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# basic education

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

**SENIOR CERTIFICATE EXAMINATIONS/  
SENIORSERTIFIKAAT-EKSAMEN  
NATIONAL SENIOR CERTIFICATE EXAMINATIONS/  
NASIONALE SENIORSERTIFIKAAT-EKSAMEN**

**MATHEMATICS P2/WISKUNDE V2**

**MARKING GUIDELINES/NASIENRIGLYNE**

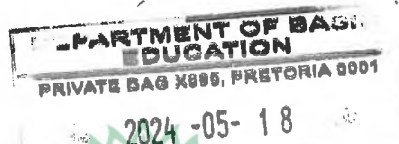
**MAY/JUNE/MEI/JUNIE 2024**

**MARKS: 150  
PUNTE: 150**

*M. Sasman*  
Approved (UMALUSI)  
2024-05-14

These marking guidelines consist of 26 pages./  
*Hierdie nasienriglyne bestaan uit 26 bladsye.*

APPROVED  
*Q. Mkhil* (DBE IM)  
14/5/2024



*Q. Mkhil*  
Approved  
*Q. Mkhil*  
2024-05-14

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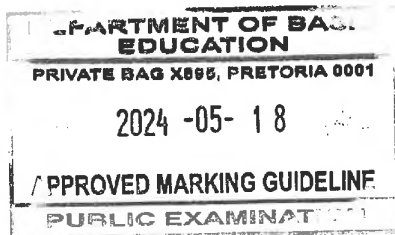
**NOTE:**

- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and did not redo 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 op '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.
- Aanvaar van antwoorde/waardes om 'n probleem op te los, word NIE toegelaat nie.

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



**QUESTION/VRAAG 1**

|     |                                                                                                                                                                                                                                                                                                  |                                                                                                                                       |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 1.1 | $a = -43,72$<br>$b = 2,36$<br>$y = -43,72 + 2,36x$                                                                                                                                                                                                                                               | ✓ $a = -43,72$<br>✓ $b = 2,36$<br>✓ equation<br>(3)                                                                                   |
| 1.2 | <p style="text-align: center;"><b>Scatter plot</b></p>                                                                                                                                                                                                                                           | ✓ any correct two points<br>✓ straight line joining the points for $x \in [85 ; 160]$<br>(2)                                          |
| 1.3 | $y = -43,72 + 2,36(110)$<br>$y = 215,88$<br><b>OR</b><br>$y = 215,90$ (calculator)                                                                                                                                                                                                               | ✓ substitution<br>✓ answer<br>(2)<br><br>✓✓ answer<br>(2)                                                                             |
| 1.4 | $y = -43,72 + 2,36(130)$<br>$y = 263,08$<br>Percentage increase in weight = $\frac{263,08 - 215,88}{215,88} \times 100$<br>$= 21,86\%$<br><b>OR</b><br>$y = 263,08$<br>Percentage = $\frac{263,08}{215,88} \times 100$<br>$= 121,86\%$<br>Percentage increase in weight = $121,86 - 100 = 21,86$ | ✓ y -value<br>✓ difference between y-values<br>✓ +ve answer<br>(3)<br><br>✓ y -value<br>✓ difference between %<br>✓ +ve answer<br>(3) |
|     |                                                                                                                                                                                                                                                                                                  | <b>[10]</b>                                                                                                                           |



## QUESTION/VRAAG 2

| 2.1                | <table border="1"> <thead> <tr> <th>Distance<br/>(x km)</th><th>Frequency</th><th>Cumulative<br/>frequency</th></tr> </thead> <tbody> <tr> <td><math>0 \leq x &lt; 5</math></td><td>3</td><td>3</td></tr> <tr> <td><math>5 \leq x &lt; 10</math></td><td>7</td><td>10</td></tr> <tr> <td><math>10 \leq x &lt; 15</math></td><td>20</td><td>30</td></tr> <tr> <td><math>15 \leq x &lt; 20</math></td><td>12</td><td>42</td></tr> <tr> <td><math>20 \leq x &lt; 25</math></td><td>5</td><td>47</td></tr> <tr> <td><math>25 \leq x &lt; 30</math></td><td>3</td><td>50</td></tr> </tbody> </table> | Distance<br>(x km)                                                                             | Frequency | Cumulative<br>frequency | $0 \leq x < 5$ | 3 | 3 | $5 \leq x < 10$ | 7 | 10 | $10 \leq x < 15$ | 20 | 30 | $15 \leq x < 20$ | 12 | 42 | $20 \leq x < 25$ | 5 | 47 | $25 \leq x < 30$ | 3 | 50 | ✓ 10<br>✓ all values correct |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|-----------|-------------------------|----------------|---|---|-----------------|---|----|------------------|----|----|------------------|----|----|------------------|---|----|------------------|---|----|------------------------------|
| Distance<br>(x km) | Frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Cumulative<br>frequency                                                                        |           |                         |                |   |   |                 |   |    |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                              |
| $0 \leq x < 5$     | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 3                                                                                              |           |                         |                |   |   |                 |   |    |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                              |
| $5 \leq x < 10$    | 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 10                                                                                             |           |                         |                |   |   |                 |   |    |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                              |
| $10 \leq x < 15$   | 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 30                                                                                             |           |                         |                |   |   |                 |   |    |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                              |
| $15 \leq x < 20$   | 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 42                                                                                             |           |                         |                |   |   |                 |   |    |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                              |
| $20 \leq x < 25$   | 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 47                                                                                             |           |                         |                |   |   |                 |   |    |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                              |
| $25 \leq x < 30$   | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 50                                                                                             |           |                         |                |   |   |                 |   |    |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                              |
|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (2)                                                                                            |           |                         |                |   |   |                 |   |    |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                              |
| 2.2                | <p style="text-align: center;">Ogive/Ogief</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ✓ grounding<br>✓ plotting a min of 3 points (cf at upper limits)<br>✓ smooth, increasing curve |           |                         |                |   |   |                 |   |    |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                              |
|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (3)                                                                                            |           |                         |                |   |   |                 |   |    |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                              |
| 2.3                | $Q_3 = 17,8$<br>$Q_1 = 11$<br><br>$IQR = 6,8$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | ✓ $Q_3$ (accept between 17-19) and $Q_1$ (accept between 10-12,5)<br>✓ answer (accept 5-9)     |           |                         |                |   |   |                 |   |    |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                              |
|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | (2)                                                                                            |           |                         |                |   |   |                 |   |    |                  |    |    |                  |    |    |                  |   |    |                  |   |    |                              |

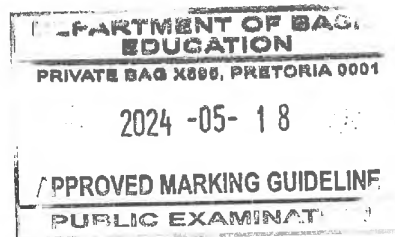
Mathematics P2/Wiskunde V2

5

DBE/May/June/Mei/Junie 2024

SC/SS/NSC/NSS – Marking Guidelines/Nasienriglyne

|     |                                                                                                                                      |                                                     |
|-----|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| 2.4 | $5 \leq x < 10$                                                                                                                      | ✓ $5 \leq x < 10$<br>(1)                            |
| 2.5 | Estimated mean = $\frac{2,5(3) + 7,5(11) + 12,5(20) + 17,5(8) + 22,5(5) + 27,5(3)}{50}$<br>$= \frac{675}{50}$<br>$= 13,5 \text{ km}$ | ✓ new frequencies<br>✓ $\sum fx$<br>✓ answer<br>(3) |
|     |                                                                                                                                      | [11]                                                |



A handwritten signature in black ink.

