



Province of the  
**EASTERN CAPE**  
EDUCATION

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**  
*GRAAD 11*

**NOVEMBER 2012**

**MATHEMATICS P2/*WISKUNDE V2***  
**MEMORANDUM**

**MARKS:**  
**PUNTE:** 150

---

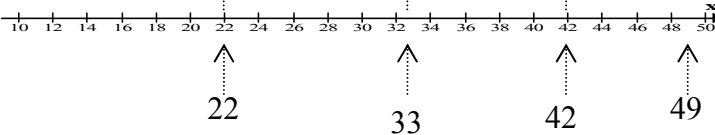
This memorandum consists of 8 pages.  
*Hierdie memorandum bestaan uit 8 bladsye.*

---

## QUESTION/VRAAG 1

1.1	Quadratic / Kwadratiese	✓ answer/antwoord	(1)
1.2	Yes. The shape of the graph shows it./ Ja. Die vorm van die grafiek toon dit	✓ Yes/Ja ✓ reason/rede	(2)
1.3	Drivers should drive at a speed between 80 km/h and 120 km/h. Bestuurders behoort teen 'n spoed tussen 80 km/h en 120 km/h te bestuur.	✓✓ answer/antwoord	(2)
			[5]

## QUESTION/VRAAG 2

2.1.1	11;18;22;25;31;35;36;42;44;49 Median/Mediaan = $\frac{31+35}{2} = 33$	✓ Method/Metode ✓ Answer/Antwoord Answer only: 2/2 Slegs antwoord :2/2	(2)
2.1.2	$Q_1 = 22$ $Q_3 = 42$ Semi IQR = $\frac{42-22}{2} = 10$	✓ $Q_1$ ✓ $Q_3$ ✓ answer/antwoord	(3)
2.2	Min=11, $Q_1=22$ , $Q_2=33$ , $Q_3=42$ , Max/Maks =49 	✓ min ✓ $Q_1$ and/en $Q_3$ ✓ $Q_2$ ✓ max/maks	(4)
2.3	Data is skewed to the left./Data is skeef na links OR/OF Data is more widely distributed below the median./ Data is wyer verspreid onder die mediaan	✓ answer/ antwoord	(1)
			[10]

**QUESTION/VRAAG 3**

3.1	$\frac{20+32+25+14+x+38+22+30+19+28+34+40+25}{13} = 27$ $x = 24$	✓ method/metode ✓ answer/antwoord	(2)																																													
3.2	<table border="1" style="display: inline-table; vertical-align: top;"> <thead> <tr> <th>X</th> <th><math>x - \bar{x}</math></th> <th><math>(x - \bar{x})^2</math></th> </tr> </thead> <tbody> <tr><td>20</td><td><math>20 - 27 = -7</math></td><td>49</td></tr> <tr><td>32</td><td><math>32 - 27 = 5</math></td><td>25</td></tr> <tr><td>25</td><td><math>25 - 27 = -2</math></td><td>4</td></tr> <tr><td>14</td><td><math>14 - 27 = -13</math></td><td>169</td></tr> <tr><td>24</td><td><math>24 - 27 = -3</math></td><td>9</td></tr> <tr><td>38</td><td><math>38 - 27 = 11</math></td><td>121</td></tr> <tr><td>22</td><td><math>22 - 27 = -5</math></td><td>25</td></tr> <tr><td>30</td><td><math>30 - 27 = 3</math></td><td>9</td></tr> <tr><td>19</td><td><math>19 - 27 = -8</math></td><td>64</td></tr> <tr><td>28</td><td><math>28 - 27 = 1</math></td><td>1</td></tr> <tr><td>34</td><td><math>34 - 27 = 7</math></td><td>49</td></tr> <tr><td>40</td><td><math>40 - 27 = 13</math></td><td>169</td></tr> <tr><td>25</td><td><math>25 - 27 = -2</math></td><td>4</td></tr> <tr> <td><b>Sum/Som</b></td> <td><b>698</b></td> <td></td> </tr> </tbody> </table> $SD = \sqrt{\frac{698}{13}}$ $SD = 7,33$	X	$x - \bar{x}$	$(x - \bar{x})^2$	20	$20 - 27 = -7$	49	32	$32 - 27 = 5$	25	25	$25 - 27 = -2$	4	14	$14 - 27 = -13$	169	24	$24 - 27 = -3$	9	38	$38 - 27 = 11$	121	22	$22 - 27 = -5$	25	30	$30 - 27 = 3$	9	19	$19 - 27 = -8$	64	28	$28 - 27 = 1$	1	34	$34 - 27 = 7$	49	40	$40 - 27 = 13$	169	25	$25 - 27 = -2$	4	<b>Sum/Som</b>	<b>698</b>		✓ sum/som ✓ $\sqrt{\frac{698}{13}}$ ✓ Answer/antwoord Answer only: 3/3 Slegs antwoord: 3/3	(3)
X	$x - \bar{x}$	$(x - \bar{x})^2$																																														
20	$20 - 27 = -7$	49																																														
32	$32 - 27 = 5$	25																																														
25	$25 - 27 = -2$	4																																														
14	$14 - 27 = -13$	169																																														
24	$24 - 27 = -3$	9																																														
38	$38 - 27 = 11$	121																																														
22	$22 - 27 = -5$	25																																														
30	$30 - 27 = 3$	9																																														
19	$19 - 27 = -8$	64																																														
28	$28 - 27 = 1$	1																																														
34	$34 - 27 = 7$	49																																														
40	$40 - 27 = 13$	169																																														
25	$25 - 27 = -2$	4																																														
<b>Sum/Som</b>	<b>698</b>																																															
3.3	One standard deviation from the mean/Een standaardafwyking vanaf die gemiddelde: $19,67$ to/tot $34,33 \therefore 9$ spectators/toeskouers	✓ interval ✓ answer/antwoord	(2)																																													
			<b>[7]</b>																																													

