



**GAUTENG PROVINCE**  
EDUCATION  
REPUBLIC OF SOUTH AFRICA

# **PREPARATORY EXAMINATION/ VOORBEREIDENDE EKSAMEN**

**2022**

## **MARKING GUIDELINES/ NASIENRIGLYNE**

**(10612)**

**MATHEMATICS (PAPER 2)/WISKUNDE (VRAESTEL 2)**

**26 pages/bladsye**

## NOTE:

- If a candidate answers a question TWICE, mark only the FIRST attempt.
- If a candidate has crossed-out an attempt of a question and has not redone the question, mark the crossed-out version.
- Consistent accuracy applies in ALL aspects of the marking guidelines. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

## LET WEL:

- As 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.
- As 'n kandidaat 'n antwoord van 'n vraag doodtrek en nie oordoen nie, sien die doodgetrekte poging na.
- Volgehoue akkuraatheid word in ALLE aspekte van die nasienriglyne toegepas. Hou op nasien by die tweede berekeningsfout.
- Aannames van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat NIE.

| GEOMETRY/MEETKUNDE |                                                                                                                     |
|--------------------|---------------------------------------------------------------------------------------------------------------------|
| S                  | A mark for a correct statement<br>(A statement mark is independent of a reason.)                                    |
|                    | <i>'n Punt vir 'n korrekte bewering</i><br><i>('n Punt vir 'n bewering is onafhanklik van die rede.)</i>            |
| R                  | A mark for a correct reason<br>(A reason mark may only be awarded if the statement is correct.)                     |
|                    | <i>'n Punt vir 'n korrekte rede</i><br><i>('n Punt word slegs vir die rede toegeken as die bewering korrek is.)</i> |
| S/R                | Award a mark if the statement AND the reason are both correct.                                                      |
|                    | <i>(Ken 'n punt toe as beide die bewering EN die rede korrek is.)</i>                                               |

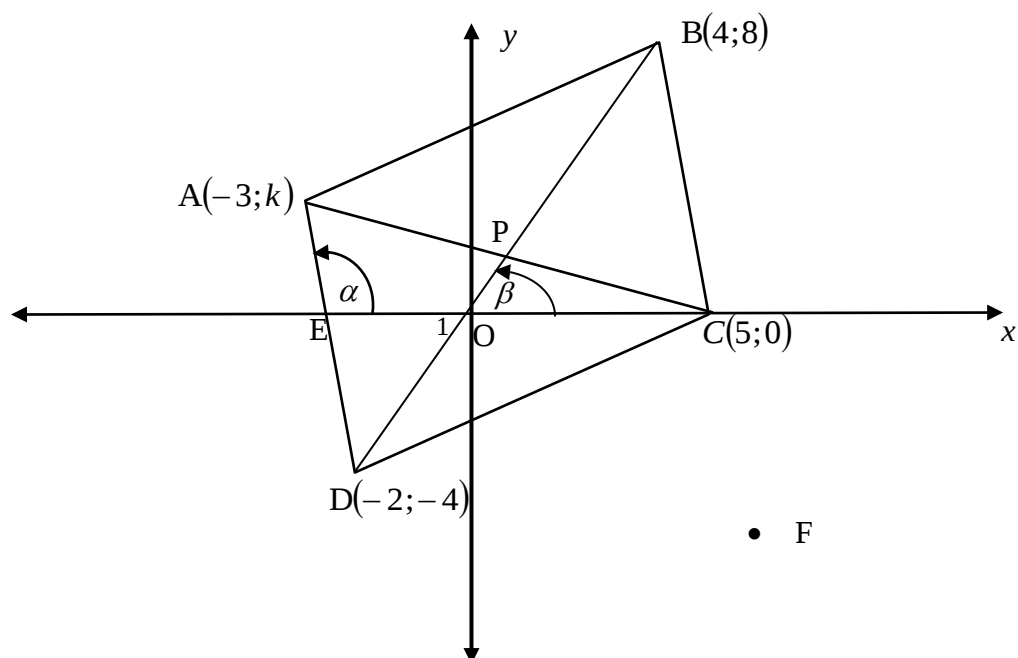
## QUESTION/VRAAG 1

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                       |             |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 1.1 | $a = 38,26$<br>$b = 2,46$<br>$\hat{y} = 38,26 + 2,46x$<br><br><b>NOT</b> allowed to round to <b>Units</b> , but may round off to 3 decimal or 1 decimal place<br>Mag <b>NIE</b> afrond tot <b>Ene</b> nie, maar mag afrond tot 3 desimale of 1 desimale plek                                                                                                                                                                                                     | ✓ $a = 38,26$<br>✓ $b = 2,46$<br>✓ $\hat{y} = 38,26 + 2,46x$<br><b>answer only full marks/</b><br><b>antwoord alleenlik volpunte</b>  | (3)         |
| 1.2 | $r = 0,97$                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ✓ answer/antwoord                                                                                                                     | (1)         |
| 1.3 | Very strong positive correlation/<br><i>Baie sterk positiewe korrelasie</i>                                                                                                                                                                                                                                                                                                                                                                                      | ✓ srong positive/<br><i>sterk positief</i>                                                                                            | (1)         |
| 1.4 | $\bar{x} = (2+8+4+6+12+10+11) \div 7 = 7,57$<br><br>$y = [38,26 + 2,46(7,57)] - [15,74 + 4,54 (7,57)]$<br>$y = 6,77$<br><br>The difference is/Die verskil is 6,77%                                                                                                                                                                                                                                                                                               | ✓ $\bar{x} = 7,57$<br><br>✓ substitute/vervang 7,57<br><br>✓ answer/antwoord (% not necessary to indicate/ % nie nodig om aan te dui) | (3)         |
| 1.5 | (2;9)<br><b>OR/OF</b><br>$x = 2; y = 9$                                                                                                                                                                                                                                                                                                                                                                                                                          | ✓ answer/antwoord<br><br>✓ answer/antwoord                                                                                            | (1)         |
| 1.6 | Lack of attendance by online learner/ <i>Gebrek aan bywoning van aanlyn leerling</i><br><b>OR/OF</b><br>Section taught may have been difficult to grasp online/ <i>Afdeling wat onderrig was, was moeilik om te verstaan met aanlynklas</i><br><b>OR/OF</b><br>Poor connectivity/ <i>Slegte verbinding</i><br><b>OR/OF</b><br>Lack of resources/ <i>Gebrek aan hulpbronne</i><br><b>OR/OF</b><br>Insufficient ICT skills/ <i>Onvoldoende Rekenaarvaardighede</i> | ✓ any valid answer/enige geldige antwoord                                                                                             | (1)         |
|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                       | <b>[10]</b> |

## QUESTION/VRAAG 2

|                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                 |             |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 2.1.1                                | $2500 \leq w < 3000$                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ✓ answer/antwoord                                                                                                                                                                                                                                                                                                                                                               | (1)         |
| 2.1.2                                | $\frac{250(1)+750(2)+1\,250(3)+1\,750(8)+2\,250(6)+2\,750(15)+3\,250(5)}{40}$ <p>estimated/geskatte <math>\bar{x} = \frac{90\,500}{40}</math><br/> <math>= 2\,262,5 \text{ grams/gram}</math></p> <p>If numerator is correct and denominator is incorrect 1/3<br/>         If numerator is incorrect and denominator is correct 2/3 (CA)<br/> <i>Indien teller korrek is en noemer is verkeerd 1/3</i><br/> <i>Indien teller verkeerd is en noemer is korrek 2/3 (CA)</i></p> | ✓ 90 500<br>✓ 40<br>✓ answer/antwoord                                                                                                                                                                                                                                                                                                                                           | (3)         |
| 2.2.1                                | <p><b>Cumulative Frequency Curve (Ogive)</b><br/> <b><i>Kumulatiewe Frekwensiekurwe (Ogief)</i></b></p>                                                                                                                                                                                                                                                                                                                                                                       | ✓ grounding point/<br><i>gegronde punt</i> (4 ; 0)<br>and/en (3 504 ; 40)<br>✓ shape/vorm (if ruler<br>is used to connect<br>points, NO mark for<br>shape/ <i>indien liniaal</i><br><i>gebruik word om</i><br><i>punte te verbind</i><br><i>GEEN punt vir</i><br><i>vorm</i><br>✓✓ (1 mistake - 1<br>mark; 2 mistakes -<br>no mark/1 fout – 1<br>punt; 2 foute – geen<br>punte) | (4)         |
| 2.2.2                                | It will not deviate./it will remain the same.<br><i>Dit sal nie afwyk nie./dit sal dieselfde bly.</i>                                                                                                                                                                                                                                                                                                                                                                         | ✓ answer/antwoord                                                                                                                                                                                                                                                                                                                                                               | (1)         |
| 2.2.3<br>CA<br>from<br>/van<br>2.1.2 | $2\,262,5 + 4$<br>$= 2\,266,5 \text{ grams/gram}$                                                                                                                                                                                                                                                                                                                                                                                                                             | ✓ addition of 4/4<br><i>bygetel</i><br>✓ answer/antwoord                                                                                                                                                                                                                                                                                                                        | (2)         |
|                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                 | <b>[11]</b> |

