

# Soek jy 'n fantastiese tutor?

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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 2023**

**MARKS: 150  
PUNTE: 150**

**These marking guidelines consist of 21 pages./  
Hierdie nasienriglyne bestaan uit 21 bladsye.**

**NOTE:**

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

**LET WEL:**

- As 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.
- As 'n kandidaat 'n antwoord van 'n vraag doodtrek en nie oordoen nie, merk die doodgetrekte poging.
- 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.

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

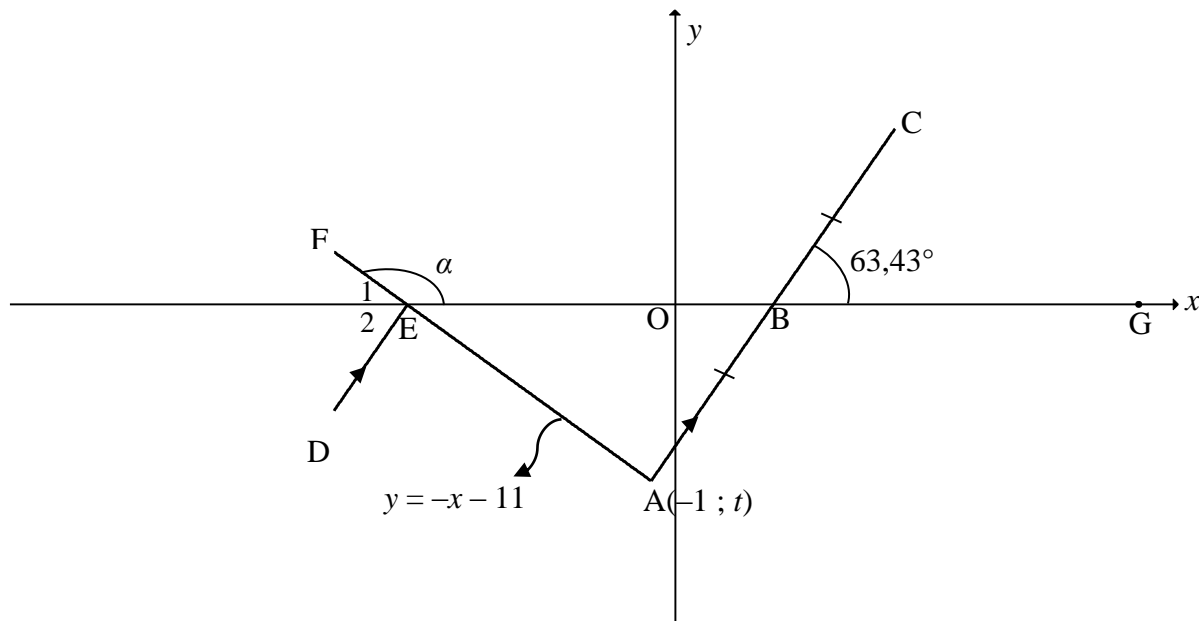
**QUESTION/VRAAG 1**

|       |   |   |
|-------|---|---|
| 1.1.1 | $a = 1730,22$<br>$b = 13,96$<br>$\hat{y} = 1730,22 + 13,96x$  | $\checkmark a = 1730,22$<br>$\checkmark b = 13,96$<br>$\checkmark$ equation<br>(3)                  |
| 1.1.2 | $\hat{y} = 1730,22 + 13,96x$<br>$\hat{y} = 1730,22 + 13,96(28500)$<br>$\hat{y} = R399\,590,22$<br><br><b>OR/OF</b><br><br>$\hat{y} = R399\,599,64$ (calc)   | $\checkmark$ substitution<br>$\checkmark$ answer<br>(2)<br><br>$\checkmark\checkmark$ answer<br>(2) |
| 1.1.3 | $r = 0,98002 \dots$<br>$r = 0,98$   | $\checkmark$ answer<br>(1)  |
| 1.1.4 | There is a very strong positive correlation between the amount spent on advertising and sales. /<br><i>Daar is 'n baie sterk positiewe korrelasie tussen die bedrag spandeer op advertensie en die verkope.</i> | $\checkmark$ strong positive<br>(1)   |
| 1.2.1 | $\bar{x} = \frac{1\,552\,195}{9}$<br>$\bar{x} = 172\,466,11$  | $\checkmark \bar{x} = \frac{1\,552\,195}{9}$<br>$\checkmark$ answer<br>(2)                          |
| 1.2.2 | $\sigma = 56\,950,09$   | $\checkmark$ answer<br>(1)  |
| 1.2.3 | $\bar{x} + \sigma$<br>$= 172\,466,11 + 56\,950,09$<br>$= 229\,416,20$<br><br>2 years/jaar   | $\checkmark \bar{x} + \sigma$<br>$\checkmark$ answer<br>(2)   |
|       |   | <b>[12]</b>   |

