

SA's Leading Past Year

Exam Paper Portal



You have Downloaded, yet Another Great  
Resource to assist you with your Studies 😊

Thank You for Supporting SA Exam Papers

Your Leading Past Year Exam Paper Resource Portal

Visit us @ [www.saexampapers.co.za](http://www.saexampapers.co.za)



**SA EXAM  
PAPERS**



# basic education

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

**NATIONAL/NASIONALE  
SENIOR  
CERTIFICATE/SERTIFIKAAT**

**GRADE/GRAAD 12**

**MATHEMATICS P2/WISKUNDE V2**

**FEBRUARY/MARCH/FEBRUARIE/MAART 2017**

**MEMORANDUM**

**MARKS / PUNTE: 150**

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

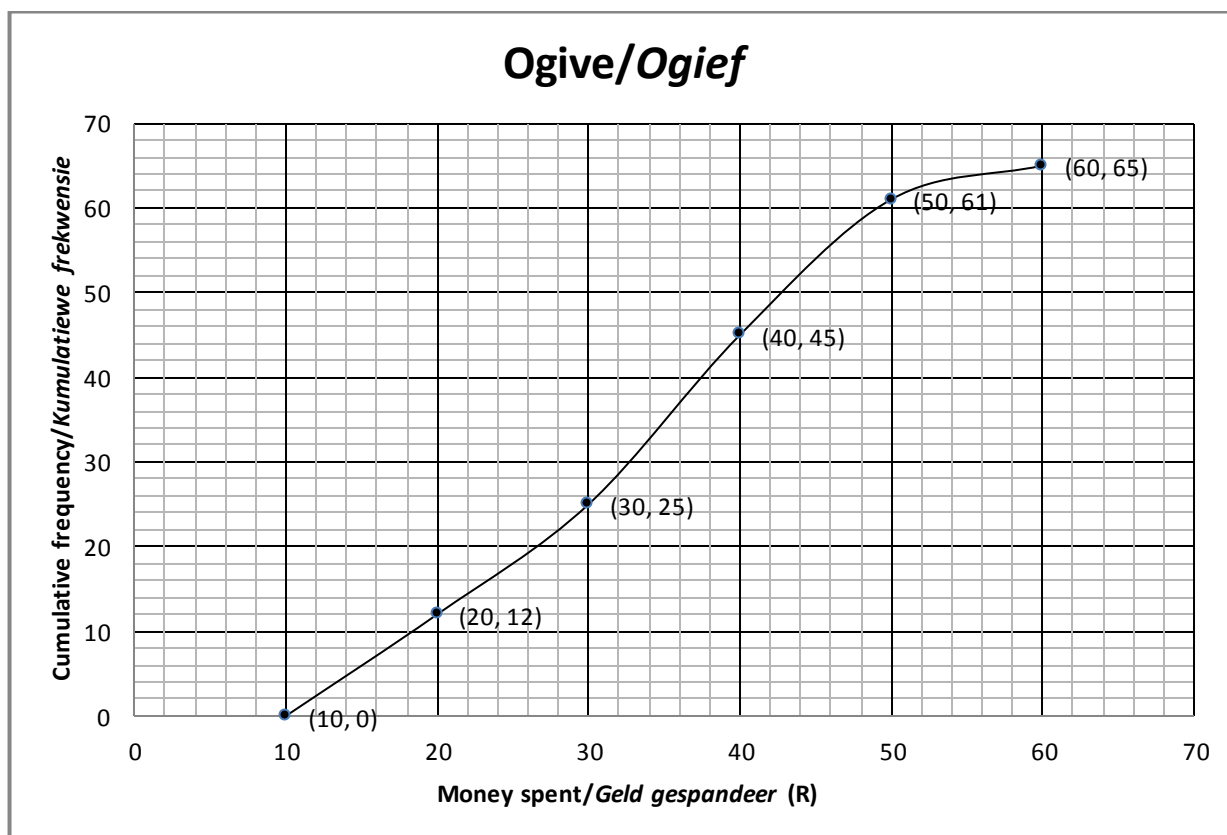
**NOTE:**

- If a candidate answered a question TWICE, mark only the FIRST attempt.
- If a candidate has crossed out an attempt to answer a question and did not redo it, 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:**

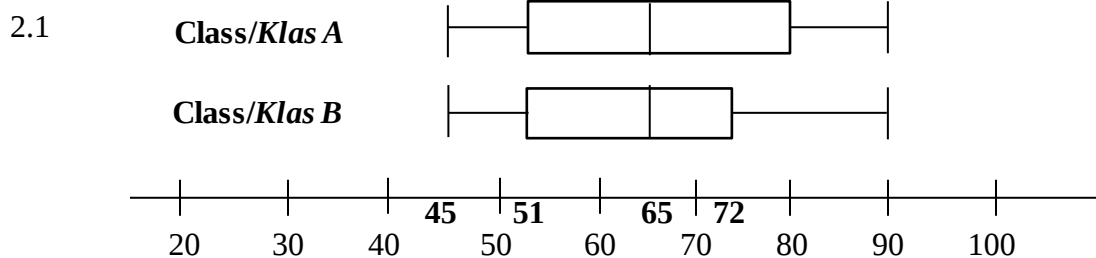
- *Indien 'n kandidaat 'n vraag TWEE keer beantwoord het, sien slegs die EERSTE poging na.*
- *As 'n kandidaat 'n poging om 'n vraag te beantwoord, doodgetrek en nie oorgedoen het nie, sien die doodgetrekte poging na.*
- *Volgehoue akkuraatheid is op ALLE aspekte van die memorandum van toepassing. Staak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

## QUESTION/VRAAG 1



| Amount of money/<br>Bedrag geld<br>(in R) | $10 \leq x < 20$ | $20 \leq x < 30$ | $30 \leq x < 40$ | $40 \leq x < 50$ | $50 \leq x < 60$ |
|-------------------------------------------|------------------|------------------|------------------|------------------|------------------|
| Frequency<br>Frekwensie                   | $a$              | 13               | 20               | $b$              | 4                |

|     |                                                                                                                                                                                                 |                                               |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| 1.1 | 65 learners/leerders                                                                                                                                                                            | ✓ answer<br>(1)                               |
| 1.2 | Modal class/Modale klas: $30 \leq x < 40$                                                                                                                                                       | ✓ answer<br>(1)                               |
| 1.3 | $a = 12$<br>$b = 61 - 45$<br>$= 16$                                                                                                                                                             | ✓ answer<br>✓ answer<br>(2)                   |
| 1.4 | No. of learners/Aantal leerders = $65 - 54$ <b>OR/OF</b> $65 - 55$<br>$= 11$ $= 10$<br><div style="border: 1px solid black; padding: 5px; display: inline-block;">Answer only: full marks</div> | ✓ 54 or 55<br>✓ 11 or 10<br>(2)<br><b>[6]</b> |