## QUESTION/VRAAG 3



|     |                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                               |     |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 3.1 | $m_{BC} = \frac{8-0}{4-5}$<br>$m_{BC} = -8$                                                                                                                                                                                                                                                                                    | ✓ correct substitution into gradient formula (swop x and y around 0/2)/korrekte vervanging in gradiënt formule (ruil x en y om 0/2/<br>✓ answer/antwoord                                                                                                                                                                                      | (2) |
| 3.2 | $AB = \sqrt{65} = \sqrt{(-3-4)^2 + (k-8)^2}$ $65 = 49 + k^2 - 16k + 64$ $k^2 - 16k + 48 = 0$ $(k-4)(k-12) = 0$ $k = 4 \text{ or/of } k = 12$ $\therefore k = 4$<br><b>OR/OF</b> $AB = \sqrt{65} = \sqrt{(-3-4)^2 + (k-8)^2}$ $65 = 49 + (k-8)^2$ $(k-8)^2 = 16$ $k-8 = \pm 4$ $k = 4 \text{ or/of } k = 12$ $\therefore k = 4$ | ✓ substitute A and B into distance formula/vervang A en B in die afstandformule<br>✓ standard form/standaardvorm<br>✓ factors/faktore<br>✓ $k = 4$<br>✓ substitute A and B into distance formula/vervang A en B in die afstandformule<br>✓ isolate square/soleer kwadraat<br>✓ square root both sides/vierkantswortel weerskante<br>✓ $k = 4$ | (4) |