**QUESTION/VRAAG 2**

| 2.1              | $35 < x \leq 45$   | ✓ answer<br>(1)   |                  |                      |                 |    |    |                  |    |    |                  |    |     |                  |    |     |                  |    |     |                  |    |     |                  |    |     |  |
|------------------|--|---|------------------|----------------------|-----------------|----|----|------------------|----|----|------------------|----|-----|------------------|----|-----|------------------|----|-----|------------------|----|-----|------------------|----|-----|--|
| 2.2              | 320 people/mense   | ✓ answer<br>(1)   |                  |                      |                 |    |    |                  |    |    |                  |    |     |                  |    |     |                  |    |     |                  |    |     |                  |    |     |  |
| 2.3              | <table border="1"> <thead> <tr> <th>AGE</th><th>NUMBER OF PEOPLE</th><th>CUMULATIVE FREQUENCY</th></tr> </thead> <tbody> <tr> <td><math>5 &lt; x \leq 15</math></td><td>20</td><td>20</td></tr> <tr> <td><math>15 &lt; x \leq 25</math></td><td>25</td><td>45</td></tr> <tr> <td><math>25 &lt; x \leq 35</math></td><td>60</td><td>105</td></tr> <tr> <td><math>35 &lt; x \leq 45</math></td><td>90</td><td>195</td></tr> <tr> <td><math>45 &lt; x \leq 55</math></td><td>55</td><td>250</td></tr> <tr> <td><math>55 &lt; x \leq 65</math></td><td>40</td><td>290</td></tr> <tr> <td><math>65 &lt; x \leq 75</math></td><td>30</td><td>320</td></tr> </tbody> </table> | AGE   | NUMBER OF PEOPLE | CUMULATIVE FREQUENCY | $5 < x \leq 15$ | 20 | 20 | $15 < x \leq 25$ | 25 | 45 | $25 < x \leq 35$ | 60 | 105 | $35 < x \leq 45$ | 90 | 195 | $45 < x \leq 55$ | 55 | 250 | $55 < x \leq 65$ | 40 | 290 | $65 < x \leq 75$ | 30 | 320 |  |
| AGE              | NUMBER OF PEOPLE   | CUMULATIVE FREQUENCY  |                  |                      |                 |    |    |                  |    |    |                  |    |     |                  |    |     |                  |    |     |                  |    |     |                  |    |     |  |
| $5 < x \leq 15$  | 20   | 20  |                  |                      |                 |    |    |                  |    |    |                  |    |     |                  |    |     |                  |    |     |                  |    |     |                  |    |     |  |
| $15 < x \leq 25$ | 25   | 45  |                  |                      |                 |    |    |                  |    |    |                  |    |     |                  |    |     |                  |    |     |                  |    |     |                  |    |     |  |
| $25 < x \leq 35$ | 60   | 105   |                  |                      |                 |    |    |                  |    |    |                  |    |     |                  |    |     |                  |    |     |                  |    |     |                  |    |     |  |
| $35 < x \leq 45$ | 90   | 195   |                  |                      |                 |    |    |                  |    |    |                  |    |     |                  |    |     |                  |    |     |                  |    |     |                  |    |     |  |
| $45 < x \leq 55$ | 55   | 250   |                  |                      |                 |    |    |                  |    |    |                  |    |     |                  |    |     |                  |    |     |                  |    |     |                  |    |     |  |
| $55 < x \leq 65$ | 40   | 290   |                  |                      |                 |    |    |                  |    |    |                  |    |     |                  |    |     |                  |    |     |                  |    |     |                  |    |     |  |
| $65 < x \leq 75$ | 30   | 320   |                  |                      |                 |    |    |                  |    |    |                  |    |     |                  |    |     |                  |    |     |                  |    |     |                  |    |     |  |
|                  | <p style="text-align: center;"><b>OGIVE/OGIEF</b></p>  | <ul style="list-style-type: none"> <li>✓ cumulative frequency</li> <li>✓ grounding</li> <li>✓ plotting at upper limit</li> <li>✓ shape</li> </ul> <p style="text-align: right;">(4)</p> |                  |                      |                 |    |    |                  |    |    |                  |    |     |                  |    |     |                  |    |     |                  |    |     |                  |    |     |  |
| 2.4              | Median = 41  | ✓✓ answer<br>(2)  |                  |                      |                 |    |    |                  |    |    |                  |    |     |                  |    |     |                  |    |     |                  |    |     |                  |    |     |  |
|                  |  | <b>[8]</b>  |                  |                      |                 |    |    |                  |    |    |                  |    |     |                  |    |     |                  |    |     |                  |    |     |                  |    |     |  |