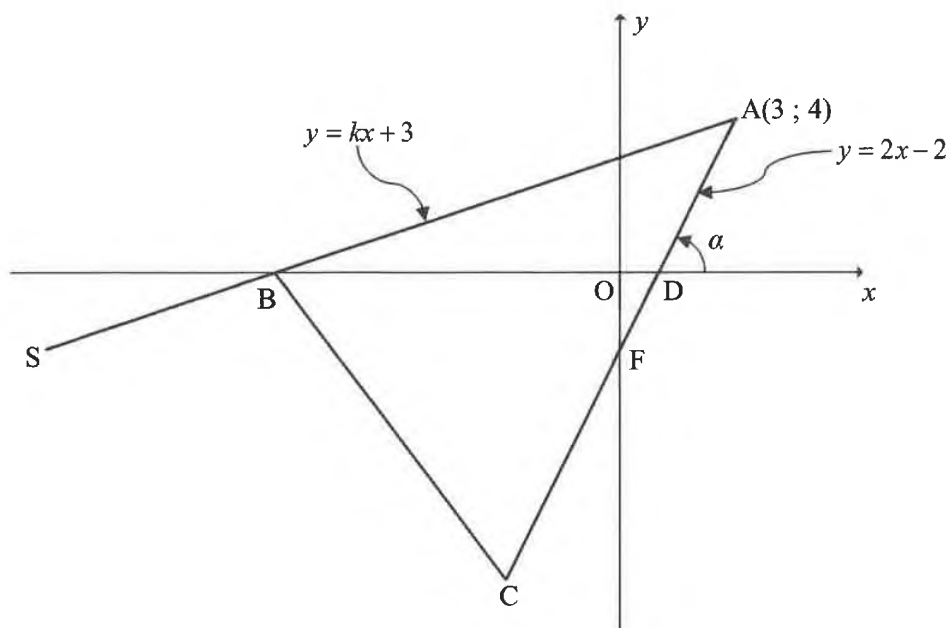
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## QUESTION/VRAAG 3



|     |                                                                                                                                                                                                                |                                                                                      |                                                |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------|
| 3.1 | $y = kx + 3$<br>$4 = k(3) + 3$<br>$3k = 1$<br>$\therefore k = \frac{1}{3}$<br><br><b>OR</b><br>y-intercept of AB: (0 ; 3)<br><br>$m_{AB} = \frac{4-3}{3-0}$<br>$= \frac{1}{3}$<br>$\therefore k = \frac{1}{3}$ | ✓ substitution (3 ; 4)<br><br><br><br><br><br><br><br><br><br>✓ substitution (0 ; 3) | (1)<br><br><br><br><br><br><br><br><br><br>(1) |
| 3.2 | $0 = \frac{1}{3}x + 3$<br>$-3 = \frac{1}{3}x$<br>$x = -9$<br>B(-9 ; 0)                                                                                                                                         | ✓ $y = 0$<br><br><br>✓ answer                                                        | <br><br><br>(2)                                |

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*MS*

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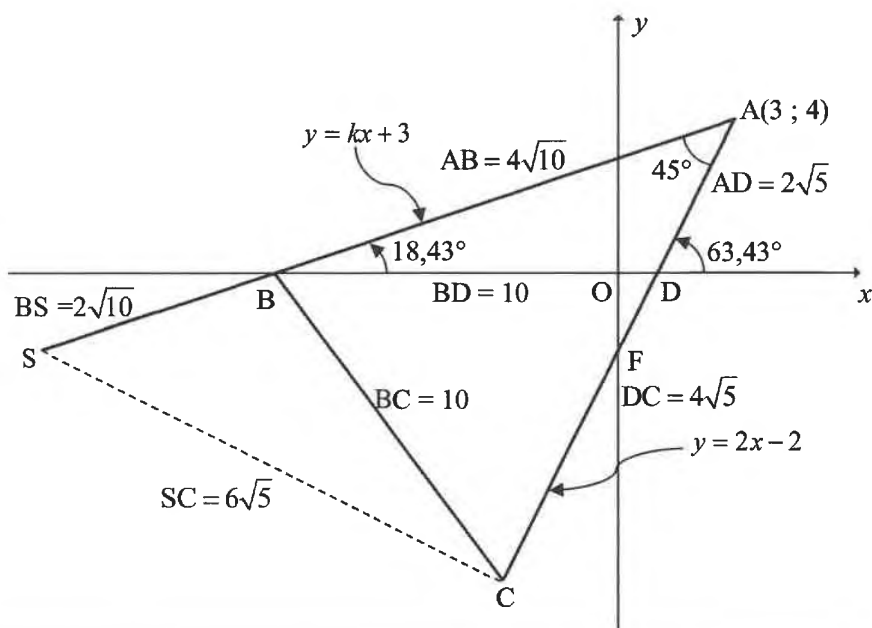


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|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3.3 | $F(0; -2)$<br>$F\left(\frac{x+3}{2}; \frac{y+4}{2}\right)$<br>$\frac{x+3}{2} = 0 \quad \frac{y+4}{2} = -2$<br>$x = -3 \quad y = -8$<br>$C(-3; -8)$<br><br><b>OR</b> by translation<br><br>$F(0; -2)$<br>$A \rightarrow F(x; y) \rightarrow (x-3; y-6)$<br>$F \rightarrow C(0; -2) \rightarrow (0-3; -2-6) = (-3; -8)$                                                                                                                                                                                                                | $\checkmark F(0; -2)$<br><br>$\checkmark \frac{x+3}{2} = 0; \frac{y+4}{2} = -2$<br><br>$\checkmark x\text{-value} \quad \checkmark y\text{-value}$<br><b>(4)</b><br><br>$\checkmark F(0; -2)$<br>$\checkmark (x-3; y-6)$<br>$\checkmark x\text{-value} \quad \checkmark y\text{-value}$<br><b>(4)</b>                                                                                                                                                                 |
| 3.4 | $m_{BC} = \frac{0 - (-8)}{-9 - (-3)} \quad \text{OR} \quad m_{BC} = \frac{-8 - 0}{-3 - (-9)}$<br><br>$m_{BC} = -\frac{4}{3}$<br>$y = -\frac{4}{3}x + c$<br>$(-2) = -\frac{4}{3}(-15) + c$<br><br>$c = -22$<br>$y = -\frac{4}{3}x - 22$<br><br><b>OR</b><br><br>$m_{BC} = \frac{0 - (-8)}{-9 - (-3)} \quad \text{OR} \quad m_{BC} = \frac{-8 - 0}{-3 - (-9)}$<br><br>$m_{BC} = -\frac{4}{3}$<br>$y - y_1 = -\frac{4}{3}(x - x_1)$<br>$y - (-2) = -\frac{4}{3}(x - (-15))$<br>$y + 2 = -\frac{4}{3}x - 20$<br>$y = -\frac{4}{3}x - 22$ | $\checkmark$ substitution of B and C into the gradient formula<br><br>$\checkmark m_{BC}$<br><br>$\checkmark m_{\text{line}} = m_{BC}$<br><br>$\checkmark$ substitution of S(-15; -2)<br><br><br>$\checkmark$ equation<br><b>(5)</b><br><br><br>$\checkmark$ substitution into the gradient formula<br><br>$\checkmark m_{BC}$<br><br>$\checkmark m_{\text{line}} = m_{BC}$<br><br>$\checkmark$ substitution of S(-15; -2)<br><br>$\checkmark$ equation<br><b>(5)</b> |