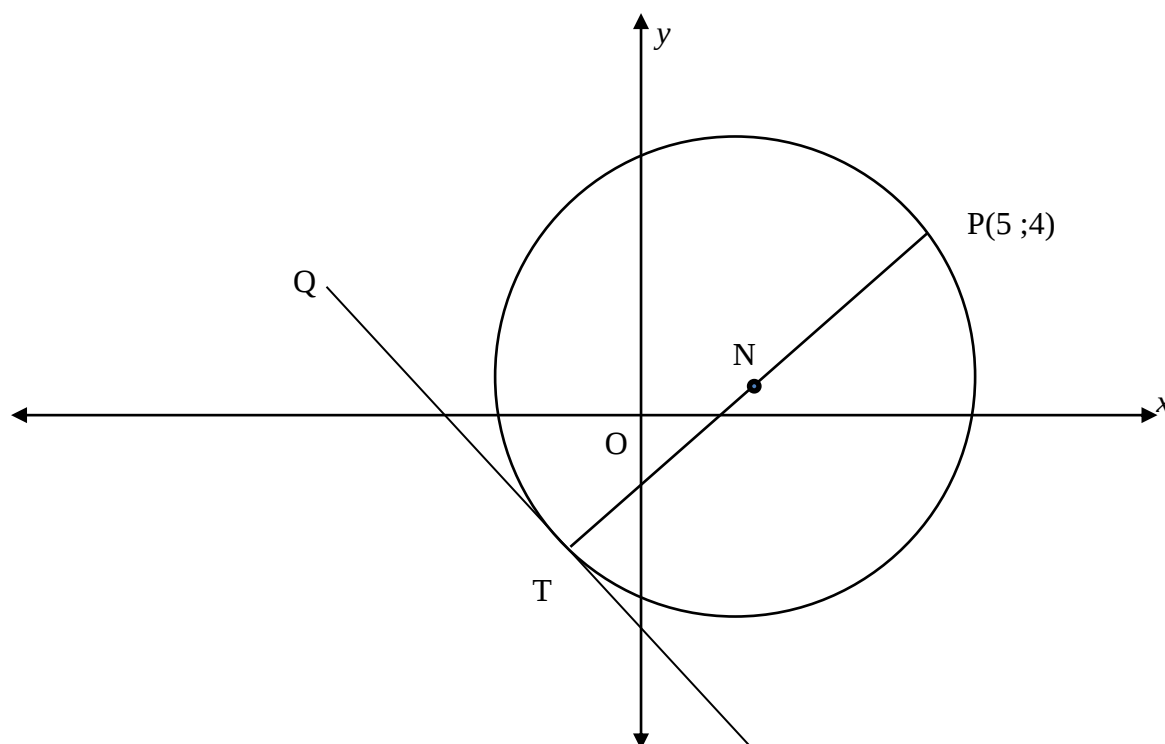
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|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 3.3 | $m_{BD} = \frac{8 - (-4)}{4 - (-2)} = 2$ $m_{AC} = \frac{4 - 0}{-3 - 5} = -\frac{1}{2}$ $\therefore m_{BD} \times m_{AC} = 2 \times -\frac{1}{2} = -1$ $\therefore BP \perp AC$ <p><b>OR/OF</b></p> <p>Coordinates of P = Midpoint of AC = Midpoint of BD/<br/> <i>Koördinate van P = Middelpunt van AC = Middelpunt van BD</i></p> $= \left( \frac{-3+5}{2}; \frac{4+0}{2} \right) = \left( \frac{-2+4}{2}; \frac{-4+8}{2} \right)$ $= (1; 2)$ $m_{BP} = \frac{8-2}{4-1} = 2$ $m_{AC} = \frac{4-0}{-3-5} = -\frac{1}{2}$ $\therefore m_{BP} \times m_{AC} = 2 \times -\frac{1}{2} = -1$ $\therefore BP \perp AC$                                                                         | $\checkmark m_{BD} = 2$<br>$\checkmark m_{AC} = -\frac{1}{2}$<br>$\checkmark m_{BD} \times m_{AC} = -1$<br>(must show the multiplication/<br><i>moet die vermenigvuldiging aandui</i> ) | (3) |
| 3.4 | <p>Midpoint of AF = Midpoint of DC/<br/> <i>Middelpunt van AF = Middelpunt van DC</i></p> $\frac{x+(-3)}{2} = \frac{-2+5}{2} \text{ and/en } \frac{y+4}{2} = \frac{-4+0}{2}$ $x = 6 \text{ and/en } y = -8$ $\therefore F(6; -8)$ <p><b>Answer Only: Full Marks/Antwoord alleenlik: Volpunte</b></p> <p><b>OR/OF</b></p> <p>Method: Translation/Metode: Translasie<br/> <i>A → D:</i><br/> <math>(x; y) \rightarrow (x+1; y-8)</math><br/> <math>\therefore</math> by symmetry/as simmetrie: <math>C \rightarrow F</math>:<br/> <math>C(5; 0) \rightarrow F(5+1; 0-8)</math><br/> <math>\therefore F(6; -8)</math></p> <p><b>Answer Only: Full Marks/Antwoord alleenlik: Volpunte</b></p> | $\checkmark x - \text{coordinate/}$<br>$x - \text{koördinaat}$<br>$\checkmark y - \text{coordinate/}$<br>$y - \text{koördinaat}$                                                        | (2) |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |  |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 3.5 | <p><b>ONLY QUESTION (3.5) IN PAPER WHERE LEARNER WILL BE PENALISED FOR INCORRECT ROUNDING</b><br/> <b>ENIGSTE VRAAG (3.5) IN VRAESTEL WAAR LEERLING GEPENALISEER WORD VIR VERKEERDE AFRONDING</b></p> <p> <math>m_{AD} = m_{BC} = -8</math><br/> <math>\tan \alpha = m_{AD}</math><br/> <math>\tan \alpha = -8</math><br/> <math>\alpha = 180^\circ - \tan^{-1}(8)</math><br/> <math>= 180^\circ - 82,87^\circ</math><br/> <math>= 97,13^\circ</math><br/> <math>\tan \beta = m_{BD} = 2</math><br/> <math>\beta = 63,43^\circ</math><br/> <math>\hat{O}_1 = 63,43^\circ</math> (vert.opp. <math>\angle</math>s/regoorst.<math>\angle</math>e)<br/> <math>\hat{E}\hat{D}\hat{O} = \alpha - \beta</math> (ext. <math>\angle</math> of <math>\Delta</math>/buite <math>\angle</math> van <math>\Delta</math>)<br/> <math>= 97,13^\circ - 63,43^\circ</math><br/> <math>= 33,7^\circ</math> </p> <p><b>OR/OF</b></p> <p>       In <math>\triangle APD</math>, <math>\hat{A}\hat{P}\hat{D} = 90^\circ</math><br/> <math>AP = 2\sqrt{5}</math><br/> <math>PD = 3\sqrt{5}</math><br/> <math>\tan \hat{E}\hat{D}\hat{O} = \frac{AP}{PD}</math><br/> <math>\tan \hat{E}\hat{D}\hat{O} = \frac{2\sqrt{5}}{3\sqrt{5}}</math><br/> <math>\hat{E}\hat{D}\hat{O} = 33,69 \approx 33,7^\circ</math><br/>       (rounded off to ONE decimal place/rond af tot EEN desimale plek)     </p> <p><b>OR/OF</b></p> <p>       In <math>\triangle APD</math>, <math>\hat{A}\hat{P}\hat{D} = 90^\circ</math><br/> <math>AP = 2\sqrt{5}</math> &amp; <math>AD = \sqrt{65}</math><br/> <math>\sin \hat{E}\hat{D}\hat{O} = \frac{AP}{AD}</math><br/> <math>\sin \hat{E}\hat{D}\hat{O} = \frac{2\sqrt{5}}{\sqrt{65}}</math><br/> <math>\hat{E}\hat{D}\hat{O} = 33,69 \approx 33,7^\circ</math><br/>       (rounded off to ONE decimal place/rond af tot EEN desimale plek)     </p> <p><b>OR/OF</b></p> | <p>✓ <math>m_{AD} = -8</math></p> <p>✓ <math>\tan \alpha = -8</math></p> <p>✓ <math>\alpha = 97,13^\circ</math></p> <p>✓ <math>\beta = 63,43^\circ</math></p> <p>✓ <math>\alpha - \beta</math></p> <p>✓ answer/antwoord</p> <p>✓ <math>\hat{A}\hat{P}\hat{D} = 90^\circ</math></p> <p>✓ <math>AP = 2\sqrt{5}</math></p> <p>✓ <math>PD = 3\sqrt{5}</math></p> <p>✓ trig ratio/<br/>trig verhouding</p> <p>✓ substitution/<br/>vervang</p> <p>✓ answer/antwoord</p> <p>✓ <math>\hat{A}\hat{P}\hat{D} = 90^\circ</math></p> <p>✓ <math>AP = 2\sqrt{5}</math></p> <p>✓ <math>AD = \sqrt{65}</math></p> <p>✓ trig ratio/<br/>trig verhouding</p> <p>✓ substitution/<br/>vervang</p> <p>✓ answer/antwoord</p> |  |
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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <p>In <math>\triangle APD</math><br/> <math>\hat{A}PD = 90^\circ</math><br/> <math>PD = 3\sqrt{5}</math><br/> <math>AD = \sqrt{65}</math><br/> <math>\cos \hat{E}DO = \frac{PD}{AD}</math><br/> <math>\cos \hat{E}DO = \frac{3\sqrt{5}}{\sqrt{65}}</math><br/> <math>\hat{E}DO = 33,69 \approx 33,7^\circ</math><br/> (rounded off to ONE decimal place/<i>rond af tot EEN desimale plek</i>)</p> <p><b>OR/OF</b></p> <p>In <math>\triangle ABD</math><br/> <math>BD = 6\sqrt{5}</math><br/> <math>AD = \sqrt{65}</math><br/> <math>\cos \hat{E}DO = \frac{AD^2 + BD^2 - AB^2}{2(AD)(BD)}</math><br/> <math>\cos \hat{E}DO = \frac{(\sqrt{65})^2 + (6\sqrt{5})^2 - (\sqrt{65})^2}{2(\sqrt{65})(6\sqrt{5})} = \frac{3}{\sqrt{13}}</math><br/> <math>\hat{E}DO = 33,69 \approx 33,7^\circ</math><br/> (rounded off to ONE decimal place/<i>rond af tot EEN desimale plek</i>)</p> | <p>✓ <math>\hat{A}PD = 90^\circ</math><br/> ✓ <math>PD = 3\sqrt{5}</math><br/> ✓ <math>AD = \sqrt{65}</math><br/> <br/> ✓ trig ratio/trig<br/>verhouding<br/> ✓ substitution/<br/>vervangings<br/> ✓ answer/antwoord</p> <p>✓ <math>BD = 6\sqrt{5}</math><br/> ✓ <math>AD = \sqrt{65}</math><br/> <br/> ✓ cosine rule/<br/>kosinusreël<br/> <br/> ✓ substitution/<br/>vervangings<br/> ✓ <math>\frac{3}{\sqrt{13}}</math><br/> ✓ answer/antwoord</p> | (6) |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                   |      |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 3.6 | $AC = \sqrt{(5 - (-3))^2 + (0 - 4)^2} = \sqrt{80} = 4\sqrt{5}$ $DP = \sqrt{(-2 - 1)^2 + (-4 - 2)^2} = \sqrt{45} = 3\sqrt{5}$ $\text{Area of/van } \triangle ADC = \frac{1}{2} AC \times DP$ $\therefore \text{Area of/van } \triangle ADC = \frac{1}{2} (4\sqrt{5}) \times (3\sqrt{5})$ $= 30 \text{ square units/vierkante eehede}$ <p><b>OR/OF</b></p> <p>ABCD is a rhombus, because the diagonals bisect perpendicularly and all sides are equal.<br/> <i>ABCD is 'n ruit, want die hoeklyne halveer mekaar reghoekig en al die sye is ewe lank.</i></p> $\therefore \hat{CDO} = \hat{EDO} \quad (\text{diags of rhombus bisect } \angle\text{s of rhombus/diag van ruit halveer die } \angle\text{e van die ruit})$ $\therefore \hat{ADC} = 2 \times 33,7^\circ = 67,4^\circ$ $\text{Area of/van } \triangle ADC = \frac{1}{2} \times AD \times DC \times \sin \hat{ADC}$ $\therefore \text{Area of/van } \triangle ADC = \frac{1}{2} \times (\sqrt{65}) \times (\sqrt{65}) \times \sin(67,4^\circ)$ $= 30 \text{ square units/vierkante eenhede}$ | ✓ length of AC/<br><i>lengte van AC</i><br>✓ length of DP/<br><i>lengte van DP</i><br>✓ correct<br>substitution into<br>formula/ <i>korrekte</i><br>vervanging in<br>formule<br>✓ answer/antwoord |      |
|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ✓ $\hat{CDO} = \hat{EDO}$<br>✓ $\hat{ADC} = 67,4^\circ$<br>✓ substitution into<br>formula/<br>vervanging in<br>formule<br>✓ answer/antwoord                                                       | (4)  |
|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                   | [21] |