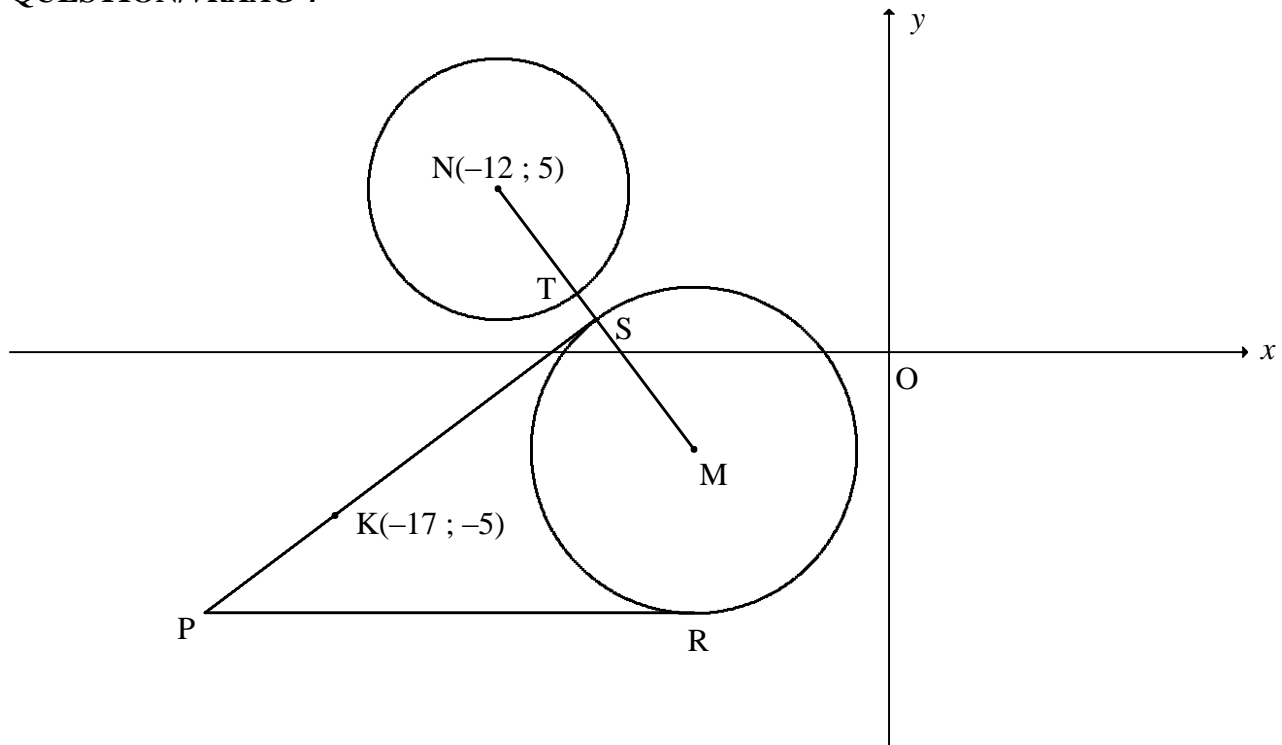
**QUESTION/VRAAG 3**



|       |  |  |
|-------|--|--|
| 3.1.1 | $y = -x - 11$<br>$A(-1 ; t)$<br>$t = -(-1) - 11$<br>$t = -10$                                  | ✓ substitution<br>✓ value of $t$<br>(2)  |
| 3.1.2 | $\tan \alpha = -1$<br>$ref.\angle = 45^\circ$<br>$\therefore \alpha = 135^\circ$               | ✓ $\tan \alpha = -1$<br>✓ $135^\circ$<br>(2)   |
| 3.1.3 | $\tan 63,43^\circ = m_{AC}$<br>$m_{AC} = 2$  | ✓ $\tan 63,43^\circ = m_{AC}$<br>✓ answer<br>(2)   |
| 3.2   | $m_{AC} = 2$<br>$A(-1 ; -10)$<br>$y = 2x + k$<br>$-10 = 2(-1) + k$<br>$k = -8$<br>$y = 2x - 8$ | <b>OR/OF</b> $y - y_1 = 2(x - x_1)$<br>$y - (-10) = 2(x - (-1))$<br>$y = 2x - 8$<br>✓ substitution of $m$ and A<br>✓ equation<br>(2) |

|       |  |   |
|-------|--|---|
| 3.3.1 | $y = 2x - 8$<br>$0 = 2x - 8$<br>$x_B = 4$<br><br>$\frac{x_C + (-1)}{2} = 4$<br>$x_C = 9$<br><br>$\frac{y_C + (-10)}{2} = 0$<br>$y_C = 10$<br><br><b>OR/OF</b> by translation / <i>met translasie</i><br><br>$A \rightarrow B (x; y) \rightarrow (x+5; y+10)$<br>$B \rightarrow C (4; 0) \rightarrow (4+5; 0+10) = (9; 10)$   | $\checkmark x_B = 4$<br><br>$\checkmark x_C = 9 \quad \checkmark y_C = 10$<br>(3)<br><br>$\checkmark (x+5; y+10)$<br>$\checkmark x_C = 9 \quad \checkmark y_C = 10$<br>(3)  |
| 3.3.2 | $\hat{A}BE = 63,43^\circ$<br>$\hat{E}_2 = 63,43^\circ$<br>$\hat{E}_1 = 45^\circ$<br>$\hat{F}ED = 108,43^\circ$<br><br><b>OR/OF</b><br><br>$\hat{E}AB = 135^\circ - 63,43^\circ$<br>$\hat{E}AB = 71,57^\circ$<br>$\hat{D}EA = \hat{E}AB = 71,57^\circ$<br>$\hat{F}ED = 108,43^\circ$<br><br><b>OR/OF</b><br><br>$\hat{A}BE = 63,43^\circ$<br>$\hat{D}EO = 116,57^\circ$<br>$\hat{F}ED = 360^\circ - (116,57^\circ + 135^\circ)$<br>$= 108,43^\circ$ | [vert. opp $\angle$ 's =]<br>[corres. $\angle$ 's, $DE \parallel AB$ ]<br>[ $\angle$ s on a str line]<br><br>$\checkmark \hat{A}BE = 63,43^\circ$<br>$\checkmark \hat{E}_1 = 45^\circ$<br>$\checkmark \hat{F}ED = 108,43^\circ$<br>(3)<br><br>$\checkmark \hat{E}AB = 71,57^\circ$<br>$\checkmark \hat{D}EA = \hat{E}AB = 71,57^\circ$<br>$\checkmark \hat{F}ED = 108,43^\circ$<br>(3)<br><br>$\checkmark \hat{A}BE = 63,43^\circ$<br>$\checkmark \hat{D}EO = 116,57^\circ$<br>$\checkmark \hat{F}ED = 108,43^\circ$<br>(3) |
| 3.4   | $y = 0$<br>$x_E = -11$<br>$\frac{x_G + (-11)}{2} = 4$<br>$x_G = 19$<br><br>$(x-19)^2 + y^2 = 15^2$<br>$(x-19)^2 + y^2 = 225$   | $\checkmark x_E = -11$<br><br>$\checkmark x_G = 19$<br><br>$\checkmark (x-19)^2 + y^2 \quad \checkmark 225$<br>(4)  |
|       |  | <b>[18]</b>   |

**QUESTION/VRAAG 4**



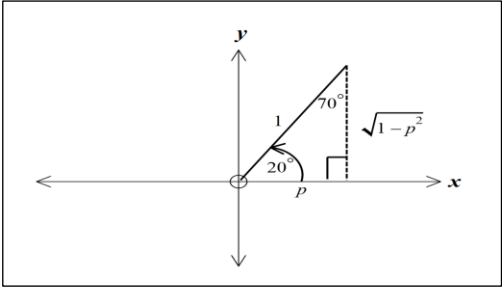
|       |   |  |
|-------|---|--|
| 4.1   | $M(-6; -3)$   | ✓ $-6$ ✓ $-3$<br>(2)   |
| 4.2.1 | $x^2 + y^2 + 24x - 10y + 153 = 0$<br>$(x+12)^2 + (y-5)^2 = -153 + 144 + 25$<br>$(x+12)^2 + (y-5)^2 = 16$<br>$r^2 = 16$<br>$r = 4$ units | ✓ $r^2 = -153 + 144 + 25$<br>✓ length of radius<br>(2)   |
| 4.2.2 | $NM = \sqrt{(-12 - (-6))^2 + (5 - (-3))^2}$<br>$NM = 10$ units<br>$SM = 5$ units<br>$\therefore TS = 10 - 5 - 4 = 1$ unit               | ✓ substitution into distance formula<br>✓ $NM = 10$ units<br>✓ $SM = 5$ units<br>✓ answer<br>(4) |
| 4.3.1 | $R(-6; -8)$<br>$y = -8$   | ✓ $y_R = -8$<br>✓ answer<br>(2)  |