**QUESTION/VRAAG 2**

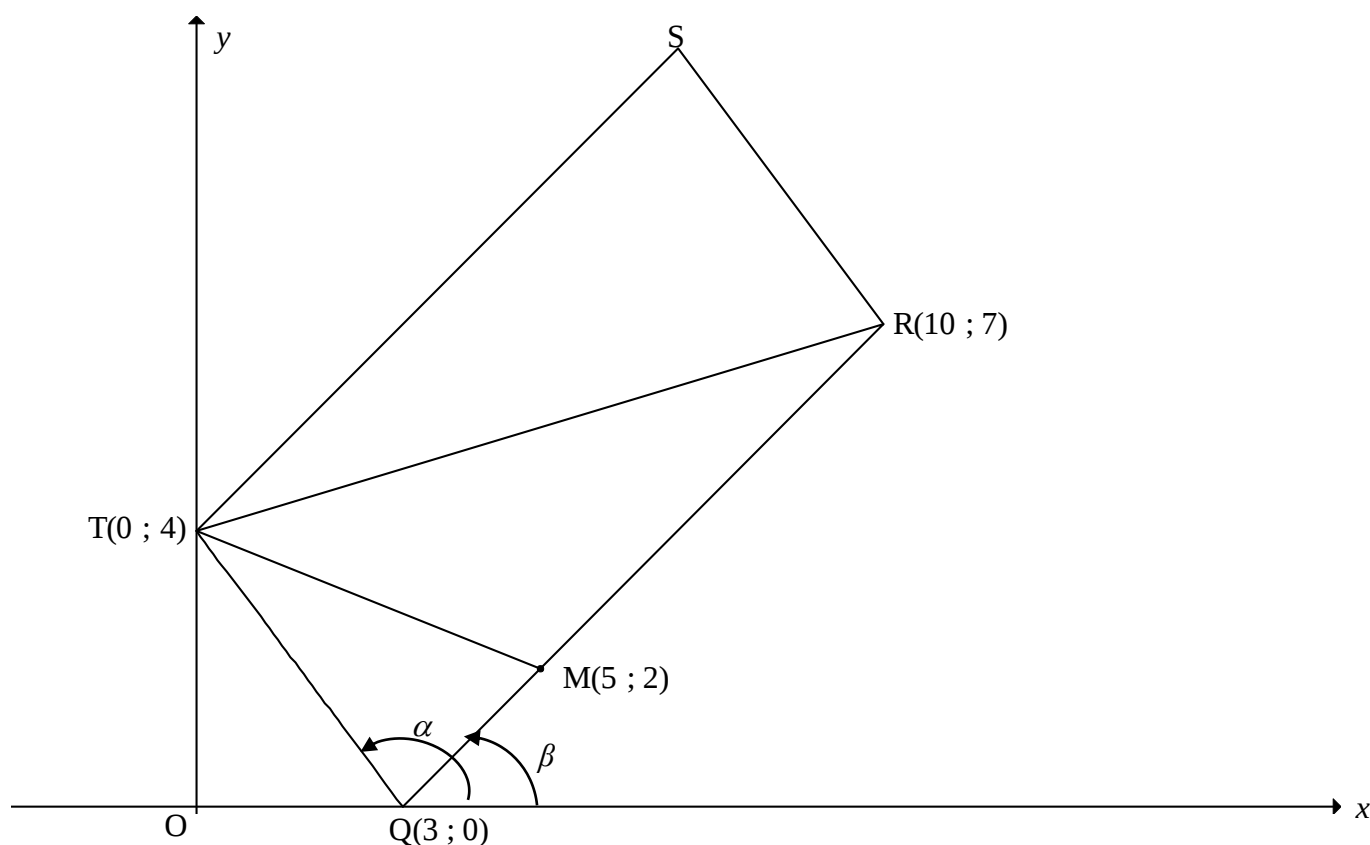
|       |                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                      |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 2.1.1 | IQR of Class B/IKV van Klas B = $Q_3 - Q_1$<br>= $72 - 51$<br>= 21 marks/punte                                                                                                                                                                                                                                                                                                                                               | ✓ 72 and 51<br>✓ 21 only<br>(2)                                                      |
| 2.1.2 | Although the boxes contain the same number of data points, the marks for Class A are more widely spread./Alhoewel die monde dieselfde aantal datapunte bevat, is die punte van Klas A meer verspreid.<br><b>OR/OF</b><br>Although the boxes contain the same number of data points, the marks for Class B are more clustered./Alhoewel die monde dieselfde aantal datapunte bevat, is die punte van Klas B nader aan mekaar. | ✓ ✓ Class A is more widely spread<br>(2)<br><br>✓ ✓ Class B is more clustered<br>(2) |
| 2.1.3 | Medians are the same/Mediane is dieselfde<br>Ranges are the same <b>OR</b> Maximum and minimum values are the same/Variasiewydtes is dieselfde <b>OF</b> die maksimum en minimum waarde is dieselfde<br>75% of both classes obtained 51 and above/75% van albei klasse behaal 51 en meer.                                                                                                                                    | ✓ ✓ any TWO of the 3 reasons mentioned<br>(2)                                        |

## 2.2

| COUPLE/PAAR               | 1  | 2 | 3 | 4 | 5 | 6  | 7  | 8  |
|---------------------------|----|---|---|---|---|----|----|----|
| JUDGE 1/<br>BEOORDELAAR 1 | 18 | 4 | 6 | 8 | 5 | 12 | 10 | 14 |
| JUDGE 2/<br>BEOORDELAAR 2 | 15 | 6 | 3 | 5 | 5 | 14 | 8  | 15 |

|       |                                                                                                                                                         |                                                  |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| 2.2.1 | $a = -0,03$<br>$b = 0,93$<br>$\hat{y} = -0,03 + 0,93x$                                                                                                  | ✓ value $a$<br>✓ value $b$<br>✓ equation<br>(3)  |
| 2.2.2 | $\hat{y} = -0,03 + 0,93(15)$<br>= 13,92 <b>OR/OF</b> 13,85<br>$\approx 14$                                                                              | ✓ substitution<br><br>✓ answer<br>(2)            |
| 2.2.3 | Yes <b>OR</b> they are consistent, because $r = 0,9$ . ( $r = 0,89567\dots$ )/Ja <b>OF</b> hulle is konsekwent, want $r = 0,9$ . ( $r = 0,89567\dots$ ) | ✓ statement<br>✓ $r = 0,9$<br>(2)<br><b>[13]</b> |

