



# basic education

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

## **NATIONAL SENIOR CERTIFICATE**

**GRADE/GRAAD 12**

**MATHEMATICS P2/WISKUNDE V2**

**NOVEMBER 2014**

**MEMORANDUM**

**MARKS/PUNTE: 150**

**This memorandum consists of 23 pages.  
*Hierdie memorandum bestaan uit 23 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.

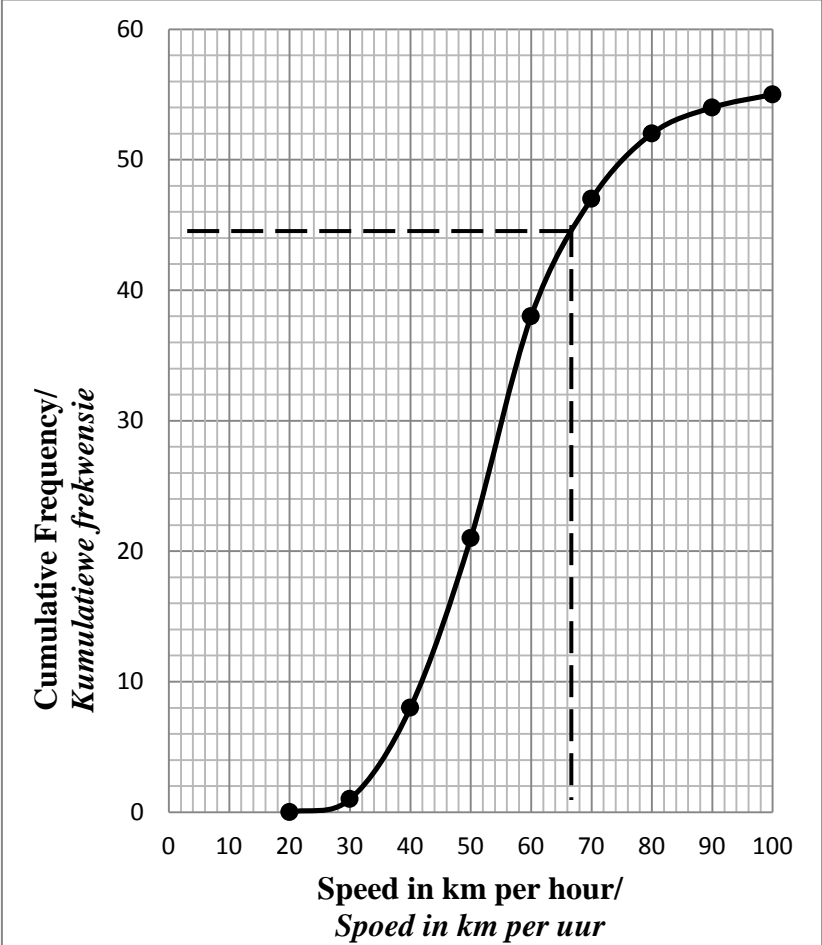
**NOTA:**

- 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.

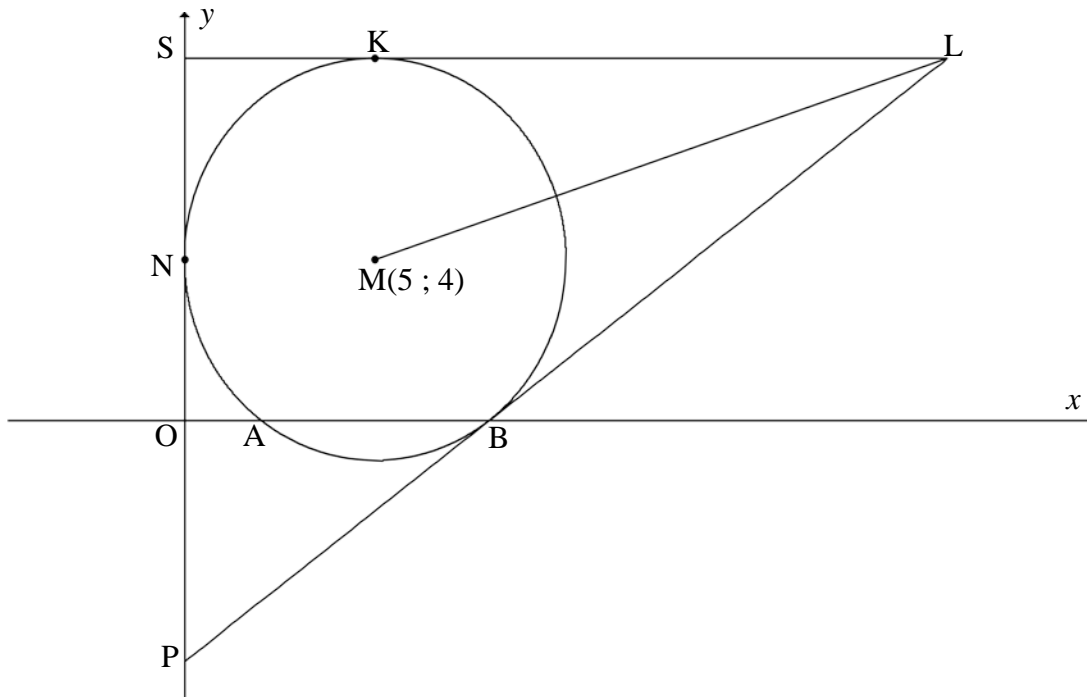
**QUESTION/VRAAG 1**

|     |   |   |
|-----|---|---|
| 1.1 | $\bar{x} = \frac{816}{12} = 68$   | ✓ $\frac{816}{12}$<br>✓ 68<br>(2)   |
| 1.2 | $\sigma = 18,42$  | ✓ answer/antw<br>(1)  |
| 1.3 | $(68 - 18,42 ; 68 + 18,42) = (49,58 ; 86,42)$<br>$\therefore$ 6 candidates had a mark within one standard deviation of the mean/6 kandidate het 'n punt binne een standaardafwyking vanaf die gemiddelde. | ✓✓ interval<br>✓ answer/antw<br>(3)   |
| 1.4 | $a = 22,828\dots = 22,83$<br>$b = 0,66429\dots = 0,66$<br>$\therefore \hat{y} = 0,66x + 22,83$ <b>OR/OF</b> $\hat{y} = 22,83 + 0,66x$   | ✓ value of a/<br>waarde van a<br>✓ value of b/<br>waarde van b<br>✓ equation/vgl<br>(3) |
| 1.5 | $\hat{y} = 0,66x + 22,83$<br>$y = 0,66(60) + 22,83$<br>$62,43\dots\% \approx 62\%$<br><br><b>OR/OF</b><br><br>$62,69\% \approx 63\%$  | ✓ subs of 60 into<br>equation<br>✓ answer/antw<br>(2)<br><br>✓✓ answer/antw<br>(2)      |
| 1.6 | (82 ; 62)   | ✓ answer/antw<br>(1)<br><b>[12]</b>   |

**QUESTION/VRAAG 2**

| 2.1                  | $50 < x \leq 60$ <b>OR/OF</b> $50 \leq x < 60$ <b>OR/OF</b><br>between 50 and 60/tussen 50 en 60  |   |  | ✓ answer/antw<br><br>(1)  |                                |   |                  |   |   |                  |   |   |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                  |   |    |                   |   |    |  |
|----------------------|---|---|--|---|--------------------------------|---|------------------|---|---|------------------|---|---|------------------|----|----|------------------|----|----|------------------|---|----|------------------|---|----|------------------|---|----|-------------------|---|----|--|
| 2.2.1                | <table border="1"> <thead> <tr> <th>Class<br/><i>Klas</i></th> <th>Frequency<br/><i>Frekwensie</i></th> <th>Cumulative frequency<br/><i>Kumulatiewe frekwensie</i></th> </tr> </thead> <tbody> <tr> <td><math>20 &lt; x \leq 30</math></td> <td>1</td> <td>1</td> </tr> <tr> <td><math>30 &lt; x \leq 40</math></td> <td>7</td> <td>8</td> </tr> <tr> <td><math>40 &lt; x \leq 50</math></td> <td>13</td> <td>21</td> </tr> <tr> <td><math>50 &lt; x \leq 60</math></td> <td>17</td> <td>38</td> </tr> <tr> <td><math>60 &lt; x \leq 70</math></td> <td>9</td> <td>47</td> </tr> <tr> <td><math>70 &lt; x \leq 80</math></td> <td>5</td> <td>52</td> </tr> <tr> <td><math>80 &lt; x \leq 90</math></td> <td>2</td> <td>54</td> </tr> <tr> <td><math>90 &lt; x \leq 100</math></td> <td>1</td> <td>55</td> </tr> </tbody> </table> |   |  | Class<br><i>Klas</i>  | Frequency<br><i>Frekwensie</i> | Cumulative frequency<br><i>Kumulatiewe frekwensie</i> | $20 < x \leq 30$ | 1 | 1 | $30 < x \leq 40$ | 7 | 8 | $40 < x \leq 50$ | 13 | 21 | $50 < x \leq 60$ | 17 | 38 | $60 < x \leq 70$ | 9 | 47 | $70 < x \leq 80$ | 5 | 52 | $80 < x \leq 90$ | 2 | 54 | $90 < x \leq 100$ | 1 | 55 | ✓ 8<br><br><br><br><br><br><br><br><br><br>✓ 55<br><br>(2) |
| Class<br><i>Klas</i> | Frequency<br><i>Frekwensie</i>  | Cumulative frequency<br><i>Kumulatiewe frekwensie</i> |  |   |                                |   |                  |   |   |                  |   |   |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                  |   |    |                   |   |    |  |
| $20 < x \leq 30$     | 1   | 1   |  |   |                                |   |                  |   |   |                  |   |   |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                  |   |    |                   |   |    |  |
| $30 < x \leq 40$     | 7   | 8   |  |   |                                |   |                  |   |   |                  |   |   |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                  |   |    |                   |   |    |  |
| $40 < x \leq 50$     | 13  | 21  |  |   |                                |   |                  |   |   |                  |   |   |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                  |   |    |                   |   |    |  |
| $50 < x \leq 60$     | 17  | 38  |  |   |                                |   |                  |   |   |                  |   |   |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                  |   |    |                   |   |    |  |
| $60 < x \leq 70$     | 9   | 47  |  |   |                                |   |                  |   |   |                  |   |   |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                  |   |    |                   |   |    |  |
| $70 < x \leq 80$     | 5   | 52  |  |   |                                |   |                  |   |   |                  |   |   |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                  |   |    |                   |   |    |  |
| $80 < x \leq 90$     | 2   | 54  |  |   |                                |   |                  |   |   |                  |   |   |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                  |   |    |                   |   |    |  |
| $90 < x \leq 100$    | 1   | 55  |  |   |                                |   |                  |   |   |                  |   |   |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                  |   |    |                   |   |    |  |
| 2.2.2                |    |   |  | ✓ grounding at<br>(20 ; 0)/ anker<br>by (20 ; 0)<br>✓ plotting at<br>upper limits/<br>plot by boonste<br>limiete<br>✓ smooth shape<br>of curve/gladde<br>kurwe<br><br><br><br><br><br><br><br><br><br>(3) |                                |   |                  |   |   |                  |   |   |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                  |   |    |                   |   |    |  |
| 2.3                  | 55 – 44 (accept/aanvaar 43 – 45)<br>≈ 11 motorists/motoriste<br>(accept/aanvaar 10 – 12 motorists/motoriste)  |   |  | ✓ 44<br>✓ 11<br><br>(2)<br><b>[8]</b>   |                                |   |                  |   |   |                  |   |   |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                  |   |    |                   |   |    |  |

