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Department:  
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**PROVINCIAL ASSESSMENT/  
PROVINSIALE ASSESSERING**

**GRADE 12/GRAAD 12**

**TECHNICAL MATHEMATICS P2/ TEGNIESE WISKUNDE V2  
JUNE/JUNIE 2025  
MARKING GUIDES/ NASIENRIGLYNE**

**MARKS/ PUNTE: 150**

|              |                                                                      |
|--------------|----------------------------------------------------------------------|
| <b>A</b>     | Accuracy/Akkuraatheid                                                |
| <b>AO</b>    | Answer only/Antwoord alleenlik                                       |
| <b>CA</b>    | Consistent Accuracy/Volgehoue Akkuraatheid                           |
| <b>I</b>     | Identity/Identiteit                                                  |
| <b>M</b>     | Method/Metode                                                        |
| <b>NPR</b>   | No Penalty for Rounding/Geen penalisering vir Afronding              |
| <b>NPU</b>   | No Penalty for Units omitted/Geen penalisering vir eenhede weggelaat |
| <b>R</b>     | Rounding/Afronding                                                   |
| <b>RE</b>    | Reason/Rede                                                          |
| <b>S</b>     | Simplification / Vereenvoudiging                                     |
| <b>F</b>     | Formula/Formule                                                      |
| <b>SF</b>    | Substitution in correct Formula/Vervanging in korrekte formule       |
| <b>ST/RE</b> | Statement with reason/Bewering met rede                              |
|              |                                                                      |

**This marking guideline consists of 16 pages./Hierdie nasienriglyne bestaan uit 16 bladsye.**

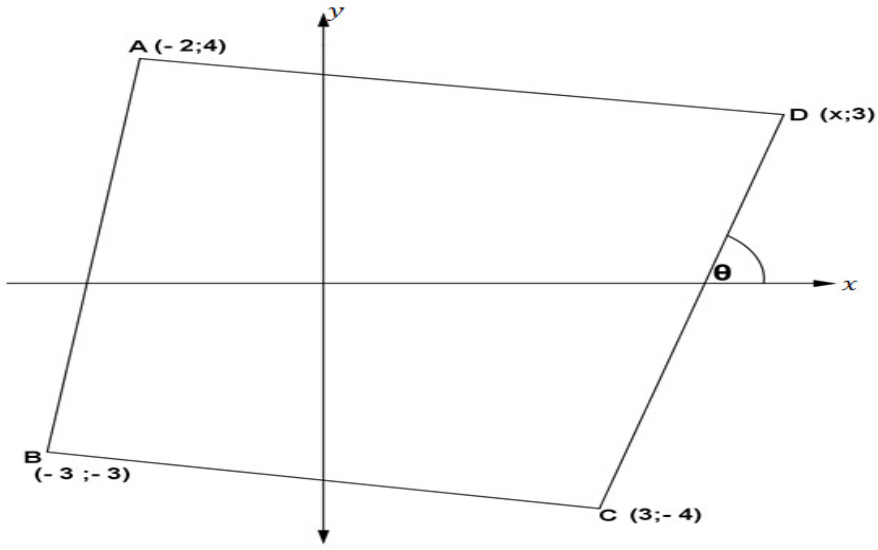


## GENERAL GUIDELINES FOR MARKING/ALGEMENE RIGLYNE OM TE MERK

- If a learner makes **more than one attempt** at answering a question and **does not cancel** any of them out, only the **first attempt will be marked** irrespective of which of the attempt(s) may be the correct answer./As 'n leerder **meer as een poging** aanwend om 'n vraag te beantwoord en **nie een van hulle word uitgeskakel nie**, sal slegs die **eerste poging gemerk word** ongeag watter van die poging(s) die regte antwoord kan wees.
- Consistent accurate marking regarding calculations will be followed in the following cases / Volgehoue akkurate nasiening met betrekking tot berekeninge sal in die volgende gevalle gevolg word:
  - Sub question to sub question: When a certain variable is incorrectly calculated in one sub question and needs to be substituted into another sub question full marks can be awarded for the subsequent sub questions provided the methods used are correct and the calculations are correct./  
*Subvraag na subvraag: Wanneer 'n sekere veranderlike verkeerd in een subvraag bereken word en in 'n ander subvraag vervang moet word, kan volpunte toegeken word vir die daaropvolgende subvrae, mits die metodes wat gebruik is, en die berekeninge korrek is.*
  - Assuming values/answers to solve a problem is unacceptable./  
*Aanvaarding van waardes/antwoorde om 'n probleem op te los, is onaanvaarbaar.*
- If a learner did a question in pencil, and did not write it over in pen, the pencil must be marked. Draw a line through and make note of it./  
*As 'n leerder 'n vraag in potlood gedoen het en dit nie in pen oorgeskryf het nie, moet die potlood gemerk word. Trek 'n lyn deur en maak 'n nota daarvan.*