|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3.5 | $\tan \alpha = m_{AC} = 2$<br>$\alpha = 63,43^\circ$<br>$\tan \hat{A}BD = m_{AS} = \frac{1}{3}$<br>$\hat{A}BD = 18,43^\circ$<br>$\hat{B}AC = \alpha - \hat{A}BD$<br>$\hat{B}AC = 63,43^\circ - 18,43^\circ$<br>$\hat{B}AC = 45^\circ$<br><b>OR</b><br>$AB = \sqrt{(-9-3)^2 + (0-4)^2}$<br>$AB = 4\sqrt{10}$<br>$BD = 10$<br>$AD = \sqrt{(3-1)^2 + (4-0)^2}$<br>$AD = 2\sqrt{5}$<br>$BD^2 = AB^2 + AD^2 - 2AB \cdot AD \cos \hat{B}AC$<br>$(10)^2 = (4\sqrt{10})^2 + (2\sqrt{5})^2 - 2(4\sqrt{10})(2\sqrt{5}) \cos \hat{B}AC$<br>$\cos \hat{B}AC = \frac{\sqrt{2}}{2}$<br>$\hat{B}AC = 45^\circ$ | $\checkmark \tan \alpha = m_{AC} = 2$<br>$\checkmark \alpha = 63,43^\circ$<br>$\checkmark \tan \hat{A}BD = m_{AS} = \frac{1}{3}$<br>$\checkmark \hat{A}BD = 18,43^\circ$<br>$\checkmark$ answer<br><br>$\checkmark$ length of AB<br><br>$\checkmark$ calculation of remaining 2 lengths<br><br>$\checkmark$ substitution into cosine-rule<br><br>$\checkmark$ rewriting in terms of $\cos \hat{B}AC$<br>$\checkmark$ answer<br><br>(5) |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3.6 | <p>A(3 ; 4) and S(-15 ; -2)</p> $AS = \sqrt{(x_A - x_S)^2 + (y_A - y_S)^2}$ $AS = \sqrt{(3 - (-15))^2 + (4 - (-2))^2}$ $AS = \sqrt{360} = 6\sqrt{10} = 18,97$<br><div style="text-align: center;"> <math display="block">\frac{\text{Area of } \triangle ABD}{\text{Area of } \triangle ASC} = \frac{\frac{1}{2}(BD)(\perp h)}{\frac{1}{2}(AS)(AC)\sin \hat{B}\hat{A}\hat{C}}</math> <math display="block">\frac{\text{Area of } \triangle ABD}{\text{Area of } \triangle ASC} = \frac{\frac{1}{2}(10)(4)}{\frac{1}{2}(6\sqrt{10})(6\sqrt{5})\sin 45^\circ}</math> <math display="block">\frac{\text{Area of } \triangle ABD}{\text{Area of } \triangle ASC} = \frac{2}{9}</math> </div> <p><b>OR</b></p> $AS = \sqrt{(3 - (-15))^2 + (4 - (-2))^2}$ $AS = \sqrt{360} = 6\sqrt{10} = 18,97$<br>$AB = \sqrt{(-9-3)^2 + (0-4)^2} = 4\sqrt{10}$ $AD = \sqrt{(3-1)^2 + (4-0)^2} = 2\sqrt{5}$<br><div style="text-align: center;"> <math display="block">\frac{\text{Area of } \triangle ABD}{\text{Area of } \triangle ASC} = \frac{\frac{1}{2}(AB)(AD)\sin \hat{A}}{\frac{1}{2}(AS)(AC)\sin \hat{A}}</math> <math display="block">= \frac{\frac{1}{2}(4\sqrt{10})(2\sqrt{5})\sin \hat{A}}{\frac{1}{2}(6\sqrt{10})(6\sqrt{5})\sin \hat{A}}</math> <math display="block">= \frac{2}{9}</math> </div> | <div style="margin-bottom: 10px;">✓ AS = <math>\sqrt{(3 - (-15))^2 + (4 - (-2))^2}</math></div> <div style="margin-bottom: 10px;">✓ length of AS</div><br><br><br><br><div style="margin-bottom: 10px;">✓ Area <math>\triangle ABD</math></div> <div style="margin-bottom: 10px;">✓ Area <math>\triangle ASC</math></div> <div style="margin-bottom: 10px;">✓ answer</div> <div style="text-align: right;">(5)</div><br><br><br><br><div style="margin-bottom: 10px;">✓ AS = <math>\sqrt{(3 - (-15))^2 + (4 - (-2))^2}</math></div> <div style="margin-bottom: 10px;">✓ length of AS</div><br><br><br><br><div style="margin-bottom: 10px;">✓ Area <math>\triangle ABD</math></div> <div style="margin-bottom: 10px;">✓ Area <math>\triangle ASC</math></div> <div style="margin-bottom: 10px;">✓ answer</div> <div style="text-align: right;">(5)</div> |
|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>[22]</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

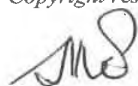
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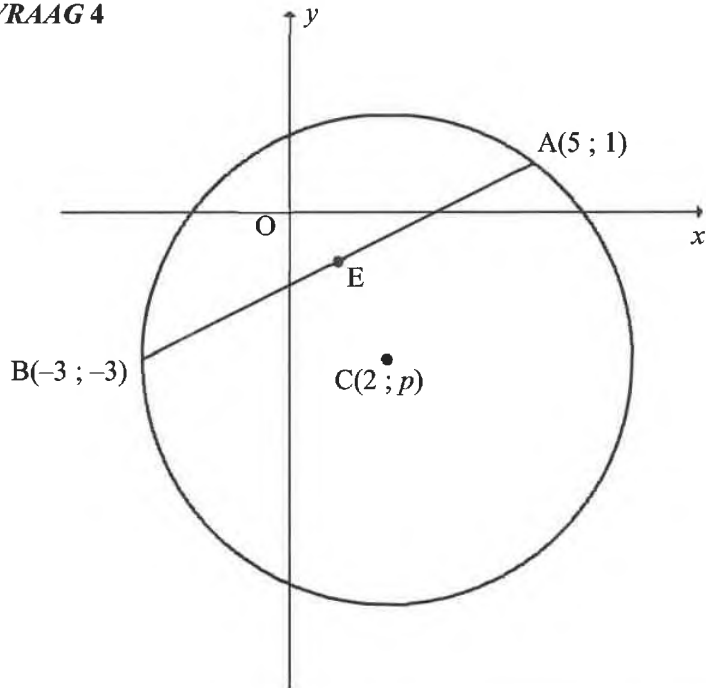
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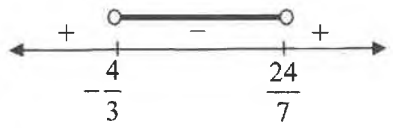
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## QUESTION/VRAAG 4



|     |                                                                                                                                                                                                                                                                                      |                                                                                                                            |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| 4.1 | $E\left(\frac{5+(-3)}{2}; \frac{1+(-3)}{2}\right)$ $\therefore E(1; -1)$                                                                                                                                                                                                             | $\checkmark x=1 \quad \checkmark y=-1$<br>(2)                                                                              |
| 4.2 | $AB = \sqrt{(x_A - x_B)^2 + (y_A - y_B)^2}$ $AB = \sqrt{(5 - (-3))^2 + (1 - (-3))^2}$ $AB = \sqrt{80} = 4\sqrt{5} = 8,94 \text{ units}$                                                                                                                                              | $\checkmark AB = \sqrt{80} = 4\sqrt{5} = 8,94$<br>(1)                                                                      |
| 4.3 | $m_{AB} = \frac{1 - (-3)}{5 - (-3)}$ $m_{AB} = \frac{1}{2}$ $\therefore m_{CE} = -2 \quad [CE \perp AB]$ $E(1; -1)$ $y = -2x + c$ $(-1) = -2(1) + c$ $c = 1$ $y = -2x + 1$ <p style="text-align: center;"><b>OR</b></p> $y - y_1 = -2(x - x_1)$ $y - (-1) = -2(x - 1)$ $y = -2x + 1$ | $\checkmark m_{AB} = \frac{1}{2}$<br>$\checkmark m_{CE}$<br>$\checkmark$ substitution of E<br>$\checkmark$ equation<br>(4) |

|     |                                                                                                                                                 |                                                                                                                          |                                            |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| 4.4 | $y = -2x + 1$<br>$p = -2(2) + 1$<br>$p = -3$<br><br><b>OR</b><br><br>$m_{CE} = -2$<br>$\frac{p - (-1)}{2 - 1} = -2$<br>$p + 1 = -2$<br>$p = -3$ | ✓ substitution of $C(2; p)$<br>into $\perp$ bisector of AB<br><br>✓ substitution of C and E<br>into the gradient formula | (1)<br><br><br><br><br><br><br><br><br>(1) |
| 4.5 | $BC = r = 5$ units<br><br>$\therefore (x-2)^2 + (y+3)^2 = 25$<br>$x^2 - 4x + 4 + y^2 + 6y + 9 = 25$<br>$x^2 + y^2 - 4x + 6y - 12 = 0$           | ✓ $BC = r = 5$ units<br><br>✓ $(x-2)^2 + (y+3)^2 = r^2$<br>✓ $x^2 - 4x + 4 + y^2 + 6y + 9 = 25$                          | (4)                                        |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                     |                                                                                                                                                                                 |      |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 4.6 | $(x-2)^2 + (y+3)^2 = 25$<br>$y = tx + 8$<br>$(x-2)^2 + (tx+8+3)^2 = 25$<br>$x^2 - 4x + 4 + t^2x^2 + 22tx + 121 - 25 = 0$<br>$x^2(t^2 + 1) + x(22t - 4) + 100 = 0$<br><br>$\Delta < 0$<br><br>$(22t - 4)^2 - 4(t^2 + 1)(100) < 0$<br>$484t^2 - 176t + 16 - 400t^2 - 400 < 0$<br>$84t^2 - 176t - 384 < 0$<br>$21t^2 - 44t - 96 < 0$<br>$(7t - 24)(3t + 4) < 0$<br><br>CV: $\frac{24}{7}; -\frac{4}{3}$<br><br><br><br>$\therefore t \in \left(-\frac{4}{3}; \frac{24}{7}\right)$ | <b>OR</b> $x^2 + y^2 - 4x + 6y - 12 = 0$<br><br><b>OR</b> $x^2 + (tx+8)^2 - 4x + 6(tx+8) - 12 = 0$<br><b>OR</b> $x^2 + t^2x^2 + 16tx + 64 - 4x + 6tx + 48 - 12 = 0$ | ✓ substitution<br>of $y = tx + 8$<br>✓ standard<br>form<br>✓ $\Delta < 0$<br><br><br><br><br><br>✓ standard form<br>of $\Delta$<br><br>✓ critical<br>values<br><br><br>✓ answer | (6)  |
|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                     |                                                                                                                                                                                 | [18] |