## QUESTION/VRAAG 3



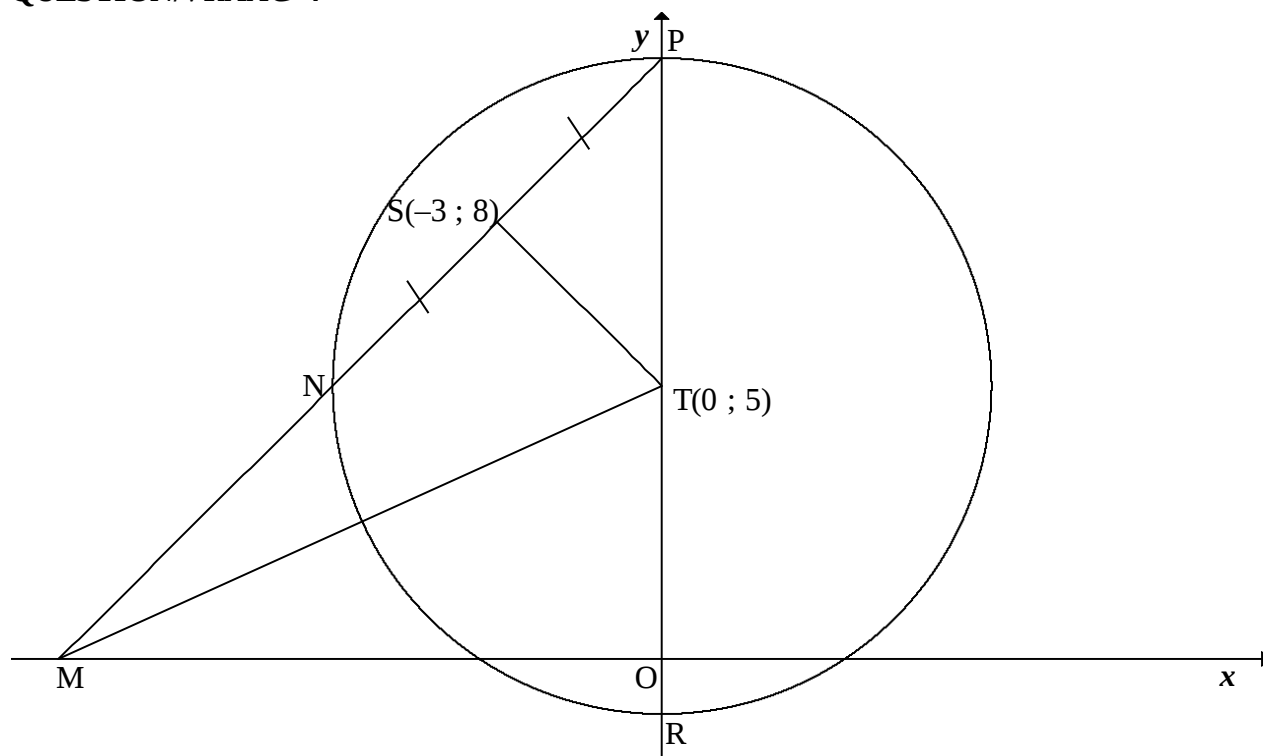
|     |                                                                                                                                                                                                                                                                                     |                                                                                                                             |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| 3.1 | $m_{TQ} = \frac{4-0}{0-3}$ $= -\frac{4}{3}$                                                                                                                                                                                                                                         | ✓ answer<br>(1)                                                                                                             |
| 3.2 | $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $RQ = \sqrt{(10-3)^2 + (7-0)^2}$ $RQ = \sqrt{98} = 7\sqrt{2}$                                                                                                                                                                            | ✓ substitution/substitusie<br>✓ answer in surd form<br>(2)                                                                  |
| 3.3 | $m_{FQ} = m_{TQ}$ $\frac{-8}{k-3} = -\frac{4}{3}$ $4k - 12 = 24$ $k = 9$ <p><b>OR/OF</b></p> $m_{FT} = m_{QT}$ $\frac{-8-4}{k-0} = -\frac{4}{3}$ $-36 = -4k$ $k = 9$ <p><b>OR/OF</b></p> <p>Equation of TQ: <math>y = -\frac{4}{3}x + 4</math></p> $-8 = -\frac{4}{3}k + 4$ $k = 9$ | ✓ equating gradients/stel gradient gelyk<br>✓ $m_{FQ} = \frac{-8}{k-3}$<br>✓ simplification/vereenvoudig<br>✓ answer<br>(4) |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3.4 | <p>Using transformation/<i>Gebruik transformasie</i>:<br/> <math>\therefore S(7 ; 11)</math></p> <p><b>OR/OF</b><br/> Midpoint of TR = midpoint of SQ [diag   m/hkle  m]<br/> Midpoint of TR = <math>(5 ; \frac{11}{2})</math><br/> <math>\frac{x_S + 3}{2} = 5</math> and <math>\frac{y_S + 0}{2} = \frac{11}{2}</math><br/> <math>\therefore x_S = 7</math> and <math>y_S = 11</math><br/> <math>\therefore S(7 ; 11)</math></p> <p><b>OR/OF</b><br/> Equation of TS: <math>y = \left( \frac{7-2}{10-5} \right) x + 4 = x + 4</math><br/> Equation of RS: <math>y - 7 = -\frac{4}{3}(x - 10)</math><br/> <math>y = -\frac{4}{3}x + \frac{61}{3}</math><br/> <math>x + 4 = -\frac{4}{3}x + \frac{61}{3}</math><br/> <math>7x = 49</math><br/> <math>x = 7</math><br/> <math>\therefore y = 11</math><br/> <math>\therefore S(7 ; 11)</math></p> | <p>✓ ✓ <i>x</i>-value/waarde<br/> ✓ ✓ <i>y</i>-value/waarde<br/> (4)</p> <p>✓ <i>x</i>-value/waarde of/van T<br/> ✓ <i>y</i>-value/waarde of/van T</p> <p>✓ <i>x</i>-value/waarde of/van S<br/> ✓ <i>y</i>-value/waarde of/van S<br/> (4)</p> <p>✓ equations of TS and RS/vgls van TS en RS</p> <p>✓ equating / gelykstel</p> <p>✓ <i>x</i>-value/waarde<br/> ✓ <i>y</i>-value/waarde<br/> (4)</p> |
| 3.5 | <p><math>\hat{T}SR = \hat{T}QR</math> [opp <math>\angle</math>s of   m/teenoorst <math>\angle</math>e   m]<br/> <math>\hat{T}QR = \alpha - \beta</math><br/> <math>\tan \alpha = m_{TQ} = -\frac{4}{3}</math><br/> <math>\therefore \alpha = 180^\circ - 53,13^\circ = 126,87^\circ</math><br/> <math>\tan \beta = m_{RQ} = \frac{7}{7} = 1</math><br/> <math>\therefore \beta = 45^\circ</math><br/> <math>\hat{T}QR = 126,87^\circ - 45^\circ</math><br/> <math>= 81,87^\circ</math><br/> <math>\hat{T}SR = 81,87^\circ</math></p> <p><b>OR/OF</b></p>                                                                                                                                                                                                                                                                                         | <p>✓ <math>\hat{T}QR = \alpha - \beta</math><br/> ✓ <math>\tan \alpha = m_{TQ}</math><br/> ✓ <math>\alpha</math><br/> ✓ <math>\tan \beta = m_{RQ}</math><br/> ✓ <math>\beta</math></p> <p>✓ answer<br/> (6)</p>                                                                                                                                                                                    |

|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                  |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | $\begin{aligned} \text{TQ} &= \text{SR} = 5 \\ \text{TR} &= \sqrt{100 + 9} = \sqrt{109} \\ \text{RQ} &= \text{TS} = \sqrt{49 + 49} = \sqrt{98} \\ \cos \hat{\text{RQT}} &= \cos \hat{\text{TSR}} = \frac{\text{TQ}^2 + \text{RQ}^2 - \text{TR}^2}{2 \cdot \text{TQ} \cdot \text{RQ}} \\ &= \frac{25 + 98 - 109}{2(5)(\sqrt{98})} \\ &= 0,141... \\ \hat{\text{RQT}} &= \hat{\text{TSR}} = 81,87^\circ \end{aligned}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ✓ length of TQ <b>OR</b> SR<br>✓ length of TR<br>✓ length of RQ <b>OR</b> TS<br><br>✓ correct subst into cosine rule<br><br>✓ simplification<br>✓ answer<br>(6)                  |
| 3.6.1 | $\begin{aligned} \text{MQ} &= \sqrt{(5-3)^2 + (2-0)^2} \\ \text{MQ} &= \sqrt{8} \\ \frac{\text{MQ}}{\text{RQ}} &= \frac{\sqrt{8}}{\sqrt{98}} \\ &= \frac{2}{7} \quad \text{or} \quad 0,29 \end{aligned}$ <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-top: 10px;">Answer only: full marks</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ✓ substitution/ <i>substitusie</i><br>✓ $\text{MQ} = \sqrt{8} = 2\sqrt{2}$<br><br>✓ answer<br>(3)                                                                                |
| 3.6.2 | $\begin{aligned} \frac{\text{area of } \triangle \text{TQM}}{\text{area of } \triangle \text{TQR}} &= \frac{\frac{1}{2} \cdot \text{QM} \cdot \perp h}{\frac{1}{2} \cdot \text{QR} \cdot \perp h} \quad [\perp h \text{ same/dieselfde}] \\ &= \frac{\text{QM}}{\text{QR}} = \frac{2}{7} \\ \frac{\text{area of } \triangle \text{TQM}}{\text{area of parm RQTS}} &= \frac{\text{area of } \triangle \text{TQM}}{2 \times \text{area of } \triangle \text{TQR}} \\ &= \frac{1}{2} \left( \frac{2}{7} \right) = \frac{1}{7} \end{aligned}$ <p><b>OR/OF</b></p> $\begin{aligned} \frac{\text{area of } \triangle \text{TQM}}{\text{area of } \triangle \text{TQR}} &= \frac{\text{QM}}{\text{QR}} \\ &= \frac{2}{7} \\ \frac{\text{area of } \triangle \text{TQM}}{\text{area of parm RQTS}} &= \frac{\text{area of } \triangle \text{TQM}}{2 \text{area of } \triangle \text{TQR}} \\ &= \frac{1}{2} \left( \frac{2}{7} \right) = \frac{1}{7} \end{aligned}$ <p><b>OR/OF</b></p> | ✓ $\frac{\text{area of } \triangle \text{TQM}}{\text{area of } \triangle \text{TQR}} = \frac{2}{7}$<br><br>✓<br>area parm RQTS = 2area $\triangle \text{TQR}$<br>✓ answer<br>(3) |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | $\frac{\text{area of } \triangle TQM}{\text{area of parm RQTS}} = \frac{\frac{1}{2} QM \cdot \perp h}{RQ \cdot \perp h}$ $= \frac{1}{2} \left( \frac{2}{7} \right)$ $= \frac{1}{7}$ <p><b>OR/OF</b></p> $\frac{\text{area of } \triangle TQM}{\text{area of parm RQTS}} = \frac{\frac{1}{2} QT \cdot QM \cdot \sin(\alpha - \beta)}{2 \text{area of } \triangle QTR}$ $= \frac{\frac{1}{2} QT \cdot QM \cdot \sin(\alpha - \beta)}{2 \left[ \frac{1}{2} \cdot QT \cdot QR \cdot \sin(\alpha - \beta) \right]}$ $= \frac{1}{2} \left( \frac{2}{7} \right)$ $= \frac{1}{7}$ | $\checkmark \frac{\frac{1}{2} QM \cdot \perp h}{RQ \cdot \perp h}$ $\checkmark \frac{1}{2} \left( \frac{2}{7} \right)$ $\checkmark \text{ answer}$ <p style="text-align: right;">(3)</p><br>$\checkmark$ $\text{area parm RQTS} = 2 \text{area } \triangle TQR$ $\checkmark \frac{\frac{1}{2} QT \cdot QM \cdot \sin(\alpha - \beta)}{2 \left[ \frac{1}{2} \cdot QT \cdot QR \cdot \sin(\alpha - \beta) \right]}$ $\checkmark \text{ answer}$ <p style="text-align: right;">(3)<br/><b>[23]</b></p> |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## QUESTION/VRAAG 4