**QUESTION 1 / VRAAG 1**

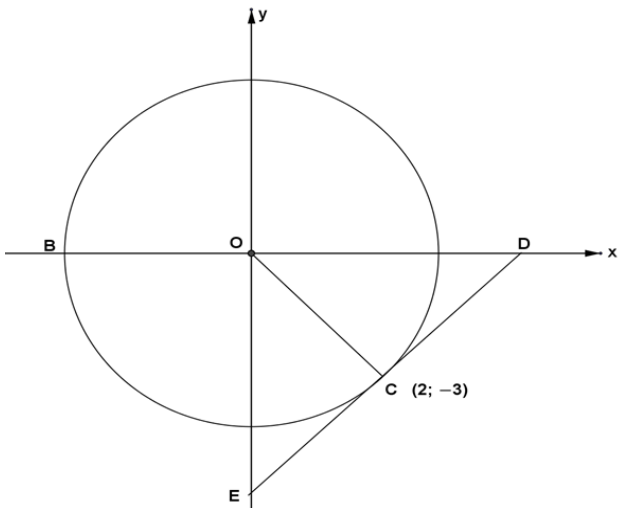
|     |                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                    |                                         |
|-----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| 1.1 |                                                                                                                                                                                                                                                  |                                                                                                                                                    |                                         |
| 1.1 | $m_{BC} = \frac{y_C - y_B}{x_C - x_B}$ $= \frac{-4 - (-3)}{3 - (-3)}$ $= -\frac{1}{6}$                                                                                                                                                                                                                                             | ✓ SF<br>✓ answer/antwoord<br><br><b>Only CA with correct formula/ CA slegs met korrekte formule</b>                                                | <b>A</b><br><b>CA</b><br><br><b>(2)</b> |
| 1.2 | $y - y_C = m(x - x_C)$ can also use B(-3;-3)<br>$y - (-4) = -\frac{1}{6}(x - 3)$<br>$-4 = -\frac{1}{6}(3) + c$<br>$y = -\frac{1}{6}x + \frac{1}{2} - 4$<br>$y = -\frac{1}{6}x - \frac{7}{2}$ or/of -3,5<br><b>OR/OF</b><br>use B(-3;-3)<br>$y = -\frac{1}{6}x + c$ $c = -\frac{7}{2}$ $\therefore y = -\frac{1}{6}x - \frac{7}{2}$ | ✓ SF<br>✓ answer/antwoord                                                                                                                          | <b>A</b><br><b>CA</b><br><br><b>(2)</b> |
| 1.3 | $-\frac{1}{7} = \frac{4-3}{-2-x}$ <b>OR/OF</b> $x - (-2) = 7$<br>$-7 = -2 - x$ $x + 2 = 7$<br>$x = -2 + 7$ $x = 5$<br>$x = 5$                                                                                                                                                                                                      | ✓ SF<br>✓ answer/antwoord<br><br><div style="border: 1px solid black; padding: 5px; display: inline-block;"> <b>AO: full marks/volpunte</b> </div> | <b>A</b><br><b>A</b><br><br><b>(2)</b>  |



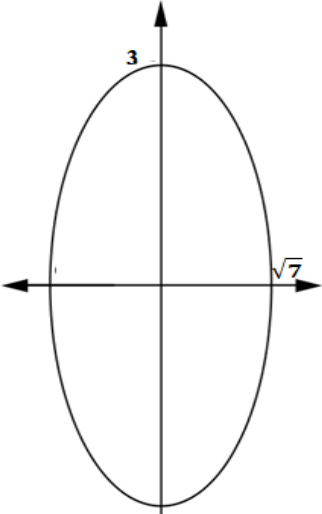
|     |                                                                                                                                                                                                             |                                                                                                                   |                                           |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| 1.4 | $m_{BC} \neq m_{AD}$<br>$\therefore BC \nparallel AD$                                                                                                                                                       | ✓ reason/rede<br>✓ answer/antwoord                                                                                | A<br>A<br><b>(2)</b>                      |
| 1.5 | $M_{AB} = \left( \frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2} \right)$<br>$= \left( \frac{-2 + (-3)}{2}; \frac{4 + (-3)}{2} \right)$<br>$= \left( -\frac{5}{2}; \frac{1}{2} \right)$ <b>or/of</b> $(-2,5; 0,5)$ | ✓ SF<br>✓ answer/antwoord                                                                                         | A<br>CA<br><b>(2)</b>                     |
| 1.6 | $y - (-4) = 6(x - (-1))$<br>$y + 4 = 6x + 6$<br>$y = 6x + 2$                                                                                                                                                | ✓ correct gradient/<br>korrekte gradiënt<br>$m = 6$<br>✓ substitute/vervanging<br>$(-1; -4)$<br>✓ answer/antwoord | A<br>A<br>CA<br><b>(3)</b>                |
| 1.7 | $\tan \theta = m$<br>$\tan \theta = \frac{7}{2}$<br>$\theta = 74,05^\circ$ accept/aanvaar $74^\circ$                                                                                                        | ✓ $\tan \theta = m$<br>✓ gradient of/gradiënt<br>van DC<br><b>CA from/vanaf 1.3</b><br>✓ answer/antwoord          | A<br>CA<br>A<br><b>(3)</b><br><b>[16]</b> |



**QUESTION 2 / VRAAG 2**

|       |                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                  |                                                 |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
|       |                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                  |                                                 |
| 2.1.1 | $x^2 + y^2 = r^2$ $(2)^2 + (-3)^2 = r^2$ $13 = r^2$ $\therefore x^2 + y^2 = 13$                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>✓ SF</li> <li>✓ answer/antwoord</li> </ul> <div style="border: 1px solid black; padding: 2px; display: inline-block;"> <b>AO: full marks/volpunte</b> </div>                              | <b>A</b><br><b>CA</b><br><b>(2)</b>             |
| 2.1.2 | $(-\sqrt{13}; 0)$ <b>or/of</b> $(-3.61; 0)$                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>✓ <math>x</math>-value/waarde</li> <li>✓ <math>y</math>-value/waarde</li> </ul>                                                                                                           | <b>A</b><br><b>A</b><br><b>(2)</b>              |
| 2.1.3 | $m_{OC} = -\frac{3}{2}$                                                                                                                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>✓ correct gradient/<br/>korrekte gradiënt</li> </ul>                                                                                                                                      | <b>A</b><br><b>(1)</b>                          |
| 2.1.4 | $y - y_c = m(x - x_c)$ <b>OR/OF</b> $y = mx + c$<br>$-3 = \frac{2}{3}(2) + c$<br>$y - (-3) = \frac{2}{3}(x - 2)$ $c = -\frac{13}{3}$<br>$y = \frac{2}{3}x - \frac{4}{3} - 3$ $\therefore y = \frac{2}{3}x - \frac{13}{3}$<br>$y = \frac{2}{3}x - \frac{13}{3}$ <b>or/of</b> $-4,33$ <b>or/of</b> $-4\frac{1}{3}$ | <b>CA the gradient from/die gradiënt vanaf 2.1.3</b><br><ul style="list-style-type: none"> <li>✓ correct gradient/korrekte gradiënt</li> <li>✓ substitute/vervanging <math>(2; -3)</math></li> <li>✓ answer /antwoord</li> </ul> | <b>A</b><br><b>A</b><br><b>CA</b><br><b>(3)</b> |
| 2.1.5 | $y = \frac{2}{3}x - \frac{13}{3}$<br>$0 = \frac{2}{3}x - \frac{13}{3}$<br>$\frac{13}{3} \times \frac{3}{2} = x$<br>$\frac{13}{2} = x$ $\therefore D\left(\frac{13}{2}; 0\right)$ <b>or/of</b> $(6,5; 0)$                                                                                                         | <b>CA equation from/vergelyking vanaf 2.1.4</b><br><ul style="list-style-type: none"> <li>✓ substitute/vervanging <math>y = 0</math></li> <li>✓ coordinates/koördinate</li> </ul> <b>OR/OF</b> $x$ -value/waarde                 | <b>CA</b><br><b>CA</b><br><b>(2)</b>            |



