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**NATIONAL  
SENIOR CERTIFICATE  
*NASIONALE  
SENIOR SERTIFIKAAT***

**GRADE/*GRAAD* 12**

**SEPTEMBER 2025**

**MATHEMATICS P2/*WISKUNDE V2*  
MARKING GUIDELINE/*NASIENRIGLYN***

**MARKS/*PUNTE*: 150**

This marking guideline consists of 20 pages.  
*Hierdie nasienriglyn bestaan uit 20 bladsye.*



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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 not redone a question, mark the crossed-out version.
- Consistency accuracy applies in ALL aspects of the marking guideline. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

| <b>GEOMETRY</b> |                                                                                                         |
|-----------------|---------------------------------------------------------------------------------------------------------|
| <b>S</b>        | A mark for a correct statement.<br>(A statement mark is independent of a reason).                       |
| <b>R</b>        | A mark for the correct reason.<br>(A reason mark may only be awarded only if the statement is correct). |
| <b>S/R</b>      | Award a mark if a statement and a reason are both correct.                                              |

**NOTA:**

- As 'n kandidaat 'n vraag TWEEKEER beantwoord, merk slegs die EERSTE poging.
- As 'n kandidaat 'n poging van 'n vraag doodtrek en dit nie oordoen nie, merk die doodgetrekte poging.
- Volgehoue akkuraatheid word in ALLE aspekte van die nasienriglyn toegepas. Hou op nasien by die tweede berekeningsfout.
- Om antwoorde/waardes te aanvaar om 'n probleem op te los, word NIE toegelaat nie.

| <b>MEETKUNDE</b> |                                                                                                         |
|------------------|---------------------------------------------------------------------------------------------------------|
| <b>S</b>         | 'n Punt vir korrekte bewering.<br>( 'n Punt vir 'n bewering is onafhanklik van die rede.)               |
| <b>R</b>         | 'n Punt vir 'n korrekte rede.<br>( 'n Punt word slegs vir die rede toegeken as die bewering korrek is.) |
| <b>S/R</b>       | Ken 'n punt toe as die bewering en rede beide korrek is.                                                |



## QUESTION/VRAAG 1

Data Set/Datastel:

|    |    |    |       |           |    |    |    |
|----|----|----|-------|-----------|----|----|----|
| 15 | 17 | 20 | 20    | 20        | 21 | 22 | 24 |
| 29 | 29 | 30 | $11t$ | $11t + 2$ | 36 | 38 | 55 |

|     |                                                                                                                     |                                                                                                                    |             |
|-----|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|-------------|
| 1.1 | Mode / <i>Modus</i> = 20                                                                                            | ✓ answer/ <i>antwoord</i>                                                                                          | (1)         |
| 1.2 | $Q_1 = 20$<br>$Q_3 = \frac{22t + 2}{2} = 11t + 1$<br>$IQR = Q_3 - Q_1$<br>$14 = 11t + 1 - 20$<br>$\therefore t = 3$ | ✓ $Q_1$<br><br>✓ $Q_3 = 11t + 1$<br><br>✓ answer/ <i>antwoord</i>                                                  | (3)         |
| 1.3 | $\bar{x} = \frac{444}{16}$<br>$\therefore = 27,75$<br>(Answer only full marks/ <i>Slegs antwoord – volpunte</i> )   | ✓ 444<br><br>✓ answer/ <i>antwoord</i>                                                                             | (2)         |
| 1.4 | Standard deviation / <i>Standaardafwyking</i> = 9,86                                                                | ✓ answer/ <i>antwoord</i>                                                                                          | (1)         |
| 1.5 | $\bar{x} - sd = 27,75 - 9,86$<br>$= 17,89$<br>2 visitors<br>2 <i>besoekers</i>                                      | ✓ $27,75 - 9,86$<br>correct substitution<br><i>korrekte vervanging</i><br>✓ 17,89<br><br>✓ answer/ <i>antwoord</i> | (3)         |
|     |                                                                                                                     |                                                                                                                    | <b>[10]</b> |



## QUESTION/VRAAG 2

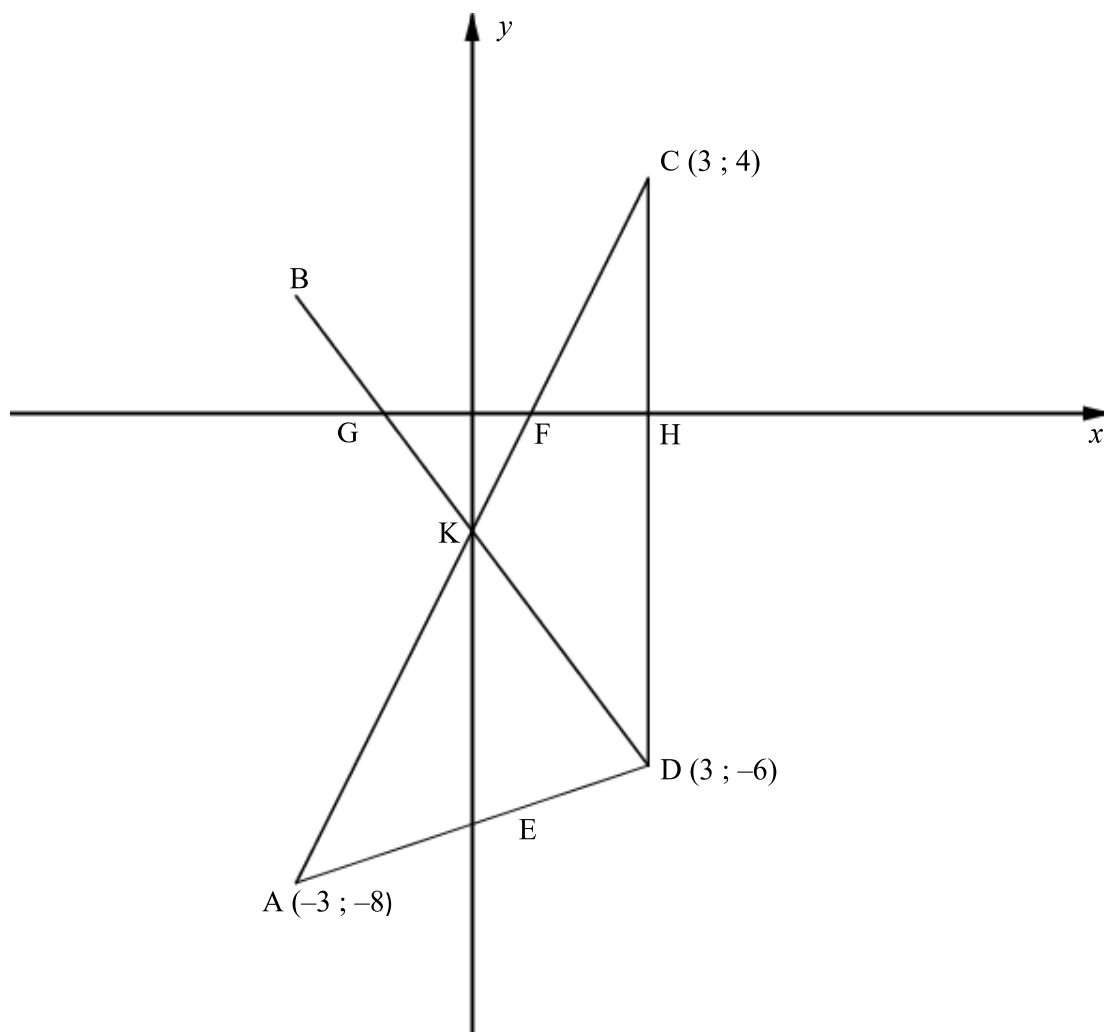
| Years / Jaar                                                                         |  | 1          | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 |    |
|--------------------------------------------------------------------------------------|--|------------|----|----|----|----|----|----|----|----|----|----|
| Temperatures (degrees Celsius)<br><i>Temperature (grade Celsius)</i>                 |  | $x$<br>$x$ | 41 | 9  | 30 | 15 | 25 | 20 | 20 | 35 | 39 | 16 |
| Finishing times of athletes<br>(in minutes)<br><i>Eindtyd van atleet (in minute)</i> |  | $y$<br>$y$ | 72 | 30 | 66 | 29 | 45 | 43 | 41 | 66 | 68 | 31 |