|              |  |  |
|--------------|--|--|
| <p>4.3.2</p> | $m_{NM} = \frac{5 - (-3)}{-12 - (-6)}$ $m_{NM} = -\frac{4}{3}$ $m_{\text{tangent}} = \frac{3}{4}$ $-5 = \frac{3}{4}(-17) + c \quad \text{OR/OF} \quad y - y_1 = \frac{3}{4}(x - x_1)$ $c = \frac{31}{4} \quad y - (-5) = \frac{3}{4}(x - (-17))$ $y = \frac{3}{4}x + \frac{31}{4} \quad y = \frac{3}{4}x + \frac{31}{4}$ <p><b>OR/OF</b></p> $NS = SM = 5$ $S\left(\frac{-12-6}{2}; \frac{5-3}{2}\right)$ $S(-9; 1)$ $m_{SK} = \frac{1 - (-5)}{-9 + 17}$ $= \frac{6}{8} = \frac{3}{4}$ $y + 5 = \frac{3}{4}(x + 17)$ $y = \frac{3}{4}x + \frac{31}{4} \text{ or } y = \frac{3}{4}x + 7\frac{3}{4}$ | <p>✓ substitution</p> <p>✓ <math>m_{NM} = -\frac{4}{3}</math></p> <p>✓ <math>m_{\text{tangent}} = \frac{3}{4}</math></p> <p>✓ substitution of <math>m</math> and <math>N</math></p> <p>✓ equation (5)</p> <p>✓ <math>S</math> midpoint</p> <p>✓ coordinates of <math>S</math></p> <p>✓ <math>m_{\text{tangent}} = \frac{3}{4}</math></p> <p>✓ substitution of <math>m</math> and <math>K(-17; -5)</math> or <math>S</math></p> <p>✓ equation (5)</p> |
| <p>4.4.1</p> | $-8 = \frac{3}{4}x + \frac{31}{4}$ $-32 = 3x + 31$ $3x = -63$ $x = -21$ $P(-21; -8)$ $R(-6; -8)$ <p><math>PR = PS = 15</math> units [tangents from same point]</p> <p><math>MS = MR = 5</math> units</p> <p>Perimeter PSMR = <math>15 + 15 + 5 + 5</math><br/>= 40 units</p>   | <p>✓ <math>-8 = \frac{3}{4}x + \frac{31}{4}</math></p> <p>✓ <math>x = -21</math></p> <p>✓ <math>PR = PS = 15</math> units</p> <p>✓ <math>MS = MR = 5</math> units</p> <p>✓ answer (5)</p>  |

|       |   |  |
|-------|---|--|
| 4.4.2 | $\frac{\text{area of } \triangle NPS}{\text{area of quadrilateral PSMR}}$ $\frac{\frac{1}{2} NS.SP}{\frac{1}{2} SP.MS + \frac{1}{2} MR.PR}$ $= \frac{\frac{1}{2} (5)(15)}{2\left(\frac{1}{2}\right)(5)(15)}$ $= \frac{1}{2}$ <p><b>OR</b></p> $\triangle NPS \equiv \triangle SPM \equiv \triangle MPR$ $\frac{\text{area of } \triangle NPS}{\text{area of quadrilateral PSMR}}$ $= \frac{1}{2}$ | <p>✓ substitution</p> <p>✓ answer (2)</p> <p>✓ congruent</p> <p>✓ answer (2)</p> |
|       |   | <b>[22]</b>  |

**QUESTION/VRAAG 5**

|       |  |   |
|-------|--|---|
| 5.1   | $\frac{1 - \sin(-\theta)\cos(90^\circ + \theta)}{\cos(\theta - 360^\circ)}$ $= \frac{1 - (-\sin\theta)(-\sin\theta)}{\cos\theta}$ $= \frac{1 - \sin^2\theta}{\cos\theta}$ $= \frac{\cos^2\theta}{\cos\theta}$ $= \cos\theta$   | <p>✓ <math>-\sin\theta</math> ✓ <math>-\sin\theta</math><br/>✓ <math>\cos\theta</math></p> <p>✓ <math>\cos^2\theta</math><br/>✓ answer</p> <p>(5)</p>                   |
| 5.2.1 | $\cos 200^\circ$ $= -\cos 20^\circ$ $= -p$   | <p>✓ reduction<br/>✓ answer</p> <p>(2)</p>  |
| 5.2.2 | $\sin(-70^\circ)$ $= -\sin 70^\circ$ $= -\cos 20^\circ$ $= -p$ <p><b>OR/OF</b></p> $\sin(-70^\circ)$ $= -\sin 70^\circ$ $= -p$    | <p>✓ reduction<br/>✓ answer</p> <p>(2)</p> <p>✓ reduction<br/>✓ answer</p> <p>(2)</p>   |
| 5.2.3 | $\sin 10^\circ$ $\cos(2(10^\circ)) = 1 - 2\sin^2 10^\circ$ $2\sin^2 10^\circ = 1 - \cos 20^\circ$ $\sin 10^\circ = \sqrt{\frac{1 - \cos 20^\circ}{2}}$ $\sin 10^\circ = \sqrt{\frac{1 - p}{2}}$ <p><b>OR/OF</b></p> $\sin 10^\circ$ $\sin(30^\circ - 20^\circ)$ $= \sin 30^\circ \cos 20^\circ - \cos 30^\circ \sin 20^\circ$ $= \frac{1}{2}p - \frac{\sqrt{3}}{2}\sqrt{1-p^2} = \frac{p - \sqrt{3}\sqrt{1-p^2}}{2}$ <p><b>OR/OF</b></p> | <p>✓ double angle</p> <p>✓ <math>\sin 10^\circ</math> as subject</p> <p>✓ answer</p> <p>(3)</p> <p>✓ using special angle<br/>✓ expanding</p> <p>✓ answer</p> <p>(3)</p> |