|     |                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                        |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4.1 | line from centre to <b>midpt of chord</b> /<br>lyn vanaf midpt na midpt van koord                                                                                                                                                                                                                                                                               | ✓ answer<br>(1)                                                                                                                                        |
| 4.2 | $m_{ST} = \frac{8-5}{-3-0}$ $= -1$ $m_{ST} \times m_{NP} = -1 \quad [TS \perp NP]$ $\therefore m_{NP} = 1$ $\therefore y = x + c$ $8 = -3 + c$ $c = 11$ $\therefore y = x + 11$ <div style="text-align: right;"> <math display="block">y - y_1 = 1(x - x_1)</math> <math display="block">y - 8 = 1(x + 3)</math> <math display="block">y = x + 11</math> </div> | ✓ subst $(-3; 8)$ and $(0; 5)$ into gradient formula<br>✓ $m_{ST}$<br>✓ $m_{NP}$<br><br>✓ subst $(-3; 8)$ into equation of a line<br>✓ equation<br>(5) |
| 4.3 | $P(0; 11)$ [y-intercept of chord NP]<br>$\therefore$ radius is 6 units<br>$R(0; -1)$<br>Equations of the tangents to the circle parallel to the x-axis/<br><i>Vgls van die raaklyne aan die sirkel    aan die x-as:</i><br>$y = 11$ and $y = -1$                                                                                                                | ✓ coordinates of P/<br>koördinate v P<br>✓ coordinates of R<br>koördinate van R<br><br>✓✓ answers<br>(4)                                               |
| 4.4 | $M(-11; 0)$ [x-intercept of x-afsnit van NP]<br>$MT = \sqrt{(0-11)^2 + (5-0)^2}$<br>$MT = \sqrt{146} = 12,08$                                                                                                                                                                                                                                                   | ✓✓ coordinates of M<br>✓ substitution<br>✓ answer<br>(4)                                                                                               |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                    |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| 4.5 | <p>MT = diameter/middel lyn [conv <math>\angle</math> in <math>\frac{1}{2}</math> circle/omgek <math>\angle</math> in <math>\frac{1}{2}</math> sirkel]</p> <p>radius = <math>\frac{\sqrt{146}}{2}</math> units</p> <p>Centre of circle/Middelpunt v sirkel<br/>= Midpoint MT /Middelpunt MT</p> <p>= <math>\left(\frac{-11}{2}; \frac{5}{2}\right)</math></p> <p>Equation of circle through S, T and M: <math>\left(x + \frac{11}{2}\right)^2 + \left(y - \frac{5}{2}\right)^2 = \frac{146}{4}</math></p> <p><b>OR/OF</b> <math>\left(x + 5\frac{1}{2}\right)^2 + \left(y - 2\frac{1}{2}\right)^2 = \frac{73}{2} = 6,04</math></p> | <p>✓ radius of circle</p> <p>✓ x value of M</p> <p>✓ y value of M</p> <p>✓ LHS of equation</p> <p>✓ RHS of equation</p> <p>(5)<br/><b>[19]</b></p> |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|

**QUESTION/VRAAG 5**

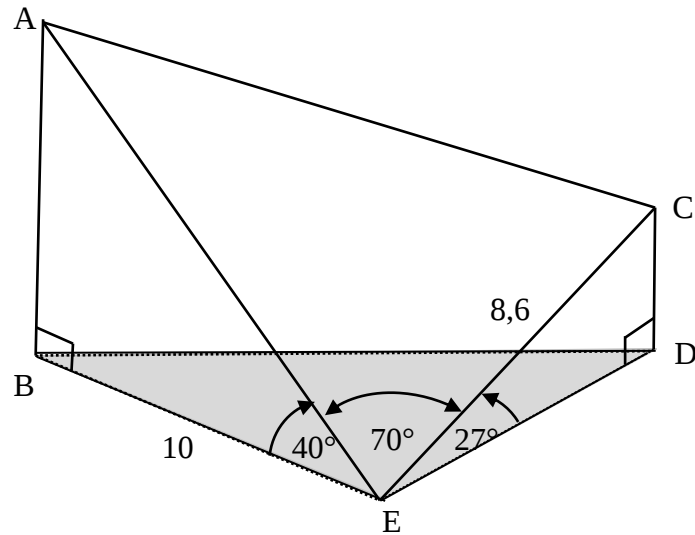
|     |                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                            |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5.1 | <p><math>a = -1</math><br/><math>b = 2</math></p>                                                                                                                                                                                    | <p>✓ answer</p> <p>✓ answer</p> <p>(2)</p>                                                                                                                                                                                                                                                                                                                 |
| 5.2 | <p><math>f(3x) = -\sin 3x</math></p> <p>Period of <math>f(3x) = \frac{360^\circ}{3}</math><br/><math>= 120^\circ</math></p> <div style="border: 1px solid black; padding: 5px; display: inline-block;">Answer only: Full marks</div> | <p>✓ <math>\frac{360^\circ}{3}</math></p> <p>✓ answer</p> <p>(2)</p>                                                                                                                                                                                                                                                                                       |
| 5.3 | <p><math>x \in [90^\circ; 135^\circ) \cup \{180^\circ\}</math></p> <p><b>OR/OF</b></p> <p><math>90^\circ \leq x &lt; 135^\circ</math> or <math>x = 180^\circ</math></p>                                                              | <p>✓ <math>90^\circ</math> and <math>135^\circ</math><br/>in interval form</p> <p>✓ <math>180^\circ</math> as single value</p> <p>✓ correct brackets</p> <p>(3)</p> <p>✓ <math>90^\circ</math> and <math>135^\circ</math><br/>in interval form</p> <p>✓ <math>180^\circ</math> as single value</p> <p>✓ correct inequalities</p> <p>(3)<br/><b>[7]</b></p> |