**QUESTION/VRAAG 3**

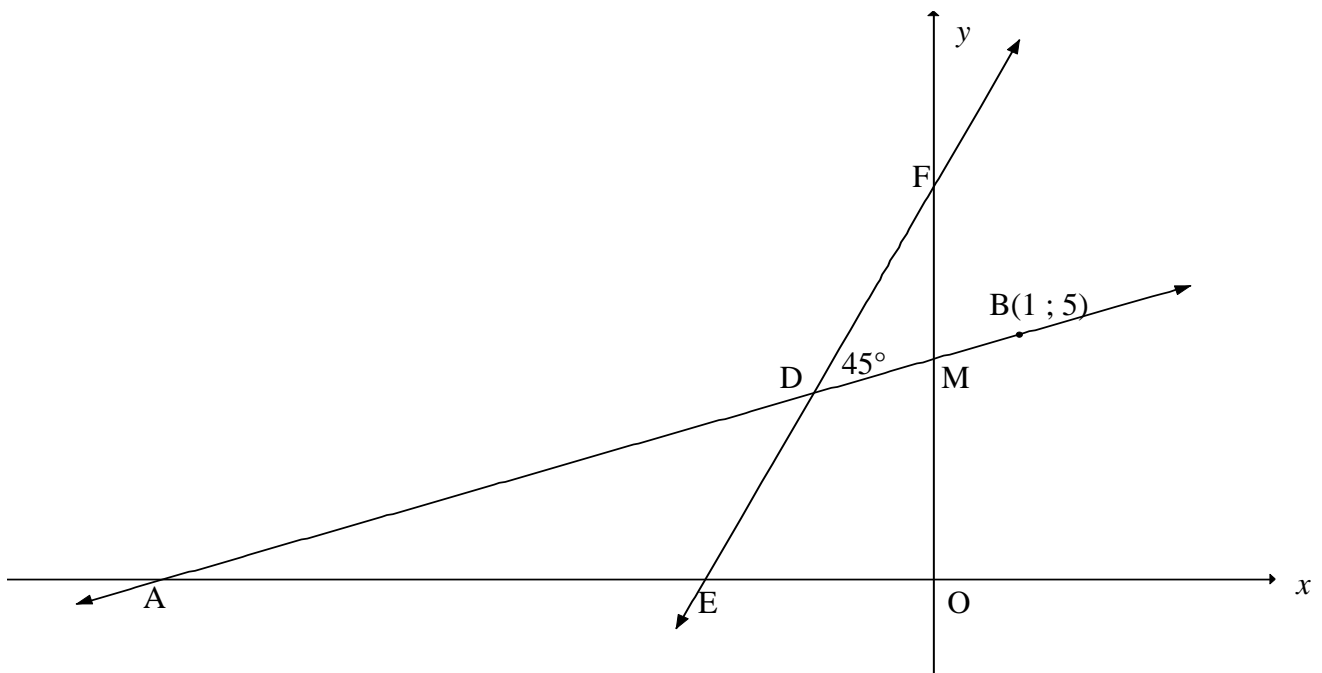


|       |   |  |   |
|-------|---|--|---|
| 3.1   | $r = MN = 5$  | ✓ answer/antw<br>(1)   |   |
| 3.2   | $(x - 5)^2 + (y - 4)^2 = 25$  | ✓ equation/vgl<br>(1)  |   |
| 3.3   | $A(x ; 0)$<br>$(x - 5)^2 + (0 - 4)^2 = 25$<br>$x^2 - 10x + 25 + 16 = 25$<br>$x^2 - 10x + 16 = 0$<br>$(x - 8)(x - 2) = 0$<br>$\therefore x = 8$ or/of $x = 2$<br>$\therefore A(2 ; 0)$ | $(x - 5)^2 + (0 - 4)^2 = 25$<br>$(x - 5)^2 + 16 = 25$<br>$(x - 5)^2 = 9$<br>$(x - 5) = \pm 3$<br>$\therefore x = 8$ or/of $x = 2$<br>$\therefore A(2 ; 0)$ | ✓ substitute into eq/<br>vervang in vgl<br>$y = 0$<br>✓ standard form/<br>standaardvorm or<br>perfect square<br>form/kwadr vorm<br>✓ answer/antw<br>(3) |
| 3.4.1 | $m_{MB} = \frac{4 - 0}{5 - 8}$<br>$= -\frac{4}{3}$  | ✓ subst M and B<br>into form/vervang<br>M and B in form<br>✓ $m_{MB} = -\frac{4}{3}$<br>(2)  |   |

|              |  |  |
|--------------|--|--|
| <p>3.4.2</p> | <p><math>m_{MB} \times m_{PB} = -1</math> (tangent <math>\perp</math> radius/ <math>rkl \perp</math> radius)<br/> <math>m_{PB} = \frac{3}{4}</math><br/> <math>y = \frac{3}{4}x + c</math>      <b>OR/OF</b>    <math>y - y_1 = \frac{3}{4}(x - x_1)</math><br/> <math>0 = \frac{3}{4}(8) + c</math>      <math>y - 0 = \frac{3}{4}(x - 8)</math><br/> <math>y = \frac{3}{4}x - 6</math>      <math>y = \frac{3}{4}x - 6</math></p>  | <p>✓<br/> <math>m_{MB} \times m_{PB} = -1</math><br/>                 ✓ <math>m_{PB} = \frac{3}{4}</math><br/><br/>                 ✓ equation/vgl<br/>                 (3)</p>  |
| <p>3.5</p>   | <p><math>y_K = y_M + r = 4 + 5</math><br/> <math>y = 9</math></p>  | <p>✓ 9<br/>                 ✓ equation/vgl<br/>                 (2)</p>  |
| <p>3.6</p>   | <p>At/By L:<br/> <math>\frac{3}{4}x - 6 = 9</math><br/> <math>3x - 24 = 36</math><br/> <math>3x = 60</math><br/> <math>x = 20</math><br/> <math>\therefore L(20 ; 9)</math></p>  | <p>✓ equating<br/>                 simultaneously<br/>                 ✓ simplification<br/><br/>                 (2)</p>  |
| <p>3.7</p>   | <p><math>L(20 ; 9)</math><br/> <math>ML = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}</math>    <b>OR/OF</b>    <math>ML = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}</math><br/> <math>= \sqrt{(20 - 5)^2 + (9 - 4)^2}</math>      <math>= \sqrt{(15)^2 + (5)^2}</math><br/> <math>= \sqrt{225 + 25}</math>      <math>= \sqrt{(5)^2(9 + 1)}</math><br/> <math>= \sqrt{250}</math> or / of <math>5\sqrt{10}</math>      <math>= \sqrt{250}</math> or / of <math>5\sqrt{10}</math></p>  | <p>✓ correct subst<br/>                 into distance<br/>                 formula/<br/>                 korrekte subst<br/>                 in afstand-<br/>                 formule<br/>                 ✓ answer in surd<br/>                 form/antw in<br/>                 wortelvorm<br/>                 (2)</p>   |
| <p>3.8</p>   | <p><b>MK <math>\perp</math> KL</b> <b>OR/OF</b> <math>\widehat{MKL} = 90^\circ</math> (radius <math>\perp</math> tangent/radius <math>\perp</math> rkl)<br/> <math>\therefore ML</math> is a diameter as it subtends a right angle/<math>ML</math> is middellyn<br/> <math>r = \frac{ML}{2} = \frac{\sqrt{250}}{2} = \sqrt{\frac{125}{2}}</math> or 7,91<br/>                 Centre of circle = midpoint of <math>ML</math>/Midpt van sirkel = midpt v <math>ML</math><br/> <math>x = \frac{5 + 20}{2} = \frac{25}{2} = 12,5</math>      <math>y = \frac{4 + 9}{2} = \frac{13}{2} = 6,5</math><br/>                 Centre/midpt: (12,5 ; 6,5)<br/>                 Equation of the circle <math>KLM</math> /Vgl van sirkel <math>KLM</math>:<br/> <math>\therefore (x - 12,5)^2 + (y - 6,5)^2 = \frac{250}{4} = \frac{125}{2} = 62,5</math><br/><br/> <b>OR/OF</b></p> | <p>✓ S<br/><br/>                 ✓ value<br/>                 of/waarde<br/>                 van r<br/><br/>                 ✓ <math>x = 12,5</math><br/>                 ✓ <math>y = 6,5</math><br/><br/>                 ✓ answer in<br/>                 correct<br/>                 form/ antw in<br/>                 korrekte vorm<br/>                 (5)</p> |