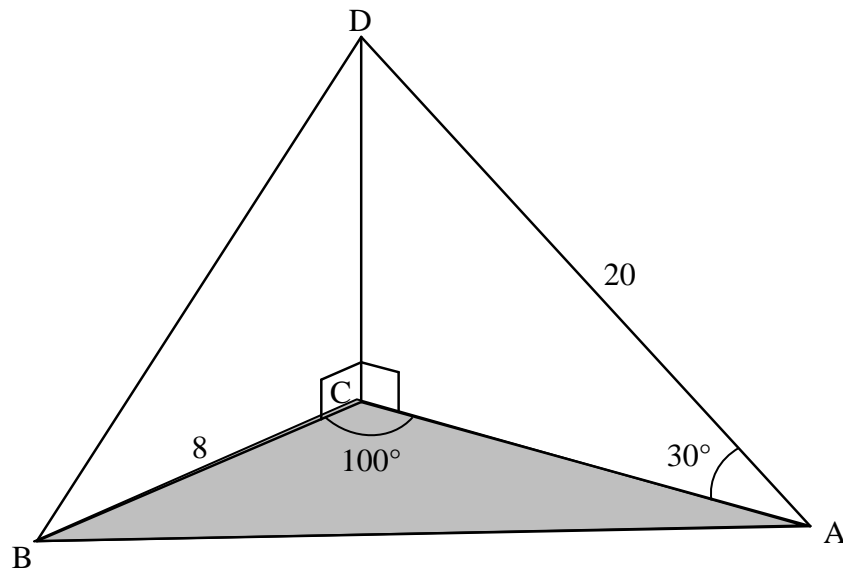
|       |  |  |
|-------|--|--|
|       | $\sin 10^\circ$ $\sin(70^\circ - 60^\circ)$ $= \sin 70^\circ \cos 60^\circ - \cos 70^\circ \sin 60^\circ$ $= p \cdot \frac{1}{2} - \sqrt{1-p^2} \times \frac{\sqrt{3}}{2} = \frac{p - \sqrt{3}\sqrt{1-p^2}}{2}$ <p><b>OR/OF</b></p> $\sin 10^\circ$ $= \cos 80^\circ$ $\cos(60^\circ + 20^\circ)$ $= \cos 60^\circ \cos 20^\circ - \sin 60^\circ \sin 20^\circ$ $= \frac{1}{2}p - \frac{\sqrt{3}}{2} \cdot \sqrt{1-p^2}$ | <p>✓ using special angle<br/>✓ expanding</p> <p>✓ answer (3)</p> <p>✓ using special angle<br/>✓ expanding</p> <p>✓ answer (3)</p>      |
| 5.3   | $\cos(A + 55^\circ)\cos(A + 10^\circ) + \sin(A + 55^\circ)\sin(A + 10^\circ)$ $= \cos[A + 55^\circ - (A + 10^\circ)]$ $= \cos 45^\circ$ $= \frac{1}{\sqrt{2}} \quad \text{or} \quad \frac{\sqrt{2}}{2}$  | <p>✓✓ compound identity</p> <p>✓ answer (3)</p>  |
| 5.4.1 | $\text{LHS} = \frac{\cos 2x + \sin 2x - \cos^2 x}{\sin x - 2 \cos x} \qquad \text{RHS} = -\sin x$ $= \frac{\cos^2 x - \sin^2 x + 2 \sin x \cos x - \cos^2 x}{\sin x - 2 \cos x}$ $= \frac{-\sin^2 x + 2 \sin x \cos x}{\sin x - 2 \cos x}$ $= \frac{-\sin x(\sin x - 2 \cos x)}{\sin x - 2 \cos x}$ $= -\sin x$ $\therefore \text{LHS} = \text{RHS}$   | <p>✓ <math>\cos^2 x - \sin^2 x</math><br/>✓ <math>2 \sin x \cos x</math></p> <p>✓ common factor of <math>-\sin x</math></p> <p>(3)</p> |
| 5.4.2 | $\frac{\cos 2x + \sin 2x - \cos^2 x}{-3 \sin^2 x + 6 \sin x \cos x}$ $= \frac{\cos 2x + \sin 2x - \cos^2 x}{-3 \sin x(\sin x - 2 \cos x)}$ $= \frac{\cos 2x + \sin 2x - \cos^2 x}{(\sin x - 2 \cos x)} \times \frac{1}{-3 \sin x}$ $= (-\sin x) \times \frac{1}{-3 \sin x}$ $= \frac{1}{3}$  | <p>✓ common factor of <math>-3 \sin x</math></p> <p>✓ substitution</p> <p>✓ answer (3)</p>   |

|       |  |   |
|-------|--|---|
| 5.5.1 | $3 \tan 4x = -2 \cos 4x$<br>$3 \left( \frac{\sin 4x}{\cos 4x} \right) = -2 \cos 4x$<br>$3 \sin 4x + 2 \cos^2 4x = 0$<br>$3 \sin 4x + 2(1 - \sin^2 4x) = 0$<br>$-2 \sin^2 4x + 3 \sin 4x + 2 = 0$<br>$2 \sin^2 4x - 3 \sin 4x - 2 = 0$<br>$(2 \sin 4x + 1)(\sin 4x - 2) = 0$<br>$\sin 4x = -\frac{1}{2} \quad \text{or} \quad \sin 4x \neq 2$ | <p>✓ identity</p> <p>✓ <math>1 - \sin^2 4x</math></p> <p>✓ standard form</p> <p>✓ factors</p> <p>(4)</p>  |
| 5.5.2 | $\sin 4x = -\frac{1}{2}$<br>$\text{ref. } \angle = 30^\circ$<br>$4x = 210^\circ + k.360^\circ \quad \text{or} \quad 4x = 330^\circ + k.360^\circ$<br>$x = 52,5^\circ + k.90^\circ ; k \in Z \quad \quad \quad x = 82,5^\circ + k.90^\circ ; k \in Z$   | <p>✓ <math>210^\circ ; 330^\circ</math></p> <p>✓ <math>52,5^\circ ; 82,5^\circ</math></p> <p>✓ <math>k.90^\circ ; k \in Z</math></p> <p>(3)</p> |
|       |  | [28]  |