**QUESTION/VRAAG 4**

4.1	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Interval</th> <th>Frequency <i>Frekwensie</i></th> <th>Cumulative frequency <i>Kumulatiewe frekwensie</i></th> </tr> </thead> <tbody> <tr><td><math>5 \leq x &lt; 10</math></td><td>5</td><td>5</td></tr> <tr><td><math>10 \leq x &lt; 15</math></td><td>9</td><td>14</td></tr> <tr><td><math>15 \leq x &lt; 20</math></td><td>14</td><td>28</td></tr> <tr><td><math>20 \leq x &lt; 25</math></td><td>17</td><td>45</td></tr> <tr><td><math>25 \leq x &lt; 30</math></td><td>11</td><td>56</td></tr> <tr><td><math>30 \leq x &lt; 35</math></td><td>7</td><td>63</td></tr> <tr><td><math>35 \leq x &lt; 40</math></td><td>2</td><td>65</td></tr> </tbody> </table>	Interval	Frequency <i>Frekwensie</i>	Cumulative frequency <i>Kumulatiewe frekwensie</i>	$5 \leq x < 10$	5	5	$10 \leq x < 15$	9	14	$15 \leq x < 20$	14	28	$20 \leq x < 25$	17	45	$25 \leq x < 30$	11	56	$30 \leq x < 35$	7	63	$35 \leq x < 40$	2	65	✓ First 4 correct/eerste 4 korrek ✓ Last 3 correct/laaste 3 korrek	(2)
Interval	Frequency <i>Frekwensie</i>	Cumulative frequency <i>Kumulatiewe frekwensie</i>																									
$5 \leq x < 10$	5	5																									
$10 \leq x < 15$	9	14																									
$15 \leq x < 20$	14	28																									
$20 \leq x < 25$	17	45																									
$25 \leq x < 30$	11	56																									
$30 \leq x < 35$	7	63																									
$35 \leq x < 40$	2	65																									
4.2		✓ (5 ; 0) ✓ All points correct/Alle punte korrek ✓ Shape/vorm	(3)																								
4.3	80% of/van 40 = 32 Approximately 5 learners/Ongeveer 5 leeders (Accept 4, 5 or 6/Aanvaar 4, 5 of 6)	✓ method/metode ✓✓ answer/antwoord	(3)																								
			<b>[8]</b>																								