|  |  |
|--|--|
| <p><b>MK ⊥ KL OR/OF <math>\widehat{MKL} = 90^\circ</math></b> (radius ⊥ tangent/radius ⊥ rkl)<br/> <math>\therefore</math> ML is a diameter as it subtends a right angle/ML is middellyn<br/>                 Centre of circle = midpoint of ML/Midpt van sirkel = midpt v ML<br/> <math>x = \frac{5+20}{2} = \frac{25}{2} = 12,5</math>      <math>y = \frac{4+9}{2} = \frac{13}{2} = 6,5</math><br/>                 Centre/midpt: (12,5 ; 6,5)<br/>                 Equation of the circle KLM /Vgl van sirkel KLM:<br/> <math>(x-12,5)^2 + (y-6,5)^2 = r^2</math><br/>                 subst (5 ; 4): <math>(5-12,5)^2 + (4-6,5)^2 = r^2</math><br/> <math>62,5 = r^2</math><br/> <math>\therefore (x-12,5)^2 + (y-6,5)^2 = \frac{250}{4} = \frac{125}{2} = 62,5</math></p> <p><b>OR/OF</b></p> <p>By symmetry about LM/deur simmetrie om LM:<br/> <b>MK ⊥ KL OR/OF <math>\widehat{MKL} = 90^\circ</math></b> (radius ⊥ tangent/radius ⊥ rkl)<br/> <math>\therefore</math> ML is a diameter as it subtends a right angle/ML is middellyn<br/>                 ML is a diameter /ML is 'n middellyn<br/> <math>r = \frac{ML}{2} = \frac{\sqrt{250}}{2} = \sqrt{\frac{125}{2}}</math> or /of 7,91<br/>                 Centre of circle = midpoint of ML/Midpt van sirkel = midpt v ML<br/> <math>x = \frac{5+20}{2} = \frac{25}{2} = 12,5</math>      <math>y = \frac{4+9}{2} = \frac{13}{2} = 6,5</math><br/>                 Centre/midpt: (12,5 ; 6,5)<br/>                 Equation of the circle KLM /Vgl van sirkel KLM:<br/> <math>\therefore (x-12,5)^2 + (y-6,5)^2 = \frac{250}{4} = \frac{125}{2} = 62,5</math></p> | <p>✓ S</p> <p>✓ <math>x = 12,5</math><br/>                 ✓ <math>y = 6,5</math></p> <p>✓ value of/waarde van <math>r^2</math></p> <p>✓ answer in correct form/antw in korrekte vorm (5)</p> <p>✓ S</p> <p>✓ value of/waarde van <math>r</math></p> <p>✓ <math>x = 12,5</math><br/>                 ✓ <math>y = 6,5</math></p> <p>✓ answer in correct form/antw in korrekte vorm (5)</p> <p><b>[21]</b></p> |
|--|--|

**QUESTION/VRAAG 4**

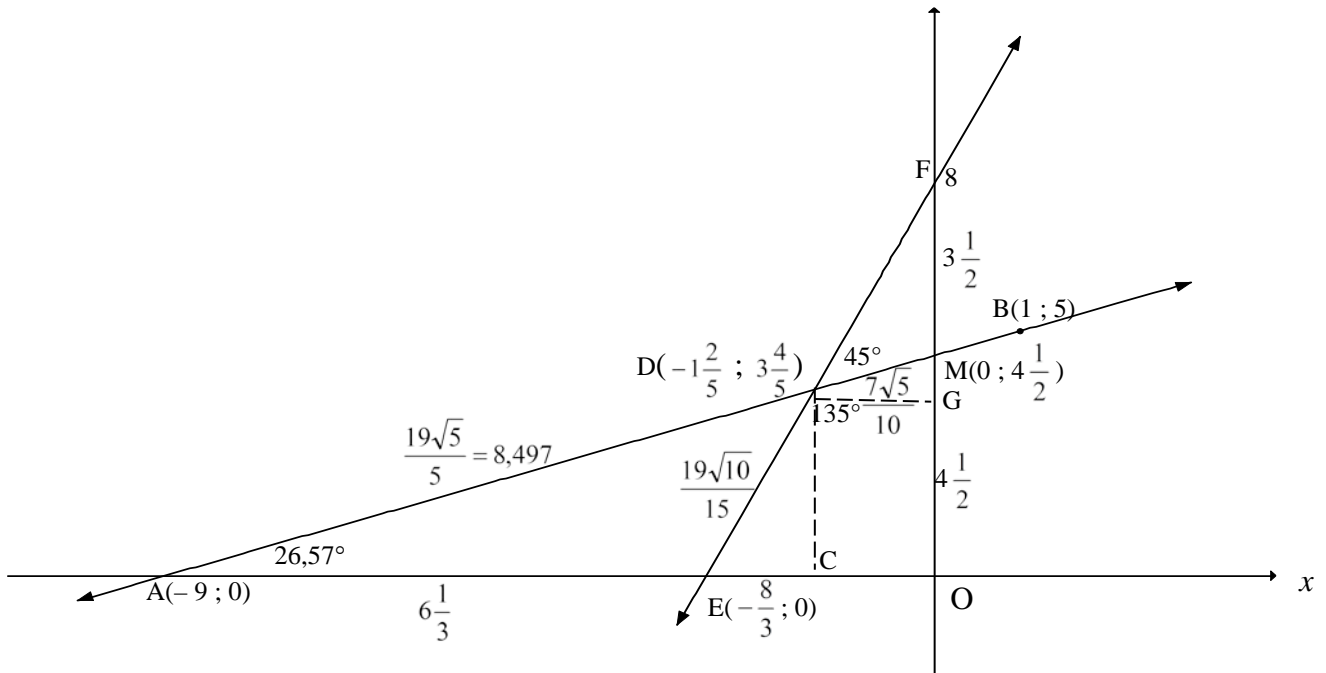


|     |   |  |
|-----|---|--|
| 4.1 | $y = 0: 3x + 8 = 0$ $x = -\frac{8}{3}$ $\therefore E\left(-2\frac{2}{3}; 0\right) \text{ OR/OF } E\left(-\frac{8}{3}; 0\right)$   | ✓ y-value/waarde<br>✓ x-value/waarde<br>(2)  |
| 4.2 | $\tan \hat{D}EO = m_{DE} = 3$ $\therefore \hat{D}EO = 71,565\dots = 71,57^\circ$ $\hat{D}AE = 71,565\dots^\circ - 45^\circ$ $= 26,57^\circ$   | ✓ $\tan \hat{D}EO = 3$<br>✓ $71,565\dots^\circ$<br>✓ $26,57^\circ$<br>(3)  |
| 4.3 | $m_{AB} = \tan 26,57^\circ$ $= \frac{1}{2}$ $y = \frac{1}{2}x + c \quad \text{OR/OF} \quad y - y_1 = \frac{1}{2}(x - x_1)$ $5 = \frac{1}{2}(1) + c \quad y - 5 = \frac{1}{2}(x - 1)$ $y = \frac{1}{2}x + 4\frac{1}{2} \quad y = \frac{1}{2}x + \frac{9}{2}$ | ✓ $m_{AB} = \tan 26,57^\circ$<br>✓ $m_{AB} = \frac{1}{2}$<br>✓ subst of $m$ and $(1; 5)$ into formula/<br>subst $m$ en $(1; 5)$ in<br>formule<br>✓ equation/vgl<br>(4) |

|            |   |  |
|------------|---|--|
| <p>4.4</p> | <p>Solve <math>x - 2y + 9 = 0</math> and <math>y = 3x + 8</math> simultaneously:</p> $x - 2(3x+8) + 9 = 0$ $x - 6x - 16 + 9 = 0$ $-5x = 7$ $x = -1\frac{2}{5}$ <p><math>\therefore y = 3(-1\frac{2}{5}) + 8</math>    <b>OR/OF</b>    <math>-1\frac{2}{5} - 2y + 9 = 0</math></p> $y = 3\frac{4}{5}$ $y = 3\frac{4}{5}$ <p><math>\therefore D(-1\frac{2}{5} ; 3\frac{4}{5})</math></p> <p><b>OR/OF</b></p> $x = 2y - 9$ $y = 3(2y - 9) + 8$ $y = 6y - 27 + 8$ <p><math>\therefore y = 3\frac{4}{5}</math></p> $x = 2(3\frac{4}{5}) - 9$ <p><b>OR/OF</b>    <math>3\frac{4}{5} = 3x + 8</math></p> $x = -1\frac{2}{5}$ $x = -1\frac{2}{5}$ <p><math>\therefore D(-1\frac{2}{5} ; 3\frac{4}{5})</math></p> <p><b>OR/OF</b></p> $3x + 8 = \frac{1}{2}x + 4\frac{1}{2}$ $6x + 16 = x + 9$ $5x = -7$ <p><math>\therefore x = -1\frac{2}{5}</math></p> <p><math>\therefore y = 3(-1\frac{2}{5}) + 8</math>    <b>OR/OF</b>    <math>y = \frac{1}{2}(-1\frac{2}{5}) + 4\frac{1}{2}</math></p> $y = 3\frac{4}{5}$ $y = 3\frac{4}{5}$ <p><math>\therefore D(-1\frac{2}{5} ; 3\frac{4}{5})</math></p> <p><b>OR/OF</b></p> | <p>✓ subst/vervang</p> <p>✓ x-value/waarde</p> <p>✓ subst/vervang</p> <p>✓ y-value/waarde (4)</p><br><p>✓ subst/vervang</p> <p>✓ y value/waarde</p> <p>✓ subst/vervang</p> <p>✓ x-value/waarde</p> <p>(4)</p><br><p>✓ equating/gelyk stel</p> <p>✓ x value/waarde</p> <p>✓ subst/vervang</p> <p>✓ y-value/waarde (4)</p> |
|------------|---|--|