**QUESTION/VRAAG 6**

|       |  |  |
|-------|--|--|
| 6.1   | Period = $180^\circ$   | ✓ answer<br>(1)  |
| 6.2   |  | ✓ x-intercepts<br>✓ turning points<br>✓ end points<br>(3)  |
| 6.3   | $y \in [-1; 1]$ <b>OR/OF</b> $-1 \leq y \leq 1$  | ✓ answer<br>(1)  |
| 6.4   | $g(x) = -\cos 2x$<br>$g(x + 45^\circ) = -\cos 2(x + 45^\circ)$<br>$= -\cos(2x + 90^\circ)$<br>$= \sin 2x$  | ✓ $-\cos 2(x + 45^\circ)$<br>✓ answer<br>(2)   |
| 6.5.1 | $x \in (-90^\circ; -45^\circ)$ <b>OR/OF</b> $-90^\circ < x < -45^\circ$  | ✓✓ $x \in (-90^\circ; -45^\circ)$<br>(2)   |
| 6.5.2 | $2 \cos 2x - 1 > 0$<br>$\cos 2x > \frac{1}{2}$<br>$-\cos 2x < -\frac{1}{2}$<br>$x \in (-30^\circ; 30^\circ)$ <b>OR/OF</b> $-30^\circ < x < 30^\circ$ | ✓ $\cos 2x > \frac{1}{2}$<br>✓ $-\cos 2x < -\frac{1}{2}$<br>✓ $x = \pm 30^\circ$ ✓ interval<br>(4) |
|       |  | <b>[13]</b>  |

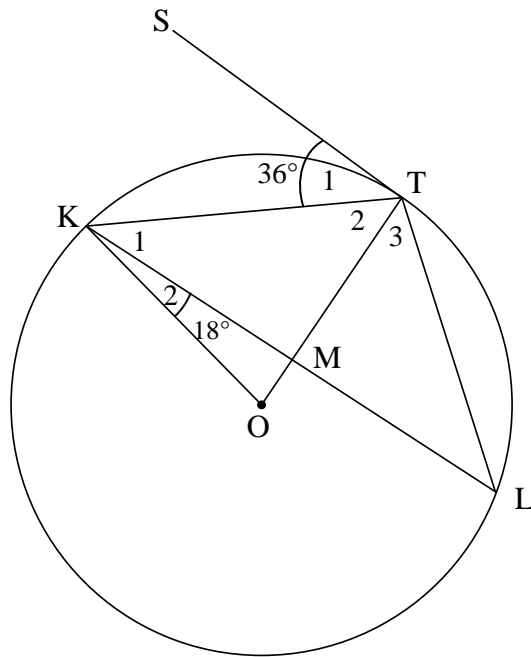
## QUESTION/VRAAG 7



|       |  |   |
|-------|--|---|
| 7.1.1 | $\frac{AC}{20} = \cos 30^\circ$ $AC = 20 \cos 30^\circ$ $AC = 10\sqrt{3} = 17,32 \text{ units}$ <p><b>OR/OF</b></p> $\frac{AC}{\sin 60^\circ} = \frac{20}{\sin 90^\circ}$ $\therefore AC = 20 \sin 60 = 17,32$ | ✓ trig ratio<br><br>✓ answer (2)<br><br><br>✓ trig ratio<br>✓ answer (2)                      |
| 7.1.2 | $AB^2 = AC^2 + BC^2 - 2AC \cdot BC \cos \hat{ACB}$ $AB^2 = (10\sqrt{3})^2 + 8^2 - 2(10\sqrt{3})(8) \cos 100^\circ$ $AB = 20,30 \text{ units}$  | ✓ cosine formula<br><br>✓ substitution into cosine formula<br>✓ answer (3)                    |
| 7.2   | $\frac{\sin \hat{ADB}}{AB} = \frac{\sin \hat{ABD}}{AD}$ $\frac{\sin \hat{ADB}}{20,3} = \frac{\sin 73,4^\circ}{20}$ $\sin \hat{ADB} = \frac{20,3 \sin 73,4^\circ}{20}$ $\hat{ADB} = 76,58^\circ$                | ✓ sine formula in $\triangle ABD$<br><br>✓ substitution into sine formula<br><br>✓ answer (3) |
|       |  | <b>[8]</b>  |