|     |                                                                                                                                                                                                                                                       |                                                                                                                                       |                                                                                                                                                                                                                   |     |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 2.1 | $r = 0,96$                                                                                                                                                                                                                                            | ✓ answer/antwoord                                                                                                                     | (1)                                                                                                                                                                                                               |     |
| 2.2 | Very strong positive correlation<br><i>Baie sterk positiewe korrelasie</i>                                                                                                                                                                            | ✓ very strong positive correlation<br><i>Baie sterk positiewe korrelasie</i>                                                          | (1)                                                                                                                                                                                                               |     |
| 2.3 | $a = 10,92$<br>$b = 1,53$<br>$y = 10,92 + 1,53x$                                                                                                                                                                                                      | ✓ correct value of $a$<br><i>korrekte waarde van a</i><br>✓ correct value of $b$<br><i>korrekte waarde van b</i><br>✓ answer/antwoord | (3)                                                                                                                                                                                                               |     |
| 2.4 | $57 = 10,92 + 1,53x$<br>$x = 30$                                                                                                                                                                                                                      | ✓ substitution/vervanging<br>✓ answer/antwoord                                                                                        | (2)                                                                                                                                                                                                               |     |
| 2.5 | <div><p><b>Temperatures versus Finishing Time</b><br/><i>Temperature teenoor Eindtyd</i></p><p>Finishing Time (in minutes)<br/><i>Eindtyd (in minute)</i></p><p>Temperatures (in Degrees Celcius)<br/><i>Temperature (in Grade Celsius)</i></p></div> |                                                                                                                                       | <div>✓ Any two correct points<br/><i>Enige twee korrekte punte</i></div> <div>✓ straight line joining points for <math>x \in [9;41]</math><br/><i>Reguitlyn verbind punte vir <math>x \in [9;41]</math></i></div> | (2) |

|  |  |  |  |  |  |  |  |  |  |  |  |     |
|--|--|--|--|--|--|--|--|--|--|--|--|-----|
|  |  |  |  |  |  |  |  |  |  |  |  | [9] |
|--|--|--|--|--|--|--|--|--|--|--|--|-----|



## QUESTION/VRAAG 3



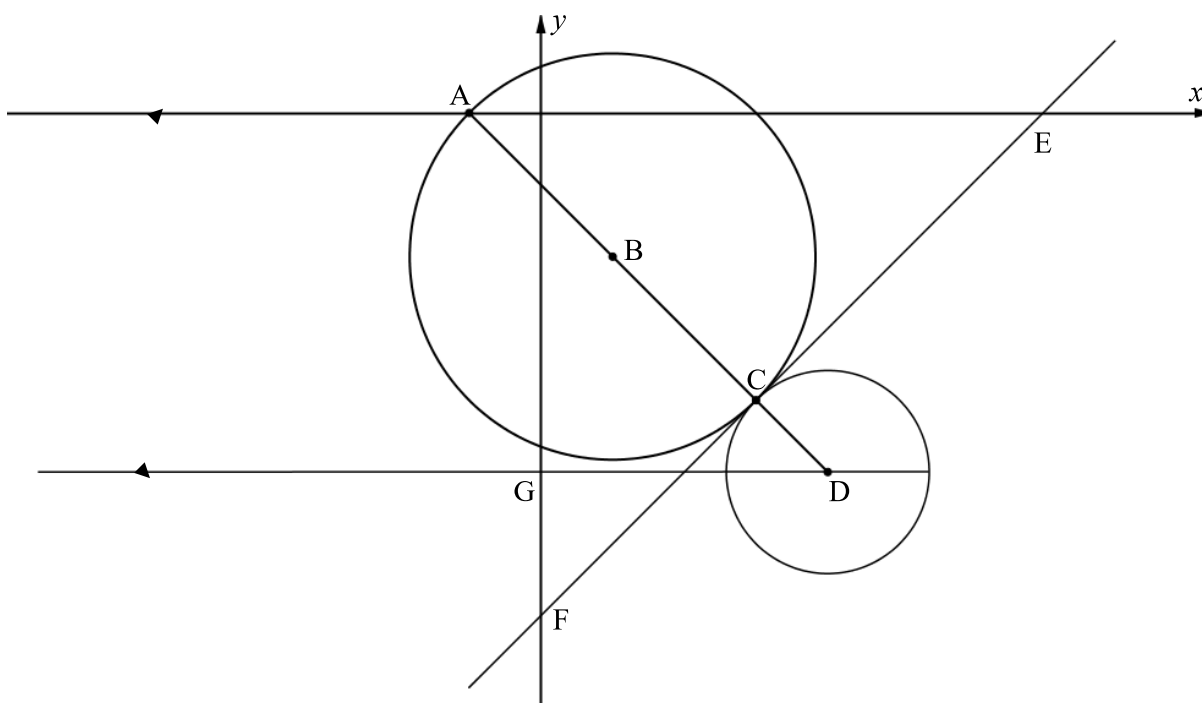
|     |                                                                                             |                                                                                                                                                                                  |     |
|-----|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 3.1 | $AC = \sqrt{(-3-3)^2 + (-8-4)^2}$ $= 6\sqrt{5}$                                             | ✓ correct substitution/ <i>korrekte vervanging</i><br>✓ correct answer/ <i>korrekte antwoord</i>                                                                                 | (2) |
| 3.2 | $m_{AC} = \frac{4+8}{3+3}$ $= 2$                                                            | ✓ correct substitution/ <i>korrekte vervanging</i><br>✓ answer/ <i>antwoord</i>                                                                                                  | (2) |
| 3.3 | $m_{AD} = \frac{-6+8}{3+3}$ $= \frac{1}{3}$ $y+8 = \frac{1}{3}(x+3)$ $y = \frac{1}{3}x - 7$ | ✓ $m_{AD}$<br>✓ substitution of $m_{AD}$ and D(3 ; - 6) or A(-3 ; -8)<br><i>vervanging van <math>m_{AD}</math> en D(3 ; - 6) of A(-3 ; -8)</i><br>✓ Equation/ <i>Vergelyking</i> | (3) |