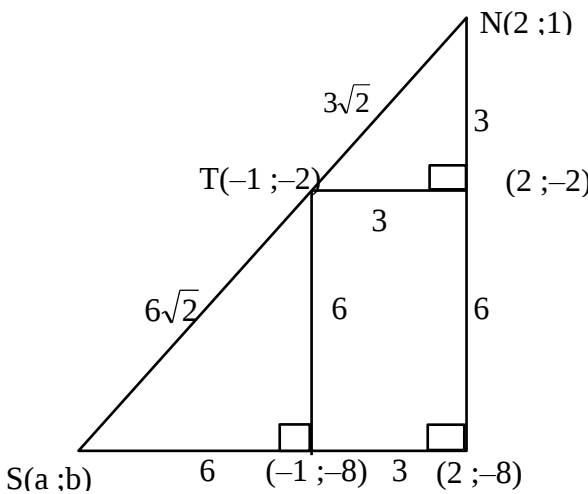
## QUESTION/VRAAG 4



|     |                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                     |                                                                                                                      |     |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-----|
| 4.1 | $x^2 + y^2 - 4x - 2y - 13 = 0$<br>$x^2 - 4x + 4 + y^2 - 2y + 1 = 13 + 4 + 1$<br>$(x-2)^2 + (y-1)^2 = 18$                                                                                                                                                                                                                       | <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <b>Answer only: Full marks/<br/>Antwoord alleenlik: Volpunte</b> </div> | ✓ completing the square/vierkants-voltooiing<br>✓ $(x-2)^2 + (y-1)^2$<br>✓ RHS/RK                                    | (3) |
| 4.2 | N(2;1)<br><br>$NT = \sqrt{18} = 3\sqrt{2}$ <b>OR/OF</b> 2,24                                                                                                                                                                                                                                                                   |                                                                                                                                                     | ✓ both x and y correct/<br>albei x en y korrek<br>CA from/van 4.1<br>✓ length of NT/lengte van NT                    | (2) |
| 4.3 | Midpoint of TNP/Middelpunt van TNP, N(2;1)<br>$\frac{x_T + 5}{2} = 2$ and/en $\frac{y_T + 4}{2} = 1$<br>T(-1;-2)<br><br><b>OR/OF</b><br><br>Method: Translation/Metode: Translasie<br>P → N:<br>$(x; y) \rightarrow (x-3; y-3)$<br>$\therefore N \rightarrow T$ :<br>$N(2;1) \rightarrow T(2-3; 1-3)$<br>$\therefore T(-1;-2)$ |                                                                                                                                                     | ✓ x – value/waarde<br>✓ y – value/waarde<br><br><br><br><br><br><br><br><br>✓ x – value/waarde<br>✓ y – value/waarde |     |

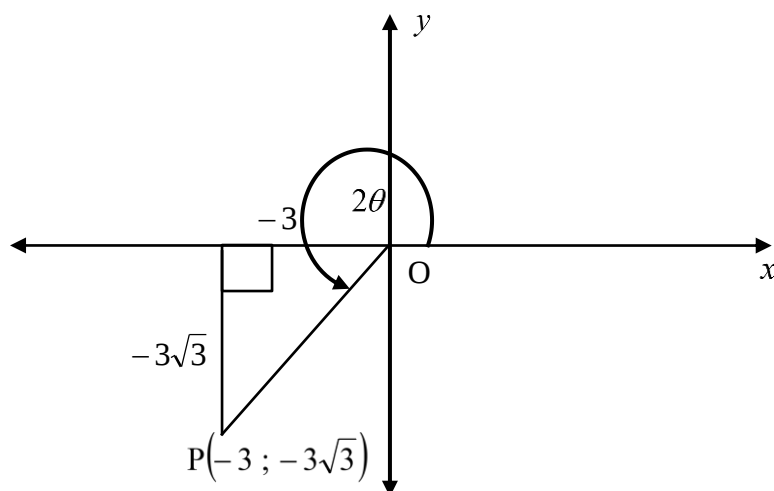
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|     | $m_{NT} = \frac{1 - (-2)}{2 - (-1)} = \frac{3}{3} = 1$ $m_{NT} \times m_{QT} = -1$ $\therefore m_{QT} = -1$ $y - (-2) = -1[x - (-1)]$ $y + 2 = -1(x + 1)$ $y = -x - 3$ <p style="text-align: center;"><b>OR/OF</b></p> $y = -x + c$ $-2 = -1(-1) + c$ $c = -3$ $y = -x - 3$ <p style="text-align: center;"><i>radius <math>\perp</math> tangent</i><br/><i>radius <math>\perp</math> raaklyn</i></p>                                                                                                                                                                                                                                                                                              | $\checkmark m_{NT} = 1$<br>$\checkmark m_{QT} = -1$<br>$\checkmark$ substitute/vervang $m$ and/en $T(-1; -2)$<br>CA from/van 4.3<br>$\checkmark y = -x - 3$                                                                            | (6) |
| 4.4 | $NS = 3NT$<br>$NS^2 = 9NT^2$<br>$(a - 2)^2 + (b - 1)^2 = 9(\sqrt{18})^2 = 162 \dots\dots\dots (1)$<br>$NT \perp QT$ and/en $ST \perp QT \quad \therefore m_{ST} = m_{NT} = 1$<br>$\frac{b + 2}{a + 1} = 1$ $b + 2 = a + 1$ $b = a - 1 \dots\dots\dots (2)$ <p style="text-align: center;"><i>Substitute (2) into (1)/vervang (2) in (1)</i></p> $(a - 2)^2 + (a - 1 - 1)^2 = 162$ $(a - 2)^2 + (a - 2)^2 = 162$ $2(a - 2)^2 = 162$ $(a - 2)^2 = 81$ $\therefore a - 2 = 9 \quad \text{or/of} \quad a - 2 = -9$ $a = 11 \quad \text{or/of} \quad a = -7$ <p>But/maar <math>a &lt; 0</math></p> $\therefore a = -7$ $b = (-7) - 1 = -8$ $S(-7; -8)$ <p style="text-align: center;"><b>OR/OF</b></p> | $\checkmark$ equation/vergelyking<br>$\checkmark m_{ST} = m_{NT} = 1$<br>$\checkmark \frac{b + 2}{a + 1} = 1$<br>$\checkmark b = a - 1$<br><br>$\checkmark$ substitution/<br>vervang<br><br>$\checkmark a = -7$<br>$\checkmark b = -8$ |     |



|                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                              |             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| $(a+1)^2 + (b+2)^2 = 72 \dots\dots (2)$<br>Substitute (1) into (2) /<br><i>vervang (1) in (2)</i><br>$(a+1)^2 + (a-1+2)^2 = 72$<br>$2a^2 + 4a - 70 = 0$<br>$a^2 + 2a - 35 = 0$<br>$(a+7)(a-5) = 0$<br>$a = -7$ or/of $a = 5$<br>$a = -7$ and/en $b = (-7) - 1 = -8$<br>$S(-7; -8)$                       | $2(a+1)^2 = 72$<br>$(a+1)^2 = 36$<br>$a+1 = -6$ or/of $a+1 = 6$<br>$a = -7$ or/of $a = 5$<br>$a = -7$<br>$b = -7 - 1 = -8$<br>$S(-7; -8)$<br><div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <b>Answer only: 2/7/<br/>Antwoord alleenlik: 2/7</b> </div> | ✓ equation/ (2)<br><i>vergelyking (2)</i><br><br>✓ substitution/<br><i>vervang</i><br><br>✓ ✓ coordinates/<br><i>koördinate</i>                                                                                                                                                                                              |             |
| <p><b>OR/OF</b></p>  <p><b>OR/OF</b></p> $\frac{x_T - x_N}{x_S - x_N} = \frac{y_T - y_N}{y_S - y_N} = \frac{1}{3}$ $\frac{-3}{a-2} = \frac{-3}{b-1} = \frac{1}{3}$ $a-2 = -9$ $a = -7$ $b-1 = -9$ $b = -8$ $S(-7; -8)$ |                                                                                                                                                                                                                                                                                                      | ✓ diagram<br>✓ ✓ $(2; -2)$<br>✓ ✓ $(2; -8)$<br>✓ ✓ $S(-7; -8)$<br>✓ dividing of a line<br>segment into a<br>given ratio/ <i>verdeel<br/>lynsegment in<br/>gegewe verhouding</i><br>✓ ✓ substitution/<br><i>vervang</i><br>✓ equation/<br><i>vergelyking</i><br>✓ $a = -7$<br>✓ equation/<br><i>vergelyking</i><br>✓ $b = -8$ | (7)         |
|                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                              | <b>[18]</b> |

