoorst. <math>\angle</math>e van 'n koordevierhoek</i> )   | ✓ statement / <i>stelling</i><br>✓ reason / <i>rede</i>  | (2)         |
| 8.4.4                | $\hat{D}_1 = \hat{C}_1$ ( $\angle$ s in the same segment)<br>( <i><math>\angle</math>e in dieselfde segment</i> )  | ✓ statement / <i>stelling</i><br>✓ reason / <i>rede</i>  | (2)         |
|                      |  |  | <b>[15]</b> |

| QUESTION 9 / VRAAG 9 |  |  |
|----------------------|--|--|
| 9.1                  | $\hat{P}\hat{C}Q = 80^\circ$ ( $\angle$ s opp = sides) / ( $\angle$ e teenoor = sye)<br>$\hat{P}\hat{C}B = 100^\circ$ ( $\angle$ s on a straight line)<br>( $\angle$ e op 'n reguitlyn)<br>$\therefore$ BC is not a diameter (angle between the tangent and BC is not equal to $90^\circ$ )<br><i>BC is nie 'n middellyn nie. (hoek tussen die raaklyn en BC is nie gelyk aan <math>90^\circ</math> nie)</i>   | ✓ statement / <i>stelling</i><br>✓ reason / <i>rede</i><br>✓ statement / <i>stelling</i><br>✓ reason / <i>rede</i><br>✓ conclusion / <i>gevolgtrekking</i>   |
|                      |  | (5)  |
| 9.2                  | $\hat{P}_1 = \hat{B}$ (alt $\angle$ s, PQ $\parallel$ AB) / ( <i>verw.</i> $\angle$ e, PQ $\parallel$ AB)<br>$\hat{B} = \hat{C}_3$ ( $\angle$ s opp = sides; radii)<br>( $\angle$ e teenoor = sye: radiusse)<br>$\hat{C}_3 = \hat{C}_1$ (vert. opp. angles) / ( <i>regoorst. hoek</i> )<br>$\therefore \hat{P}_1 = \hat{C}_1$<br>$\therefore$ PQ = QC (sides opp = angles)<br>( <i>sye teenoor = hoek</i> )  | ✓ statement / <i>stelling</i><br>✓ reason / <i>rede</i><br>✓ statement / <i>stelling</i><br>✓ reason / <i>rede</i><br><br>✓ statement / <i>stelling</i><br>✓ statement and reason <i>stelling en rede</i>  |
|                      |  | (6)  |
| 9.3                  | $\hat{A} = \hat{E}_2$ (ext. $\angle$ of a cq) / ( <i>buite <math>\angle</math> van koordev.</i> )<br>$\hat{D} = 180^\circ - \hat{E}_2$ (co-interior $\angle$ s; BE $\parallel$ CD)<br>( <i>ko-binne <math>\angle</math> e : BE <math>\parallel</math> CD</i> )<br>$\hat{D} + \hat{A} = 180^\circ$<br>$\therefore$ ACDF is a cq (opp $\angle$ s supplementary) /<br><i>is 'n koordev (teenoorst. <math>\angle</math> e is suppl.)</i><br><br><p style="text-align: center;"><b>OR/OF</b></p> $\hat{D} = \hat{E}_1$ (corres. $\angle$ s; BE $\parallel$ CD)<br>( <i>ooreenk. <math>\angle</math> e : BE <math>\parallel</math> CD</i> )<br>$\hat{E}_2 = 180^\circ - \hat{E}_1$ ( $\angle$ s on a straight line)<br>( $\angle$ e op 'n reguitlyn)<br>$\hat{A} = 180^\circ - \hat{E}_1$ (opp $\angle$ s of a cq)<br>( <i>teenoorst. <math>\angle</math> e is suppl.</i> )<br>$\hat{D} + \hat{A} = 180^\circ$<br>$\therefore$ ACDF is a cyclic quad. / <i>is 'n koordevierhoek</i><br>(opp $\angle$ s of a quad. supplementary)<br>( <i>teenoorst. <math>\angle</math> e van koordev. is supplementêr</i> ) | ✓ statement / <i>stelling</i><br>✓ reason / <i>rede</i><br>✓ statement and reason <i>stelling en rede</i><br><br>✓ statement and reason <i>stelling en rede</i><br>✓ reason / <i>rede</i><br><br>✓ statement / <i>stelling</i><br><br>✓ reason / <i>rede</i><br><br>✓ statement and reason <i>stelling en rede</i><br>✓ statement and reason <i>stelling en rede</i><br><br>✓ reason / <i>rede</i> |
|                      |  | (5)  |
|                      |  | <b>[16]</b>  |

## QUESTION 10 / VRAAG 10

10.1



RTP/TE BEWYS:  $\frac{MS}{SO} = \frac{MT}{TN}$

Construction: Join SN, and OT, and construct perpendicular heights /

Konstruksie: Verbind SN en OT, trek loodregte hoogtes

Proof / Bewys:

$$\frac{\text{area } \Delta MST}{\text{area } \Delta OST} = \frac{\frac{1}{2} \times MS \times h}{\frac{1}{2} \times SO \times h} = \frac{MS}{SO}$$

$$\frac{\text{area } \Delta MST}{\text{area } \Delta TNS} = \frac{\frac{1}{2} \times MT \times k}{\frac{1}{2} \times TN \times k} = \frac{MT}{TN}$$