## QUESTION/VRAAG 5

5.1	$S(-6; 4), T(-1; 3), R(-7; -1)$ $ST = \sqrt{(-1 + 6)^2 + (3 - 4)^2}$ $ST = \sqrt{26}$ $SR = \sqrt{(-7 + 6)^2 + (-1 - 4)^2}$ $SR = \sqrt{26}$ $ST = SR.$ $\therefore \Delta STR$ is isosceles/ <i>gelykbenig</i> .	$\checkmark$ Substitution/ <i>instelling</i> $\checkmark ST = \sqrt{26}$ $\checkmark SR = \sqrt{26}$ $\checkmark$ Conclusion/ <i>gevolgtrekking</i>	(4)
5.2	$B\left(\frac{-7-1}{2}; \frac{-1+3}{2}\right)$ $B(-4; 1)$	$\checkmark$ Substitution/ <i>instelling</i> $\checkmark -4 \checkmark 1$	(3)
5.3	$S(-6; 4), B(-4; 1)$ $m_{SB} = \frac{1-4}{-4+6}$ $m_{SB} = -\frac{3}{2}$ $y - 4 = -\frac{3}{2}(x + 6)$ $y = -\frac{3}{2}x - 5$	$\checkmark$ Substitution/ <i>instelling</i> $\checkmark$ Gradient/ <i>gradiënt</i> $\checkmark$ Substitution/ <i>instelling</i> $\checkmark$ Answer/ <i>antwoord</i>	(4)
5.4	$y = -\frac{3}{2}x - 5$ and/en $A(p; -17)$ $-17 = -\frac{3}{2}p - 5$ $\therefore p = 8$	$\checkmark$ Substitution of/ <i>instelling van</i> $-17$ $\checkmark$ Substitution of/ <i>instelling van</i> $p$ $\checkmark$ Answer/ <i>antwoord</i>	(3)
5.5	$T(-1; 3), R(-7; -1)$ and/en $m_{AS} = -\frac{3}{2}$ $m_{TR} = \frac{-1-3}{-7+1}$ $m_{TR} = \frac{2}{3}$ $m_{AS} \times m_{TR} = -\frac{3}{2} \times \frac{2}{3}$ $= -1$ Hence AS is perpendicular to TR <i>AS is loodreg op TR</i>	$\checkmark m_{TR} = \frac{2}{3}$ $\checkmark m_{TR} \times m_{AS}$ $\checkmark$ AS perpendicular to TR/ <i>AS is loodreg op TR</i>	(3)
5.6	STAR is a kite/ <i>vlieër</i> Diagonal AS bisects TR at right angles <i>Skuinslyn AS halveer TR en is loodreg op TR</i> OR/OF $\Delta STR$ and $\Delta RAT$ are both isosceles. <i><math>\Delta STR</math> en <math>\Delta RAT</math> is albei gelykbenig.</i>	$\checkmark$ Kite/ <i>vlieër</i> $\checkmark\checkmark$ Reason/ <i>rede</i>	(3)
			<b>[20]</b>

## QUESTION/VRAAG 6

6.1	$x + y + 2 = 0$ and/en $Q(7;6)$ $y = -x - 2$ $m = -1$ $y - 6 = -(x - 7)$ $y = -x + 13$	$\checkmark m = -1$ $\checkmark$ substitution/ <i>instelling</i> $\checkmark$ answer/ <i>antwoord</i>	(3)
-----	----------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------	-----

6.2	$Q(7; 6), R(4; -6)$ $m_{QR} = \frac{-6 - 6}{4 - 7}$ $m_{QR} = 4$	✓ substitution/ <i>instelling</i> ✓ answer/ <i>antwoord</i>	(2)
6.3	$P(-2; 0)$	✓ -2 ✓ 0	(2)
6.4	$m_{QR} = \frac{12}{3}$ $\therefore T(1; 12)$	✓ Method/ <i>metode</i> ✓ 1 ✓ 12	(3)
6.5	$\tan \alpha = 4$ $\alpha = 75,96^\circ$ $m_{QR} = \frac{2}{3} \therefore \tan \theta = \frac{2}{3}$ $\theta = 33,69^\circ$ $\widehat{PQR} = 75,96^\circ - 33,69^\circ = 42,27^\circ$	✓ $\tan \alpha = 4$ ✓ $\alpha = 75,96^\circ$ ✓ $m_{PQ} = \frac{2}{3}$ ✓ $\theta = 33,69^\circ$ ✓ Answer/ <i>antwoord</i>	(5)
			<b>[15]</b>