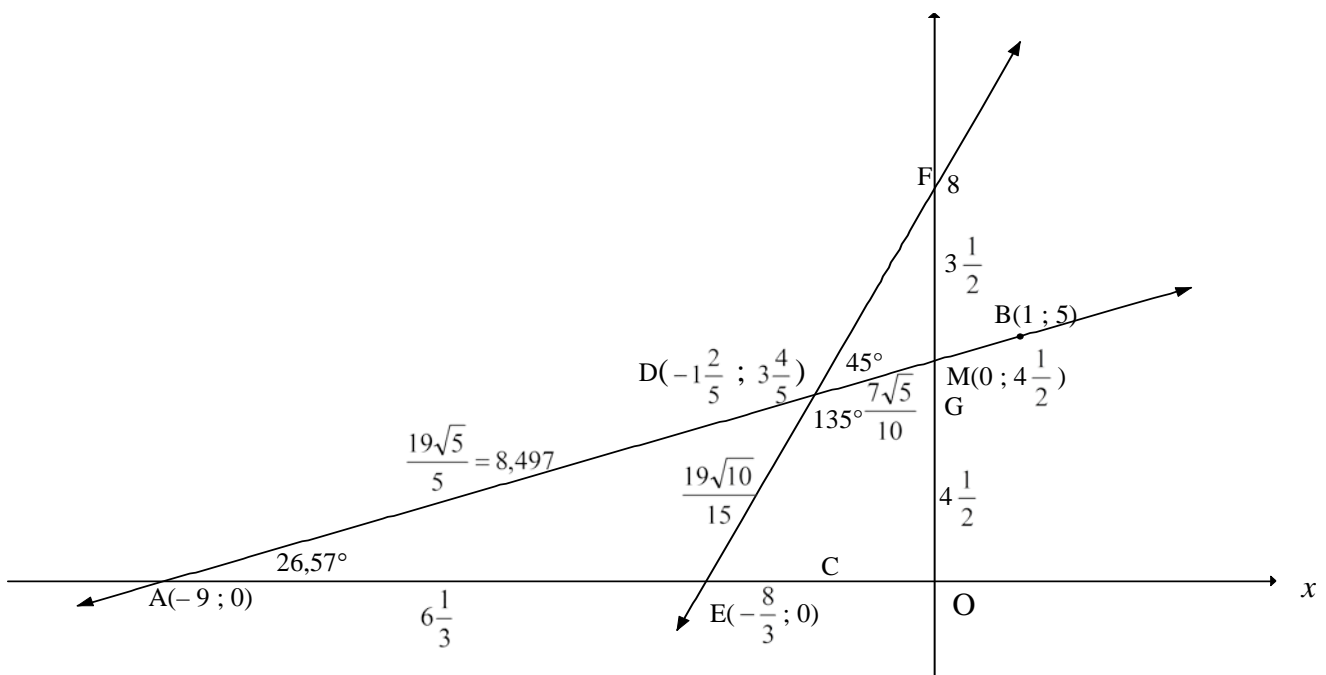
|  |  |   |
|--|--|---|
|  | $x - 2y = -9 \dots\dots(1)$ $-6x + 2y = 16 \dots\dots(2)$ <p>(1) + (2):</p> $-5x = 7$ $\therefore x = -1\frac{2}{5}$ $\therefore -1\frac{2}{5} - 2y = -9 \quad \text{OR/OF} \quad y = 3(-1\frac{2}{5}) + 8$ $y = 3\frac{4}{5} \qquad y = 3\frac{4}{5}$ $\therefore D(-1\frac{2}{5}; 3\frac{4}{5})$ <p><b>OR/OF</b></p> $y = 3x + 8 \dots\dots\dots(1)$ $6y = 3x + 27 \dots\dots\dots(2)$ <p>(1) - (2):</p> $-5y = -19$ $\therefore y = 3\frac{4}{5}$ $3\frac{4}{5} = 3x + 8 \qquad \text{OR/OF} \qquad x = 2(3\frac{4}{5}) - 9$ $x = -1\frac{2}{5} \qquad x = -1\frac{2}{5}$ $\therefore D(-1\frac{2}{5}; 3\frac{4}{5})$ | <p>✓ adding/optelling</p> <p>✓ x-value/waarde</p> <p>✓ subst/vervang</p> <p>✓ y-value/waarde</p> <p style="text-align: right;">(4)</p> <p>✓</p> <p>subtracting/afrekking</p> <p>✓ y-value/waarde</p> <p>✓ subst/vervang</p> <p>✓ x-value/waarde</p> <p style="text-align: right;">(4)</p> |
|--|--|---|



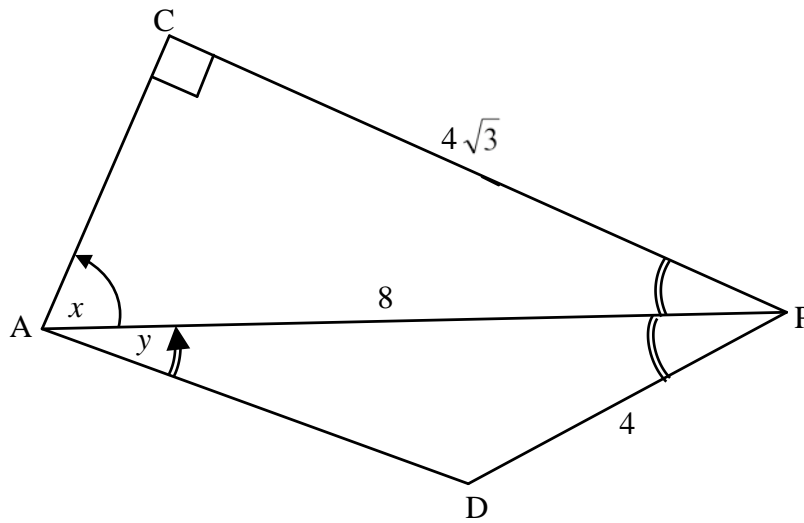
|  |   |
|--|---|
| <p>4.5</p> <p>area DMOE = area <math>\Delta</math>AMO – area <math>\Delta</math>ADE<br/> <math>x_A = 2(0) - 9 \quad \therefore A(-9; 0)</math></p> <p>area <math>\Delta</math>AMO<br/> <math>= \frac{1}{2} \cdot AO \cdot OM</math><br/> <math>= \frac{1}{2} (9)(4 \frac{1}{2})</math><br/> <math>= 20,25</math></p> <p>area <math>\Delta</math>ADE<br/> <math>= \frac{1}{2} \cdot AE \cdot y_D</math><br/> <math>= \frac{1}{2} \cdot (AO - EO) \cdot y_D</math><br/> <math>= \frac{1}{2} \left( 9 - 2 \frac{2}{3} \right) \left( 3 \frac{4}{5} \right)</math><br/> <math>= 12,03</math></p> <p style="text-align: center;"><b>OR/OF</b></p> <p>area <math>\Delta</math>ADE<br/> <math>= \frac{1}{2} AD \cdot AE \cdot \sin \hat{D}AE</math><br/> <math>= \frac{1}{2} \left( \frac{19\sqrt{5}}{5} \right) \cdot 6 \frac{1}{3} \cdot \sin 26,57^\circ</math><br/> <math>= 12,03</math></p> <p><math>\therefore</math> area DMOE = 8,22 square units/vk eenh</p> <p style="text-align: center;"><b>OR/OF</b></p> | <p>✓ correct method/<br/>korrekte metode</p> <p>✓ <math>x_A = -9</math></p> <p>✓ <math>\frac{1}{2} (9)(4 \frac{1}{2})</math></p> <p>✓ <math>AE = 9 - 2 \frac{2}{3} = 6 \frac{1}{3}</math></p> <p>✓ <math>y_D = 3 \frac{4}{5}</math></p> <p style="text-align: center;"><b>OR/OF</b></p> <p>✓ <math>AD = \frac{19\sqrt{5}}{5}</math></p> <p>✓ <math>AE = 6 \frac{1}{3}</math></p> <p>✓ answer/antw</p> <p style="text-align: right;">(6)</p> |
|--|---|