**QUESTION/VRAAG 6**

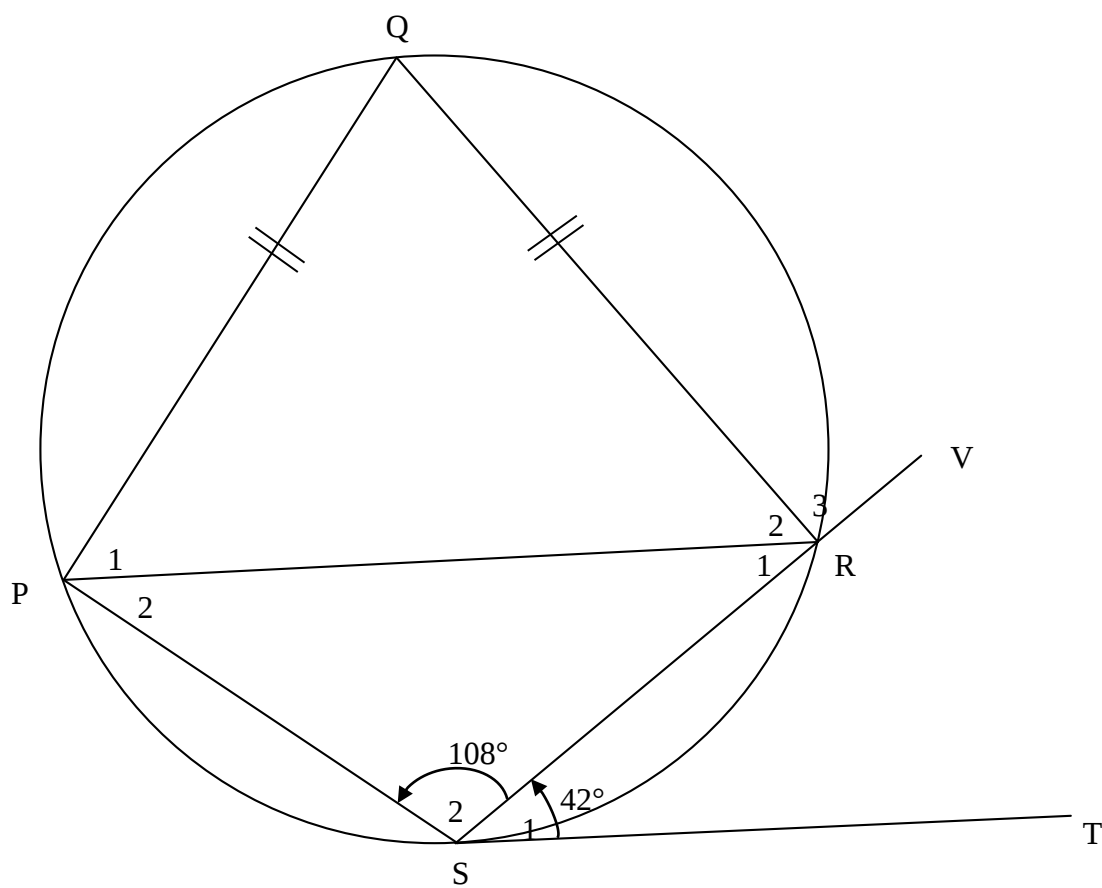
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                          |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6.1.1 | $\sin (360^\circ - 36^\circ) = -\sin 36^\circ$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ✓ answer<br>(1)                                                                                                                                                                                          |
| 6.1.2 | $\cos 72^\circ = \cos(2 \times 36^\circ)$<br>$= 1 - 2 \sin^2 36^\circ$ <div style="border: 1px solid black; padding: 2px; display: inline-block;">Answer only: Full marks</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ✓ double angle/dubbelhoek<br>✓ answer<br>(2)                                                                                                                                                             |
| 6.2   | <p>R.T.P.: <math>1 - \frac{\tan^2 \theta}{1 + \tan^2 \theta} = \cos^2 \theta</math></p> <p>LHS = <math>\frac{1 + \tan^2 \theta - \tan^2 \theta}{1 + \tan^2 \theta}</math></p> <p><math>= \frac{1}{1 + \frac{\sin^2 \theta}{\cos^2 \theta}}</math></p> <p><math>= \frac{1}{\frac{\cos^2 \theta + \sin^2 \theta}{\cos^2 \theta}}</math></p> <p><math>= \frac{1}{\frac{1}{\cos^2 \theta}}</math></p> <p><math>= \cos^2 \theta</math></p> <p>= RHS</p> <p><b>OR/OF</b></p> <p>LHS = <math>\frac{1 + \tan^2 \theta - \tan^2 \theta}{1 + \tan^2 \theta}</math></p> <p><math>= \frac{1}{1 + \frac{\sin^2 \theta}{\cos^2 \theta}}</math></p> <p><math>= \frac{1}{1 + \frac{\sin^2 \theta}{\cos^2 \theta}} \times \frac{\cos^2 \theta}{\cos^2 \theta}</math></p> <p><math>= \frac{\cos^2 \theta}{\cos^2 \theta + \sin^2 \theta}</math></p> <p><math>= \frac{\cos^2 \theta}{1}</math></p> <p><math>= \cos^2 \theta</math></p> <p>= RHS</p> <p><b>OR/OF</b></p> | ✓ writing as a single fraction/skryf as enkelbreuk<br>✓ quotient identity/kwosiëntidentiteit<br>✓ denominator as a single fraction / Noemer as enkelbreuk<br>✓ square identity/vierkantidentiteit<br>(4) |
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ✓ writing as a single fraction/skryf as enkelbreuk<br>✓ quotient identity / kwosiëntidentiteit<br>✓ $\times \frac{\cos^2 \theta}{\cos^2 \theta}$<br>✓ square identity/vierkantidentiteit<br>(4)          |
|       | <b>OR/OF</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ✓ quotient identity/                                                                                                                                                                                     |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | $\begin{aligned} \text{LHS} &= 1 - \left( \frac{\sin^2 \theta}{\cos^2 \theta} \div \left( 1 + \frac{\sin^2 \theta}{\cos^2 \theta} \right) \right) \\ &= 1 - \left( \frac{\sin^2 \theta}{\cos^2 \theta} \times \frac{\cos^2 \theta}{\cos^2 \theta + \sin^2 \theta} \right) \\ &= 1 - \left( \frac{\sin^2 \theta}{\cos^2 \theta} \times \frac{\cos^2 \theta}{1} \right) \\ &= 1 - \sin^2 \theta \\ &= \cos^2 \theta \\ &= \text{RHS} \end{aligned}$                                                                                                                                                                                                                                                                                                                                                                                                                             | <p><i>kwosiëntidentiteit</i></p> <p>✓ writing as a single fraction/ skryf as enkelbreuk</p> <p>✓ square identity/vierkantidentiteit</p> <p>✓ simplification/vereenvoudiging</p> <p>(4)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 6.3 | $\begin{aligned} \cos^2 \frac{1}{2}x &= \frac{1}{4} \\ \cos \frac{1}{2}x &= \frac{1}{2} \text{ or } -\frac{1}{2} \\ \frac{1}{2}x &= 60^\circ + k.360^\circ \text{ or } \frac{1}{2}x = 300^\circ + k.360^\circ \text{ or} \\ \frac{1}{2}x &= 120^\circ + k.360^\circ \text{ or } \frac{1}{2}x = 240^\circ + k.360^\circ \\ x &= 120^\circ + k.720^\circ \text{ or } x = 600^\circ + k.720^\circ \text{ or} \\ x &= 240^\circ + k.720^\circ \text{ or } x = 480^\circ + k.720^\circ; k \in \mathbb{Z} \end{aligned}$ <p><b>OR/OF</b></p> $\begin{aligned} \cos^2 \frac{1}{2}x &= \frac{1}{4} \\ \cos \frac{1}{2}x &= \frac{1}{2} \text{ or } -\frac{1}{2} \\ \frac{1}{2}x &= \pm 60^\circ + k.360^\circ \text{ or } \frac{1}{2}x = \pm 120^\circ + k.360^\circ \\ x &= \pm 120^\circ + k.720^\circ \text{ or } x = \pm 240^\circ + k.720^\circ; k \in \mathbb{Z} \end{aligned}$ | <p>✓✓ <math>\cos^2 \frac{1}{2}x = \frac{1}{4}</math></p> <p>✓ <math>60^\circ</math> and <math>300^\circ</math></p> <p>✓ <math>120^\circ</math> and <math>240^\circ</math></p> <p>✓ write at least one general solution as <math>\frac{1}{2}x = \angle + k.360^\circ</math></p> <p>✓ write at least one general solution as <math>x = \angle + k.720^\circ; k \in \mathbb{Z}</math></p> <p>(6)</p> <p>✓✓ <math>\cos^2 \frac{1}{2}x = \frac{1}{4}</math></p> <p>✓ <math>\pm 60^\circ</math> ✓ <math>\pm 120^\circ</math></p> <p>✓ write at least one general solution as <math>\frac{1}{2}x = \angle + k.360^\circ</math></p> <p>✓ write at least one general solution as <math>x = \angle + k.720^\circ k \in \mathbb{Z}</math></p> <p>(6)</p> |