## QUESTION/VRAAG 5

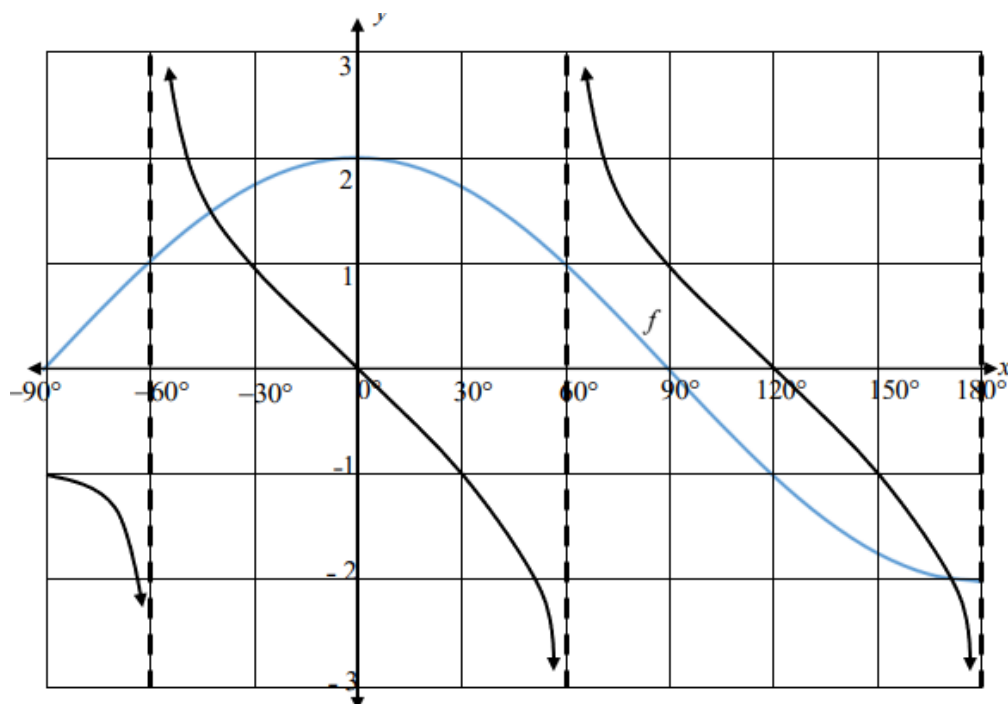
5.1



|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                            |     |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 5.1.1 | $OP^2 = (-3)^2 + (-3\sqrt{3})^2$ $OP = 6$ $\cos 2\theta = \frac{-3}{6} = -\frac{1}{2}$                                                                                                                                                                                                                                                                                                                                                          | ✓ Pythagoras<br>✓ $OP = 6$<br>✓ $\cos 2\theta = -\frac{1}{2}$                                                                                                                                                                                                              | (3) |
| 5.1.2 | $\cos 2\theta = 1 - 2\sin^2 \theta$ $\therefore 2\sin^2 \theta = 1 - \cos 2\theta$ $\therefore \sin^2 \theta = \frac{1 - \cos 2\theta}{2}$ $= \frac{1 - \left(-\frac{1}{2}\right)}{2}$ $= \frac{3}{4}$ $\therefore \sin \theta = \frac{\sqrt{3}}{2}$ <p><b>OR/OF</b></p> $-\frac{1}{2} = 1 - 2\sin^2 \theta$ $\therefore -\frac{3}{2} = -2\sin^2 \theta$ $\therefore \sin^2 \theta = \frac{3}{4}$ $\therefore \sin \theta = \frac{\sqrt{3}}{2}$ | ✓ double angle identity/<br><i>dubbelhoekidentiteit</i><br><br>✓ correct substitution/<br><i>korrekte vervanging</i><br><br>✓ answer/antwoord<br><br><br>✓ $-\frac{1}{2} = 1 - 2\sin^2 \theta$<br><br>✓ simplification/<br><i>vereenvoudiging</i><br><br>✓ answer/antwoord | (3) |

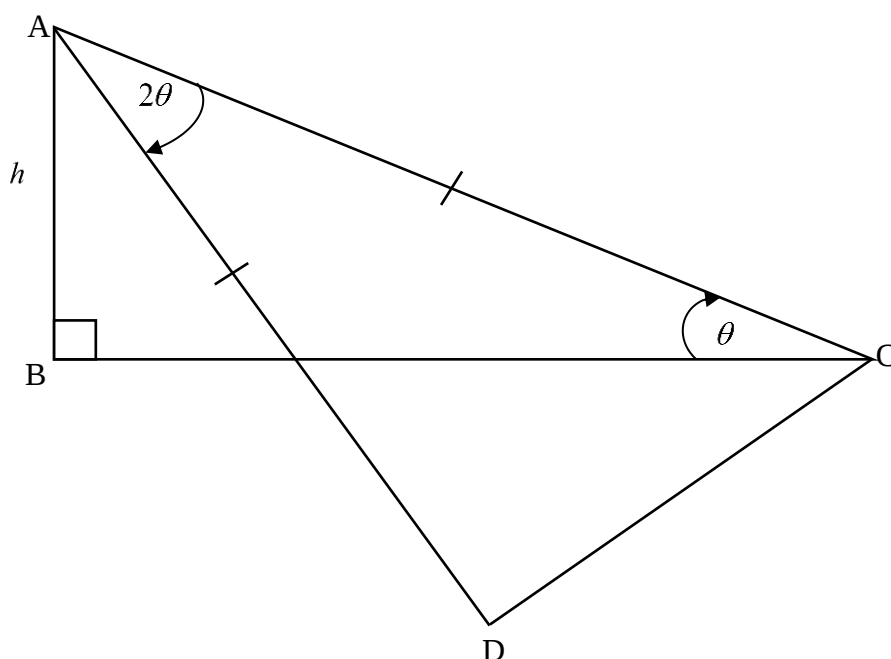
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                             |      |     |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----|
| 5.2   | $\cos^2(180^\circ + x) + \cos(-x) \cdot \tan x \cdot \cos(90^\circ + x)$<br>$= \cos^2 x + \cos x \cdot \tan x \cdot (-\sin x)$<br>$= \cos^2 x + \cos x \cdot \frac{\sin x}{\cos x} \cdot (-\sin x)$<br>$= \cos^2 x - \sin^2 x$<br>$= \cos 2x$                                                                                                                                                                                            | $\checkmark \cos^2 x$<br>$\checkmark \cos x$<br>$\checkmark -\sin x$<br>$\checkmark \frac{\sin x}{\cos x}$<br>$\checkmark \cos^2 x - \sin^2 x$<br>$\checkmark \cos 2x$                                                                                                                                      | (6)  |     |
| 5.3.1 | $5 \tan \theta - 6 \cos \theta = 0$<br>$5 \left( \frac{\sin \theta}{\cos \theta} \right) - 6 \cos \theta = 0$<br>$5 \sin \theta - 6 \cos^2 \theta = 0$<br>$5 \sin \theta - 6(1 - \sin^2 \theta) = 0$<br>$5 \sin \theta - 6 + 6 \sin^2 \theta = 0$<br>$6 \sin^2 \theta + 5 \sin \theta - 6 = 0$                                                                                                                                           | $\checkmark \tan \theta = \frac{\sin \theta}{\cos \theta}$<br><br>$\checkmark$ multiplying by $\cos \theta$ /<br>vermenigvuldiging met $\cos \theta$<br>$\checkmark \cos^2 \theta = 1 - \sin^2 \theta$                                                                                                      | (3)  |     |
| 5.3.2 | $6 \sin^2 \theta + 5 \sin \theta - 6 = 0$<br>$(3 \sin \theta - 2)(2 \sin \theta + 3) = 0$<br>$\sin \theta = \frac{2}{3}$ or/of $\sin \theta = -\frac{3}{2}$<br>no solution/ geen oplossing<br><br>$\theta = 41,81^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$ or/of $\theta = 138,19^\circ + k \cdot 360^\circ; k \in \mathbb{Z}$                                                                                                       | $\checkmark$ factors (must indicate)/faktore (moet aandui)<br>$\checkmark$ both values of $\sin \theta$ /<br>albei waardes van $\sin \theta$<br>$\checkmark$ no solution/geen oplossing<br><br>$\checkmark \theta = 41,81^\circ$ or/of $138,19^\circ$<br>$\checkmark + k \cdot 360^\circ; k \in \mathbb{Z}$ | (5)  |     |
| 5.4   | <b>This question has been removed from the question paper. Do not mark this question.</b><br><b><i>Hierdie vraag is uit die vraestel verwyder. Moenie hierdie vraag merk nie.</i></b>                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                             |      | (0) |
| 5.5   | $\sin(3\alpha - \beta) = \frac{1}{\sqrt{2}}$ ref/verwys $\angle = 45^\circ$<br>$3\alpha - \beta = 180^\circ - 45^\circ$<br>$3\alpha - \beta = 135^\circ \dots\dots\dots(1)$<br>$\tan(2\alpha + \beta) = \frac{1}{\sqrt{3}}$ ref/verwys $\angle = 30^\circ$<br>$2\alpha + \beta = 180^\circ + 30^\circ$<br>$2\alpha + \beta = 210^\circ \dots\dots\dots(2)$<br>$5\alpha = 345^\circ$ (1)+(2)<br>$\alpha = 69^\circ$<br>$\beta = 72^\circ$ | $\checkmark 3\alpha - \beta = 135^\circ$<br><br><br>$\checkmark 2\alpha + \beta = 210^\circ$<br><br>$\checkmark \alpha = 69^\circ$<br>$\checkmark \beta = 72^\circ$                                                                                                                                         | (4)  |     |
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                             | [24] |     |