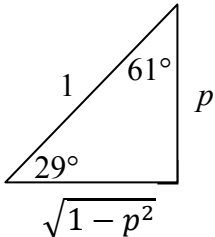
**QUESTION/VRAAG 7**

7.1.1	$R'(-1; -6)$	✓ -1 ✓ -6	(2)
7.1.2	$R'(6; 1)$	✓ 6 ✓ 1	(2)
7.2.1	$(x; y) \rightarrow (x; -y) \rightarrow (x - 3; -y)$ $(x; y) \rightarrow (x - 3; -y)$	✓ $x$ ✓ $-y$ ✓ $x - 3$ ✓ $-y$	(4)
7.2.2		✓ $D''(1; -3)$ ✓ $E''(-3; 1)$ ✓ $F''(2; 2)$ ✓ Diagram	(4)
7.2.3	Rigid. The size and shape do not change <i>Rigied. Die grootte en vorm verander nie</i>	✓ Rigid/ <i>rigied</i> ✓ reason/ <i>rede</i>	(2)
7.3.1	$N'(\frac{3}{2}; -6)$	✓ $\frac{3}{2}$ ✓ -6	(2)
7.3.2	Perimeter of/ <i>omtrek van</i> KLMN = 10 units/ <i>eenhede</i> Perimeter of/ <i>omtrek van</i> $K'L'M'N'$ = $3 \times 10$ = 30 units/ <i>eenhede</i>	✓ Method/ <i>metode</i> ✓ Answer/ <i>antwoord</i> Answer only/ <i>Slegs antwoord: 2/2</i>	(2)
7.4	Rotation about the origin through $90^\circ$ anticlockwise <i>Rotasie rondom die oorsprong deur <math>90^\circ</math> anti-kloksge wys</i>	✓ $90^\circ$ ✓ anticlockwise/ <i>anti-kloksge wys</i>	(2)
			<b>[20]</b>

## QUESTION/VRAAG 8

8.1	$V = \pi r^2 h$ and/en $V = 4\,000\text{ cm}^3$ $\pi r^2 (15) = 4\,000$ $r = 9,21\text{ cm}$	✓ Substitution of/ <i>instelling van</i> 15 ✓ Substitution of/ <i>instelling van</i> 4 000 ✓ answer/ <i>antwoord</i>	(3)
8.2	$V_{\text{cone}} = \frac{1}{3} \text{ area of base/opp van basis} \times H$ $H = \sqrt{10^2 - 9,21^2}$ $= 3,89\text{ cm}$ $\therefore V_{\text{cone/kegel}} = \frac{1}{3} \pi (9,21)^2 (3,89)$ $= 345,54\text{ cm}^3$ $V_{\text{container/houer}} = 4\,000\text{ cm}^3 + 345,54\text{ cm}^3$ $= 4\,345,54\text{ cm}^3$ [accept/ <i>aanvaar</i> 4 346,4]	✓ $H = 3,89$ [or/of 3,9] ✓ Substitution/ <i>Vervanging</i> ✓ $V = 345,54$ [or/of 346,4] ✓ answer/ <i>antwoord</i>	(4)
8.3	$SA = \pi r^2 + 2\pi r h + \pi r s$ $= \pi (9,21)^2 + 2\pi (9,21)(15) + \pi (9,21)(10)$ $= 1\,423,85\text{ cm}^2$	substitution/ <i>instelling</i> : ✓ in $\pi r^2$ ✓ in $2\pi r h$ ✓ in $\pi r s$ ✓ answer/ <i>antwoord</i>	(4)
			[11]

## QUESTION/VRAAG 9

9.1.1	$\sin 29^\circ = p$ $x^2 = 1 - p^2$ $x = \sqrt{1 - p^2}$  $\cos 29^\circ = \sqrt{1 - p^2}$ OR/OF $\sin^2 29^\circ + \cos^2 29^\circ = 1$ $p^2 + \cos^2 29^\circ = 1$ $\cos 29^\circ = \sqrt{1 - p^2}$	 ✓ diagram ✓ $x = \sqrt{1 - p^2}$ ✓ answer/ <i>antwoord</i>  OR/OF ✓ identity/ <i>identiteit</i> ✓ substitution/ <i>instelling</i> ✓ answer/ <i>antwoord</i>	(3)
9.1.2	$\tan(-569^\circ) = -\tan 29^\circ$ $= -\frac{p}{\sqrt{1 - p^2}}$ OR/OF $\tan(-569^\circ) = -\tan 29^\circ$ $= -\frac{\sin 29^\circ}{\cos 29^\circ}$ $= -\frac{p}{\sqrt{1 - p^2}}$	✓ $-\tan 29^\circ$ ✓ answer/ <i>antwoord</i>  OR/OF ✓ $-\tan 29^\circ$  ✓ answer/ <i>antwoord</i>	(2)
9.1.3	$1 - \cos^2 61^\circ = 1 - p^2$ OR/OF $1 - \cos^2 61^\circ = \sin^2 61^\circ = \cos^2 29^\circ$ $= (\sqrt{1 - p^2})^2$ $= 1 - p^2$	✓✓ answer/ <i>antwoord</i> OR/OF  ✓ $\sin^2 61^\circ$ ✓ answer/ <i>antwoord</i>	(2)