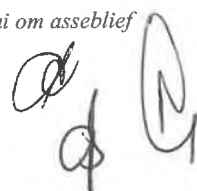
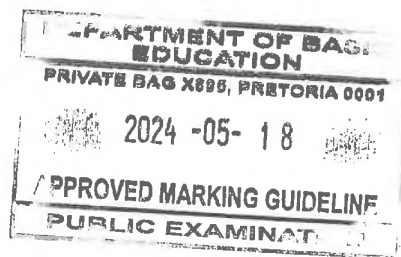


**QUESTION/VRAAG 5**

|       |                                                                                                                                                                                                                                                                                                                       |                                                                                                                                  |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| 5.1.1 | $\sin 220^\circ$<br>$= -\sin 40^\circ$<br>$= -p$                                                                                                                                                                                                                                                                      | ✓ $-\sin 40^\circ$<br>✓ answer<br>(2)                                                                                            |
| 5.1.2 | $\cos^2 50^\circ$<br>$= \sin^2 40^\circ$<br>$= p^2$                                                                                                                                                                                                                                                                   | ✓ $\sin^2 40$<br>✓ answer<br>(2)                                                                                                 |
| 5.1.3 | $\cos(-80^\circ)$<br>$= \cos 80^\circ$<br>$= 1 - 2\sin^2 40^\circ$<br>$= 1 - 2p^2$<br><br><b>OR</b><br><br>$\cos(-80^\circ)$<br>$= \cos 80^\circ$<br>$= \cos(30^\circ + 50^\circ)$<br>$= \cos 30^\circ \cos 50^\circ - \sin 30^\circ \sin 50^\circ$<br>$= \frac{\sqrt{3}p}{2} - \frac{\sqrt{1-p^2}}{2}$               | ✓ $\cos 80^\circ$<br>✓ double angle<br>✓ answer<br>(3)<br><br><br>✓ $\cos 80^\circ$<br>✓ expansion<br>✓ answer<br>(3)            |
| 5.2.1 | $\text{LHS} = \tan x(1 - \cos^2 x) + \cos^2 x$<br>$= \frac{\sin x}{\cos x}(\sin^2 x) + \cos^2 x$<br>$= \frac{\sin^3 x + \cos^3 x}{\cos x}$<br>$= \frac{(\sin x + \cos x)(\sin^2 x - \sin x \cos x + \cos^2 x)}{\cos x}$<br>$= \frac{(\sin x + \cos x)(1 - \sin x \cos x)}{\cos x}$<br>$= \text{RHS}$<br><br><b>OR</b> | ✓ $\frac{\sin x}{\cos x}$ ✓ $\sin^2 x$<br><br>✓ simplification<br>✓ factorisation of cubes<br>✓ $\sin^2 x + \cos^2 x = 1$<br>(5) |

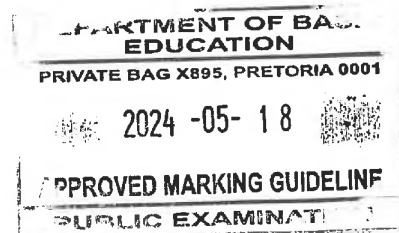
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                     |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | $\begin{aligned} \text{RHS} &= \frac{(\sin x + \cos x)(1 - \sin x \cos x)}{\cos x} \\ &= \frac{\sin x - \sin^2 x \cos x + \cos x - \sin x \cos^2 x}{\cos x} \\ &= \tan x - \sin^2 x + 1 - \sin x \cos x \\ &= \tan x + \cos^2 x - \sin x \cos x \\ &= \tan x \left( 1 - \frac{\sin x \cos x}{\tan x} \right) + \cos^2 x \\ &= \tan x \left( 1 - \frac{\sin x \cos x}{\frac{\sin x}{\cos x}} \right) + \cos^2 x \\ &= \tan x (1 - \cos^2 x) + \cos^2 x \\ &= \text{LHS} \end{aligned}$ | <p>✓ multiplication</p> <p>✓ ÷ by <math>\cos x</math></p> <p>✓ <math>-\sin^2 x + 1 = \cos^2 x</math></p> <p>✓ factorisation</p> <p>✓ <math>\tan x = \frac{\sin x}{\cos x}</math></p> <p>(5)</p>                                                                                     |
| 5.2.2 | $\cos x = 0$ or where $\tan x$ is undefined<br>$x = 90^\circ + k \cdot 360^\circ$ or $x = 270^\circ + k \cdot 360^\circ$<br>$x = 90^\circ$ or $x = -90^\circ$                                                                                                                                                                                                                                                                                                                         | <p>✓ <math>\cos x = 0</math> or <math>\tan x</math> undefined</p> <p>✓ <math>x = 90^\circ</math> ✓ <math>x = -90^\circ</math></p> <p>(3)</p>                                                                                                                                        |
| 5.3.1 | $\begin{aligned} &\frac{\sin 150^\circ + \cos^2 x - 1}{2} \\ &= \frac{\sin 30^\circ + \cos^2 x - 1}{2} \\ &= \frac{\frac{1}{2} - (1 - \cos^2 x)}{2} \\ &= \left( \frac{1}{2} - \sin^2 x \right) \times \frac{1}{2} \\ &= \frac{1 - 2\sin^2 x}{4} \\ &= \frac{\cos 2x}{4} \end{aligned}$                                                                                                                                                                                               | <p>✓ <math>\sin 30^\circ</math></p> <p>✓ <math>\sin 30^\circ = \frac{1}{2}</math> ✓ factor</p> <p>✓ <math>1 - \cos^2 x = \sin^2 x</math></p> <p>✓ simplification</p> <p>✓ answer in terms of <math>\cos 2x</math></p> <p>(6)</p>                                                    |
| 5.3.2 | $\begin{aligned} \frac{\sin 150^\circ + \cos^2 x - 1}{2} &= \frac{1}{25} \\ \frac{\cos 2x}{4} &= \frac{1}{25} \\ \cos 2x &= \frac{4}{25} \\ \text{ref} \angle &= 80,79...^\circ \\ 2x &= 80,79...^\circ + k \cdot 360^\circ \quad \text{or} \quad 2x = 279,20...^\circ + k \cdot 360^\circ \\ x &= 40,40^\circ + k \cdot 180^\circ \quad \text{or} \quad x = 139,60^\circ + k \cdot 180^\circ ; k \in \mathbb{Z} \end{aligned}$                                                       | <p>✓ answer 5.3.1 = <math>\frac{1}{25}</math></p> <p>✓ <math>2x = 80,79^\circ</math></p> <p>✓ <math>2x = 279,20...^\circ</math></p> <p>✓ <math>x = 40,40^\circ</math> and <math>x = 139,60^\circ</math></p> <p>✓ <math>+ k \cdot 180^\circ ; k \in \mathbb{Z}</math></p> <p>(5)</p> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>OR</b></p> $\frac{\sin 150^\circ + \cos^2 x - 1}{2} = \frac{1}{25}$ $\sin 150^\circ + \cos^2 x - 1 = \frac{2}{25}$ $\sin 30^\circ + \cos^2 x - 1 = \frac{2}{25}$ $\cos^2 x = \frac{29}{50}$ $\cos x = \pm \sqrt{\frac{29}{50}}$ $x = 40,40^\circ + k.360^\circ \quad \text{or} \quad x = 319,60^\circ + k.360^\circ ; k \in \mathbb{Z}$ <p>or</p> $x = 139,60^\circ + k.360^\circ \quad \text{or} \quad x = 220,40^\circ + k.360^\circ ; k \in \mathbb{Z}$ | $\checkmark \cos^2 x = \frac{29}{50}$ $\checkmark x = 40,40^\circ \quad \checkmark x = 139,60^\circ$ $\checkmark x = 220,40^\circ \text{ and } x = 319,60^\circ$ $\checkmark + k.360^\circ ; k \in \mathbb{Z}$ <p>(5)</p> |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>[26]</b>                                                                                                                                                                                                               |