## QUESTION/VRAAG 6



|                                                 |                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                          |             |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 6.1                                             | See the graph above/<br><i>Sien bostaande grafiek</i>                                                                                                                                                                                                                                                                    | ✓ asymptotes/asimptote<br>✓ $x=0^\circ$ ; $x=120^\circ$<br>✓ shape/vorm<br>✓ $(-90^\circ; -1)$ or/of $(90^\circ; 1)$                                     | (4)         |
| 6.2                                             | Period of/Periode van $g = \frac{180^\circ}{1,5} = 120^\circ$<br><div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <b>Answer only: Full marks/<br/>Antwoord alleenlik: Volpunte</b> </div>                                                                                     | ✓ method/metode<br>✓ answer/antwoord                                                                                                                     | (2)         |
| 6.3                                             | $x \in (0^\circ; 180^\circ)$ OR/OF $0^\circ < x < 180^\circ$<br><div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <b>If values are incorrect 0/2<br/>Indien waardes verkeerd is 0/2</b> </div>                                                                                 | ✓ values/waardes<br>✓ notation/notasie                                                                                                                   | (2)         |
| 6.4<br>CA<br>from<br>graph/<br>vanaf<br>grafiek | $x \in (-60^\circ; -30^\circ]$ OR/OF $-60^\circ < x \leq -30^\circ$<br>or<br>$x \in (60^\circ; 90^\circ]$ OR/OF $60^\circ < x \leq 90^\circ$<br><div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <b>If values are incorrect 0/4<br/>Indien waardes verkeerd is 0/4</b> </div> | ✓ both values/albei waardes<br>$-60^\circ; -30^\circ$<br>✓ notation/notasie<br>✓ both values/albei waardes<br>$60^\circ; 90^\circ$<br>✓ notation/notasie | (4)         |
| 6.5                                             | $h(x) = g(x - 30^\circ)$<br>$= -\tan\left[\frac{3}{2}(x - 30^\circ)\right]$<br>$= -\tan\left(\frac{3}{2}x - 45^\circ\right)$                                                                                                                                                                                             | ✓ $\frac{3}{2}(x - 30^\circ)$                                                                                                                            | (2)         |
|                                                 |                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                          | <b>[14]</b> |

## QUESTION/VRAAG 7



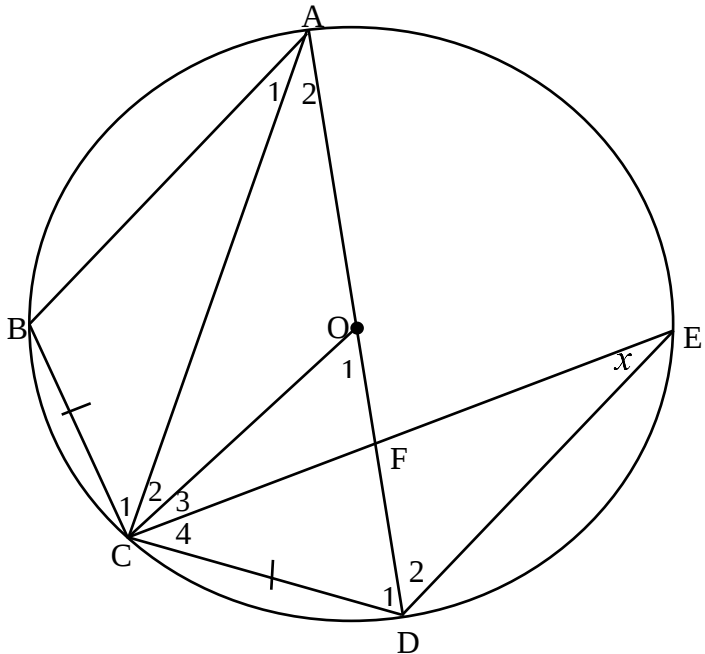
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p>In <math>\triangle ABC</math>: <math>\sin \theta = \frac{h}{AC}</math><br/> <math>\therefore AC = \frac{h}{\sin \theta}</math></p> <p>In <math>\triangle ACD</math>: <math>AC = AD</math><br/> <math>\hat{A}DC = \hat{A}CD = \frac{180^\circ - 2\theta}{2}</math> [<math>\angle</math>s opp.=sides; <math>\angle</math>s of <math>\triangle = 180^\circ</math>]<br/> <math>[\angle</math>e teenoor = sye; som vd <math>\angle</math> van <math>\triangle = 180^\circ</math>]</p> <p><math>\therefore \hat{A}DC = 90^\circ - \theta</math></p> $\frac{CD}{\sin 2\theta} = \frac{AC}{\sin(90^\circ - \theta)}$ $CD = \frac{AC \cdot \sin 2\theta}{\sin(90^\circ - \theta)}$ $= \frac{h}{\sin \theta} \times \frac{2 \sin \theta \cdot \cos \theta}{\cos \theta}$ $= 2h$ <p><b>OR/OF</b></p> | <p>✓ AC in terms of <math>h</math> and <math>\theta</math> /<br/> AC in terme van <math>h</math> en <math>\theta</math></p> <p>✓ <math>\hat{A}DC = 90^\circ - \theta</math></p> <p>✓ correct subst. into sine rule/<br/> korrekte vervanging in sinusreël</p> <p>✓ CD as subject/CD as onderwerp</p> <p>✓ <math>\sin 2\theta = 2 \sin \theta \cos \theta</math></p> <p>✓ <math>\sin(90^\circ - \theta) = \cos \theta</math></p> <p>✓ answer/antwoord</p> |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                        |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <p>In <math>\triangle ABC</math>: <math>\sin \theta = \frac{h}{AC}</math></p> <p><math>\therefore AC = \frac{h}{\sin \theta}</math></p> <p>In <math>\triangle ACD</math>: <math>AC = AD</math></p> <p><math>CD^2 = AC^2 + AD^2 - 2AC \cdot AD \cos 2\theta</math></p> <p><math>CD^2 = \left(\frac{h}{\sin \theta}\right)^2 + \left(\frac{h}{\sin \theta}\right)^2 - 2\left(\frac{h}{\sin \theta}\right)^2 \cos 2\theta</math></p> <p><math>CD^2 = \frac{h^2}{\sin^2 \theta} + \frac{h^2}{\sin^2 \theta} - 2\frac{h^2}{\sin^2 \theta} (1 - 2\sin^2 \theta)</math></p> <p><math>CD^2 = 2\frac{h^2}{\sin^2 \theta} - 2\frac{h^2}{\sin^2 \theta} + 4h^2</math></p> <p><math>CD^2 = 4h^2</math></p> <p><math>CD = 2h</math></p> | <p>✓ AC in terms of <math>h</math> and <math>\theta</math> /<br/>AC in terme van <math>h</math> en <math>\theta</math></p> <p>✓ <math>AC = CD</math></p> <p>✓ correct subst. into cosine rule/<br/>korrekte vervanging in kosinusreël</p> <p>✓ <math>\cos 2\theta = 1 - 2\sin^2 \theta</math></p> <p>✓ multiplication/<br/>vermenigvuldiging</p> <p>✓ simplification/<br/>vereenvoudiging</p> <p>✓ answer/antwoord</p> | (7) |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                        | [7] |