|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                |      |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 3.4 | $\tan \hat{BGF} = m_{BD} = -\frac{4}{3}$<br>$\hat{BGF} = 126,87^\circ$<br>$\hat{KGF} = 53,13^\circ$ [ $\angle$ s on a str. line / $\angle$ op'n reguitlyn]<br>$\tan \hat{CFH} = 2$<br>$\hat{CFH} = 63,44^\circ$<br>$\hat{GFK} = 63,44^\circ$ [vert. opp $\angle$ s / regoorst. $\angle$ e]<br>$\therefore \hat{CKD} = 116,57^\circ$ [ext $\angle$ of $\triangle GKF$ / buite $\angle$ van $\triangle GKF$ ]<br><b>OR/OF</b><br>$m_{AC} = 2$<br>$\tan \hat{CFH} = 2$<br>$\hat{CFH} = 63,44^\circ$<br>$\hat{GFK} = 63,44^\circ$ [vert. opp $\angle$ s / regoorst. $\angle$ e]<br>$\tan \hat{BGF} = m_{BD} = -\frac{4}{3}$<br>$\hat{BGF} = 126,87^\circ$<br>$\hat{BKC} = 63,43^\circ$ [ext $\angle$ of $\triangle GKF$ / buite $\angle$ van $\triangle GKF$ ]<br>$\hat{CKD} = 116,57^\circ$ [ $\angle$ s on a str. line / $\angle$ op'n reguitlyn] | $\checkmark \hat{BGF} = 126,87^\circ$<br>$\checkmark \hat{KGF} = 53,13^\circ$<br><br>$\checkmark \hat{CFH} = 63,44^\circ$<br>$\checkmark \hat{GFK} = 63,44^\circ$<br>$\checkmark$ answer/antwoord<br><br><b>OR/OF</b><br><br>$\checkmark \hat{CFH} = 63,44^\circ$<br>$\checkmark \hat{GFK} = 63,44^\circ$<br><br>$\checkmark \hat{BGF} = 126,87^\circ$<br>$\checkmark \hat{BKC} = 63,43^\circ$<br>$\checkmark$ answer/antwoord | (5)  |
| 3.5 | $K(0; -2)$<br>$KD = \sqrt{(0-3)^2 + (-2+6)^2}$<br>$= 5$<br>$CK = 3\sqrt{5}$<br>Area of $\triangle CKD$ / Oppervlakte van $\triangle CKD$<br>$= \frac{1}{2} \times 2\sqrt{5} \times 5 \times \sin 116,57^\circ$<br>$= 15$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | $\checkmark K(0; -2)$<br><br>$\checkmark KD = 5$<br>$\checkmark CK = 3\sqrt{5}$<br><br>$\checkmark$ correct substitution<br>korrekte vervanging<br>$\checkmark$ answer/antwoord                                                                                                                                                                                                                                                | (5)  |
| 3.6 | $x = 3$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | $\checkmark$ answer/antwoord                                                                                                                                                                                                                                                                                                                                                                                                   | (1)  |
| 3.7 | $E(0; -7)$ or $EK = 5$<br>$CD = 10$<br>height of/hoogte van trapezium = 3<br>$\text{Area of / van } EKCD = \frac{1}{2}(5+10) \times 3$<br>$= \frac{45}{2}$<br>$\frac{\text{Area of / van } \triangle CKD}{\text{Area of / van } EKCD} = 15 \times \frac{2}{45}$<br>$= \frac{2}{3}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | $\checkmark E(0; -7)$ or $EK = 5$<br><br>$\checkmark CD = 10$<br>$\checkmark$ height/hoogte = 3<br><br>$\checkmark \frac{45}{2}$<br><br>$\checkmark$ answer/antwoord                                                                                                                                                                                                                                                           | (5)  |
|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                | [23] |



## QUESTION/VRAAG 4



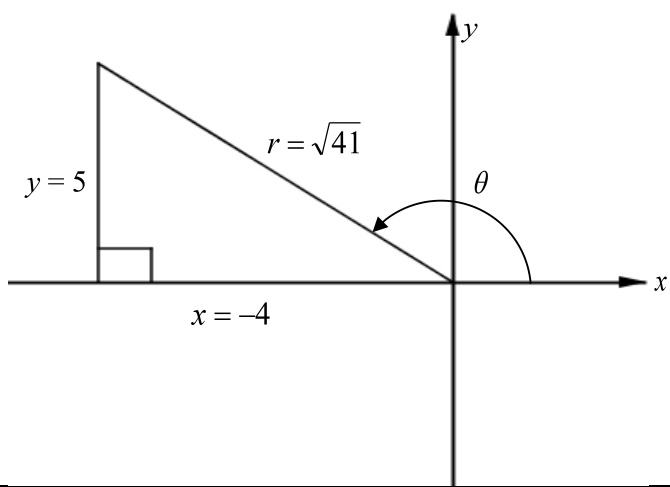
|     |                                                                                                                                                                                                              |                                                                                                                                                                             |     |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 4.1 | $x^2 + y^2 - 2x + 4y - 3 = 0$<br>$(x-1)^2 + (y+2)^2 = 8$<br>$\therefore B(1; -2)$                                                                                                                            | ✓ completing square<br><i>voltooiing van vierkant</i><br>✓ x-coordinate/x-koördinaat<br>✓ y-coordinate/y-koördinaat                                                         | (3) |
| 4.2 | $x^2 + 0^2 - 2x + 4 \cdot 0 - 3 = 0$<br>$x^2 - 2x - 3 = 0$<br>$(x-3)(x+1) = 0$<br>$x \neq 3$ or $x = 1$<br>$\therefore A(-1; 0)$                                                                             | ✓ $y = 0$<br>✓ standard form/standaardvorm<br>✓ correct x-coordinate<br><i>korrekte x-koördinaat</i>                                                                        | (3) |
| 4.3 | $m_{AB} = \frac{-2-0}{1+1}$<br>$= -1$                                                                                                                                                                        | ✓ substitution into correct formula<br><i>vervanging in korrekte formule</i><br>✓ answer/antwoord                                                                           | (2) |
| 4.4 | $\hat{ACE} = 90^\circ$ [diameter $\perp$ tan / middellyn $\perp$ raaklyn]<br>$AB = 2\sqrt{2}$ radius<br>$\therefore AC = 4\sqrt{2}$ diameter / middellyn<br>$CE^2 = 8^2 - (4\sqrt{2})^2$<br>$CE = 4\sqrt{2}$ | ✓ $\hat{ACE} = 90^\circ$<br>✓<br>$AC = 4\sqrt{2}$ (diameter / middellyn)<br>✓ correct use of Pyth. Theorem<br><i>korrekte gebruik van Pyth. Stel.</i><br>✓ $CE = 4\sqrt{2}$ | (4) |