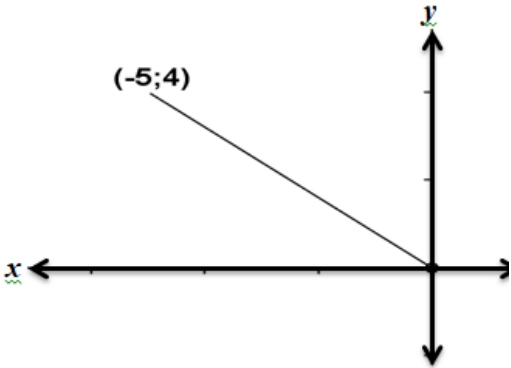
|     |                                                                                   |                                                                                                                                                                                                                                            |                                                 |
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| 2.2 |  | <ul style="list-style-type: none"> <li>✓ correct <math>x</math>-intercept<br/><i>korrekte <math>x</math>-afsnit</i></li> <li>✓ correct <math>y</math>-intercept<br/><i>korrekte <math>y</math>-afsnit</i></li> <li>✓ shape/vorm</li> </ul> | <p>A</p> <p>A</p> <p>CA</p> <p>(3)<br/>[13]</p> |
|-----|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|

**QUESTION 3 / VRAAG 3**

|       |                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                  |                                         |
|-------|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| 3.1.1 | $\cos \beta = \frac{3}{5}$<br>$\beta = \cos^{-1} \frac{3}{5}$<br>$\beta = 53,13^\circ$<br>$\therefore 53^\circ$                      | <ul style="list-style-type: none"> <li>✓ <math>\beta = 53,13^\circ</math></li> <li>✓ correct rounded answer/<br/><i>korrek afgeronde antwoord</i></li> </ul>                                                                                                                                                                                                                                                     | <p>A</p> <p>A</p> <p>(2)</p>            |
| 3.1.2 | $\frac{\pi}{6} \times \frac{180^\circ}{\pi}$<br>$= 30^\circ$                                                                         | <ul style="list-style-type: none"> <li>✓ answer/antwoord</li> </ul>                                                                                                                                                                                                                                                                                                                                              | <p>A</p> <p>(1)</p>                     |
| 3.1.3 | $\sin(2 \times 53^\circ) - \sec(30^\circ)$ <b>OR/OF</b> $53,13^\circ$<br>$= \sin(106^\circ) - \frac{1}{\cos(30^\circ)}$<br>$= -0,19$ | <ul style="list-style-type: none"> <li>✓ substitution/<i>vervanging</i><br/>CA from 3.1.1 and 3.1.2/<br/><i>CA vanaf 3.1.1 en 3.1.2</i></li> <li>✓ correct identity/<i>korrekte identiteit</i></li> <li>✓ answer/antwoord</li> </ul> <p><b>CA with the values of <math>\beta</math> and <math>\alpha</math> from above/met die waardes van <math>\beta</math> en <math>\alpha</math> vanaf bo</b></p> <p>NPR</p> | <p>CA</p> <p>A</p> <p>CA</p> <p>(3)</p> |





|       |                                                                                                                                                                                      |                                                                                                                                                                                                                                                           |                             |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| 3.2.1 |                                                                                                     | ✓ diagram ( <b>correct quadrant</b> )/<br>( <i>korrekte kwadrant</i> )                                                                                                                                                                                    | A                           |
| 3.2.2 | $r = \sqrt{(-5)^2 + (4)^2} \quad (\text{pyth})$ $r = \sqrt{41}$ $= \left(\frac{-5}{\sqrt{41}}\right)^2 + \left(\frac{4}{\sqrt{41}}\right)^2$ $= \frac{25}{41} + \frac{16}{41}$ $= 1$ | ✓ correct value of $r$ /<br><i>korrekte waarde van <math>r</math></i><br>✓ substitution/vervanging<br>✓ answer /antwoord<br><b>no decimals/geen desimale.</b><br><b>if calculator was used NO marks/</b><br><b>as sakrekenaar gebruik is, GEEN punte.</b> | A<br>CA<br>CA<br>(3)        |
| 3.3   | $8 \cos x - 2 = 2$<br>$\cos x = \frac{1}{2}$<br>$x = 60^\circ$<br><b>OR/OF</b><br>$x = 360^\circ - 60^\circ$<br>$x = 300^\circ$                                                      | ✓ simplifying ratio/<br><i>vereenvoudig verhouding</i><br>✓ first correct value of $x$ /<br><i>eerste korrekte waarde vir <math>x</math></i><br>✓ second correct value of $x$ /tweede<br><i>korrekte waarde vir <math>x</math></i>                        | A<br>CA<br>CA<br>NPR<br>(3) |
|       |                                                                                                                                                                                      |                                                                                                                                                                                                                                                           | [13]                        |