## QUESTION/VRAAG 8

|       |                                                                                                    |                                                                                                                                                                                                    |                      |     |  |
|-------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----|--|
|       |                                                                                                    |                                                                                                                                                                                                    |                      |     |  |
| 8.1.1 | $\hat{P}SR = 106^\circ$                                                                            | ext. $\angle$ of cyclic quad/buite $\angle$ van kvh.                                                                                                                                               | ✓S<br>✓R             | (2) |  |
| 8.1.2 | $\hat{P}_4 = \hat{R}_3$<br>$\hat{R}_3 = \frac{180^\circ - 106^\circ}{2}$<br>$\hat{R}_3 = 37^\circ$ | $\angle^s$ opposite = sides/ $\angle^e$ teenoor = sye<br>OR/OF equal chords; equal $\angle^s$ /gelyke<br>koorde; gelyke $\angle^e$<br>sum of $\angle^s$ in a triangle/som vd $\angle^e$ v driehoek | ✓S/R<br><br>✓S<br>✓S | (3) |  |
| 8.1.3 | $\hat{P}_5 = \hat{R}_3 = 37^\circ$                                                                 | tan chord theorem/raaklyn koordstelling                                                                                                                                                            | ✓S<br>✓R             | (2) |  |
| 8.1.4 | $\hat{O}_1 = 212^\circ$                                                                            | $\angle$ centre = $2 \times \angle$ at circumference/<br>middelpunts $\angle = 2 \times$ omtreks $\angle$                                                                                          | ✓R<br>✓S             | (2) |  |

|       |                                                                                                                                                                                                          |                                                                                                                                                                                                    |                                                                                                                            |     |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----|
| 8.1.5 | $\hat{P}_3 + \hat{P}_4 + \hat{P}_5 = 90^\circ$<br>$\hat{P}_3 = 90^\circ - 37^\circ - 37^\circ = 16^\circ$<br><br><b>OR/OF</b><br><br>$\hat{P}\hat{O}R = 148^\circ$<br>$\hat{P}_3 = \hat{R}_2 = 16^\circ$ | radius $\perp$ tangent/ <i>radius <math>\perp</math> raaklyn</i><br><br><br><br><br>$\angle$ 's around a point/ $\angle$ 'e om 'n punt<br>$\angle$ 's opposite radii/ $\angle$ 'e teenoor radiusse | $\checkmark R$<br>$\checkmark \hat{P}_3 = 16^\circ$<br><br><br><br><br>$\checkmark R$<br>$\checkmark \hat{P}_3 = 16^\circ$ | (2) |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----|

|       |                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                    |     |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|-----|
| 8.2   |                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                    |     |
| 8.2.1 | $\hat{A}_2 = \hat{E} = x$<br>$\hat{E} = \hat{A}_1 = \hat{A}_2 = x$<br><b>OR/OF</b><br>$\hat{C}_2 = \hat{A}_2 = x$ <div><b>Learner MUST first determine <math>\hat{A}_2</math> in order to get the mark for <math>\hat{C}_2</math></b><br/><b>Leerling MOET eers <math>\hat{A}_2</math> bepaal, om die punt vir <math>\hat{C}_2</math> te verdien</b></div> | $\angle^s$ in the same segment/ $\angle^e$ in dies. segment<br>= chords subtend = $\angle^s$ /gelyke koorde onderspan gelyke $\angle^e$<br>$\angle^s$ opposite radii/ $\angle$ 'e teenoor radiusse                                                                                                                                                                                                                             | ✓ S/R<br>✓ S/R<br>✓ S/R                            | (2) |
| 8.2.2 | $\hat{C}_2 + \hat{C}_3 + \hat{C}_4 = 90^\circ$<br>$\hat{D}_1 = 90^\circ - x$<br>$\hat{A}\hat{B}\hat{C} = 90^\circ + x$<br><b>OR/OF</b><br>$\hat{O}_1 = 2x$<br>$\hat{D}_1 = 90^\circ - x$<br>$\hat{A}\hat{B}\hat{C} = 90^\circ + x$                                                                                                                         | $\angle^s$ in a semi circle/ $\angle^e$ in semi sirkel<br>sum of $\angle^s$ in a triangle/som vd $\angle^e$ v driehoek<br>opposite $\angle^s$ of cyclic quad/oorst $\angle^e$ v kvh<br><br>$\angle$ centre = $2 \times \angle$ at circumference/ middelpunts $\angle = 2 \times$ omtreks $\angle$<br>sum of $\angle^s$ in a triangle/som vd $\angle^e$ v driehoek<br>opposite $\angle^s$ of cyclic quad/oorst $\angle^e$ v kvh | ✓ S/R<br>✓ S<br>✓ S/R<br><br>✓ S/R<br>✓ S<br>✓ S/R | (3) |
| 8.2.3 | $\hat{C}_3 + \hat{C}_4 = 90^\circ - x$<br>$\hat{A}_2 = \hat{C}_2 = x$<br>$\therefore \hat{A}_1 = \hat{C}_2 = x$<br>$\therefore AB \parallel CO$                                                                                                                                                                                                            | $\angle^s$ opposite radii/ $\angle$ 'e teenoor radiusse<br>$\angle^s$ opposite radii/ $\angle$ 'e teenoor radiusse<br><br>alternate $\angle^s$ =/verwis. $\angle^e$ gelyk<br><b>OR/OF</b>                                                                                                                                                                                                                                      | ✓ S/R<br>✓ S/R<br><br>✓ R                          | (3) |

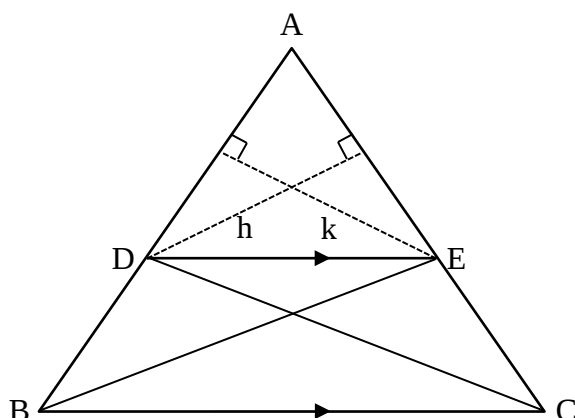
|  |                                                                                                                    |                                                                                                                                                                                                                                      |                    |             |
|--|--------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------|
|  | $\hat{C}_3 + \hat{C}_4 = 90^\circ - x$<br>$\hat{A}_1 + \hat{A}_2 = \hat{O}_1 = 2x$<br>$\therefore AB \parallel CO$ | $\angle^s$ opposite radii/ $\angle$ 'e teenoor radiusse<br>$\angle$ centre = $2 \times \angle$ at circ./<br><i>middelpunt</i> $\angle = 2 \times$ <i>omtrek</i> $\angle$<br>corresponding $\angle^s$ =/ooreenkomst. $\angle^e$ gelyk | ✓S/R<br>✓S/R<br>✓R |             |
|  |                                                                                                                    |                                                                                                                                                                                                                                      |                    | <b>[19]</b> |

## QUESTION/VRAAG 9

|       |                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                               |     |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
|       |                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                               |     |
| 9.1.1 | <p><math>\hat{F}_2 = 90^\circ</math></p> <p><math>\hat{B}_1 + \hat{B}_2 = 90^\circ</math></p> <p><math>\therefore \hat{F}_2 + \hat{B} = 180^\circ</math></p> <p>OBEF is a cyclic quad/<br/><i>OBEF is 'n</i><br/><i>koordevierhoek</i></p> <p><math>\hat{F}_1 = 90^\circ</math></p> <p><math>\hat{B}_1 + \hat{B}_2 = 90^\circ</math></p> <p><math>\therefore \hat{F}_1 = \hat{B}</math></p> | <p>line from centre to midpoint of chord/<br/><i>lyn v middelpunt na middelpunt v koord</i></p> <p>radius <math>\perp</math> tangent/radius <math>\perp</math> raaklyn</p> <p>opp. <math>\angle^s</math> are supplementary/<br/>converse of opp. <math>\angle^s</math> of a cyclic quad/<br/>oorst. <math>\angle^e</math> is supplementêr/omgekeerde v<br/>oorst <math>\angle^e</math> v kvh</p> <p><b>OR/OF</b></p> <p>line from centre to midpoint of chord/<br/><i>lyn v middelpunt na middelpunt v koord</i></p> <p>radius <math>\perp</math> tangent/radius <math>\perp</math> raaklyn</p> <p>ext. <math>\angle</math> = interior opposite <math>\angle</math>/<br/>converse of exterior. <math>\angle</math> of a cyclic quad/<br/><math>\angle</math> = oorst binne <math>\angle^e</math>/omgekeerde van buite<br/><math>\angle</math> van kvh</p> | <p><math>\checkmark</math> S/R</p> <p><math>\checkmark</math> S/R</p> <p><math>\checkmark</math> R</p> <p><math>\checkmark</math> S/R</p> <p><math>\checkmark</math> S/R</p> <p><math>\checkmark</math> R</p> | (3) |