|       |                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                              |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6.4.1 | $\sin(A - B) = \cos[90^\circ - (A - B)]$ $= \cos[(90^\circ - A) - (-B)]$ $= \cos(90^\circ - A)\cos(-B) + \sin(90^\circ - A)\sin(-B)$ $= \sin A \cos B + \cos A(-\sin B)$ $= \sin A \cos B - \cos A \sin B$ <p><b>OR/OF</b></p> $\sin(A - B) = \cos[90^\circ - (A - B)]$ $= \cos[(90^\circ + B) - A]$ $= \cos(90^\circ + B)\cos A + \sin(90^\circ + B)\sin A$ $= -\sin B \cos A + \cos B \sin A$ $= \sin A \cos B - \cos A \sin B$ | ✓ co-ratio/ko-verhouding<br>✓ writing as a difference of A & B/<br><i>skryf as verskil van A &amp; B</i><br>✓ expansion/uitbreiding<br>✓ all reductions/alle reduksies<br>(4)                                |
| 6.4.2 | $\sin(x + 64^\circ) \cos(x + 379^\circ) + \sin(x + 19^\circ) \cos(x + 244^\circ)$ $= \sin(x + 64^\circ) \cos(x + 19^\circ) + \sin(x + 19^\circ)[- \cos(x + 64^\circ)]$ $= \sin(x + 64^\circ) \cos(x + 19^\circ) - \cos(x + 64^\circ) \sin(x + 19^\circ)$ $= \sin[x + 64^\circ - (x + 19^\circ)]$ $= \sin 45^\circ$ $= \frac{1}{\sqrt{2}}$                                                                                         | ✓ $\cos(x + 379^\circ) = \cos(x + 19^\circ)$<br>✓✓ $\cos(x + 244^\circ) = -\cos(x + 64^\circ)$<br>✓✓ compound formula identity/<br><i>saamgestelde identiteit</i><br>✓ $\sin 45^\circ$<br>(6)<br><b>[23]</b> |

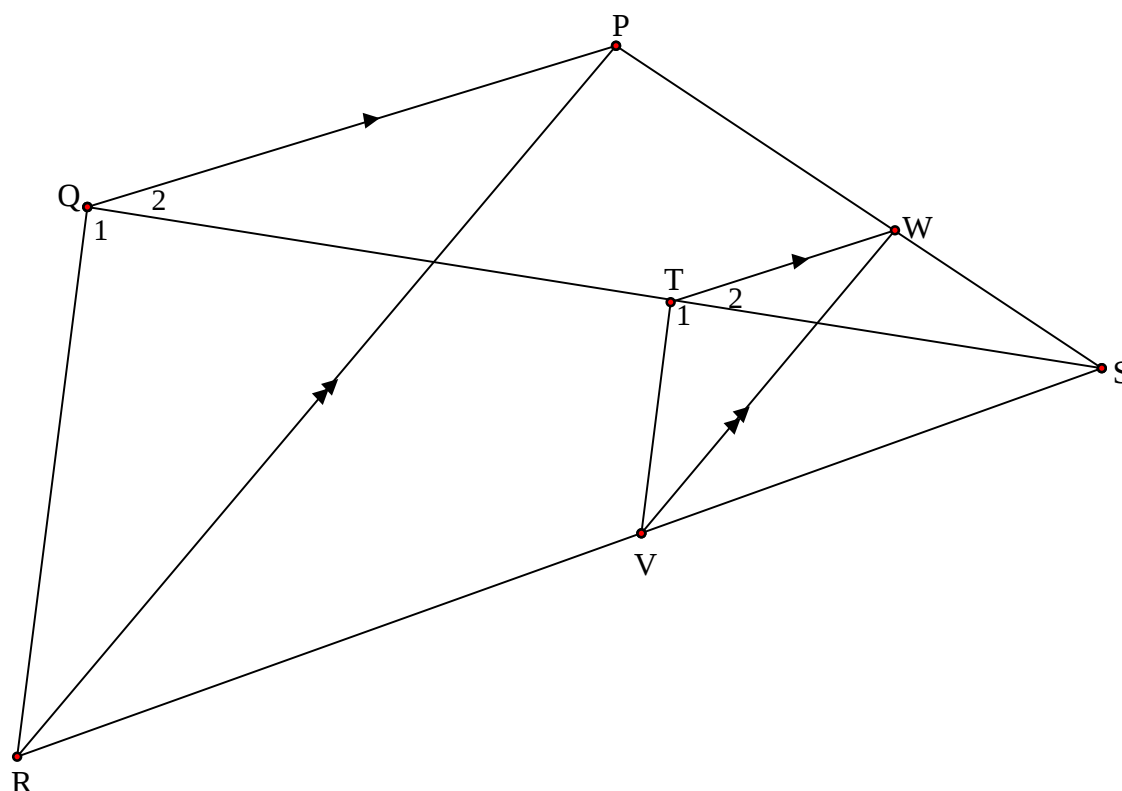
**QUESTION/VRAAG 7**

|     |                                                                                                                                                         |                                                                                                                                                                                                          |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7.1 | $\sin 27^\circ = \frac{CD}{8,6}$<br>$CD = 8,6 \sin 27^\circ$<br>$CD = 3,90 \text{ m}$                                                                   | ✓ substitution in correct trig ratio /<br><i>substitusie in korrekte trig verh</i><br><br>✓ answer<br><br>(2)                                                                                            |
| 7.2 | $\cos 40^\circ = \frac{10}{AE}$<br>$AE = \frac{10}{\cos 40^\circ}$<br>$AE = 13,05 \text{ m}$                                                            | ✓ substitution in correct trig ratio /<br><i>substitusie in korrekte trig verh</i><br><br>✓ answer<br><br>(2)                                                                                            |
| 7.3 | $AC^2 = CE^2 + AE^2 - 2 CE \cdot AE (\cos \hat{AEC})$<br>$= (8,6)^2 + (13,05)^2 - 2(8,6)(13,05)(\cos 70^\circ)$<br>$= 167,49$<br>$AC = 12,94 \text{ m}$ | ✓ correct use of cosine rule in $\triangle ACE$ /<br><i>korrekte gebruik van reel in <math>\triangle ACE</math></i><br>✓ correct subst into cosine rule<br>✓ $AC^2$<br>✓ answer<br><br>(4)<br><b>[8]</b> |