**QUESTION 4 / VRAAG 4**

|     |                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                  |                                             |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
| 4.1 | $\frac{\cos(\pi + \theta) \cdot \tan(180^\circ + \theta) \cdot \sin^2(180 - \theta)}{-\tan(180^\circ - \theta) \cdot \sin \theta \cdot \cos(180 - \theta) \cdot \frac{1}{\sec \theta}}$ $= \frac{-\cos \theta \cdot \tan \theta \cdot \sin \theta \cdot \sin \theta}{\tan \theta \cdot \sin \theta \cdot -\cos \theta \cdot \cos \theta}$ $= \tan \theta$ | ✓ $-\cos \theta$<br>✓ $\tan \theta$<br>✓ $\sin^2 \theta$<br>✓ $-(-\tan \theta)$ <b>or/of</b> $\tan \theta$<br>✓ $-\cos \theta$<br>✓ identity/identiteit $\frac{1}{\sec \theta} = \cos \theta$<br>✓ $\tan \theta$ answer/antwoord | A<br>A<br>A<br>A<br>A<br>A<br>A<br>A<br>(7) |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|





|     |                                                                                                                                                                                                                                               |                                                                                                                                  |                                                         |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| 4.2 | $\frac{\sin^2 \theta}{\cos^2 \theta} + \frac{\cos^2 \theta}{\cos^2 \theta} = \frac{1}{\cos^2 \theta}$ <p><b>LHS/RK:</b><br/> <math>\tan^2 \theta + 1</math><br/> <math>= \sec^2 \theta</math><br/> <math>= \frac{1}{\cos^2 \theta}</math></p> | <p>✓ <math>\tan^2 \theta</math></p> <p>✓ 1</p> <p>✓ <math>\sec^2 \theta</math></p> <p>✓ <math>\frac{1}{\cos^2 \theta}</math></p> | <p>A</p> <p>A</p> <p>A</p> <p>A</p> <p>(4)<br/>[11]</p> |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|

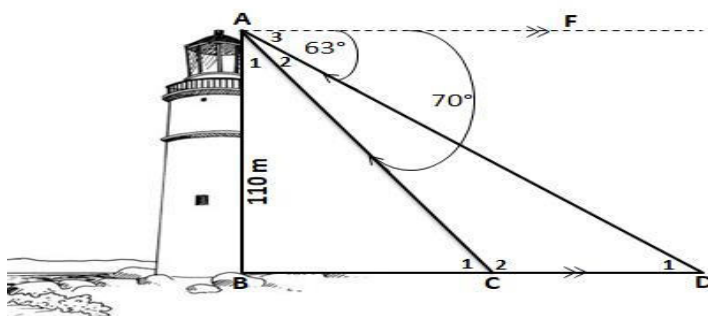
## QUESTION 5/ VRAAG 5

|       |                                      |                                                                          |                     |
|-------|--------------------------------------|--------------------------------------------------------------------------|---------------------|
| 5.1   |                                      |                                                                          |                     |
| 5.1.1 | $x = 90^\circ$ or/of $x = 270^\circ$ | <p>✓ <math>x = 90^\circ</math></p> <p>✓ <math>x = 270^\circ</math></p>   | <p>A</p> <p>(2)</p> |
| 5.1.2 | $180^\circ$                          | <p>✓ correct answer/<br/>korrekte antwoord</p>                           | <p>A</p> <p>(1)</p> |
| 5.1.3 | $x = 45^\circ$                       | <p>✓ correct answer/<br/>korrekte antwoord</p>                           | <p>A</p> <p>(1)</p> |
| 5.1.4 | $(180^\circ; 0)$                     | <p>✓ notation/Notasie</p> <p>✓ correct answer/<br/>korrekte antwoord</p> | <p>A</p> <p>(2)</p> |
| 5.2   |                                      |                                                                          |                     |
| 5.2.1 | $a = 1$                              | <p>✓ answer/antwoord</p>                                                 | <p>A</p> <p>(1)</p> |
| 5.2.2 | $180^\circ$                          | <p>✓ answer/antwoord</p>                                                 | <p>A</p> <p>(1)</p> |



|       |                                    |                                                             |                  |
|-------|------------------------------------|-------------------------------------------------------------|------------------|
| 5.2.3 | $(90^\circ; -1)$                   | ✓ $90^\circ$<br>✓ $-1$                                      | A<br>A<br>(2)    |
| 5.3.1 | $(90^\circ; 180^\circ)$            | ✓ correct values/<br>korrekte waardes<br>✓ notation/notasie | A<br>(2)         |
| 5.3.2 | $(45^\circ; 135^\circ)$            | ✓ correct values/<br>korrekte waardes<br>✓ notation/notasie | A<br>(2)         |
| 5.4   | $-1 \leq y \leq 1$ OR/OF $[-1; 1]$ | ✓ values/waardes<br>✓ notation/notasie                      | A<br>(2)<br>[16] |