|  |  |  |
|--|--|--|
|  | <p>area DMOE = area rectangle DCOG + area <math>\triangle DMG</math> + area <math>\triangle DEC</math></p> $= \left(1\frac{2}{5} \times 3\frac{4}{5}\right) + \frac{1}{2}\left(1\frac{2}{5}\right)\left(\frac{7}{10}\right) + \frac{1}{2}\left(3\frac{4}{5}\right)\left(\frac{19}{15}\right)$ $= 8,22 \text{ square units/vk eenh}$ <p style="text-align: center;"><b>OR/OF</b></p> <p>area DMOE = area <math>\triangle EDO</math> + area <math>\triangle ODM</math></p> $= \frac{1}{2}(\text{EO} \times y_D) + \frac{1}{2}(\text{OM} \times -x_D)$ $= \frac{1}{2}\left[\left(\frac{8}{3} \times \frac{19}{5}\right) + \left(\frac{9}{2} \times \frac{7}{5}\right)\right]$ $= \frac{1}{2}\left(\frac{304 + 189}{30}\right)$ $= \frac{493}{60} \text{ or/of } 8\frac{13}{60} \text{ or/of } 8,22 \text{ square units/vk eenh}$ <p style="text-align: center;"><b>OR/OF</b></p> <p>area DMOE = area <math>\triangle EOF</math> – area <math>\triangle DMF</math></p> $= \frac{1}{2}(\text{EO} \times \text{OF}) - \frac{1}{2}(\text{OF} - \text{OM})(-x_D)$ $= \frac{1}{2}\left[\left(\frac{8}{3} \times 8\right) + \left(\frac{7}{2} \times \frac{7}{5}\right)\right]$ $= \frac{1}{2}\left(\frac{640 - 147}{30}\right)$ $= \frac{493}{60} \text{ or } 8\frac{13}{60} \text{ or } 8,22 \text{ square units/vk eenh}$ <p style="text-align: center;"><b>OR/OF</b></p> | <p>✓ correct method/<br/>korrekte metode</p> <p>✓ <math>3\frac{4}{5}</math></p> <p>✓ <math>1\frac{2}{5}</math> ✓ 0,7</p> <p>✓ <math>\frac{19}{15}</math></p> <p>✓ answer</p> <p style="text-align: right;">(6)</p> <p>✓ correct method/<br/>korrekte metode</p> <p>✓ <math>y_D = \frac{19}{5}</math> or <math>3\frac{4}{5}</math></p> <p>✓ <math>\text{EO} = \frac{8}{3}</math></p> <p>✓ <math>-x_D = \frac{7}{5}</math></p> <p>✓ <math>\text{OM} = \frac{9}{2}</math> or <math>4\frac{1}{2}</math></p> <p>✓ answer/antw</p> <p style="text-align: right;">(6)</p> <p>✓ correct method/<br/>korrekte metode</p> <p>✓ <math>y_F = 8</math></p> <p>✓ <math>\text{EO} = \frac{8}{3}</math></p> <p>✓ <math>-x_D = \frac{7}{5}</math></p> <p>✓ <math>\text{FM} = 3\frac{1}{2}</math></p> <p>✓ answer/antw</p> <p style="text-align: right;">(6)</p> |
|--|--|--|

|   |  |
|---|--|
| <p>area <math>\Delta EOM = \frac{1}{2}(EO \times OM)</math></p> $= \frac{1}{2}\left(\frac{8}{3} \times \frac{9}{2}\right)$ $= 6 \text{ sq units/vk eenh}$<br><p><math>ED = \sqrt{\left(-\frac{7}{5} + \frac{8}{3}\right)^2 + \left(\frac{19}{5}\right)^2}</math> and <math>DM = \sqrt{\left(\frac{7}{5}\right)^2 + \left(\frac{9}{2} - \frac{19}{5}\right)^2}</math></p> $= \frac{19\sqrt{10}}{15} \text{ or } 4,005\dots$ $= \frac{7\sqrt{5}}{10} \text{ or } 1,565\dots$<br><p>area <math>\Delta EDM = \frac{1}{2}(ED \times DM \times \sin \hat{EDM})</math></p> $= \frac{1}{2}\left(\frac{19\sqrt{10}}{15}\right)\left(\frac{7\sqrt{5}}{10}\right)\sin 135^\circ$ $= \frac{133}{60} \text{ or } 2,216\dots$<br><p><math>\therefore</math> area DMOE = area <math>\Delta EOM</math> + area <math>\Delta EDM</math></p> $= 6 + 2,216\dots$ $= \frac{493}{60} \text{ or/of } 8\frac{13}{60} \text{ or/of } 8,22 \text{ square units/eenh}^2$ | <p>✓ area <math>\Delta EOM</math></p><br><p>✓ <math>ED = \frac{19\sqrt{10}}{15}</math></p> <p>✓ <math>DM = \frac{7\sqrt{5}}{10}</math></p><br><p>✓ area <math>\Delta EDM</math></p> <p>✓ correct method/<br/><i>korrekte metode</i></p><br><p>✓ answer/antw</p><br><p style="text-align: right;">(6)<br/><b>[19]</b></p> |
|---|--|



**QUESTION/VRAAG 5**



|            |  |   |
|------------|--|---|
| <p>5.1</p> | $\sin \hat{C}AP = \frac{CP}{AP}$ $\sin x = \frac{4\sqrt{3}}{8} = \frac{\sqrt{3}}{2}$ $x = 60^\circ$ <p>OR/OF</p> $\frac{\sin 90^\circ}{8} = \frac{\sin x}{4\sqrt{3}}$ $\sin x = \frac{4\sqrt{3}}{8} = \frac{\sqrt{3}}{2}$ $x = 60^\circ$                         | <p>✓ correct sine ratio/<br/>korrekte sin-verh</p> <p>✓ <math>\frac{\sqrt{3}}{2}</math></p> <p>(2)</p> <p>✓ correct sine ratio/<br/>korrekte sin-verh</p> <p>✓ <math>\frac{\sqrt{3}}{2}</math></p> <p>(2)</p> |
| <p>5.2</p> | $\hat{C}PA = \hat{D}PA = 30^\circ \quad (\text{AP bisects } \hat{D}PC)$ $AD^2 = AP^2 + DP^2 - 2 \cdot AP \cdot DP \cdot \cos \hat{A}PD$ $= 8^2 + 4^2 - 2(8)(4) \cos 30^\circ$ $= 8^2 + 4^2 - 2(8)(4) \left(\frac{\sqrt{3}}{2}\right)$ $= 24,57\dots$ $AD = 4,96$ | <p>✓ <math>\hat{D}PA = 30^\circ</math></p> <p>✓ correct subst into cosine rule/<br/>korrekte subst in cos-reël</p> <p>✓ 24,57...</p> <p>✓ 4,96</p> <p>(4)</p>   |

|     |   |  |
|-----|---|--|
| 5.3 | $\frac{\sin \hat{D}\hat{A}P}{DP} = \frac{\sin \hat{A}P\hat{D}}{AD}$ $\frac{\sin y}{4} = \frac{\sin 30^\circ}{4,96}$ $\sin y = \frac{4 \sin 30^\circ}{4,96}$ $= 0,403\dots$ $y = 23,78^\circ$ <p style="text-align: center;"><b>OR/OF</b></p> $AD^2 = AP^2 + DP^2 - 2 \cdot AP \cdot DP \cdot \cos \hat{D}\hat{A}P$ $4^2 = 8^2 + (4,96)^2 - 2(8)(4,96) \cdot \cos y$ $\cos y = \frac{8^2 + (4,96)^2 - 4^2}{2(8)(4,96)}$ $\cos y = 0,9148\dots$ $y = 23,82^\circ$ | <p>✓ correct subst into sine rule/<br/><i>korrekte subst in sin-reël</i></p> <p>✓ sin y subject</p> <p>✓ 23,78°</p> <p style="text-align: right;">(3)</p> <p>✓ correct subst into cosine rule/<br/><i>korrekte subst in cos-reël</i></p> <p>✓ cos y subject</p> <p>✓ 23,82°</p> <p style="text-align: right;">(3)<br/><b>[9]</b></p> |
|-----|---|--|