## QUESTION/VRAAG 6

|     |                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                       |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| 6.1 | Period = $360^\circ$                                                                                                                                                                                                                                                                                                                                                           | ✓ $360^\circ$<br>(1)                                                                                                  |
| 6.2 | Amplitude = 1                                                                                                                                                                                                                                                                                                                                                                  | ✓ 1<br>(1)                                                                                                            |
| 6.3 | $a = -45^\circ$                                                                                                                                                                                                                                                                                                                                                                | ✓ $a = -45^\circ$<br>(1)                                                                                              |
| 6.4 | $\sin 2x = k$<br><br>$k = \sin(2 \times 165^\circ)$ OR $k = \sin(2 \times (-75^\circ))$<br>$k = \sin 330^\circ$ $k = \sin(-150^\circ)$<br>$k = -\sin 30^\circ$<br>$k = -\frac{1}{2}$<br><br><b>OR</b><br><br>$k = \cos(165^\circ - 45^\circ)$ OR $k = \cos(-75^\circ - 45^\circ)$<br>$k = \cos 120^\circ$ $k = \cos(-120^\circ)$<br>$k = -\cos 60^\circ$<br>$k = -\frac{1}{2}$ | ✓ $-\sin 30^\circ$<br>✓ $-\frac{1}{2}$<br><br>(2)<br><br>✓ $-\cos 60^\circ$<br>✓ $-\frac{1}{2}$<br><br>(2)            |
| 6.5 | Points of intersection are translated $60^\circ$ to the left<br>$x = -15^\circ$                                                                                                                                                                                                                                                                                                | ✓ $x = -15^\circ$<br>(1)                                                                                              |
| 6.6 | $\sqrt{2} \sin 2x = \sin x + \cos x$<br>$\sin 2x = \frac{1}{\sqrt{2}} \sin x + \frac{1}{\sqrt{2}} \cos x$<br>$\sin 2x = \sin 45^\circ \sin x + \cos 45^\circ \cos x$<br>$\sin 2x = \cos(45^\circ - x)$ OR $\sin 2x = \cos(x - 45^\circ)$<br><br>$\therefore$ 2 roots in the interval $x \in [-90^\circ; 90^\circ]$                                                             | ✓ division by $\sqrt{2}$<br>✓ special angles<br>✓ $\cos(45^\circ - x)$ or $\cos(x - 45^\circ)$<br>✓ answer<br><br>(4) |
|     |                                                                                                                                                                                                                                                                                                                                                                                | [10]                                                                                                                  |

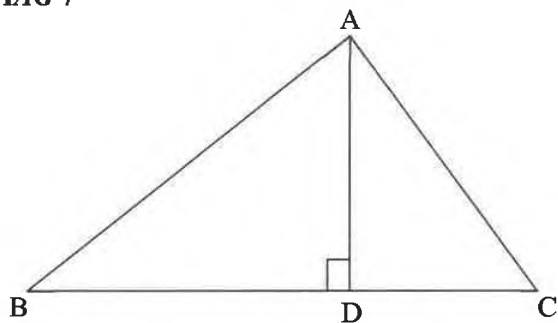


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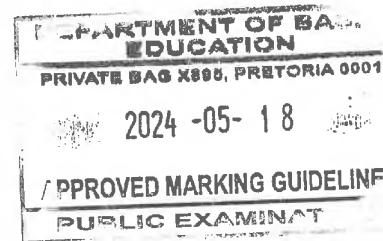
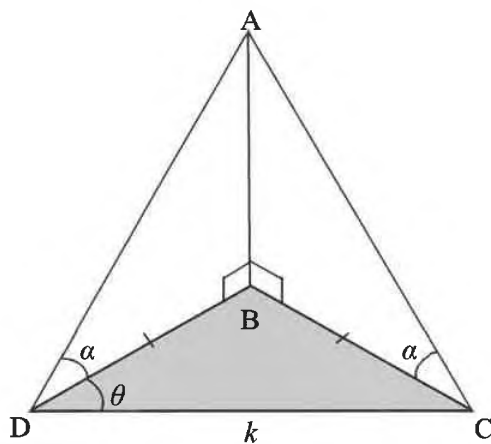
**QUESTION/VRAAG 7**

7.1



|       |                                                                                                                                        |                                                                         |
|-------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| 7.1.1 | $\sin \hat{B} = \frac{AD}{AB}$<br>$AD = AB \sin \hat{B}$                                                                               | $\checkmark \sin \hat{B} = \frac{AD}{AB}$<br>$\checkmark$ answer<br>(2) |
| 7.1.2 | $\text{Area of } \triangle ABC = \frac{1}{2}(BC)(AD)$<br>$\therefore \text{Area of } \triangle ABC = \frac{1}{2}(BC)(AB) \sin \hat{B}$ | $\checkmark \frac{1}{2}(BC)(AD)$<br>(1)                                 |

7.2

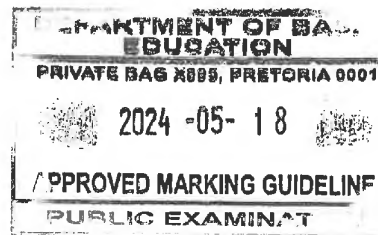


|       |                                                                                                                                                                                                                                                    |                                                                                                 |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| 7.2.1 | <p>In <math>\triangle ADB</math></p> $\sin \alpha = \frac{AB}{AD}$<br>$AD = \frac{AB}{\sin \alpha}$ <p>In <math>\triangle ABC</math></p> $\sin \alpha = \frac{AB}{AC}$<br>$AC = \frac{AB}{\sin \alpha}$ <p><math>AD = AC</math><br/> <b>OR</b></p> | $\checkmark \sin \alpha = \frac{AB}{AD}$<br><br>$\checkmark \sin \alpha = \frac{AB}{AC}$<br>(2) |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|



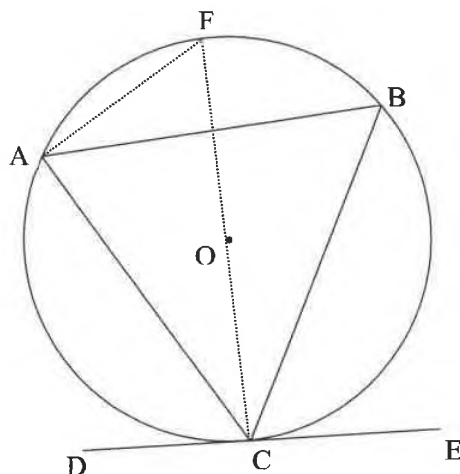
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|       | <p>In <math>\triangle ADB</math> and <math>\triangle ACB</math><br/> <math>AB = AB</math> [common side]<br/> <math>\hat{A}BD = \hat{A}BC = 90^\circ</math> [given]<br/> <math>BD = BC</math> [given]<br/> <math>\triangle ADB \equiv \triangle ACB</math> [S<math>\angle</math>S]<br/> <math>\therefore AD = AC</math></p> <p><b>OR</b></p> <p>In <math>\triangle ADB</math> and <math>\triangle ACB</math><br/> <math>\hat{A}DB = \hat{A}CB = \alpha</math> [given]<br/> <math>\hat{A}BD = \hat{A}BC = 90^\circ</math> [given]<br/> <math>AB = AB</math> <b>OR</b> <math>BD = BC</math> [common side <b>OR</b> given]<br/> <math>\therefore \triangle ADB \equiv \triangle ACB</math> [<math>\angle</math><math>\angle</math>S]<br/> <math>\therefore AD = AC</math></p> <p><b>OR</b></p> <p><math>AD^2 = AB^2 + DB^2</math> [Pythagoras]<br/> <math>AC^2 = AB^2 + BC^2</math> [Pythagoras]<br/>         But <math>DB = BC</math> [given]<br/> <math>\therefore AD^2 = AC^2</math><br/> <math>\therefore AD = AC</math></p> | <p><math>\checkmark \triangle ADB \equiv \triangle ACB \checkmark R</math><br/>         (2)</p> <p><math>\checkmark \triangle ADB \equiv \triangle ACB \checkmark R</math><br/>         (2)</p> <p><math>\checkmark</math> both Pythagoras statements<br/> <math>\checkmark DB = BC</math><br/>         (2)</p>                                                                                                   |
| 7.2.2 | <p><math>\frac{BD}{\sin \theta} = \frac{k}{\sin(180^\circ - 2\theta)}</math><br/> <math>BD = \frac{k \sin \theta}{\sin 2\theta}</math><br/> <math>BD = \frac{k \sin \theta}{2 \sin \theta \cos \theta}</math><br/> <math>BD = \frac{k}{2 \cos \theta}</math></p> <p><b>OR</b></p> <p><math>BC^2 = k^2 + BD^2 - 2k(BD)\cos \theta</math><br/> <math>BD^2 = k^2 + BD^2 - 2k(BD)\cos \theta</math><br/> <math>k^2 - 2k(BD)\cos \theta = 0</math><br/> <math>2k(BD)\cos \theta = k^2</math><br/> <math>\therefore BD = \frac{k}{2 \cos \theta}</math></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <p><math>\checkmark</math> substitution of <math>(180^\circ - 2\theta)</math> into sine rule<br/> <math>\checkmark</math> reduction<br/> <math>\checkmark</math> double angle<br/>         (3)</p> <p><math>\checkmark</math> substitution into cosine-rule<br/> <math>\checkmark</math> substitution BC with BD into cosine-rule<br/> <math>\checkmark</math> simplification in terms of BD<br/>         (3)</p> |