## QUESTION 6/ VRAAG 6

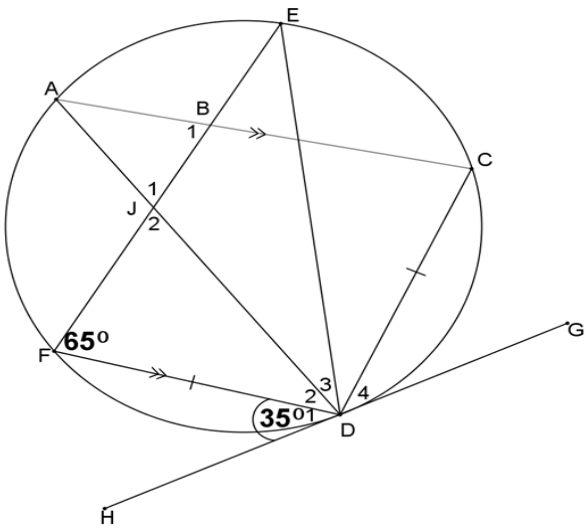


|       |                                                                                                                                                                                                                                                                                          |                                                                                                                                                                |                                   |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| 6.1.1 | $\hat{C}_1 = 70^\circ$ Alternate/Verwisselende $\angle$ s/e $AF \parallel BD$<br>OR/OF Interior/Binne $\angle$ 's/e of/van $\Delta$                                                                                                                                                      | ✓ statement/bewering<br>✓ reason/rede                                                                                                                          | A<br>A<br>(2)                     |
| 6.1.2 | $\hat{A}_2 = 70^\circ - 63^\circ$<br>$= 7^\circ$                                                                                                                                                                                                                                         | ✓ answer/antwoord                                                                                                                                              | A<br>(1)                          |
| 6.2   | $\sin 70^\circ = \frac{110}{AC}$ OR/OF $\frac{AC}{\sin 90^\circ} = \frac{110}{\sin 70^\circ}$<br><br>$AC = \frac{110}{\sin 70^\circ}$<br><br>$AC = 117,06m$<br><br>Learners can determine BC and use pyth to get AC./<br>Leerders kan BC bepaal en AC bepaal d.m.v. Pyth<br>BC = 40,0367 | ✓ SF<br>✓ AC=117,06<br><br><br><br><br><br><br>NPR                                                                                                             | A<br>A<br><br><br><br><br><br>(2) |
| 6.3   | $\frac{CD}{\sin 7^\circ} = \frac{117,06}{\sin 63^\circ}$<br>$CD = 16,01$<br>OR/OF<br>$\frac{CD}{\sin 7^\circ} = \frac{AD}{\sin 110^\circ} = \frac{123,46}{\sin 110^\circ}$<br><br>$CD = 16,01$                                                                                           | ✓ method/metode<br>✓ $63^\circ$<br>✓ answer/antwoord<br><br>CA if $\angle$ values are wrong<br>from 6.1. /<br>CA as $\angle$ waardes verkeerd is<br>vanaf 6.1. | A<br>A<br>CA                      |

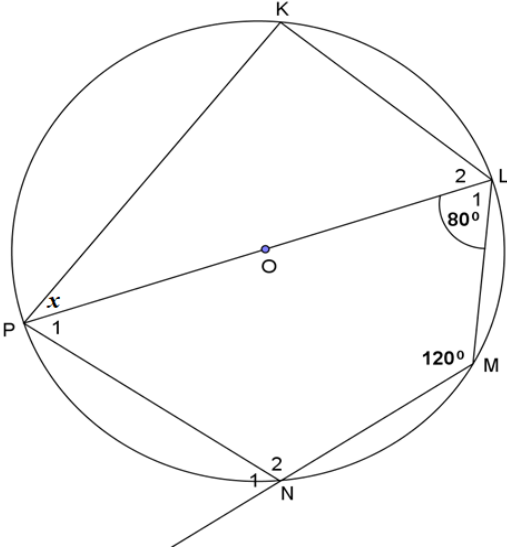


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|     | <b>OR/OF</b><br>$BC = \frac{110}{\tan 70^\circ}$ and/en $BD = \frac{110}{\tan 63^\circ}$<br>$= 40,04$ $= 56,05$<br>$\therefore CD = 56,06 - 40,04$<br>$CD = 16,01$                                                                  | NPR                                                                                                                            | (3)                    |
| 6.4 | $AD = c$<br>$c^2 = a^2 + d^2 - 2ad \cos c$<br>$c = \sqrt{(16,01)^2 + (117,06)^2 - 2(16,01)(117,06) \cos 110^\circ}$<br>$= 123,46$<br><b>OR/OF</b><br>$C = \sqrt{(110)^2 + (56,05)^2 - 2(110)(56,05) \cos 90^\circ}$<br>$c = 123,46$ | ✓ SF<br>✓ answer/antwoord<br><br><b>CA if sides are wrong from 6.2 and 6.3./CA as sye verkeerd is vanaf 6.2 en 6.3.</b><br>NPR | A<br>CA<br><br><br>(2) |
|     |                                                                                                                                                                                                                                     |                                                                                                                                | [10]                   |

**QUESTION 7/ VRAAG 7**

|       |                                                                                                                                                                                                                                                                                                                                          |                                                   |                                               |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------|
| 7.1   |                                                                                                                                                                                                                                                       |                                                   |                                               |
| 7.1.1 | <b>any three angles/enige drie hoeke:</b><br>$\hat{E} = 35^\circ$ tangent chord/raaklyn koord<br>$\hat{A} = 35^\circ$ $\angle$ 's subt by equal chords/ $\angle$ 'e onderspan deur gelyke koorde<br>$\hat{D}_2 = 35^\circ$ alternate/verwisselende $\angle$ 's/e $AC \parallel FD$<br>$\hat{D}_4 = 35^\circ$ tangent chord/raaklyn koord | ✓ ST<br>✓ R<br><br>✓ ST<br>✓ R<br><br>✓ ST<br>✓ R | A<br>A<br><br>A<br>A<br><br>A<br>A<br><br>(6) |
| 7.1.2 | $\hat{A}\hat{D}H = 70^\circ$                                                                                                                                                                                                                                                                                                             | ✓ ST                                              | A<br>(1)                                      |
| 7.1.3 | $\hat{C} = 70^\circ$ tangent chord/raaklyn koord                                                                                                                                                                                                                                                                                         | ✓ ST<br>✓ R                                       | CA<br>A<br>(2)                                |