**QUESTION/VRAAG 8**

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                    |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| 8.1 | $\hat{Q} = 72^\circ$ [opp $\angle$ s of cyclic quad/teenoorst $\angle$ e koordevh]                                                                                                                                                                                                                                                                                                                                                                                           | ✓ S ✓ R<br>(2)                                                                     |
| 8.2 | $\hat{R}_2 = \hat{P}_1$ [ $\angle$ s opp equal sides/ $\angle$ e teenoor gelyke sye]<br>$\hat{R}_2 = \frac{180^\circ - 72^\circ}{2}$ [sum of $\angle$ s in $\Delta$ /som v $\angle$ e in $\Delta$ ]<br>$= 54^\circ$                                                                                                                                                                                                                                                          | ✓ S/R<br><br>✓ answer<br>(2)                                                       |
| 8.3 | $\hat{P}_2 = 42^\circ$ [tan chord theorem/raakl-koordst]                                                                                                                                                                                                                                                                                                                                                                                                                     | ✓ S ✓ R<br>(2)                                                                     |
| 8.4 | $\hat{R}_3 = \hat{P}_1 + \hat{P}_2$ [ext $\angle$ of cyclic quad/buite $\angle$ van koordevh]<br>$= 54^\circ + 42^\circ$<br>$= 96^\circ$<br><br><b>OR/OF</b><br>$\hat{R}_1 = 180^\circ - 108^\circ - 42^\circ = 30^\circ$ [sum of/som van $\angle$ s/e in $\Delta$ ]<br>$\hat{R}_3 = 180^\circ - \hat{R}_1 - \hat{R}_2$ [ $\angle$ s on str line/ $\angle$ e op reguitlyn]<br>$= 180^\circ - 30^\circ - 54^\circ$ [sum of/som van $\angle$ s/e in $\Delta$ ]<br>$= 96^\circ$ | ✓ R<br><br>✓ S<br><br>✓ $\hat{R}_1 = 30^\circ$<br><br>✓ S<br><br>(2)<br><b>[8]</b> |

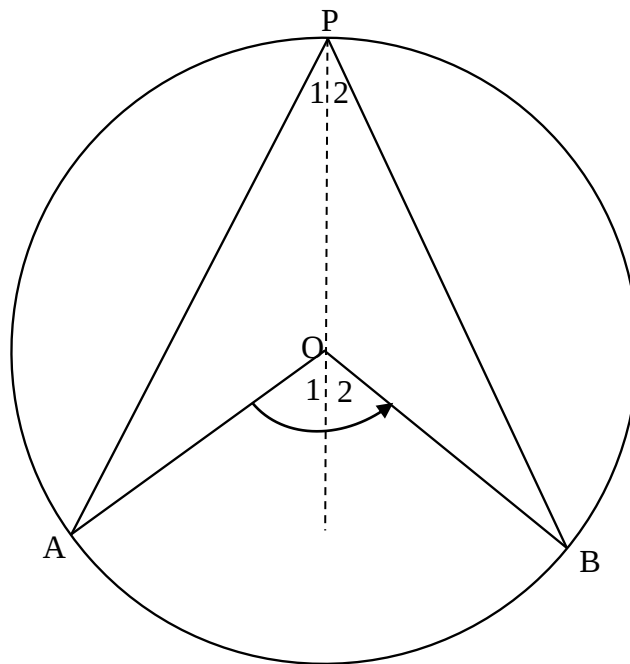
## QUESTION/VRAAG 9



|       |                                                                                                 |                                                                                                                                                                                               |                                           |
|-------|-------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| 9.1.1 | $\frac{ST}{TQ} = \frac{SW}{WP}$ $= \frac{2}{3}$                                                 | [prop theorem/eweredighst; $TW \parallel QP$ ]                                                                                                                                                | ✓ S<br>✓ S<br>(2)                         |
| 9.1.2 | $\frac{SV}{VR} = \frac{SW}{WP}$ $= \frac{2}{3}$                                                 | [prop theorem/eweredighst; $VW \parallel RP$ ]                                                                                                                                                | ✓ answer<br>(1)                           |
| 9.2   | $\frac{ST}{TQ} = \frac{SV}{VR}$ $\therefore TV \parallel QR$ $\therefore \hat{T}_1 = \hat{Q}_1$ | [both equal/beide gelyk $\frac{WS}{PW}$ ]<br>[line divides 2 sides of $\Delta$ in prop/lyn verdeel 2 sye van $\Delta$ in dies verh]<br>[corresp/ooreenkomst $\angle$ s/e; $TV \parallel QR$ ] | ✓ S<br>✓ S ✓ R<br>✓ R<br>(4)              |
| 9.3   | $\Delta VWS \parallel \Delta RPS$                                                               |                                                                                                                                                                                               | ✓ $\Delta RPS$ (any order)<br>(1)         |
| 9.4   | $\frac{WV}{PR} = \frac{SW}{SP}$ $= \frac{2}{5}$                                                 | $\frac{WV}{PR} = \frac{SV}{SR}$ $= \frac{2}{5}$                                                                                                                                               | ✓ ratio<br>✓ answer<br>(2)<br><b>[10]</b> |

**QUESTION/VRAAG 10**

10.1

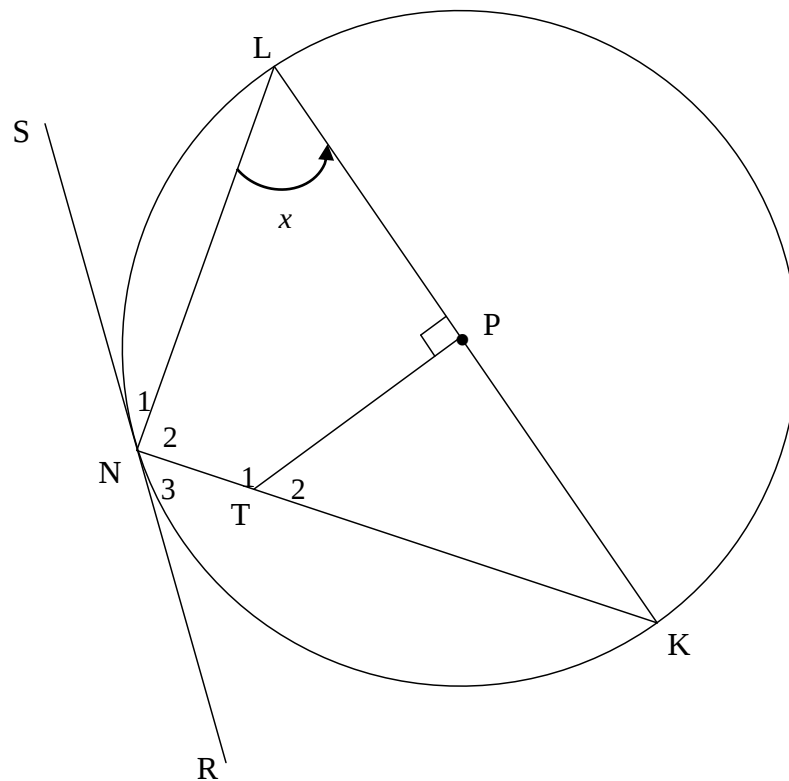


|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                  |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
|  | <p><b>Constr/Konst :</b><br/>         Draw line PO and extend /Trek lyn PO en verleng</p> <p><b>Proof/Bewys :</b><br/> <math>OP = OA</math> [radii]<br/> <math>\therefore \hat{P}_1 = \hat{A}</math> [<math>\angle</math>s opp/teenoor = sides/sye]<br/>         but <math>\hat{O}_1 = \hat{P}_1 + \hat{A}</math> [ext <math>\angle</math> of <math>\Delta</math>]<br/> <math>\therefore \hat{O}_1 = 2\hat{P}_1</math><br/>         Similarly/Netso, <math>\hat{O}_2 = 2\hat{P}_2</math><br/> <math>\therefore \hat{O}_1 + \hat{O}_2 = 2(\hat{P}_1 + \hat{P}_2)</math><br/>         i.e. <math>\hat{AOB} = 2\hat{APB}</math></p> | <p>✓ construction</p> <p>✓ S/R</p> <p>✓ S/R</p> <p>✓ S</p> <p>✓ S</p> <p>(5)</p> |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|