But / Maar  $\Delta MST$  is common / gemeen

And / En

area of  $\Delta OST$  = area of  $\Delta TNS$  (same base, same height)

area van  $\Delta OST$  = area van  $\Delta TNS$  (dies. basis en dies. hoogte)

$$\therefore \frac{MS}{SO} = \frac{MT}{TN}$$

area / oppervlakte

✓ area of the two triangles  
area van twee driehoeke

✓  $\frac{MS}{SO}$

✓ area of the two triangles  
area van twee driehoeke

✓  $\frac{MT}{TN}$

✓ statement and reason  
stelling en rede

(5)

|        |  |   |            |
|--------|--|---|------------|
| 10.2.1 | <p>In <math>\triangle APS</math> and/en <math>\triangle BRS</math></p> <p><math>\hat{P}_4 = \hat{R}_1</math> (tan – chord theorem)<br/>(<i>raaklyn-koord Stelling</i>)</p> <p><math>\hat{A} = \hat{B}_2 = 90^\circ</math> (given) / (<i>gegee</i>)</p> <p><math>\triangle APS \parallel \triangle BRS</math> (AAA) / (<math>\angle\angle\angle</math>)</p>   | <p>✓ statement and reason<br/><i>stelling en rede</i></p> <p>✓ statement / <i>stelling</i></p> <p>✓ 3<sup>rd</sup> <math>\angle</math> / 3<sup>de</sup> <math>\angle</math></p> <p><b>OR/OF</b><br/>reason for similarity<br/><i>rede vir gelykvormigheid</i></p>   | (3)        |
| 10.2.2 | <p><math>\frac{AP}{BR} = \frac{PS}{RS} = \frac{AS}{BS}</math> (similar triangles)<br/>(<i>gelykvormige driehoeke</i>)</p> <p><math>\therefore AP \cdot RS = BR \cdot PS</math></p>   | <p>✓ for the statement<br/><i>vir die stelling</i></p>  | (1)        |
| 10.2.3 | <p><math>\hat{P}_2 = 90^\circ</math> (<math>\angle</math> s in a semi – circle)<br/>(<i><math>\angle</math> e in 'n semi-sirkel</i>)</p> <p>Let/Laat: <math>\hat{P}_4 = x</math></p> <p><math>\therefore \hat{S}_1 = 90 - x</math> (<math>\angle</math> s of APS) / (<i><math>\angle</math> e van APS</i>)</p> <p><math>\therefore \hat{Q} = 90 - x</math> (ext <math>\angle</math> of a cq) / (<i>buite <math>\angle</math> van kv</i>)</p> <p><math>\therefore \hat{R}_2 = x</math> (<math>\angle</math> s of QPR) / (<i><math>\angle</math> e van QPR</i>)</p> <p><math>\therefore \hat{P}_4 = \hat{R}_2</math></p>   | <p>✓ <math>\hat{P}_2 = 90^\circ</math><br/>(<math>\angle</math> in a semi – circle) /<br/>(<i><math>\angle</math> e in 'n semi-sirkel</i>)</p> <p>✓ <math>\hat{S}_1 = 90 - x</math></p> <p>✓ <math>\hat{Q} = 90 - x</math></p> <p>✓ <math>\hat{R}_2 = x</math></p>  | (4)        |
| 10.2.4 | <p>In <math>\triangle ASP</math> and/en <math>\triangle PQR</math></p> <p><math>\hat{A} = \hat{P}_2</math> (proven / <i>bewys</i>)</p> <p><math>\hat{P}_4 = \hat{R}_2</math> (proven / <i>bewys</i>)</p> <p><math>\triangle ASP \parallel \triangle PQR</math> (AAA) / (<math>\angle\angle\angle</math>)</p> <p><math>\frac{AS}{PQ} = \frac{SP}{QR} = \frac{AP}{PR}</math> (similar triangles)<br/>(<i>gelykvormige driehoeke</i>)</p> <p><math>\therefore AP \cdot QR = SP \cdot PR</math></p> <p><math>\therefore \frac{AP}{PS} = \frac{PR}{RQ}</math></p> <p>But / <i>Maar</i>: <math>\frac{AP}{PS} = \frac{BR}{RS}</math> (from / <i>vanaf</i> 10.2)</p> <p><math>\therefore \frac{PR}{RQ} = \frac{BR}{RS}</math></p> <p><math>\therefore BR \cdot RQ = RS \cdot RP</math></p> | <p>✓ statement and reason<br/><i>stelling en rede</i></p> <p>✓ statement / <i>stelling</i></p> <p>✓ reason for similarity<br/><i>rede vir gelykvormigheid</i></p> <p>✓ <math>\frac{AP}{PS} = \frac{PR}{RQ}</math></p> <p>✓ <math>\frac{AP}{PS} = \frac{BR}{RS}</math></p> <p>✓ <math>\frac{PR}{RQ} = \frac{BR}{RS}</math></p> | (6)        |
|        |  |   | [19]       |
|        |  | <b>TOTAL/TOTAAL:</b>  | <b>150</b> |