|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |
|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 4.5 | $D(x; -5)$ $GD \parallel x\text{-axis}$<br>$m_{AD} = m_{AB}$ collinear points/samelynige punte<br>$\frac{-5-0}{x+1} = -1$<br>$-x-1 = -5$<br>$\therefore x = 4$<br>$D(4; -5)$<br><br><b>OR/OF</b><br>$D(x; -5)$ $GD \parallel x\text{-axis} / -as$<br>$m_{BD} = m_{AB}$ collinear points / saamlynige punte<br>$\frac{-2+5}{1-x} = -1$<br>$x-1 = 3$<br>$\therefore x = 4$<br>$D(4; -5)$<br><br><b>OR/OF</b><br>$\hat{ACE} = 90^\circ$ ; $D(x; -5)$ and/en $E(7; 0)$<br>$DE^2 = (x-7)^2 + (-5-0)^2$<br>$= x^2 - 14x + 74$<br>$CE^2 = 32$<br>$CD^2 = (3-x)^2 + (-4+5)^2$<br>$= 10 - 6x + x^2$<br>$x^2 - 14x + 74 = -6x + x^2 + 10 + 32$<br>$-8x = -32$<br>$x = 4$<br><br>$D(4; -5)$ | $\checkmark D(x; -5)$<br>$\checkmark m_{AD} = m_{AB}$<br>$\checkmark \frac{-5-0}{x+1} = -1$<br>$\checkmark \therefore x = 4$<br><br><b>OR/OF</b><br>$\checkmark D(x; -5)$<br>$\checkmark m_{BD} = m_{AB}$<br>$\checkmark \frac{-2+5}{1-x} = -1$<br>$\checkmark \therefore x = 4$<br><br><b>OR/OF</b><br>$\checkmark$ standard form of $DE^2$<br><i>standaardvorm van <math>DE^2</math></i><br>$\checkmark$ standard form of $CD^2$<br><i>standaardvorm van <math>CD^2</math></i><br>$\checkmark$ simplification<br><i>vereenvoudiging</i><br><br>$\checkmark x = 4$ | (4)  |
| 4.6 | $CD^2 = (7-4)^2 - (4\sqrt{2})^2$<br>$= 2$<br>$(x-4)^2 + (y+5)^2 = 2$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | $\checkmark CD^2 = 2$<br>$\checkmark$ LHS of the equation<br><i>LK van die vergelyking</i><br>$\checkmark$ RHS of the equation<br><i>RK van die vergelyking</i>                                                                                                                                                                                                                                                                                                                                                                                                     | (3)  |
|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | [19] |



## QUESTION/VRAAG 5

|       |                                                                                                                                                                                                                                                                                 |                                                                                                                             |     |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-----|
| 5.1   |                                                                                                                                                                                                |                                                                                                                             |     |
| 5.1.1 | $r = \sqrt{3^2 + (-4)^2} = 5$ $\cos \theta = -\frac{4}{\sqrt{41}}$                                                                                                                                                                                                              | ✓ value of $r$ /<br>waarde van $r$<br><br>✓ answer/antwoord                                                                 | (2) |
| 5.1.2 | $2 \sin^2 \theta = 2 \left( \frac{5}{\sqrt{41}} \right)^2$ $= \frac{50}{41}$                                                                                                                                                                                                    | ✓ correct substitution<br>korrekte vervanging<br>✓ correct answer<br>korrekte antwoord                                      | (2) |
| 5.1.3 | $\cos(90^\circ - 2\theta) = \sin 2\theta$ $= 2 \sin \theta \cos \theta$ $= 2 \left( \frac{5}{\sqrt{41}} \right) \left( -\frac{4}{\sqrt{41}} \right)$ $= -\frac{40}{41}$                                                                                                         | ✓ reduction/reduksie<br>✓ identity/identiteit<br><br>✓ correct substitution<br>korrekte vervanging<br><br>✓ answer/antwoord | (4) |
| 5.2   | $\text{LHS/LK} = \frac{3 \cos 2x + 3 \cos^2 x + 9 \sin^2 x}{4 - 4 \sin^2 x}$ $= \frac{3(2 \cos^2 x - 1) + 3 \cos^2 x + 9(1 - \cos^2 x)}{4(1 - \sin^2 x)}$ $= \frac{6 \cos^2 x - 3 + 3 \cos^2 x + 9 - 9 \cos^2 x}{4 \cos^2 x}$ $= \frac{6}{4 \cos^2 x}$ $= \frac{3}{2 \cos^2 x}$ | ✓ $2 \cos^2 x - 1$ ✓ $1 - \cos^2 x$<br>✓ $1 - \sin^2 x$<br><br><br>✓ $\frac{6}{4 \cos^2 x}$                                 | (4) |