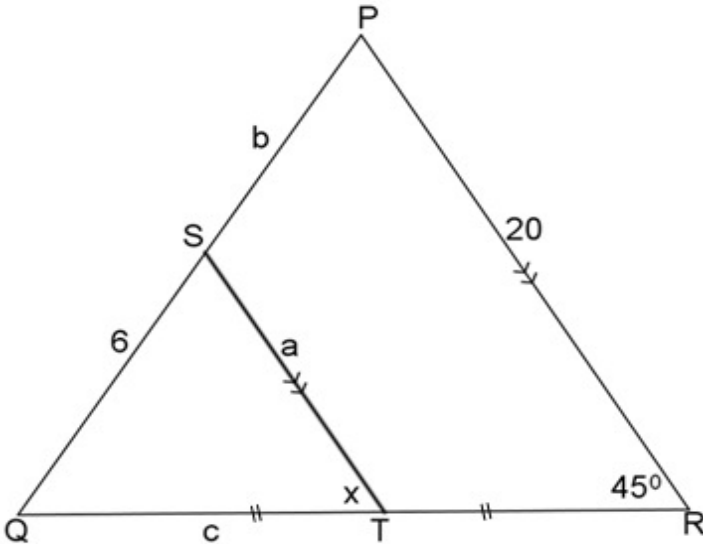
|       |                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                         |                        |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|------------------------|
| 7.1.4 | $\widehat{CDF} = 180^\circ - 70^\circ$ co interior/ko-binne $\angle$ s/e $AC \parallel FD$<br>$= 110^\circ$                                                                                                                                                                                                                                                                                              | ✓ ST<br>✓ R                                                             | CA<br>(2)              |
| 7.1.5 | $\widehat{D}_3 = 45^\circ$ interior/binne $\angle$ 's/e of $\Delta$ <b>OR/OF</b><br>$\widehat{EDG} = 65^\circ$ tangent chord/raaklyn koord<br>$\therefore \widehat{D}_3 = 45^\circ$ $\angle$ 's on a str line/ $\angle$ 'e op 'n reguit lyn                                                                                                                                                              | ✓ ST<br>✓ R                                                             | A<br>A<br>(2)          |
| 7.1.6 | <b>any two statements/enige twee bewerings:</b><br>$\widehat{A} = \widehat{D}_2$ alternate/verwisselende $\angle$ 's/e $AC \parallel FD$<br>$\widehat{J}_1 = \widehat{J}_2$ vertical opp $\angle$ 's /regoorstaande $\angle$ 'e<br><br>$\widehat{B}_1 = \widehat{F}$ alternate/verwisselende $\angle$ 's/e $AC \parallel FD$<br><br>$\Delta JAB \parallel \Delta JDF$ ( $\angle$ ; $\angle$ ; $\angle$ ) | ✓ ST/R<br>✓ ST/R<br><br>✓ reason/rede<br>$\angle$ ; $\angle$ ; $\angle$ | A<br>A<br><br>A<br>(3) |
| 7.2   |                                                                                                                                                                                                                                                                                                                        |                                                                         |                        |
| 7.2.1 | $\widehat{N}_1 = 80^\circ$ exterior $\angle$ of a cyclic quad/<br>buite $\angle$ van koordevierhoek                                                                                                                                                                                                                                                                                                      | ✓ ST<br>✓ R                                                             | A<br>A<br>(2)          |
| 7.2.2 | $\widehat{P}_1 = 60^\circ$ opposite interior $\angle$ 's of cyclic Quad./<br>teenoorstaande binne $\angle$ 'e van koordevierhoek                                                                                                                                                                                                                                                                         | ✓ ST<br>✓ R                                                             | A<br>A<br>(2)          |
| 7.2.3 | $\widehat{K} = 90^\circ$ $\angle$ in a half circle/semi-circle/<br>$\angle$ in halwe sirkel/semi-sirkel                                                                                                                                                                                                                                                                                                  | ✓ ST<br>✓ R                                                             | A<br>A<br>(2)          |
| 7.2.4 | $\widehat{L}_2 = 60^\circ$ alternate/verwisselende $\angle$ 's/e $KL \parallel PN$<br><br>$x = 30^\circ$ int $\angle$ 's of $\Delta$ / binne $\angle$ 'e van $\Delta$ <b>OR/OF</b><br><br>$x = 30^\circ$ Co interior/Ko-binne $\angle$ 's/e $KL \parallel PN$                                                                                                                                            | ✓ ST/R<br><br>✓ ST/R                                                    | A<br><br>A<br>(2)      |

[24]





**QUESTION 9/ VRAAG 9**

|       |                                                                                    |             |               |
|-------|------------------------------------------------------------------------------------|-------------|---------------|
| 9.1   |  |             |               |
| 9.1   | half the length/die helfte van die lengte (1)                                      |             |               |
| 9.2.1 | $a = 10$ midpoint theorem/middelpuntstelling                                       | ✓ ST<br>✓ R | A<br>A<br>(2) |
| 9.2.2 | $b = 6$                                                                            | ✓ ST        | A<br>(1)      |
| 9.2.3 | $x = 45^\circ$ corresp./ooreenkomstige $\angle$ 's/e $PR \parallel ST$             | ✓ ST<br>✓ R | A<br>A<br>(2) |
| 9.2.4 | $2c$                                                                               | ✓ ST        | A<br>(1)      |
|       |                                                                                    |             | [7]           |