**QUESTION/VRAAG 6**

|            |   |  |
|------------|---|--|
| <p>6.1</p> | $\begin{aligned} & \cos^2(180^\circ + x) + \tan(x - 180^\circ) \sin(720^\circ - x) \cos x \\ & = (-\cos x)^2 + [ -(-\tan x) ] (-\sin x) (\cos x) \\ & = \cos^2 x + \left( \frac{\sin x}{\cos x} \right) (-\sin x) (\cos x) \\ & = \cos^2 x - \sin^2 x \\ & = \cos 2x \end{aligned}$   | <p>✓ <math>(-\cos x)^2</math> or <math>\cos^2 x</math><br/>                 ✓ <math>\tan x</math> or <math>-(-\tan x)</math><br/>                 ✓ <math>-\sin x</math><br/>                 ✓ <math>\tan x = \frac{\sin x}{\cos x}</math><br/>                 ✓ <math>\cos^2 x - \sin^2 x</math><br/>                 (5)</p>   |
| <p>6.2</p> | $\begin{aligned} & \sin(\alpha - \beta) \\ & = \cos[90^\circ - (\alpha - \beta)] \\ & = \cos[(90^\circ - \alpha) + \beta] \\ & = \cos(90^\circ - \alpha) \cos \beta - \sin(90^\circ - \alpha) \sin \beta \\ & = \sin \alpha \cos \beta - \cos \alpha \sin \beta \end{aligned}$ <p style="text-align: center;"><b>OR/OF</b></p> $\begin{aligned} & \sin(\alpha - \beta) \\ & = \cos[90^\circ - (\alpha - \beta)] \\ & = \cos[(90^\circ + \beta) + (-\alpha)] \\ & = \cos(90^\circ + \beta) \cos(-\alpha) - \sin(90^\circ + \beta) \sin(-\alpha) \\ & = (-\sin \beta) \cos \alpha - \cos \beta (-\sin \alpha) \\ & = \sin \alpha \cos \beta - \cos \alpha \sin \beta \end{aligned}$   | <p>✓ rewrite as/herskryf<br/> <math>\cos[(90^\circ - \alpha) + \beta]</math><br/>                 ✓ expansion/<br/> <i>uitbreiding</i><br/>                 ✓ simpl/vereenv<br/>                 (3)</p> <p>✓ rewrite as/herskryf<br/> <math>\cos[(90^\circ + \beta) + (-\alpha)]</math><br/>                 ✓ expansion/<br/> <i>uitbreiding</i><br/>                 ✓ simpl/vereenv<br/>                 (3)</p>   |
| <p>6.3</p> | $\begin{aligned} & x^2 - y^2 \\ & = \sin^2 76^\circ - \cos^2 76^\circ \\ & = -(\cos^2 76^\circ - \sin^2 76^\circ) \\ & = -\cos 2(76^\circ) \\ & = -\cos 152^\circ \\ & = -(-\cos 28^\circ) \qquad \qquad \qquad \mathbf{OR/OF} \qquad = -\cos(90^\circ + 62^\circ) \\ & = \cos 28^\circ \qquad \qquad \qquad \qquad \qquad \qquad = -(-\sin 62^\circ) \\ & = \cos(90^\circ - 62^\circ) \qquad \qquad \qquad \qquad \qquad \qquad = \sin 62^\circ \\ & = \sin 62^\circ \end{aligned}$ <p style="text-align: center;"><b>OR/OF</b></p> $\begin{aligned} & x^2 - y^2 \\ & = \sin^2 76^\circ - \cos^2 76^\circ \\ & = \sin 76^\circ \sin 76^\circ - \cos 76^\circ \cos 76^\circ \\ & = \sin 76^\circ \cos 14^\circ - \cos 76^\circ \sin 14^\circ \\ & = \sin(76^\circ - 14^\circ) \\ & = \sin 62^\circ \end{aligned}$ <p style="text-align: center;"><b>OR/OF</b></p> $\begin{aligned} & x^2 - y^2 \\ & = \sin^2 76^\circ - \cos^2 76^\circ \\ & = \cos^2 14^\circ - \sin^2 14^\circ \\ & = \cos 2(14^\circ) \\ & = \cos 28^\circ \\ & = \sin 62^\circ \end{aligned}$ | <p>✓ <math>-(\cos^2 76^\circ - \sin^2 76^\circ)</math><br/>                 ✓ recognition of cos<br/>                 double angle<br/>                 ✓ <math>-\cos 152^\circ</math><br/>                 ✓ <math>\cos 28^\circ</math><br/>                 (4)</p> <p>✓ <math>\cos 14^\circ</math><br/>                 ✓ <math>\sin 14^\circ</math><br/>                 ✓ recognition of sine<br/>                 compound angle<br/>                 ✓ <math>\sin(76^\circ - 14^\circ)</math><br/>                 (4)</p> <p>✓ <math>\cos^2 14^\circ</math><br/>                 ✓ <math>\sin^2 14^\circ</math><br/>                 ✓ recognition of cos<br/>                 double angle<br/>                 ✓ <math>\cos 28^\circ</math><br/>                 (4)</p> <p style="text-align: right;"><b>[12]</b></p> |

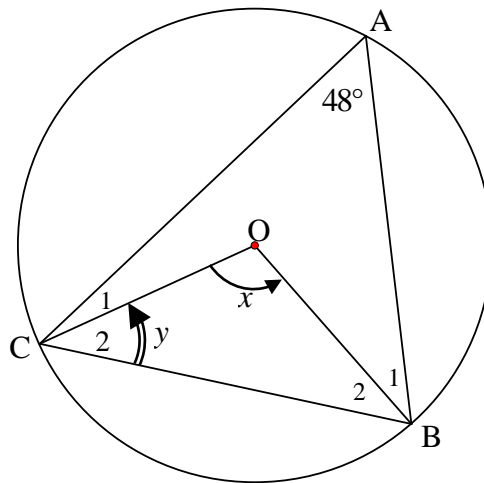
**QUESTION/VRAAG 7**

|     |  |  |
|-----|--|--|
| 7.1 | $0 \leq y \leq 2$ or $y \in [0 ; 2]$   | ✓ critical values/<br>kritieke waardes<br>✓ notation/notasie<br>(2)  |
| 7.2 | $\sin x + 1 = \cos 2x$<br>$\sin x + 1 = 1 - 2\sin^2 x$<br>$2\sin^2 x + \sin x = 0$<br>$\sin x(2\sin x + 1) = 0$  | ✓ $1 - 2\sin^2 x$<br>✓ st form/st vorm<br>(2)  |
| 7.3 | $\sin x(2\sin x + 1) = 0$<br>$\sin x = 0$ or $\sin x = -\frac{1}{2}$<br>$x = 0^\circ + k \cdot 360^\circ$ or $x = 210^\circ + k \cdot 360^\circ$ or<br>$x = 180^\circ + k \cdot 360^\circ$ or $x = 330^\circ + k \cdot 360^\circ, k \in \mathbb{Z}$<br><b>OR/OF</b><br>$x = k \cdot 180^\circ, k \in \mathbb{Z}$ | ✓ $\sin x = 0$ or<br>$\sin x = -\frac{1}{2}$<br>✓ $0^\circ ; 180^\circ$ <b>OR/OF</b><br>$x = k \cdot 180^\circ$<br>✓ $210^\circ ; 330^\circ$<br>✓ $k \cdot 360^\circ, k \in \mathbb{Z}$<br>(4) |
| 7.4 |  | ✓ y-intercept/afsnit<br>✓ x-intercepts/afsnitte<br>✓ min/max points/<br>min/maks punte<br>(3)  |
| 7.5 | $f(x) = g(x)$ at/by:<br>$x = -30^\circ ; 0^\circ ; 180^\circ ; 210^\circ$<br>$\therefore f(x + 30^\circ) = g(x + 30^\circ)$ at/by:<br>$x = -60^\circ ; -30^\circ ; 150^\circ ; 180^\circ$  | ✓ $-30^\circ ; 0^\circ ; 180^\circ ; 210^\circ$<br>✓✓ $-60^\circ ; -30^\circ ; 150^\circ ; 180^\circ$<br>(3)   |
| 7.6 | Series will converge if/Reeks sal konvergeer as: $-1 < r < 1$<br>$-1 < 2\cos 2x < 1$<br>$-\frac{1}{2} < \cos 2x < \frac{1}{2}$<br>$\therefore 30^\circ < x < 60^\circ$ or $x \in (30^\circ ; 60^\circ)$  | ✓ $-1 < r < 1$<br>✓ $r = 2\cos 2x$<br>✓ $-\frac{1}{2} < \cos 2x < \frac{1}{2}$<br>✓✓ $30^\circ < x < 60^\circ$<br>(5)<br><b>[19]</b>   |



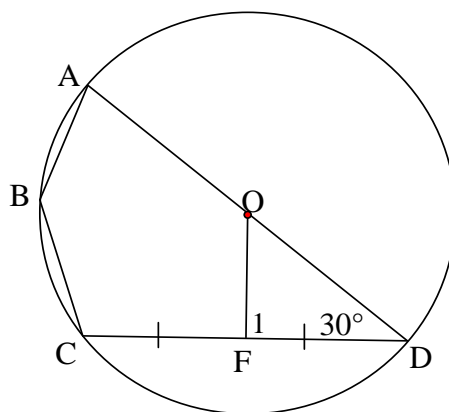
**QUESTION/VRAAG 8**

8.1



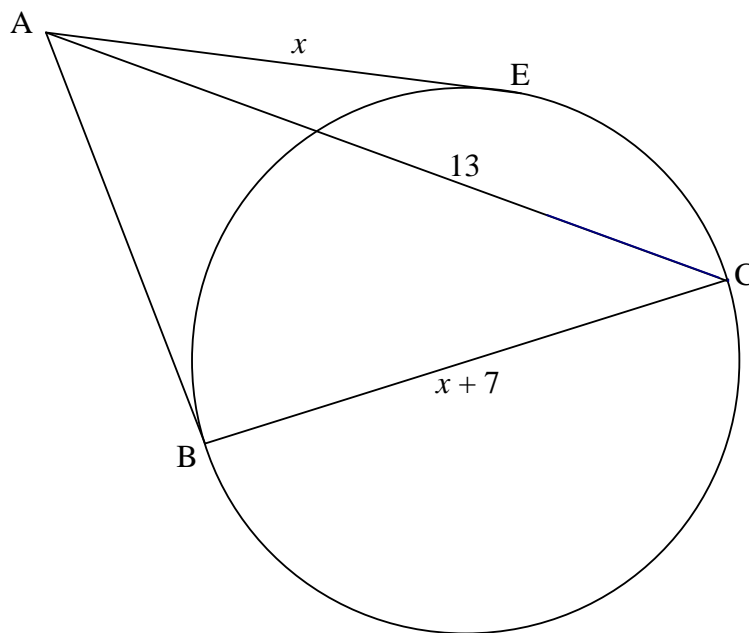
|       |   |  |                   |
|-------|---|--|-------------------|
| 8.1.1 | $x = 96^\circ$  | ( $\angle$ at centre = $2\angle$ at circumference/<br>$\angle$ by midpt = $2\angle$ by omtrek)                         | ✓ S ✓ R<br>(2)    |
| 8.1.2 | $\hat{C}_2 + \hat{B}_2 = 180^\circ - 96^\circ = 84^\circ$<br>$y = \hat{B}_2 = 42^\circ$ | (sum of $\angle$ s in $\Delta$ / som v $\angle$ e in $\Delta$ )<br>( $\angle$ s opp = sides/ $\angle$ e teenoor = sye) | ✓ S<br>✓ S<br>(2) |