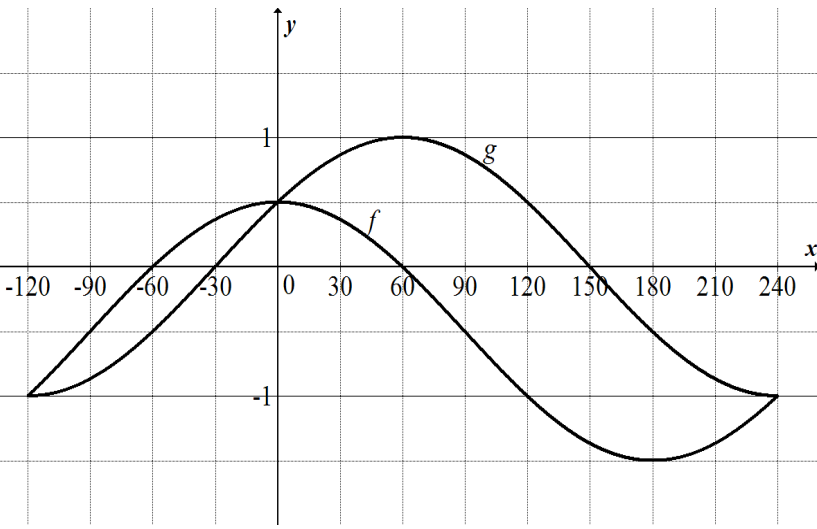


|     | OR/OF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | OR/OF                                                                                                                                                                                                                                                                                                                                                                                                   |     |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
|     | $\begin{aligned} \text{LHS/LK} &= \frac{3 \cos 2x + 3 \cos^2 x + 9 \sin^2 x}{4 - 4 \sin^2 x} \\ &= \frac{3(1 - 2 \sin^2 x) + 3(1 - \sin^2 x) + 9 \sin^2 x}{4(1 - \sin^2 x)} \\ &= \frac{6}{4 \cos^2 x} \\ &= \frac{3}{2 \cos^2 x} \end{aligned}$                                                                                                                                                                                                                                                                                                                                                                               | $\begin{aligned} &\checkmark 1 - 2 \sin^2 x \checkmark 1 - \sin^2 x \\ &\checkmark \cos^2 x \\ &\checkmark \frac{6}{4 \cos^2 x} \end{aligned}$                                                                                                                                                                                                                                                          | (4) |
| 5.3 | $\begin{aligned} &\frac{\cos x \cdot \cos(90^\circ - x) \sin(48^\circ - x) + \sin^2 x \cos(48^\circ - x)}{\sin(-x) \cdot \cos 24^\circ \cdot \cos 66^\circ} \\ &= \frac{\cos x \cdot \sin x \sin(48^\circ - x) + \sin^2 x \cos(48^\circ - x)}{(-\sin x) \cos 24^\circ \sin 24^\circ} \\ &= \frac{\sin x [\sin(48^\circ - x) \cos x + \sin x \cos(48^\circ - x)]}{(-\sin x) \left( \frac{\sin 48^\circ}{2} \right)} \\ &= \frac{\sin(48^\circ - x + x)}{-\frac{1}{2} \sin 48^\circ} \\ &= \frac{\sin 48^\circ}{-\frac{1}{2} \sin 48^\circ} \\ &= -2 \end{aligned}$                                                              | $\begin{aligned} &\checkmark \sin x \\ &\checkmark -\sin x \checkmark \sin 24^\circ \\ &\checkmark \text{taking out common } \sin x \\ &\quad \text{uithaal van } \sin x \text{ as} \\ &\quad \text{gemene faktor} \\ &\checkmark \frac{1}{2} \sin 48^\circ \\ &\checkmark \text{compound angle} \\ &\quad \text{saamgestelde hoek} \\ &\checkmark \text{answer/antwoord} \end{aligned}$                |     |
|     | <p style="text-align: center;"><b>OR/OF</b></p> $\begin{aligned} &\frac{\cos x \cdot \cos(90^\circ - x) \sin(48^\circ - x) + \sin^2 x \cos(48^\circ - x)}{\sin(-x) \cdot \cos 24^\circ \cdot \cos 66^\circ} \\ &= \frac{\cos x \cdot \sin x \sin(48^\circ - x) + \sin^2 x \cos(48^\circ - x)}{(-\sin x) \cos 24^\circ \sin 24^\circ} \\ &= \frac{\sin x [\sin(48^\circ - x) \cos x + \sin x \cos(48^\circ - x)]}{(-\sin x) \sin 24^\circ \cos 24^\circ} \\ &= \frac{\sin(48^\circ - x + x)}{-\frac{1}{2} \sin 48^\circ} \\ &= \frac{2 \sin 24^\circ \cos 24^\circ}{-\sin 24^\circ \cdot \cos 24^\circ} \\ &= -2 \end{aligned}$ | <p style="text-align: center;"><b>OR/OF</b></p> $\begin{aligned} &\checkmark \sin x \\ &\checkmark -\sin x \checkmark \sin 24^\circ \\ &\checkmark \text{taking out common } \sin x \\ &\quad \sin x \text{ as gemene faktor} \\ &\checkmark \text{compound angle} \\ &\quad \text{saamgestelde hoek} \\ &\checkmark 2 \sin 24^\circ \cos 24^\circ \\ &\checkmark \text{answer/antwoord} \end{aligned}$ | (7) |



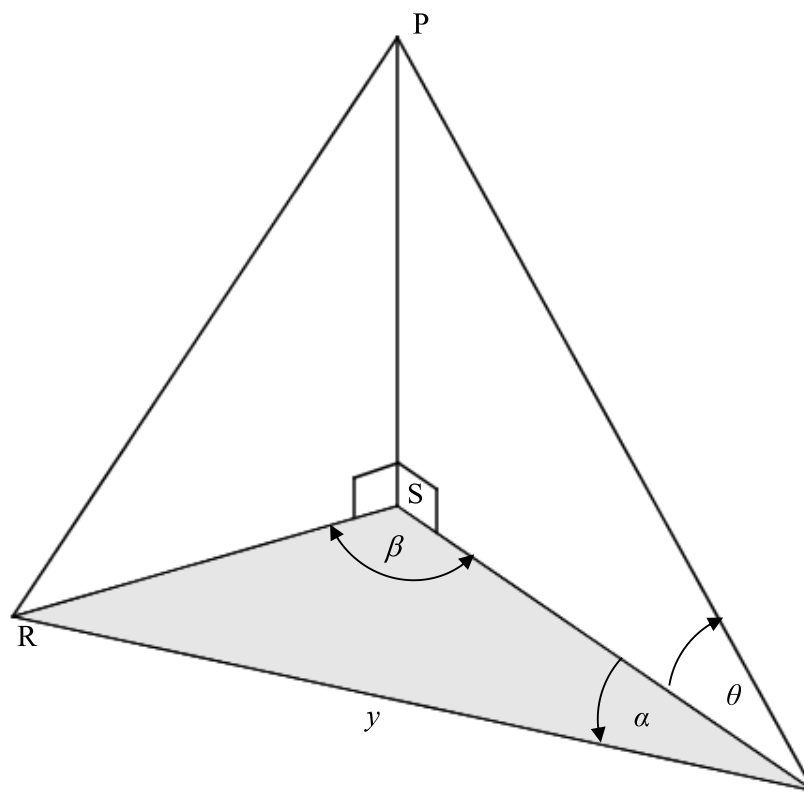
|       |                                                                                                                                                                                                                                                                                    |                                                                                                                                                                      |             |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 5.4.1 | $\left[ \cos(60^\circ - x) + \cos(x + 60^\circ) \right]^2$ $= \left[ \cos 60^\circ \cos x + \sin 60^\circ \sin x + \cos x \cos 60^\circ - \sin x \sin 60^\circ \right]^2$ $= \left[ 2 \cos 60^\circ \cos x \right]^2$ $= \left[ 2 \cdot \frac{1}{2} \cos x \right]^2$ $= \cos^2 x$ | ✓ expansion/<br>uitbreiding<br><br>✓ simplification<br>vereenvoudiging<br><br>✓ answer/antwoord                                                                      | (3)         |
| 5.4.2 | $\cos^2 x = \frac{3}{4}$ $\cos x = \pm \frac{\sqrt{3}}{2}$ $x = \pm 30^\circ + 360^\circ \cdot k \quad \text{or / of} \quad x = \pm 150^\circ + 360^\circ \cdot k, \quad k \in \mathbb{Z}$                                                                                         | ✓ $\cos^2 x = \frac{3}{4}$<br>✓ $\cos x = \pm \frac{\sqrt{3}}{2}$<br>✓ $\pm 30^\circ + 360^\circ \cdot k, k \in \mathbb{Z}$<br>✓ $\pm 150^\circ + 360^\circ \cdot k$ | (4)         |
|       |                                                                                                                                                                                                                                                                                    |                                                                                                                                                                      | <b>[26]</b> |