**QUESTION 10/ VRAAG 10**

|        |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                  |                                                          |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| 10.1.1 | $\omega = 2\pi n$<br>$= 2\pi \frac{20}{60}$<br>$= \frac{2\pi}{3}$ or/of 2,09rad                                                                                                                                                                                                                                                                       | ✓ formula/formule<br>✓ substitution of/vervanging van 20<br>✓ $\div 60$<br>✓ answer/antwoord                                                     | A<br>A<br>A<br>CA<br><b>NPR &amp; NPU</b><br><b>(4)</b>  |
| 10.1.2 | $v = \omega r$<br>$= \frac{2\pi}{3} \times 0,6$<br>$= \frac{2\pi}{5}$ or/of 1,26<br><b>OR/OF</b><br>$v = \pi D n$<br>$= \pi \times 1,2 \times \frac{20}{60}$<br>$= \frac{2\pi}{5}$ or/of 1,26                                                                                                                                                         | ✓ formula/formule<br>✓ SF<br>✓ $r = 0,6$ <b>OR/OF</b><br>$\div 60$ for 2 <sup>nd</sup> option/<br>vir 2 <sup>de</sup> opsie<br>✓ answer/antwoord | A<br>CA<br>A<br>CA<br><b>NPR &amp; NPU</b><br><b>(4)</b> |
| 10.1.3 | $s = r\theta$<br>$= 0,6 \left( \frac{60\pi}{180} \right)$<br>$= \frac{1}{5}\pi$ or/of 0,628<br>$\text{Area/Oppervlakte} = \frac{rs}{2}$<br>$= \frac{0,6 \times 0,628}{2}$<br>$= 0,19$<br><b>OR/OF</b><br>$\text{Area/Oppervlakte} = \frac{r^2\theta}{2}$<br>$= \frac{0,6 \times 60^\circ \times \frac{\pi}{180}}{2}$<br>$= \frac{3\pi}{5}$ or/of 0,19 | ✓ F<br>✓ SF<br>✓ conversion of/herlei van $60^\circ$<br>✓ answer/antwoord                                                                        | A<br>A<br>A<br>CA<br><b>NPR &amp; NPU</b><br><b>(4)</b>  |
|        |                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                  |                                                          |





|      |                                                                                                                                                                                                                                                             |                                                                                |                                                                                    |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| 10.2 | $4h^2 - 4dh + x^2 = 0$ $4h^2 - 4(30)h + 18^2 = 0$ $4h^2 - 120h + 324 = 0$ $\div 4$ $h^2 - 30h + 81 = 0$ $h = \frac{-(-30) \pm \sqrt{(-30)^2 - 4(1)(81)}}{2}$ $h = 3$ $h \neq 27$ <p><b>OR/OF</b></p> $OC = \sqrt{(15)^2 - (9)^2}$ $= 12$ $DC = 15 - 12 = 3$ | <p>✓ F</p> <p>✓ SF</p> <p>✓ method/metode</p> <p>✓ answer h=3/antwoord h=3</p> | <p><b>A</b></p> <p><b>A</b></p> <p><b>A</b></p> <p><b>CA</b></p> <p><b>(4)</b></p> |
|      |                                                                                                                                                                                                                                                             |                                                                                | <b>[16]</b>                                                                        |



**QUESTION 11/ VRAAG 11**

|        |                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                              |                                                         |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| 11.1.1 | $x = 15$<br><br>$A_T = a(m_1 + m_2 + m_3 + \dots m_4)$<br>$= 4(15 + 15,5 + 14,5 + \mathbf{14,5} + 14 + 12,5)$<br>$= 4(86)$<br>$= 344 \text{ m}^2$<br><br><b>OR/OF</b><br>$A_T = a \left( \frac{o_1 + o_n}{2} + o_2 + o_3 + o_4 + \dots o_{n-1} \right)$<br>$= 4 \left( \frac{14+12}{2} + 16 + 15 + 14 + 15 + 13 \right)$<br>$= 344 \text{ m}^2$ | ✓ $x = 15$<br><b>OR/OF 14,5</b><br><br>✓ F<br>✓ value of $a$ /<br>waarde van $a$<br>✓ SF<br><br>✓ answer/antwoord                                            | A<br><br>A<br>A<br><br>CA<br><br>CA                     |
|        |                                                                                                                                                                                                                                                                                                                                                 | <i>NPU</i>                                                                                                                                                   | <b>(5)</b>                                              |
| 11.2.1 | $V = (lxbxh) + (lxbxh)$<br><br>$V = (40 \times 16 \times 26) + (40 \times 20 \times 8)$<br><br>$V = 23040 \text{ cm}^2$                                                                                                                                                                                                                         | ✓ adding<br>volumes/<br>optel van<br>volumes<br>✓ first volume/<br>eerste volume<br>✓ second<br>volume/<br>tweede volume<br>✓ total volume/<br>totale volume | A<br><br>A<br>A<br><br>A<br><b>(4)</b>                  |
| 11.2.2 | $A = (16 \times 40) + 2(26 \times 16) + 2(26 \times 40)$<br>$= 3552 \text{ cm}^2$<br><br>$A = (20 \times 40) + 2(8 \times 20) + 2(8 \times 40)$<br>$= 1760 \text{ cm}^2$                                                                                                                                                                        | ✓ SF<br>✓ answer/<br>antwoord<br><br>✓ answer/<br>antwoord<br>CA only for correct<br>formula/CA slegs vir<br>korrekte formule                                | A<br><br>CA<br><br>A<br>CA<br><br><b>NPR</b> <b>(3)</b> |
| 11.2.3 | <i>Total Area/Totale Oppervlakte</i> $= 3552 + 1760$<br>$= 5312 \text{ cm}^2$                                                                                                                                                                                                                                                                   | ✓ total area/<br>totale<br>oppervlakte                                                                                                                       | CA<br><br><b>(1)</b>                                    |
|        |                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                              | <b>[13]</b>                                             |