|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                           |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7.2.3 | <p>Area of <math>\triangle BCD = \frac{1}{2}(DC)(BD)(\sin \hat{CDB})</math></p> $= \frac{1}{2}k \left( \frac{k}{2 \cos \theta} \right) \sin \theta$ $= \frac{1}{4}k^2 \tan \theta$ <p><b>OR</b></p> <p>Area of <math>\triangle BCD = \frac{1}{2}(BD)(BC)(\sin(180^\circ - 2\theta))</math></p> $= \frac{1}{2} \left( \frac{k}{2 \cos \theta} \right) \left( \frac{k}{2 \cos \theta} \right) (\sin 2\theta)$ $= \frac{2k^2 \sin \theta \cos \theta}{8 \cos \theta \cos \theta}$ $= \frac{1}{4}k^2 \tan \theta$ | <p>✓ substitution into area rule</p> <p>✓ <math>\frac{\sin \theta}{\cos \theta} = \tan \theta</math></p> <p>✓ <math>\frac{1}{4}k^2 \tan \theta</math></p> <p>(3)</p> <p>✓ substitution into area rule</p> <p>✓ <math>\frac{\sin \theta}{\cos \theta} = \tan \theta</math></p> <p>✓ <math>\frac{1}{4}k^2 \tan \theta</math></p> <p>(3)</p> |
|       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | [11]                                                                                                                                                                                                                                                                                                                                      |

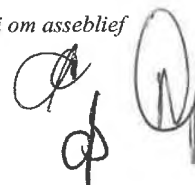
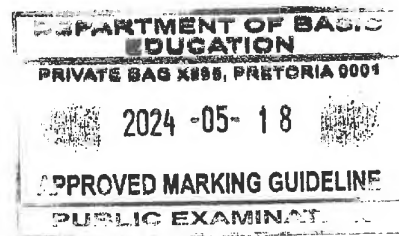


**QUESTION/VRAAG 8**

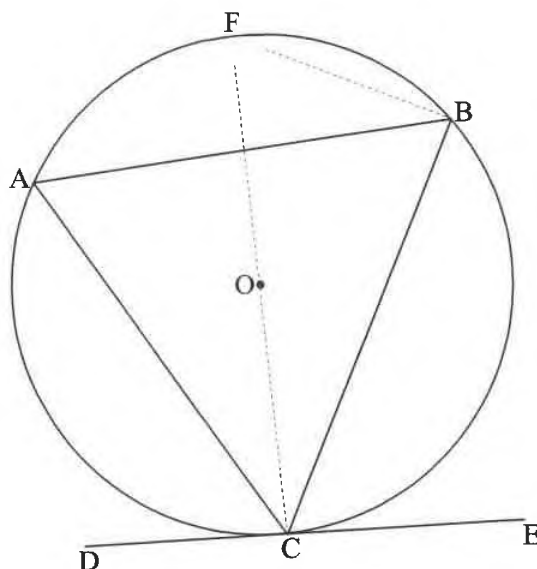
8.1



|                                                                                                   |          |
|---------------------------------------------------------------------------------------------------|----------|
| Construction: Draw diameter CF and draw AF<br><i>Konstruksie: Trek middellyn CF en verbind AF</i> | ✓ Constr |
| $\hat{FCE} = 90^\circ$ [tan $\perp$ radius/raaklyn $\perp$ radius]                                | ✓ S ✓ R  |
| $\hat{FAC} = 90^\circ$ [ $\angle$ in semi circle/ $\angle$ in halwe sirkel]                       | ✓ S/R    |
| $\hat{FAB} = \hat{FCB}$ [ $\angle$ s same segment/ $\angle$ e dieselfde segm]                     | ✓ S/R    |
| $\therefore \hat{BAC} = \hat{BCE}$<br>$\therefore \hat{BCE} = \hat{A}$                            | (5)      |

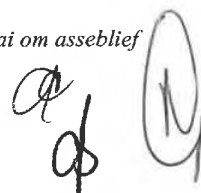
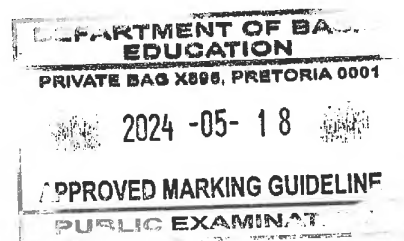
**OR**

8.1

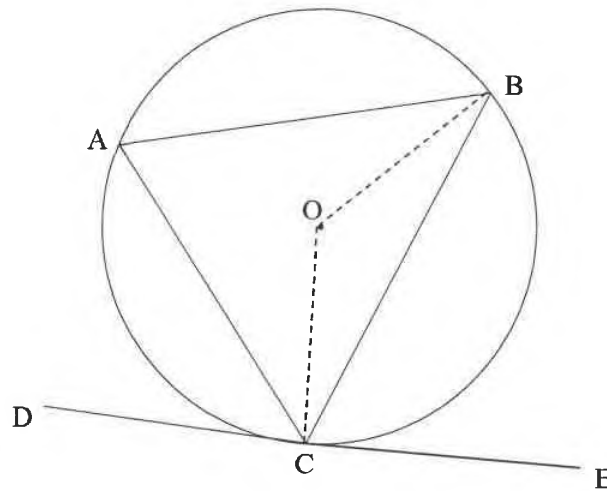


|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                               |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
|  | <p>Construction: Draw diameter CF and draw FB<br/> <i>Konstruksie: Trek middellyn CF en verbind FB</i></p> <p><math>\hat{FBC} = 90^\circ</math> [ <math>\angle</math> in semi circle/ <math>\angle</math> in halwe sirkel ]<br/> <math>\hat{BFC} + \hat{FCB} = 90^\circ</math> [ sum of <math>\angle</math>s in <math>\Delta</math>/binne <math>\angle</math>e v <math>\Delta</math> ]</p> <p><math>\hat{OCE} = 90^\circ</math> [ tan <math>\perp</math> radius/ raaklyn <math>\perp</math> radius ]<br/> <math>\therefore \hat{BCE} = \hat{F}</math><br/>         but <math>\hat{A} = \hat{F}</math> [ <math>\angle</math>s in same seg/ <math>\angle</math> in dies. segment ]<br/> <math>\therefore \hat{BCE} = \hat{A}</math></p> | <p>✓ construction</p> <p>✓ S / R</p> <p>✓ S ✓ R</p> <p>✓ S / R</p> <p>(5)</p> |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|