| QUESTION/VRAAG 6 |                                                                                                                                                                                                                                    |                                                                                                                                                           |      |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 6.1              | Range/ Waardeversameling: $y \in \left[-\frac{3}{2}; \frac{1}{2}\right]$ or/of $-\frac{3}{2} \leq y \leq \frac{1}{2}$                                                                                                              | ✓ correct critical values<br><i>korrekte kritieke waarde</i><br>✓ correct notation<br><i>korrekte notasie</i>                                             | (2)  |
| 6.2              |                                                                                                                                                  | ✓ correct intercepts with the axis/ <i>korrekte afsnitte met die asse</i><br>✓ correct turning points/ <i>korrekte draaipunte</i><br>✓ shape/ <i>vorm</i> | (3)  |
| 6.3              | $x = -120^\circ$ and/en $x = 240^\circ$                                                                                                                                                                                            | ✓✓ each $x$ -value/<br><i>elke <math>x</math>-waarde</i>                                                                                                  | (2)  |
| 6.4              | $0^\circ < x < 180^\circ$                                                                                                                                                                                                          | ✓ correct critical values/<br><i>korrekte kritieke waardes</i><br>✓ correct notation/<br><i>korrekte notasie</i>                                          | (2)  |
| 6.5              | Amplitude / <i>Amplitude</i> = 1                                                                                                                                                                                                   | ✓ answer/ <i>antwoord</i>                                                                                                                                 | (1)  |
| 6.6              | The graph of $f$ is translated/shifted $\frac{1}{2}$ units up and reflected about the $x$ -axis.<br><i>Die grafiek van <math>f</math> skuif <math>\frac{1}{2}</math> eenheid op en word gereflekteer om die <math>x</math>-as.</i> | ✓ $\frac{1}{2}$ units up<br>$\frac{1}{2}$ <i>eenheid op</i><br>✓ reflected about the $x$ -axis<br><i>gereflekteer om die <math>x</math>-as</i>            | (2)  |
|                  |                                                                                                                                                                                                                                    |                                                                                                                                                           | [12] |



## QUESTION/VRAAG 7



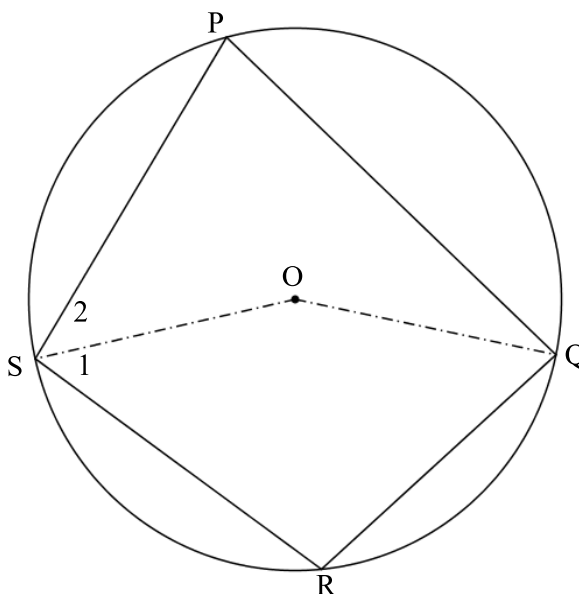
|     |                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                     |     |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 7.1 | $\hat{SRQ} = 180^\circ - (\alpha + \beta)$                                                                                                                                                                                                                                                                                | ✓ answer/antwoord                                                                                                                                                                   | (1) |
| 7.2 | $\frac{SQ}{\sin(180^\circ - (\alpha + \beta))} = \frac{y}{\sin \beta}$ $SQ = \frac{y \sin(180^\circ - (\alpha + \beta))}{\sin \beta}$ $SQ = \frac{y \sin(\alpha + \beta)}{\sin \beta}$ $\tan \theta = \frac{PS}{SQ}$ $PS = \tan \theta \cdot SQ$ $PS = \frac{y \cdot \tan \theta \cdot \sin(\alpha + \beta)}{\sin \beta}$ | ✓ use of sine rule<br>gebruik van sinusreël<br><br>✓ $\sin(\alpha + \beta)$ reduction/vermindering<br><br>✓ correct ratio of $\tan \theta$<br>korrekte verhouding van $\tan \theta$ | (3) |
| 7.3 | $PS = \frac{(116) \cdot \tan 57^\circ \cdot \sin(27^\circ + 102^\circ)}{\sin 102^\circ}$ $PS = 141,92 \text{ units/eenhede}$                                                                                                                                                                                              | ✓ substitution/vervanging<br><br>✓ answer/antwoord                                                                                                                                  | (2) |



|     |                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                        |      |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 7.4 | $\frac{\sin \alpha}{RS} = \frac{\sin \beta}{y}$ $\frac{\sin 27^\circ}{RS} = \frac{\sin 102^\circ}{116}$ $RS = \frac{116 \sin 27^\circ}{\sin 102^\circ}$ $RS = 53,84 \text{ units}$<br>$\tan \hat{P}RS = \frac{PS}{RS}$ $\tan \hat{P}RS = \frac{141,92}{53,84}$ $\hat{P}RS = \tan^{-1}\left(\frac{141,92}{53,84}\right)$ $\therefore \text{PRS} = 69,22^\circ$ | <p>✓ substitution into sine rule<br/><i>vervanging in die sinusreël</i></p> <p>✓ length of RS/<i>lengte van RS</i></p><br><p>✓ correct substitution ratio of <math>\tan \hat{P}RS</math><br/><i>korrekte vervanging verhouding van <math>\tan \hat{P}RS</math></i></p> <p>✓ answer/<i>antwoord</i></p> | (4)  |
|     |                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                        | [10] |