### QUESTION/VRAAG 8

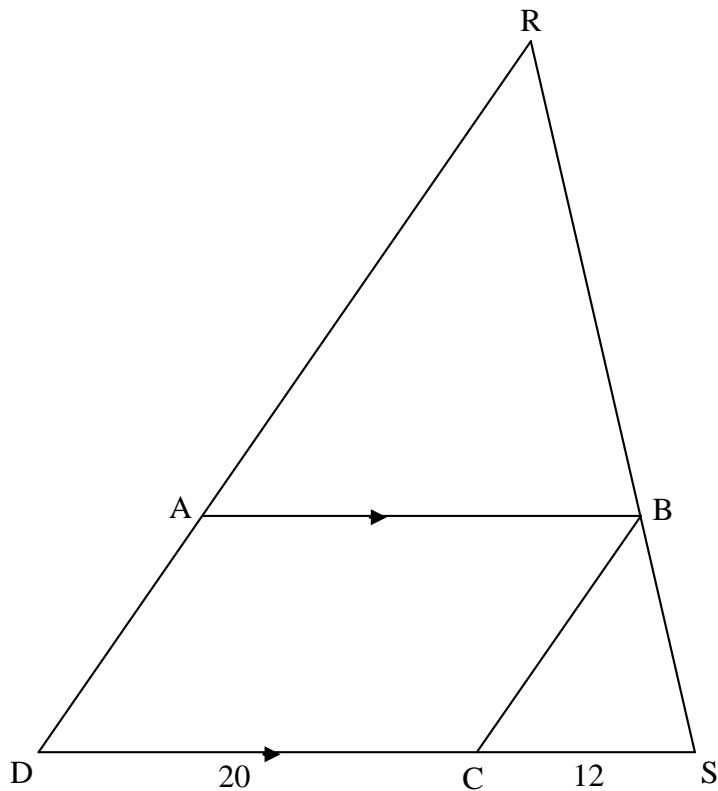
8.1



|          |   |  |
|----------|---|--|
| 8.1.1(a) | $\hat{T}_2 = 54^\circ$<br>[tan $\perp$ rad]   | ✓ S ✓R<br>(2)  |
| 8.1.1(b) | $\hat{L}=36^\circ$<br>[tan - chord theorem]   | ✓ S ✓R<br>(2)  |
| 8.1.1(c) | $\hat{KOT}=72^\circ$<br>[ $\angle$ at centre = $2 \times \angle$ at circumference]<br><br><b>OR/OF</b><br><br>$\hat{OKT} = \hat{T}_2 = 54^\circ$ [Zs opposite = radii]<br>$\hat{KOT} = 180^\circ - (54^\circ + 54^\circ)$ [sum of int $\angle$ 's of $\Delta$ ]<br>$= 72^\circ$   | ✓ S ✓R<br>(2)<br><br><br><br>✓ S/R<br><br>✓ S<br>(2)                             |
| 8.1.2    | $\hat{KMO} = 180^\circ - (18^\circ + 72^\circ)$<br>$= 90^\circ$ [sum of int $\angle$ 's of $\Delta$ ]<br><br>$\therefore KM = ML$ [line from centre $\perp$ to chord]<br><br><b>OR/OF</b><br><br>$\hat{OKT} = 54^\circ$ [Zs opposite = radii]<br>$\hat{K}_1 = 54^\circ - 18^\circ = 36^\circ$<br>$\hat{TMK} = 90^\circ$ [sum of int $\angle$ 's of $\Delta$ ]<br>$\therefore KM = ML$ [line from centre $\perp$ to chord] | ✓ S<br>✓ S<br><br>✓ R<br>(3)<br><br><br><br><br><br>✓ S<br><br>✓ S<br>✓ R<br>(3) |



8.2

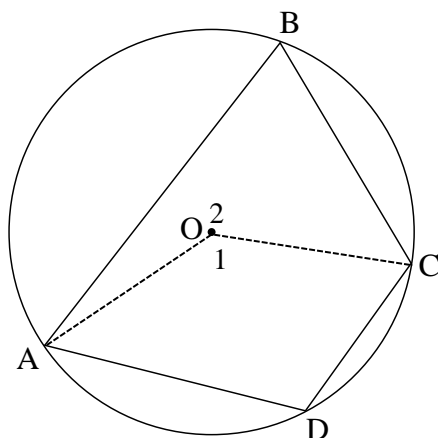


|       |  |   |
|-------|--|---|
| 8.2.1 | $\frac{DC}{CS} = \frac{20}{12} = \frac{5}{3}$ $\therefore \frac{DC}{CS} = \frac{RB}{BS}$ $\therefore BC \parallel DR \quad [\text{converse line } \parallel \text{ one side of } \Delta \text{ OR sides in the same proportion}]$ $\therefore BC \parallel AD$   | <p>✓ S</p> <p>✓ S</p> <p>✓ R</p> <p>(3)</p>   |
| 8.2.2 | $\frac{AR}{AD} = \frac{RB}{BS} \quad [\text{line } \parallel \text{ one side of } \Delta] \textbf{ OR } [\text{Prop Theorem } AB \parallel DS]$ $\frac{AR}{AD} = \frac{5}{3}$ $\frac{48 - AD}{AD} = \frac{5}{3}$ $\therefore 5AD = 144 - 3AD$ $AD = 18$ $AB = 20 \quad [\text{opp sides of parm}]$ $\therefore AD : AB = 18 : 20 = 9 : 10$ | <p>✓ <math>\frac{AR}{AD} = \frac{5}{3}</math></p> <p>✓ <math>AD = 18</math></p> <p>✓ ratio</p> <p>(3)</p> |

|  |   |   |
|--|---|---|
|  | <p><b>OR/OF</b></p> $\frac{AR}{RD} = \frac{5}{8}$ <p>.....prop thm AB    DS</p> $\frac{AR}{48} = \frac{5}{8}$ <p><math>\therefore AR = 30</math> and <math>AD = 18</math></p> $\therefore \frac{AR}{RD} = \frac{AB}{DS}$ <p>.....    <math>\Delta</math>'s</p> <p><math>\therefore AB = 20</math></p> <p><math>\therefore AB : AD = 18 : 20 = 9 : 10</math></p> | <p>✓ <math>\frac{AR}{RD} = \frac{5}{8}</math></p> <p>✓ <math>AD = 18</math></p><br><br><br><br><br><p>✓ ratio</p> |
|  | (3)   | [15]  |

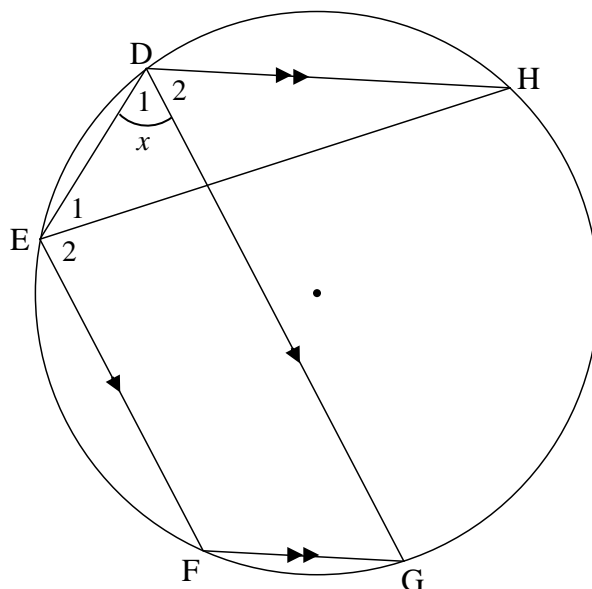
### QUESTION/VRAAG 9

9.1



|     |   |   |
|-----|---|---|
| 9.1 | <p>Constr: Draw radii OA and OC.</p> <p>Proof:</p> $\hat{O}_1 = 2\hat{B} \quad [\angle \text{ at centre} = 2 \times \angle \text{ at circumference}]$ $\hat{O}_2 = 2\hat{D} \quad [\angle \text{ at centre} = 2 \times \angle \text{ at circumference}]$ $\hat{O}_1 + \hat{O}_2 = 360^\circ \quad [\text{revolution}]$ $2\hat{B} + 2\hat{D} = 360^\circ \quad [\text{revolution}]$ $\therefore \hat{B} + \hat{D} = 180^\circ$ | <p>✓ Construction</p> <p>✓ S ✓ R</p> <p>✓ S/R</p> <p>✓ S</p> <p>(5)</p> |
|-----|---|---|