OR

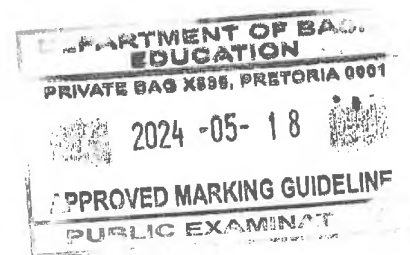


8.1

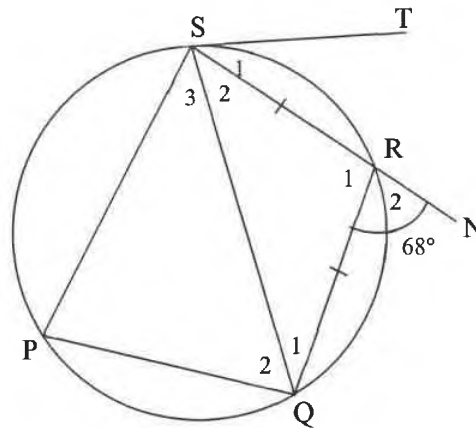


|                                                                                                                                                                                       |                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <p><b>Construction:</b> Draw radii BO and OC<br/> <b>Konstruksie:</b> Trek radiusse BO en OC</p>                                                                                      | ✓ construction |
| <p><math>\widehat{OCE} = 90^\circ</math> or <math>\widehat{BCE} = 90^\circ - \widehat{OCB}</math> [tan <math>\perp</math> radius /<br/> <i>raaklyn <math>\perp</math> radius</i>]</p> | ✓ S ✓R         |
| <p><math>\widehat{OCB} = \widehat{OBC}</math> [∠s opp equal sides/<br/> <i>∠e teenoor gelyke sye</i>]</p>                                                                             | ✓ S            |
| <p><math>\therefore \widehat{COB} = 180^\circ - 2\widehat{OCB}</math> [∠s of <math>\Delta</math> / <i>∠e van <math>\Delta</math></i>]</p>                                             |                |
| <p><math>\widehat{CAB} = 90^\circ - \widehat{OCB}</math> [∠ at centre = <math>2 \times</math> ∠ circumf/<br/> <i>midpts ∠ = <math>2 \times</math> omtreks ∠</i>]</p>                  | ✓ S/R          |
| <p><math>\therefore \widehat{BCE} = \widehat{CAB}</math></p>                                                                                                                          |                |

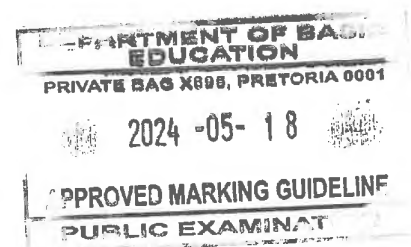
(5)



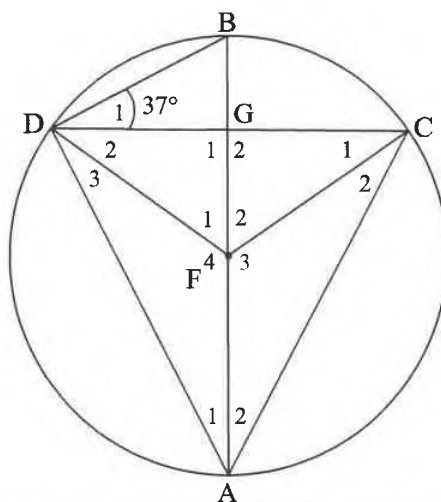
8.2



|       |                                                                                                    |                                                                                                                            |                |      |
|-------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|----------------|------|
| 8.2.1 | $\hat{P} = \hat{R}_2 = 68^\circ$                                                                   | [ext $\angle$ of cyclic quad /buite $\angle$ van kvh]                                                                      | ✓ S ✓ R        | (2)  |
| 8.2.2 | $\hat{Q}_1 = \hat{S}_2$<br>$\hat{Q}_1 + \hat{S}_2 = 68^\circ$<br>$\therefore \hat{Q}_1 = 34^\circ$ | [ $\angle$ s opp equal sides / $\angle$ e teenoor gelyke sye]<br>[ext $\angle$ of $\Delta$ / buite $\angle$ van $\Delta$ ] | ✓ S<br><br>✓ S | (2)  |
| 8.2.3 | $\hat{S}_1 = \hat{Q}_1 = 34^\circ$                                                                 | [tan-chord theorem/ $\angle$ tussen rkl en koord ]                                                                         | ✓ S ✓ R        | (2)  |
|       |                                                                                                    |                                                                                                                            |                | [11] |