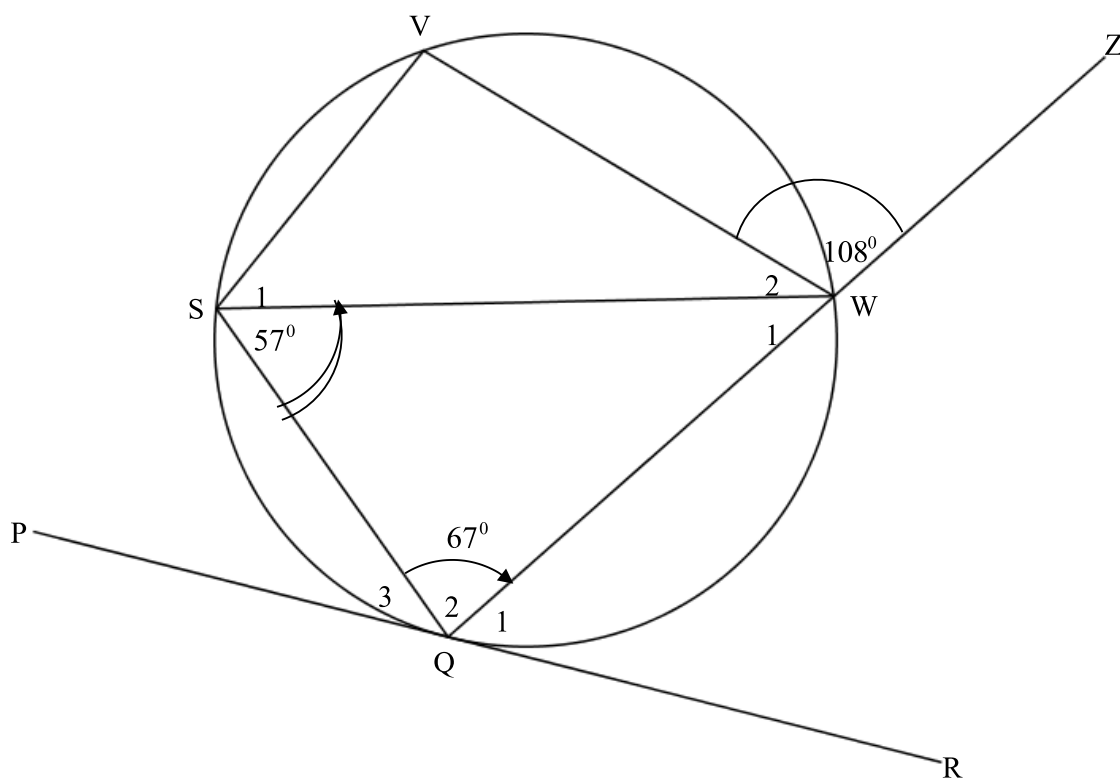


## QUESTION/VRAAG 8



|     |                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                       |     |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-----|
| 8.1 | <p>Constructions: Draw radii OS and OQ</p> <p><i>Proof :</i></p> $\hat{O}_1 = 2\hat{P} \quad [\angle \text{ at centre} = 2\angle \text{ at circumf}]$ $\hat{O}_2 = 2\hat{R} \quad [\angle \text{ at centre} = 2\angle \text{ at circumf}]$ $\hat{O}_1 + \hat{O}_2 = 360^\circ \quad [\angle \text{ s around a point}]$ $2\hat{P} + 2\hat{R} = 360^\circ \quad [\text{Substitution}]$ $\hat{P} + \hat{R} = 180^\circ$          | <p>✓ Construction</p> <p>✓ S/R</p> <p>✓ S</p> <p>✓ S/R</p> <p>✓ S</p> | (5) |
| 8.1 | <p>Konstruksies: Teken radiusse OS en OQ</p> <p><i>Bewys :</i></p> $\hat{O}_1 = 2\hat{P} \quad [\text{Middelpunts } \angle = 2 \times \text{Omtreks } \angle]$ $\hat{O}_2 = 2\hat{R} \quad [\text{Middelpunts } \angle = 2 \times \text{Omtreks } \angle]$ $\hat{O}_1 + \hat{O}_2 = 360^\circ \quad [\angle \text{'e om'n punt}]$ $2\hat{P} + 2\hat{R} = 360^\circ \quad [\text{Vervanging}]$ $\hat{P} + \hat{R} = 180^\circ$ | <p>✓ Konstruksie</p> <p>✓ S/R</p> <p>✓ S</p> <p>✓ S/R</p> <p>✓ S</p>  | (5) |





|       |                            |                                                                         |            |             |
|-------|----------------------------|-------------------------------------------------------------------------|------------|-------------|
| 8.2.1 | $\hat{V} = 113^\circ$      | [opp $\angle$ s of a cyclic quad]<br>[teenoorst. $\angle$ van koordev.] | ✓ S    ✓ R | (2)         |
| 8.2.2 | $\hat{S}_1 = 51^\circ$     | [ext $\angle$ of a cyclic quad]<br>[buite $\angle$ van koordevh]        | ✓ S    ✓ R | (2)         |
| 8.2.3 | $\widehat{WQR} = 57^\circ$ | [tan – chord theorem]<br>[raaklyn – koord stelling]                     | ✓ S    ✓ R | (2)         |
|       |                            |                                                                         |            | <b>[11]</b> |