**TOTAL/TOTAAL:150**

| TECH MATHS GR 12 JUNE 2025 PAPER 2                      |                      |                    |                    |                               |
|---------------------------------------------------------|----------------------|--------------------|--------------------|-------------------------------|
| VRAAG/<br>QUESTION                                      | KNOWLEDGE<br>LEVEL 1 | ROUTINE<br>LEVEL 2 | COMPLEX<br>LEVEL 3 | PROBLEM<br>SOLVING<br>LEVEL 4 |
| <b>Q 1: ANALYTICAL<br/>GEOMETRY</b>                     |                      |                    |                    |                               |
| 1.1                                                     | 2                    |                    |                    |                               |
| 1.2                                                     | 2                    |                    |                    |                               |
| 1.3                                                     |                      | 2                  |                    |                               |
| 1.4                                                     | 2                    |                    |                    |                               |
| 1.5                                                     | 2                    |                    |                    |                               |
| 1.6                                                     |                      | 3                  |                    |                               |
| 1.7                                                     |                      | 3                  |                    |                               |
| <b>Q 2: HALF CIRCLE ,<br/>TANGENT &amp;<br/>ELLIPSE</b> |                      |                    |                    |                               |
| 2.1.1                                                   | 2                    |                    |                    |                               |
| 2.1.2                                                   |                      | 2                  |                    |                               |
| 2.1.3                                                   | 1                    |                    |                    |                               |
| 2.1.4                                                   |                      | 3                  |                    |                               |
| 2.1.5                                                   | 2                    |                    |                    |                               |
| 2.2                                                     |                      | 3                  |                    |                               |
| <b>Q 3: TRIG RATIO'S</b>                                |                      |                    |                    |                               |
| 3.1.1                                                   | 2                    |                    |                    |                               |
| 3.1.2                                                   | 1                    |                    |                    |                               |
| 3.1.3                                                   |                      | 3                  |                    |                               |
| 3.2.1                                                   |                      | 1                  |                    |                               |
| 3.2.2                                                   |                      | 3                  |                    |                               |
| 3.3                                                     |                      | 3                  |                    |                               |



|                                                     |   |   |   |   |
|-----------------------------------------------------|---|---|---|---|
| <b>Q 4: TRIG IDENTITIES &amp; REDUCTION FORMULA</b> |   |   |   |   |
| 4.1                                                 |   |   | 7 |   |
| 4.2                                                 |   |   |   | 4 |
| <b>Q 5: TRIG GRAPHS</b>                             |   |   |   |   |
| 5.1.1                                               | 2 |   |   |   |
| 5.1.2                                               | 1 |   |   |   |
| 5.1.3                                               | 1 |   |   |   |
| 5.1.4                                               | 2 |   |   |   |
| 5.2.1                                               | 1 |   |   |   |
| 5.2.2                                               | 1 |   |   |   |
| 5.2.3                                               | 2 |   |   |   |
| 5.3.1                                               |   |   | 2 |   |
| 5.3.2                                               |   |   |   | 2 |
| 5.4                                                 | 2 |   |   |   |
| <b>Q 6: TRIG RULES</b>                              |   |   |   |   |
| 6.1.1                                               | 2 |   |   |   |
| 6.1.2                                               | 1 |   |   |   |
| 6.2                                                 |   | 2 |   |   |
| 6.3                                                 |   | 3 |   |   |
| 6.4                                                 |   | 2 |   |   |
| <b>Q 7: GEOMETRY</b>                                |   |   |   |   |
| 7.1.1                                               | 6 |   |   |   |
| 7.1.2                                               |   | 1 |   |   |
| 7.1.3                                               | 2 |   |   |   |
| 7.1.4                                               | 2 |   |   |   |
| 7.1.5                                               | 2 |   |   |   |



|                                                                                 |   |   |   |   |
|---------------------------------------------------------------------------------|---|---|---|---|
| 7.1.6                                                                           |   | 3 |   |   |
| 7.2.1                                                                           | 2 |   |   |   |
| 7.2.2                                                                           | 2 |   |   |   |
| 7.2.3                                                                           | 2 |   |   |   |
| 7.2.4                                                                           | 2 |   |   |   |
| <b>Q 8: GEOMETRY</b>                                                            |   |   |   |   |
| 8.1                                                                             | 1 |   |   |   |
| 8.2.1                                                                           | 2 |   |   |   |
| 8.2.2                                                                           | 2 |   |   |   |
| 8.2.3                                                                           | 2 |   |   |   |
| 8.2.4                                                                           |   | 2 |   |   |
| 8.2.5                                                                           |   | 3 |   |   |
| <b>Q 9: MIDPOINT T. &amp; CONCRUENCY &amp; SIMILARITY</b>                       |   |   |   |   |
| 9.1                                                                             | 1 |   |   |   |
| 9.2.1                                                                           | 2 |   |   |   |
| 9.2.2                                                                           | 1 |   |   |   |
| 9.2.3                                                                           | 2 |   |   |   |
| 9.2.4                                                                           |   |   | 1 |   |
| <b>Q 10: ANGULAR MOVEMENT, VELOCITY, SECTORS , RADIANS &amp; SEGMENT HEIGHT</b> |   |   |   |   |
| 10.1.1                                                                          |   |   | 4 |   |
| 10.1.2                                                                          |   |   | 4 |   |
| 10.1.3                                                                          |   | 4 |   |   |
| 10.2                                                                            |   |   |   | 4 |



|                                                                 |        |        |     |        |
|-----------------------------------------------------------------|--------|--------|-----|--------|
| <b>Q 11: IRREGULAR<br/>SHAPE, VOLUME &amp;<br/>SURFACE AREA</b> |        |        |     |        |
| 11.1                                                            |        |        | 3   | 2      |
| 11.2.1                                                          |        | 4      |     |        |
| 11.2.2                                                          |        |        |     | 3      |
| 11.2.3                                                          |        | 1      |     |        |
| TOTAL                                                           | 64     | 49     | 21  | 16     |
| PERCENTAGE                                                      | 42,67% | 32,67% | 14% | 10,67% |
| TOTAL OF PAPER                                                  | 150    |        |     |        |