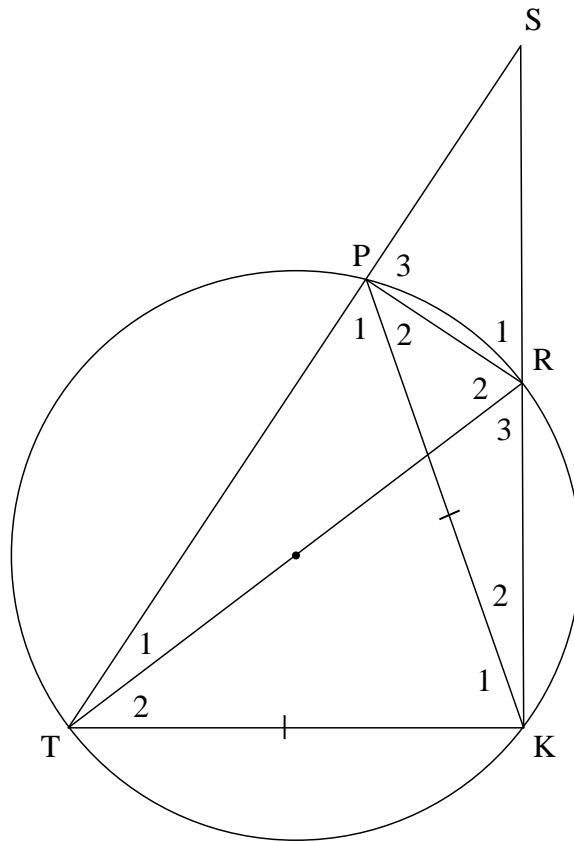
9.2



|     |  |   |
|-----|--|---|
| 9.2 | $\hat{EFG} = 180^\circ - \hat{D}_1$ [opp $\angle$ 's of cyclic quad]<br>$\therefore \hat{EFG} = 180^\circ - x$<br>$\hat{EFG} = 180^\circ - \hat{G}$ [co-int $\angle$ 's; $EF \parallel DG$ ]<br>$\hat{G} = x$<br>But $\hat{G} = \hat{D}_2$ [alt $\angle$ 's; $DH \parallel FG$ ]<br>$\therefore \hat{D}_1 = \hat{D}_2 = x$ | $\checkmark S \checkmark R$<br><br>$\checkmark S / R$<br><br>$\checkmark S / R$ |
|     |  | (4)   |
|     |  | [9]   |

**QUESTION/VRAAG 10**

10.1



|        |  |  |
|--------|--|--|
| 10.1.1 | $\hat{T}PR = 90^\circ$<br>$\hat{S}PR = 90^\circ$<br>$\therefore SR$ is a diameter<br><br><b>OR</b><br><br>$\hat{T}KR = 90^\circ$<br>$\hat{S}PR = 90^\circ$<br>$\therefore SR$ is a diameter<br><br><b>OR</b> | <div> <div>[<math>\angle</math> in semi-circle]</div> <div>[<math>\angle</math>'s on a straight line]</div> <div>[converse <math>\angle</math> in semi-circle]</div> </div> <div> <div><math>\checkmark S</math> <math>\checkmark R</math></div> <div><math>\checkmark S</math></div> <div><math>\checkmark R</math></div> <div>(4)</div> </div> <div> <div>[<math>\angle</math> in semi-circle]</div> <div>[ext <math>\angle</math> of cyclic quad]</div> <div>[converse <math>\angle</math> in semi-circle]</div> <div><b>OR</b></div> <div>[chord subtends a right angle]</div> </div> <div> <div><math>\checkmark S</math> <math>\checkmark R</math></div> <div><math>\checkmark S</math></div> <div><math>\checkmark R</math></div> <div>(4)</div> </div> |
|--------|--|--|

|        |   |  |
|--------|---|--|
| 10.1.2 | $\hat{R}_1 = \hat{P}\hat{T}\hat{K}$ [ext $\angle$ of cyclic quad]<br>$\hat{P}_1 = \hat{P}\hat{T}\hat{K} = \hat{R}_1$ [ $\angle$ s opp equal sides]<br>$\hat{S} + \hat{R}_1 = \hat{P}_1 + \hat{P}_2$ [ext $\angle$ of $\Delta$ ]<br>$\therefore \hat{S} = \hat{P}_2$ [ $\hat{R}_1 = \hat{P}_1$ ]   | $\checkmark S \checkmark R$<br>$\checkmark S / R$<br>$\checkmark S \checkmark R$<br><br>(5)  |
| 10.1.3 | In $\Delta SPK$ and $\Delta PRK$<br>$\hat{S} = \hat{P}_2$ [proved]<br>$\hat{K}_2 = \hat{K}_2$ [common]<br><br>$\Delta SPK \parallel \Delta PRK$ [ $\angle, \angle, \angle$ ]<br><br><b>OR/OF</b><br>In $\Delta SPK$ and $\Delta PRK$<br>$\hat{S} = \hat{P}_2$ [proved]<br>$\hat{K}_2 = \hat{K}_2$ [common]<br>$\hat{S}\hat{P}\hat{K} = \hat{P}\hat{R}\hat{K}$ [sum of $\angle$ s in $\Delta$ ]<br>$\Delta SPK \parallel \Delta PRK$ | $\checkmark S$<br>$\checkmark S$<br><br>$\checkmark S/R$<br><br>(3)<br><br>$\checkmark S$<br>$\checkmark S$<br>$\checkmark S/R$<br><br>(3) |
| 10.2   | $\frac{PK}{RK} = \frac{SK}{PK}$ [ $\Delta SPK \parallel \Delta PRK$ ]<br>$PK^2 = SK.RK$<br><br>$ST^2 = SK^2 + TK^2$ [Pythagoras]<br>$TK = PK$ [Given]<br>$ST^2 = SK^2 + PK^2$<br><br>$ST^2 = SK^2 + SK.RK$<br>$ST^2 = (2RK)^2 + 2RK.RK$<br>$ST^2 = 6RK^2$<br>$ST = \sqrt{6}RK$  | $\checkmark S$<br><br>$\checkmark S$<br><br><br>$\checkmark PK^2 = SK.RK$<br>$\checkmark SK = 2RK$<br>$\checkmark ST^2 = 6RK^2$<br><br>(5) |
|        |   | [17]   |

**TOTAL/TOTAAL: 150**