|        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                           |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| 10.2.5 | $\hat{O}PQ + \hat{O}QP = 180^\circ - 2y$ [sum of/sum v $\angle$ s/e in $\Delta$ ]<br>$\therefore \hat{O}QP = 90^\circ - y$ [ $\angle$ s opp equal sides/ $\angle$ e to = sye; $OP = OQ$ ]<br>In $\Delta PAQ$ :<br>$\hat{O}QP + \hat{P}_2 + \hat{QAP} = 180^\circ$<br>$90^\circ - y + y + \hat{QAP} = 180^\circ$ [sum of/sum v $\angle$ s/e in $\Delta$ ]<br>$\hat{QAP} = 90^\circ$<br>$\therefore \hat{OAP} = 90^\circ$ [ $\angle$ s/e on straight line/op reguitlyn] | $\checkmark$ S<br>$\checkmark$ S $\checkmark$ R<br><br>$\checkmark$ S<br>$\checkmark$ S<br><br>(5)        |
|        | <b>OR/OF</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                           |
|        | $\hat{O}PT = 90^\circ$ [radius $\perp$ tangent/raaklyn]<br>$\therefore \hat{P}_1 = 90^\circ - 2y$<br>$\hat{P}_1 + \hat{O} + \hat{OAP} = 180^\circ$ [sum of/sum v $\angle$ s/e in $\Delta$ ]<br>$(90^\circ - 2y) + 2y + \hat{OAP} = 180^\circ$<br>$\therefore \hat{OAP} = 90^\circ$                                                                                                                                                                                    | $\checkmark$ S $\checkmark$ R<br>$\checkmark$ S<br><br>$\checkmark$ S<br>$\checkmark$ S<br><br>(5)        |
|        | <b>OR/OF</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                           |
|        | POSQ is a kite/'n vlieër<br>$\therefore OQ \perp PS$ [diag of a kite/hoeklyne v vlieër]<br>$\therefore \hat{OAP} = 90^\circ$                                                                                                                                                                                                                                                                                                                                          | $\checkmark\checkmark\checkmark$ S<br>$\checkmark\checkmark$ R<br><br>(5)                                 |
|        | <b>OR/OF</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                           |
|        | In $\Delta OAP$ and $\Delta OAS$<br>$OP = OS$ (radii)<br>$OA$ is common<br>$\hat{POA} = 2y$<br>$= 2\hat{P}_2$<br>$= \hat{QOS}$<br>$\Delta OAP \equiv \Delta OAS$ (SAS)<br>$\hat{OAP} = \hat{OAS}$ ( $\equiv \Delta$ s)<br>$\hat{OAP} = \hat{OAS} = 90^\circ$ ( $\angle$ s on str line)                                                                                                                                                                                | $\checkmark$ S<br>$\checkmark$ S<br><br>$\checkmark$ S<br>$\checkmark$ R<br><br>$\checkmark$ S<br><br>(5) |
|        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | (5)<br>[19]                                                                                               |

**QUESTION/VRAAG 11**



|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                              |     |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 11.1 | $\hat{N}_2 = 90^\circ$ [ $\angle$ in semi-circle/ <i>halfsirkel</i> ]<br>$\therefore$ TPLN is a cyclic quad/ 'n <i>koordevh</i> [opp $\angle$ s of quad is suppl/<br><i>teenoorle v vh is suppl</i> ]<br><b>OR</b><br>$\hat{N}_2 = 90^\circ$ [ $\angle$ in semi-circle/ <i>halfsirkel</i> ]<br>$\therefore$ TPLN is a cyclic quad [ext $\angle$ = int opp $\angle$ / <i>buitele = to binne le</i> ]                                                                                                                                                                                                                                             | $\checkmark$ S $\checkmark$ R<br>$\checkmark$ R<br><br>$\checkmark$ S $\checkmark$ R<br>$\checkmark$ R                                                                       | (3) |
| 11.2 | $\hat{T}_2 = \hat{P}LN = x$ [ext $\angle$ of cyclic quad/ <i>buitele van koordevh</i> ]<br>$\hat{K} = 90^\circ - x$ [sum of/som v $\angle$ s/e in $\Delta$ ]<br>$\hat{N}_1 = \hat{K} = 90^\circ - x$ [tan chord theorem/ <i>raakl-koordst</i> ]<br><b>OR/OF</b><br>$\hat{K} = 90^\circ - x$ [sum of/som v $\angle$ s/e in $\Delta$ ]<br>$\hat{N}_1 = \hat{K} = 90^\circ - x$ [tan chord theorem/ <i>raakl-koordst</i> ]<br><b>OR/OF</b><br>$\hat{N}_3 = x$ [tan chord theorem/ <i>raakl-koordst</i> ]<br>$\hat{N}_2 = 90^\circ$ [ $\angle$ in semi circle/ <i>halfsirkel</i> ]<br>$\hat{N}_1 = 90^\circ - x$ [straight line/ <i>reguitlyn</i> ] | $\checkmark$ R<br><br>$\checkmark$ S $\checkmark$ R<br><br>$\checkmark$ R<br><br>$\checkmark$ S $\checkmark$ R<br><br>$\checkmark$ R<br><br>$\checkmark$ S<br>$\checkmark$ S | (3) |

|        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                         |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 11.3.1 | <p>In <math>\triangle KTP</math> and <math>\triangle KLN</math>:</p> <p><math>\hat{P}KT = \hat{L}KN</math> [common/<i>gemeen</i>]</p> <p><math>\hat{K}PT = \hat{K}NL = 90^\circ</math> [given/<i>gegee</i>]</p> <p><math>\therefore \triangle KTP \parallel \triangle KLN</math> [<math>\angle\angle\angle</math>]</p> <p><b>OR/OF</b></p> <p>In <math>\triangle KTP</math> and <math>\triangle KLN</math>:</p> <p><math>\hat{P}KT = \hat{L}KN</math> [common/<i>gemeen</i>]</p> <p><math>\hat{K}PT = \hat{K}NL = 90^\circ</math> [given/<i>gegee</i>]</p> <p><math>\hat{T}_2 = \hat{P}LN = x</math> [proved in 11.2 <b>OR</b> sum of <math>\angle</math>s in <math>\triangle</math>]</p> <p><math>\therefore \triangle KTP \parallel \triangle KLN</math></p> | <p>✓ S</p> <p>✓ S</p> <p>✓ R</p> <p>(3)</p> <p>✓ S</p> <p>✓ S</p> <p>✓ S</p> <p>(3)</p> |
| 11.3.2 | <p><math>\frac{KT}{KL} = \frac{KP}{KN}</math> [<math>\parallel \triangle</math>s]</p> <p><math>\therefore KT \cdot KN = KP \cdot KL</math></p> <p>But <math>KL = 2KP</math> [radii: <math>PK = LP</math>]</p> <p><math>\therefore KT \cdot KN = KP \cdot 2KP</math></p> <p><math>= 2KP^2</math></p> <p><math>= 2(KT^2 - TP^2)</math> [Theorem of Pythagoras]</p> <p><math>= 2KT^2 - 2TP^2</math></p>                                                                                                                                                                                                                                                                                                                                                           | <p>✓ S/R</p> <p>✓ S</p> <p>✓ S</p> <p>✓ S</p> <p>✓ S</p> <p>(5)</p> <p>[14]</p>         |

TOTAL/TOTAAL: 150