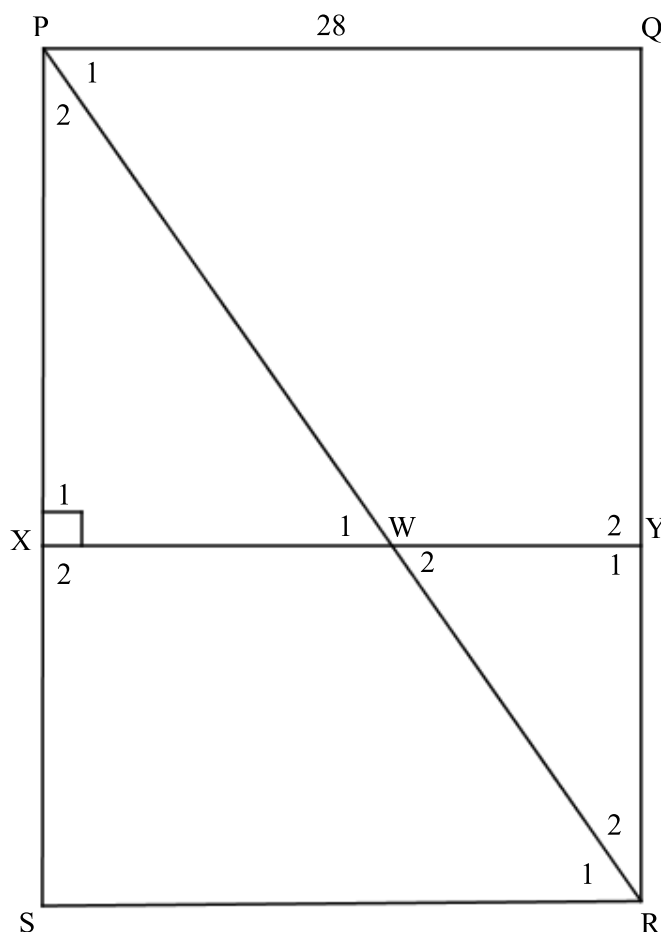




|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                           |      |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 9.4 | $\hat{D}_2 = \hat{E}_3$ [ $\angle$ s same seg] / [ $\angle$ e in dies. segment]<br>$\hat{E}_3 = \hat{A}$ [proved 9.2] / [bewys in 9.2]<br>$\therefore \hat{A} = \hat{D}_2$<br>$\therefore$ CD is a tangent to circle ABD [converse tan chord theo]<br>CD is 'n raaklyn aan die sirkel ABD<br>[omgekeerde raaklyn koord stelling]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ✓ S      ✓ R<br><br><br>✓ R                                                                                                                                                                                                                                                                                               | (3)  |
| 9.5 | $\triangle BCD$ and/en $\triangle ABE$<br>$\hat{E}_2 = \hat{C}$ [ext $\angle$ of a cyclic quad]/[buite $\angle$ van kv]<br>$\hat{A} = \hat{D}_2$ [tan chord theo] / [raaklyn - koord stelling]<br>$\hat{B}_1 = \hat{B}_3$ [3rd $\angle$ ] / [ $3^{de}$ $\angle$ ]<br>$\therefore \triangle EAB \parallel \triangle CDB$ [ $\angle\angle\angle$ ]<br>$\frac{AE}{CD} = \frac{EB}{CB}$<br>$CD = \frac{AE \times CB}{EB}$<br>$\therefore \frac{AE \times CB}{EB} = \frac{EB \times AC}{AE}$ [both/beide = CD]<br>$\frac{EB^2}{AE^2} = \frac{BC}{AC}$<br><br><p style="text-align: center;"><b>OR/OF</b></p> $\triangle BCD$ and/en $\triangle ABE$<br>$\hat{E}_2 = \hat{C}$ [ext $\angle$ of a cyclic quad]/[buite $\angle$ van kv]<br>$\hat{A} = \hat{D}_2$ [proved 9.4] / [bewys in 9.4]<br>$\hat{B}_1 = \hat{B}_3$ [3rd $\angle$ ] / [ $3^{de}$ $\angle$ ]<br>$\therefore \triangle EAB \parallel \triangle CDB$ [ $\angle\angle\angle$ ]<br>$\frac{AE}{CD} = \frac{EB}{CB}$<br>$CD \times EB = AE \times CB$<br>$\left(\frac{EB \times AC}{AE}\right) \times EB = AE \times CB$ from/vanaf 9.3<br>$\frac{EB^2}{AE^2} = \frac{BC}{AC}$ | ✓ S      ✓ R<br>✓ S<br><br><br>✓ R<br><br>✓ correct ratio<br>korrekte<br>verhouding<br><br>✓ equating CD<br>gelyk stel CD<br><br><br><br><br><br><p style="text-align: center;"><b>OR/OF</b></p> ✓ S      ✓ R<br>✓ S<br><br><br>✓ R<br><br>✓ correct ratio<br>korrekte<br>verhouding<br><br>✓ substitute CD<br>vervang CD | (6)  |
|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                           | [19] |



## QUESTION/VRAAG 10



|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                              |     |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 10.1 | $\hat{P} = 90^\circ$ [ $\angle$ s of a rect = $90^\circ$ ] / [ <i>Le van reghoek = <math>90^\circ</math></i> ]<br>$\therefore XY \parallel PQ$ [ co-int. $\angle$ s suppl ] / [ <i>ko-binne <math>\angle</math>e is suppl</i> ]                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ✓ S    ✓ R                                                                                                                                                                                                                                                   | (2) |
| 10.2 | $\frac{WR}{PR} = \frac{YR}{RQ}$ [ prop theo, $XY \parallel PS$ / line $\parallel$ to one side of a $\Delta$ ]<br><i>[ eweredigh stelling, <math>XY \parallel PS</math> / lyn <math>\parallel</math> aan een sy van <math>\Delta</math> ]</i><br>$\frac{WR}{42} = \frac{3x}{7x}$<br>$\therefore WR = 18$<br><p style="text-align: center;"><b>OR/OF</b></p> $\frac{PR}{PW} = \frac{QR}{QY}$ [ prop theo, $XY \parallel PS$ / line $\parallel$ to one side of a $\Delta$ ]<br><i>[ eweredigh stelling, <math>XY \parallel PS</math> / lyn <math>\parallel</math> aan een sy van <math>\Delta</math> ]</i><br>$\frac{42}{PW} = \frac{7x}{4x}$<br>$\therefore PW = 24$<br>$\therefore WR = 18$ | ✓ S    ✓ R<br><br>✓ correct substitution<br><i>korrekte vervanging</i> ✓<br><i>answer/antwoord</i><br><br><p style="text-align: center;"><b>OR/OF</b></p> ✓ S    ✓ R<br><br>✓ correct substitution<br><i>korrekte vervanging</i> ✓<br><i>answer/antwoord</i> | (4) |



|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                       |                          |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 10.3 | $\hat{P}_2 = \hat{P}_2$ [common] / [gemeen]<br>$\hat{X}_1 = \hat{S} = 90^\circ$ [corresp, $\angle$ s, $XY \parallel SR$ ]<br>[ooreenk. $\angle$ e, $XY \parallel SR$ ]<br>$\hat{W}_1 = \hat{R}_1$ [3rd $\angle$ s] / [ $3^{de}$ $\angle$ ]<br>$\triangle PXW \parallel \triangle PSR$ [ $\angle\angle\angle$ ]<br>$\frac{XW}{SR} = \frac{PW}{PR}$ [ $\parallel \Delta$ s]<br>$SR = 28$ [opp sides of a rect.]<br>[teenoorst.sye van 'n reghoek]<br>$\frac{XW}{28} = \frac{24}{42}$<br>$XW = 16$ | ✓ S for identifying $\parallel \Delta$ s<br><i>identifisering van <math>\parallel \Delta</math>s</i><br>✓ S<br>✓ S/R<br>✓ substitution into correct ratios<br><i>vervanging in korrekte verhoudings</i><br>✓ answer / <i>antwoord</i> | (5)                      |
|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                       | [11]                     |
|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                       |                          |
|      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                       | <b>TOTAL/TOTAAL: 150</b> |