8.2



|       |                                     |   |                |
|-------|-------------------------------------|---|----------------|
| 8.2.1 | $\hat{F}_1 = 90^\circ$              | (line from centre to midpt chord/<br>lyn vanaf midpt na midpt kd)   | ✓ S ✓ R<br>(2) |
| 8.2.2 | $\hat{A}\hat{B}\hat{C} = 150^\circ$ | (opposite $\angle$ s of cyclic quad/<br>tos $\angle$ e v koordevh ) | ✓ S ✓ R<br>(2) |

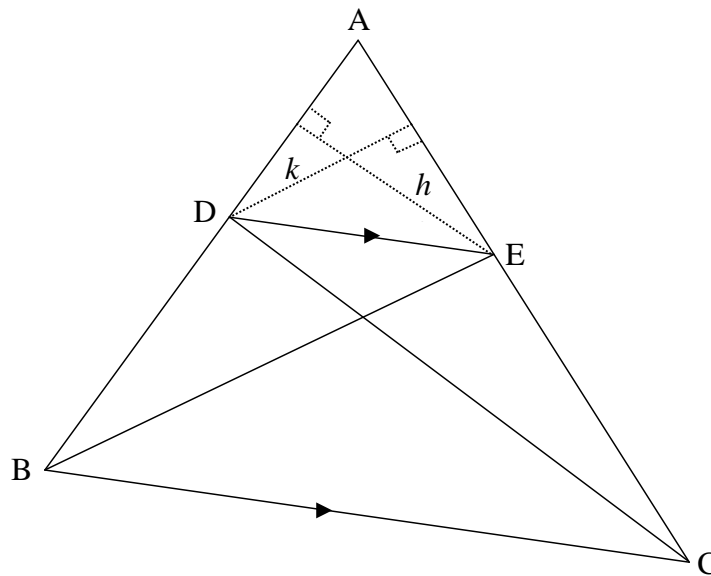
8.3



|           |  |   |
|-----------|--|---|
| 8.3.1 (a) | tangent $\perp$ radius/diameter / <i>raaklyn <math>\perp</math> radius/middellyn</i>   | ✓ R<br>(1)  |
| 8.3.1 (b) | tangents from common pt <b>OR</b> tangents from same pt /<br><i>raaklyne v gemeensk pt <b>OF</b> raaklyne vanaf dies pt</i>  | ✓ R<br>(1)  |
| 8.3.2     | $AB^2 + BC^2 = AC^2$ $x^2 + (x + 7)^2 = 13^2 \quad (\text{Theorem of/Stelling van Pythagoras})$ $x^2 + x^2 + 14x + 49 = 169$ $2x^2 + 14x - 120 = 0$ $x^2 + 7x - 60 = 0$ $(x - 5)(x + 12) = 0$ $x = 5 \quad (x \neq -12)$ | ✓ $AB^2 + BC^2 = AC^2$<br>✓ $x^2 + (x + 7)^2 = 13^2$<br>✓ standard form<br><br>✓ answer<br>(4)<br><b>[14]</b> |

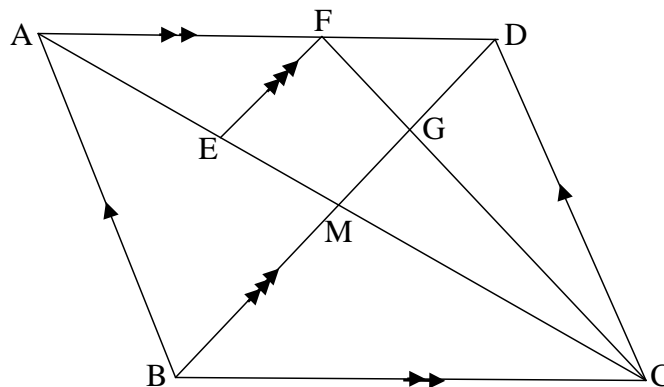
**QUESTION/VRAAG 9**

9.1



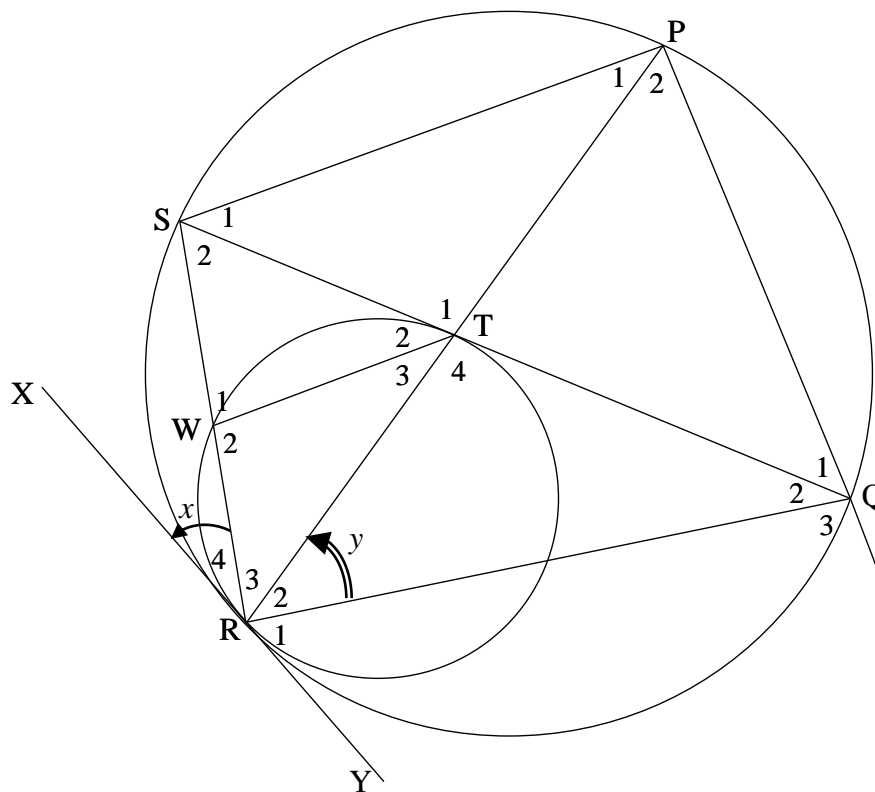
|       |   |   |
|-------|---|---|
| 9.1.1 | Same base (DE) and same height (between parallel lines)<br><i>Dieselfde basis (DE) en dieselfde hoogte (tussen ewewydige lyne)</i>  | ✓ same base/ <i>dies basis</i><br>between    lines/<br><i>tussen // lyne</i><br>(1) |
| 9.1.2 | $\frac{AD}{DB}$ $\frac{\frac{1}{2} AE \times k}{\frac{1}{2} EC \times k}$ <p>But/<i>Maar</i> area <math>\triangle DEB = \text{area } \triangle DEC</math><br/>(Same base and same height/<i>dieselfde basis en dieselfde hoogte</i>)<br/> <math display="block">\therefore \frac{\text{area } \triangle ADE}{\text{area } \triangle DEB} = \frac{\text{area } \triangle ADE}{\text{area } \triangle DEC}</math> <math display="block">\therefore \frac{AD}{DB} = \frac{AE}{EC}</math></p> | ✓ S<br><br>✓ S<br><br>✓ S<br>✓ R<br><br>✓ S<br><br>(5)                              |