|       |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                |                                                                                                                                                          |      |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 9.1.2 | $\hat{D}_1 = 90^\circ$<br>$\hat{D}_2 = 90^\circ$<br><br>In $\triangle ADB$ and/en $\triangle BDE$<br><br>$\hat{A} = \hat{B}_2$<br>$\hat{D}_1 = \hat{D}_2$<br>$\hat{B}_1 = \hat{E}$<br>$\triangle ADB \parallel \triangle BDE$ | $\angle$ in a semi circle/ $\angle$ in semisirkel<br>Adj. sup. $\angle^s$ /aangrensdde suppl. $\angle^e$<br><br>tan chord theorem/raaklyn koordstelling<br>proved/reeds bewys<br>sum of $\angle^s$ in $\triangle$ /som vd $\angle^e$ v $\triangle$<br>$\angle\angle\angle$<br><br><b>OR/OF</b> | $\checkmark$ S/R<br><br><br><br>$\checkmark$ S<br><br><br>$\checkmark$ R<br><br><br>$\checkmark$ S/R<br><br><br>$\checkmark$ S<br><br><br>$\checkmark$ R |      |
|       | $\hat{D}_1 = 90^\circ$<br>$\hat{D}_2 = 90^\circ$<br><br>In $\triangle ADB$ and/en $\triangle BDE$<br>$\hat{A} = \hat{B}_2$<br>$\hat{D}_1 = \hat{D}_2$<br>$\triangle ADB \parallel \triangle BDE$                              | $\angle$ in a semi circle/ $\angle$ in semisirkel<br>Adj. sup. $\angle^s$ /aangrensdde suppl. $\angle^e$<br><br>tan chord theorem/raaklyn koordstelling<br>proved/reeds bewys<br>$\angle\angle\angle$                                                                                          | $\checkmark$ S/R<br><br><br>$\checkmark$ S<br><br><br>$\checkmark$ R                                                                                     | (3)  |
|       |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                |                                                                                                                                                          |      |
|       | 9.1.3<br>$\hat{B}_1 = \hat{E}$<br>$\therefore OB$ is a tangent/<br>$\therefore OB$ is 'n raaklyn                                                                                                                              | 3rd $\angle$ in $\triangle$ , $\triangle ADB \parallel \triangle BDE$<br>converse of tan chord theorem/<br>omgekeerde raaklyn koordstelling                                                                                                                                                    | $\checkmark$ S<br>$\checkmark$ R                                                                                                                         | (2)  |
| 9.2   | $\frac{AD}{BD} = \frac{BD}{DE}$<br>$BD^2 = AD \times DE$<br>but/maar $BD = 2OF$<br>$BD^2 = 4OF^2$<br>$4OF^2 = AD \times DE$<br>$OF^2 = \frac{AD \times DE}{4}$                                                                | $\triangle ADB \parallel \triangle BDE$<br><br>midpoint theorem/middelpuntstelling                                                                                                                                                                                                             | $\checkmark$ S<br><br><br>$\checkmark$ S/R<br>$\checkmark$ S                                                                                             |      |
|       |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                |                                                                                                                                                          | (3)  |
|       |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                |                                                                                                                                                          | [11] |
|       |                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                |                                                                                                                                                          |      |

## QUESTION/VRAAG 10



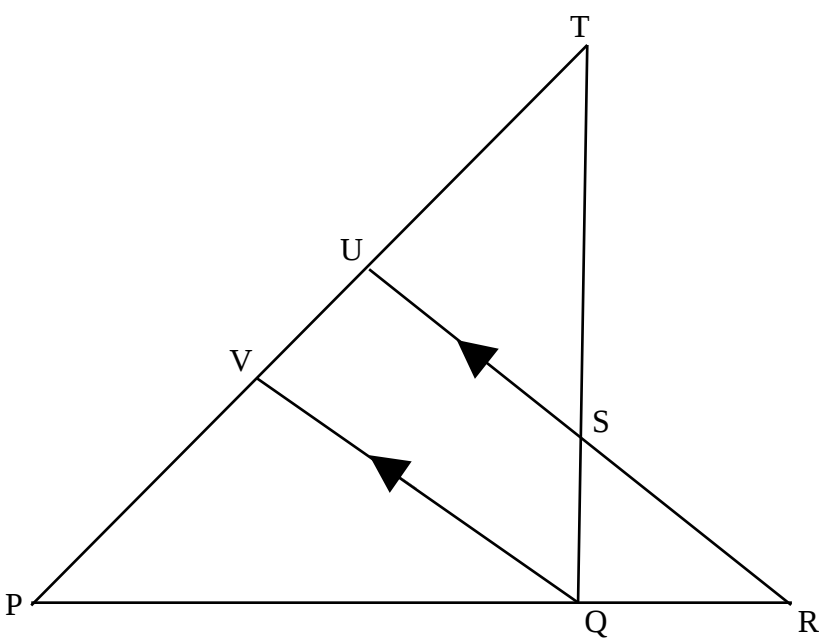
**Construction must be in words or indicated on sketch. No construction – 0/5 for question.**

**90° must be mentioned or indicated – if not 4/5**

**Konstruksie moet op skets aangedui wees, of in woorde. Geen konstruksie – 0/5 vir vraag.**

**90° moet genoem word of aangedui wees – indien nie 4/5**

|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                  |     |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-----|
| 10.1 | <p>Construction: Join DC and BE and perpendicular heights <math>k</math> and <math>h</math></p> <p>Konstruksie: Verbind DC en BE en loodregte hoogtes <math>k</math> en <math>h</math></p> $\frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEB} = \frac{\frac{1}{2} \cdot AD \cdot k}{\frac{1}{2} \cdot DB \cdot k} = \frac{AD}{DB}$ $\frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEC} = \frac{\frac{1}{2} \cdot AE \cdot h}{\frac{1}{2} \cdot EC \cdot h} = \frac{AE}{EC}$ <p>Area <math>\triangle DEB</math> = Area <math>\triangle DEC</math>      same base, same height/<br/>dies. basis, dies. hoogte</p> $\therefore \frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEB} = \frac{\text{Area } \triangle ADE}{\text{Area } \triangle DEC}$ $\therefore \frac{AD}{DB} = \frac{AE}{EC}$ | <p>✓ construction/<br/>konstruksie</p> <p>✓S</p> <p>✓S</p> <p>✓S/R</p> <p>✓S</p> | (5) |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-----|

|      |                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                        |      |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|------|
|      |                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                        |      |
| 10.2 | $\frac{QS}{ST} = \frac{VU}{UT}$ $\frac{2}{3} = \frac{VU}{2}$ $VU = \frac{4}{3}$ $PV = 5 - \frac{4}{3} = \frac{11}{3}$ $\frac{PV}{VU} = \frac{PQ}{QR}$ $\frac{PQ}{QR} = \frac{11}{3} \div \frac{4}{3}$ $\frac{PQ}{QR} = \frac{11}{4}$ | <p>Proportion theorem, <math>RU \parallel QV</math>/ line <math>\parallel</math> one side of <math>\Delta</math>/eweredigheids stelling <math>RU \parallel QV</math>/lyn <math>\parallel</math> een sy van <math>\Delta</math></p> <p>Proportion theorem, <math>RU \parallel QV</math>/ line <math>\parallel</math> one side of <math>\Delta</math>/eweredigheids stelling <math>RU \parallel QV</math>/lyn <math>\parallel</math> een sy van <math>\Delta</math></p> | $\checkmark$ S/R<br><br>$\checkmark$<br>$VU = \frac{4}{3}$<br>$\checkmark$ $PV = \frac{11}{3}$<br>$\checkmark$ S<br><br>$\checkmark$ S | (5)  |
|      |                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                        | [10] |

TOTAL/TOTAAL: 145

The mark out of 145 must be converted to a mark out of 150.  
 Die punt uit 145 moet herlei word na 'n punt uit 150.