## QUESTION/VRAAG 9

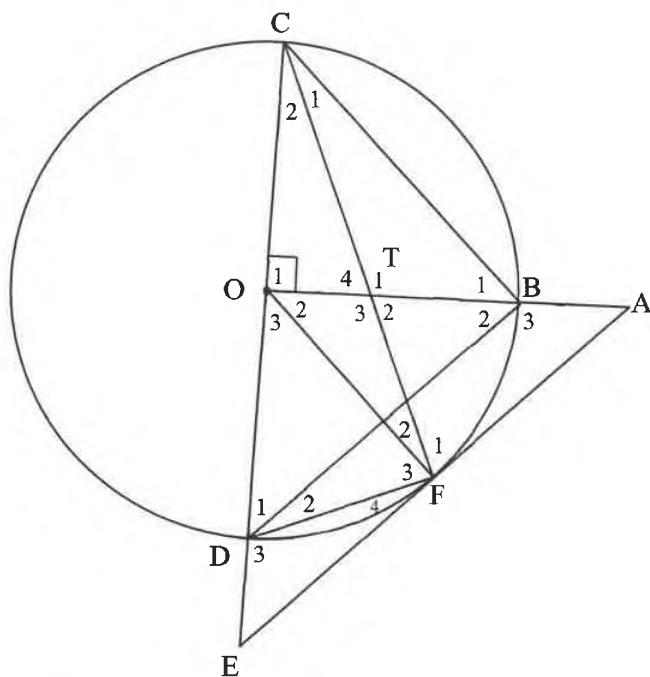


|     |                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                       |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9.1 | $\hat{A}_2 = \hat{D}_1 = 37^\circ$<br>$\hat{A}_1 = \hat{A}_2 = 37^\circ$<br>$\hat{D}_3 = \hat{A}_1 = 37^\circ$<br>$\hat{C}_2 = \hat{A}_2 = 37^\circ$                                                                                                                                                                                                    | $[\angle s \text{ in the same seg/} \angle e \text{ in dies segment}]$<br>$[BA \text{ bisects } \hat{C}\hat{A}\hat{D}/BA \text{ halveer } \hat{C}\hat{A}\hat{D}]$<br>$[\angle s \text{ opp equal sides/} \angle e \text{ teenoor gelyke sye}]$<br>$[\angle s \text{ opp equal sides/} \angle e \text{ teenoor gelyke sye}]$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | $\checkmark S \quad \checkmark R$<br><br>$\checkmark \checkmark$ any other two statements<br><br>(4)                                                                  |
| 9.2 | $\hat{A}\hat{D}\hat{G} = 53^\circ$<br>$\hat{A}_1 = 37^\circ$<br>$\therefore \hat{G}_1 = 90^\circ$<br>$\therefore CG = DG$<br><br><b>OR</b><br><br>$\hat{F}_2 = 2\hat{D}_1 = 74^\circ$<br>$\hat{D}_3 = 37^\circ$<br>$\therefore \hat{D}_2 = 16^\circ$<br>$\hat{C}_1 = \hat{D}_2 = 16^\circ$<br>$\therefore \hat{G}_2 = 90^\circ$<br>$\therefore CG = DG$ | $[\angle \text{ in semi circle/} \angle \text{ in halwe sirkel}]$<br>$[\text{proved in 9.1/reeds bewys in 9.1}]$<br>$[\text{sum of } \angle s \text{ in } \Delta/\text{binne } \angle e \text{ van } \Delta]$<br>$[\text{line from centre } \perp \text{ to chord/} \text{lyn uit midpt. } \perp \text{ op koord}]$<br><br>$[\angle \text{ at centre} = 2 \times \angle \text{ at circumference/} \text{midpt. } \angle s = 2 \times \text{omtreks } \angle]$<br>$[\text{proved in 9.1/reeds bewys in 9.1}]$<br>$[\angle \text{ in semi circle/} \angle \text{ in halwe sirkel}]$<br>$[\angle s \text{ opp equal sides/} \angle e \text{ teenoor gelyke sye}]$<br>$[\text{sum of } \angle s \text{ in } \Delta/\text{binne } \angle e \text{ van } \Delta]$<br>$[\text{line from centre } \perp \text{ to chord/} \text{lyn uit midpt. } \perp \text{ op koord}]$ | $\checkmark S \quad \checkmark R$<br><br>$\checkmark S$<br>$\checkmark R$<br><br>$\checkmark S \quad \checkmark R$<br><br>$\checkmark S$<br>$\checkmark R$<br><br>(4) |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                              |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9.3 | $\hat{F}_2 = 2\hat{D}_1 = 74^\circ$ <b>OR</b> $\hat{F}_2 = 2\hat{A}_2 = 74^\circ$ [ $\angle$ at centre = $2 \times \angle$ at circum./<br>midpt. $\angle s = 2 \times \text{omtreks} \angle$ ]<br><br>$\frac{FG}{20} = \cos 74^\circ$<br>$FG = 5,51$<br>$\therefore BG = 14,49$ units<br><br><b>OR</b><br><br>$\hat{F}_2 = 2\hat{D}_1 = 74^\circ$ [ $\angle$ at centre = $2 \times \angle$ at circumference<br>midpt. $\angle = 2 \times \text{omtreks} \angle$ ]<br><br>$\frac{FG}{20} = \sin 16^\circ$<br>$FG = 5,51$<br>$\therefore BG = 14,49$ units<br><br><b>OR</b><br><br>$\frac{DG}{20} = \cos 16^\circ$<br>$DG = 19,23$<br><br>$\frac{BG}{19,23} = \tan 37^\circ$<br>$BG = 14,49$ units<br><br><b>OR</b><br><br>$\frac{DG}{20} = \cos 16^\circ$<br>$DG = 19,23$<br><br>$FG^2 = FD^2 - DG^2$ [Pythagoras]<br>$FG^2 = 20^2 - (19,23)^2$<br>$FG = 5,51$<br><br>$BG = 20 - 5,51$<br>$= 14,49$ units | ✓ S<br><br>✓ trig ratio<br>✓ FG<br>✓ answer<br>(4)<br><br>✓ S<br><br>✓ trig ratio<br>✓ FG<br>✓ answer<br>(4)<br><br>✓ trig ratio<br>✓ length of DG<br><br>✓ trig ratio<br>✓ answer<br>(4)<br><br>✓ trig ratio<br>✓ length of DG<br><br>✓ correct use of<br>Pythagoras<br><br>✓ answer<br>(4) |
|     | DEPARTMENT OF BASIC EDUCATION<br>PRIVATE BAG X896, PRETORIA 0001<br>2024 -05- 18<br>APPROVED MARKING GUIDELINE<br>PUBLIC EXAMINATOR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | [12]                                                                                                                                                                                                                                                                                         |



## QUESTION/VRAAG 10



|      |                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                          |                                                 |
|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| 10.1 | $\hat{O}_1 = 90^\circ$<br>$\hat{F}_2 + \hat{F}_3 = 90^\circ$<br>$\hat{O}_1 = \hat{F}_2 + \hat{F}_3 = 90^\circ$<br>$\therefore$ TODF is a cyclic quad                                                                                           | [given/gegee]<br>[ $\angle$ in semi circle/ $\angle$ in halwe sirkel]<br>[ext $\angle$ = int opp $\angle$ /<br>buite $\angle$ = teenoorst. binne $\angle$ ]<br><b>OR</b><br>[converse ext $\angle$ of cyclic quad/<br>omgekeerde buite $\angle$ v kvh]                                   | ✓ S ✓ R<br>✓ S<br>✓ R<br>(4)                    |
| 10.2 | $\hat{T}_1 = \hat{T}_3$<br>But $\hat{D}_3 = \hat{T}_3$<br>$\therefore \hat{T}_1 = \hat{D}_3$                                                                                                                                                   | [vert opp $\angle$ s =/ regoorstaande $\angle$ e]<br>[ext $\angle$ of cyclic quad/ buite $\angle$ v kvh]                                                                                                                                                                                 | ✓ S / R<br>✓ S ✓ R<br>(3)                       |
| 10.3 | In $\triangle DFE$ and $\triangle TFO$<br>1) $\hat{D}_3 = \hat{T}_3$<br>2) $\hat{F}_4 = \hat{C}_2$<br>but $\hat{C}_2 = \hat{F}_2$<br>$\therefore \hat{F}_4 = \hat{F}_2$<br>3) $\hat{E} = \hat{O}_2$<br>$\triangle TFO \parallel \triangle DFE$ | [ext $\angle$ of cyclic quad/ buite $\angle$ v kvh]<br>[tan-chord theorem/<br>$\angle$ tussen rkl en koord ]<br>[ $\angle$ s opp equal sides/<br>$\angle$ e teenoor gelyke sye]<br>[3 <sup>rd</sup> $\angle$ of $\triangle$ / $\angle$ e van $\triangle$ ]<br>[ $\angle \angle \angle$ ] | ✓ S<br>✓ S / R<br>✓ S<br>✓ S<br>✓ S OR R<br>(5) |



|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |      |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
|      | <b>OR</b><br>In $\triangle DFE$ and $\triangle TFO$<br>1) $\hat{D}_3 = \hat{T}_3$ [ext $\angle$ of cyclic quad/buite $\angle$ van $\Delta$ ] ✓ S<br>2) $\hat{F}_4 = \hat{C}_2$ [tan-chord theorem/ $\angle$ tussen rkl en koord] ✓ S / R<br>$\hat{F}_2 + \hat{F}_3 = 90^\circ$ [ $\angle$ in semi circle/ $\angle$ in halwe sirkel]<br>$\hat{D}_1 + \hat{D}_2 = 90^\circ - \hat{C}_2$ [sum of $\angle$ s in $\Delta$ / binne $\angle$ e van $\Delta$ ]<br>$\hat{E} = 90^\circ - 2\hat{F}_4$ [ext $\angle$ of $\Delta$ / buite $\angle$ van $\Delta$ ] ✓ S<br>$\hat{O}_3 = 2\hat{C}_2$ [ $\angle$ at centre = $2 \times \angle$ at circumference/<br>midpt. $\angle$ s = $2 \times$ omtreks $\angle$ ]<br>$\hat{O}_2 = 90^\circ - 2\hat{F}_4$ [ $\angle$ s on a str line/ $\angle$ e op 'n reguitlyn] ✓ S<br>$\hat{O}_2 = \hat{E}$<br>3) $\therefore \hat{F}_4 = \hat{F}_2$ [ $3^{rd}$ $\angle$ of $\Delta$ / $\angle$ e van $\Delta$ ] ✓ S OR R<br>$\triangle TFO \parallel \triangle DFE$ [ $\angle \angle \angle$ ] (5) |      |
| 10.4 | $\hat{B}_2 = \hat{D}_1$ [ $\angle$ s opp equal sides/ $\angle$ e teenoor gelyke sye] ✓ S / R<br>$\hat{B}_2 = \hat{E}$ [given/gegee]<br>$\therefore \hat{D}_1 = \hat{E}$<br>$\therefore DB \parallel EA$ [corresp $\angle$ s =/ooreenkomstige $\angle$ e gelyk] ✓ R<br>(2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |
| 10.5 | In $\triangle OEA$<br>$DB \parallel EA$ [proven/reeds bewys]<br>$\frac{OD}{DE} = \frac{OB}{BA}$ [line $\parallel$ one side of $\Delta$ /lyn $\parallel$ een sy van $\Delta$ ] ✓ R<br><b>OR</b><br>[prop theorem; $DB \parallel EA$ /<br>eweredigheid stelling; $DB \parallel EA$ ]<br>$\therefore DE = \frac{DO \cdot AB}{OB}$ ✓ S<br>$\frac{FO}{FE} = \frac{TO}{DE}$ [ $\triangle TFO \parallel \triangle DFE$ ] ✓ S / R<br>$DE = \frac{TO \cdot FE}{FO}$ ✓ S<br>$\therefore \frac{DO \cdot AB}{OB} = \frac{TO \cdot FE}{FO}$ ✓ S<br>$\therefore \frac{DO \cdot AB}{DO} = \frac{TO \cdot FE}{DO}$ [DO = OB = FO]<br>$\therefore DO = \frac{TO \cdot FE}{AB}$ (5)                                                                                                                                                                                                                                                                                                                                                         |      |
|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | [19] |

TOTAL/TOTAAL: 150