9.2

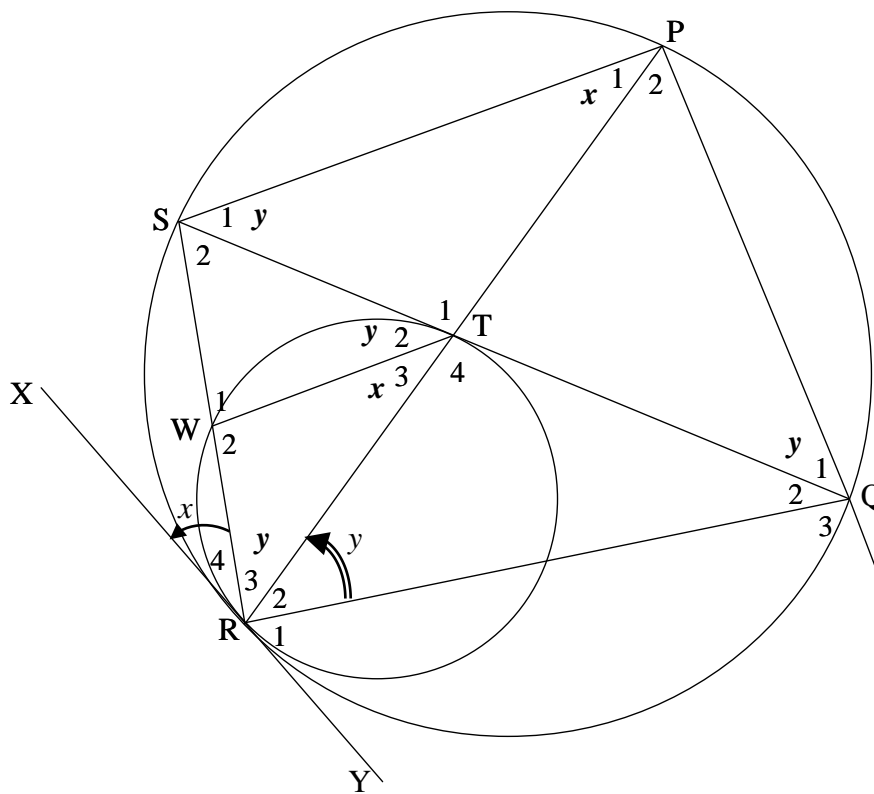


|              |   |  |
|--------------|---|--|
| <p>9.2.1</p> | $\frac{EM}{AM} = \frac{FD}{AD}$ <p>(Line parallel one side of <math>\Delta</math><br/><b>OR</b><br/>prop th; <math>EF \parallel BD</math>)<br/>(<i>Lyn ewewydig aan sy v <math>\Delta</math></i><br/><b>OF</b> eweredigst; <math>EF \parallel BD</math>)</p> $\frac{EM}{AM} = \frac{3}{7}$  | <p>✓ S ✓R</p> <p>✓ answer/antw</p> <p>(3)</p>  |
| <p>9.2.2</p> | <p><math>CM = AM</math><br/><math>\frac{CM}{ME} = \frac{AM}{ME} = \frac{7}{3}</math></p> <p>(diags of parm bisect/<i>hoekl parm halv</i>)<br/>(from 9.2.1/<i>vanaf 9.2.1</i>)</p>   | <p>✓ S ✓R</p> <p>✓ answer/antw</p> <p>(3)</p>  |
| <p>9.2.3</p> | <p><math>h</math> of <math>\Delta FDC = h</math> of <math>\Delta BDC</math> (<math>AD \parallel BC</math>)</p> $\frac{\text{area } \Delta FDC}{\text{area } \Delta BDC} = \frac{\frac{1}{2} FD \cdot h}{\frac{1}{2} BC \cdot h}$ $= \frac{FD}{AD}$ <p>(opp sides of parm =)<br/>(<i>tos sye v parm =</i>)</p> $= \frac{3}{7}$ <p><b>OR/OF</b></p> $\frac{\text{area } \Delta FDC}{\text{area } \Delta ADC} = \frac{FD}{AD} = \frac{3}{7}$ <p>(same heights)<br/>(<i>dieselde hoogtes</i>)</p> <p>But Area <math>\Delta ADC =</math> Area <math>\Delta BDC</math> (diags of parm bisect area)<br/>(<i>hoekl v parm halv opp</i>)</p> $\frac{\text{area } \Delta FDC}{\text{area } \Delta BDC} = \frac{3}{7}$ | <p>✓ <math>AD \parallel BC</math></p> <p>✓ subst into area form/<i>subst in opp formule</i></p> <p>✓ S</p> <p>✓ answer/antw</p> <p>(4)</p> <p>✓ S ✓R</p> <p>✓ S</p> <p>✓ answer/antw</p> <p>(4)</p> <p><b>[16]</b></p> |

**QUESTION/VRAAG 10**



|        |   |                                 |         |
|--------|---|---------------------------------|---------|
| 10.1.1 | Tangent chord theorem/Raaklyn-koordstelling   | ✓ R                             | (1)     |
| 10.1.2 | Tangent chord theorem/Raaklyn-koordstelling   | ✓ R                             | (1)     |
| 10.1.3 | Corresponding angles equal/Ooreenkomstige $\angle$ e gelyk  | ✓ R                             | (1)     |
| 10.1.4 | $\angle$ s subtended by chord PQ <b>OR</b> $\angle$ s in same segment<br><i><math>\angle</math>e onderspan deur dieselfde koord <b>OF</b> <math>\angle</math>e in dieselfde segment</i>   | ✓ R                             | (1)     |
| 10.1.5 | alternate $\angle$ s/verwisselende $\angle$ e ; WT    SP  | ✓ R                             | (1)     |
| 10.2   | $\frac{RW}{RS} = \frac{RT}{RP}$ <p>(Line parallel one side of <math>\Delta</math> <b>OR</b> prop th; WT    SP)<br/>(Lyn ewewydig aan sy v <math>\Delta</math> <b>OF</b> eweredighst: WT    SP)</p> <p><b>OR/OF</b></p> $\Delta RTW \parallel \Delta RPS$ <p>(<math>\angle</math>; <math>\angle</math>; <math>\angle</math>)</p> $\therefore \frac{RW}{RS} = \frac{RT}{RP}$ <p>(<math>\Delta RTW \parallel \Delta RPS</math>)</p> $\therefore RT = \frac{RW \cdot RP}{RS}$ | ✓ S ✓ R                         | (2)     |
| 10.3   | $y = \hat{T}_2 = \hat{R}_3$<br>$y = \hat{R}_3 = \hat{Q}_1$  | (tan chord theorem/Rkl-koordst) | ✓ S ✓ R |
|        | ( $\angle$ s in same segment/ $\angle$ e in dieselfde segment)  | ✓ S ✓ R                         | (4)     |



|             |  |   |
|-------------|--|---|
| <p>10.4</p> | <p><math>\hat{Q}_3 = \hat{P}SR</math> (ext <math>\angle</math> of cyc quad/buite <math>\angle</math> v kdvh)<br/> <math>\hat{P}SR = \hat{W}_2</math> (corresp <math>\angle</math>s/ooreenk <math>\angle</math>e ; WT    SP)<br/> <math>\therefore \hat{Q}_3 = \hat{W}_2</math><br/> <b>OR/OF</b><br/> <math>\hat{Q}_2 = x</math> (<math>\angle</math>s in same segment/<math>\angle</math>e in dies segment)<br/> <math>\hat{Q}_3 = 180^\circ - (x + y)</math> (<math>\angle</math>s on straight line/<math>\angle</math>e op reguitlyn)<br/> <math>\hat{W}_2 = 180^\circ - (x + y)</math> (<math>\angle</math>s of <math>\Delta WRT</math>/<math>\angle</math>e v <math>\Delta WRT</math>)<br/> <math>\therefore \hat{Q}_3 = \hat{W}_2</math></p> | <p>✓ S ✓ R<br/><br/>                 ✓ S<br/><br/>                 ✓ R<br/>                 ✓ S<br/>                 ✓ S<br/><br/>                 (3)</p>  |
| <p>10.5</p> | <p>In <math>\Delta RTS</math> and <math>\Delta RQP</math>:<br/> <math>\hat{R}_3 = \hat{R}_2 = y</math> (proven above/hierbo bewys)<br/> <math>\hat{S}_2 = \hat{P}_2</math> (<math>\angle</math>s in same segment/<math>\angle</math>e in dies segment)<br/> <math>\hat{R}TS = \hat{R}QP</math> (3<sup>rd</sup> angle of <math>\Delta</math>)<br/> <math>\therefore \Delta RTS \parallel \Delta RQP</math> (<math>\angle</math>; <math>\angle</math>; <math>\angle</math>)</p>  | <p>✓ S<br/><br/>                 ✓ S/R<br/>                 ✓ S <b>OR/OF</b><br/>                 (<math>\angle</math>; <math>\angle</math>; <math>\angle</math>)<br/><br/>                 (3)</p> |

|                             |   |   |
|-----------------------------|---|---|
| <p>10.6</p>                 | $\frac{RT}{RQ} = \frac{RS}{RP} \quad (\triangle RTS \parallel \triangle RQP)$ $\frac{RS}{RP} \times \frac{RS}{RP} = \frac{RT}{RQ} \times \frac{RS}{RP}$ $\left(\frac{RS}{RP}\right)^2 = \left(\frac{RT}{RP}\right)\left(\frac{RS}{RQ}\right)$ $= \left(\frac{RW}{RS}\right)\left(\frac{RS}{RQ}\right) \quad (\text{proven in 10.2/bewys in 10.2})$ $= \frac{RW}{RQ}$ <p><b>OR/OF</b></p> $\frac{RT}{RQ} = \frac{RS}{RP} \quad (\triangle RTS \parallel \triangle RQP)$ <p>But <math>RT = \frac{WR.RP}{RS}</math> (proven in 10.2/bewys in 10.2)</p> $\therefore \frac{RT}{RQ} = \frac{WR.RP}{RQ.RS} = \frac{RS}{RP}$ $WR.RP^2 = RQ.RS^2$ $\therefore \frac{WR}{RQ} = \frac{RS^2}{RP^2}$ <p><b>OR/OF</b></p> $\frac{RT}{RS} = \frac{RQ}{RP} \quad (\triangle RTS \parallel \triangle RQP)$ $RQ = \frac{RT.RP}{RS}$ <p>and <math>WR = \frac{RT.RS}{RP}</math> (proven in 10.2/bewys in 10.2)</p> $\frac{WR}{RQ} = \frac{\frac{RT.RS}{RP}}{\frac{RT.RP}{RS}}$ $= \frac{RT.RS}{RP} \times \frac{RS}{RT.RP}$ $= \frac{RS^2}{RP^2}$ | <p>✓ S</p> <p>✓ <math>\times \frac{RS}{RP}</math> on both sides</p> <p>✓ <math>\left(\frac{RT}{RP}\right)\left(\frac{RS}{RQ}\right)</math> (3)</p> <p>✓ S</p> <p>✓ <math>RT = \frac{WR.RP}{RS}</math></p> <p>✓ multiplication/<br/>vermenigvuldig (3)</p> <p>✓ S</p> <p>✓ <math>WR = \frac{RT.RS}{RP}</math></p> <p>✓ simplification/<br/>vereenvoudiging (3)</p> <p>[20]</p> |
| <p><b>TOTAL/TOTAAL:</b></p> |   | <p><b>150</b></p>   |