<p>9.2</p>	$\begin{aligned} \text{LHS} &= \left( \frac{1}{\sin \beta} + \frac{1}{\tan \beta} \right)^2 \\ &= \left( \frac{1}{\sin \beta} + \frac{\sin \beta}{\cos \beta} \right)^2 \\ &= \left( \frac{1}{\sin \beta} + \frac{\cos \beta}{\sin \beta} \right)^2 \\ &= \left( \frac{1+\cos \beta}{\sin \beta} \right)^2 \\ &= \frac{(1+\cos \beta)^2}{\sin^2 \beta} \\ &= \frac{(1+\cos \beta)^2}{1-\cos^2 \beta} \\ &= \frac{(1+\cos \beta)(1+\cos \beta)}{(1+\cos \beta)(1-\cos \beta)} \\ &= \frac{1+\cos \beta}{1-\cos \beta} = \text{RHS} \end{aligned}$	<p>✓ <math>\frac{\sin \beta}{\cos \beta}</math></p> <p>✓ <math>\left( \frac{1+\cos \beta}{\sin \beta} \right)^2</math></p> <p>✓ <math>1 - \cos^2 \beta</math></p> <p>✓ factors/faktore</p> <p>✓ division/deel</p>	<p>(5)</p>
			<p>[12]</p>

**QUESTION/VRAAG 10**

<p>10.1</p>	$\frac{\sin(-x) \cdot \tan(x - 360^\circ) \cdot \sin(450^\circ - x)}{\cos 180^\circ} + \cos^2(x - 180^\circ)$ $\frac{-\sin x \cdot \tan x \cdot \cos x}{-1} + \cos^2 x$ $\frac{\sin x \cdot \frac{\sin x}{\cos x} \cdot \cos x}{1} + \cos^2 x$ $\frac{1}{\sin^2 x + \cos^2 x}$ $1$	<p>✓ <math>-\sin x</math></p> <p>✓ <math>\tan x</math></p> <p>✓ <math>\cos x</math></p> <p>✓ <math>\cos^2 x</math></p> <p>✓ <math>-1</math></p> <p>✓ <math>\frac{\sin x}{\cos x}</math></p> <p>✓ <math>\sin^2 x + \cos^2 x</math></p> <p>✓ answer/antwoord</p>	<p>(8)</p>
<p>10.2</p>	<p><math>\sin x - 3\cos x = 0</math></p> <p><math>\sin x = 3\cos x</math></p> <p><math>\tan x = 3</math></p> <p><math>x = 71,57^\circ + 180^\circ k \quad (k \in \mathbb{Z})</math></p>	<p>✓ <math>\sin x = 3\cos x</math></p> <p>✓ <math>\tan x = 3</math></p> <p>✓ <math>71,57^\circ + 180^\circ k</math></p> <p>✓ <math>k \in \mathbb{Z}</math></p>	<p>(4)</p>
<p>10.3</p>	<p><math>2 \cdot \sqrt{\sin \alpha} = 1</math></p> <p><math>\sqrt{\sin \alpha} = \frac{1}{2}</math></p> <p><math>\sin \alpha = \frac{1}{4}</math></p> <p><math>\alpha = 180^\circ - 14,48^\circ</math></p> <p><math>\alpha = 165,52^\circ</math></p>	<p>✓ <math>\sin \alpha = \frac{1}{4}</math></p> <p>✓ <math>14,48^\circ</math></p> <p>✓ <math>165,52^\circ</math></p>	<p>(3)</p>
			<p>[15]</p>

## QUESTION/VRAAG 11

11.1	3	✓ 3	(1)
11.2		<i>f</i> : ✓ <i>x</i> -intercepts/ <i>x</i> -afsnitte ✓ turning points/ <i>draaipunte</i> ✓ shape/ <i>vorm</i>  <i>g</i> : ✓ <i>y</i> -intercept/ <i>y</i> -afsnit ✓ <i>x</i> -intercepts/ <i>x</i> -afsnitte ✓ shape/ <i>vorm</i>	(6)
11.3	$g(x) - f(x) \leq 0$ $g(x) \leq f(x)$ $x \in [-180^\circ; -30^\circ]$ or/of $x \in [150^\circ; 180^\circ]$ OR/OF $-180^\circ \leq x \leq -30^\circ$ or/of $150^\circ \leq x \leq 180^\circ$	✓ Values/ <i>waardes</i> ✓ Notation/ <i>notasie</i> ✓ Values/ <i>waardes</i> ✓ Notation/ <i>notasie</i> per interval	(4)
11.4.1	$g(x) = \cos(x - 30^\circ)$ $h(x) = \cos(x - 30^\circ - 60^\circ) + 1$ $= \cos(x - 90^\circ) + 1$	✓ $-90^\circ$ ✓ $+1$	(2)
11.4.2	Maximum value of/ <i>maksimum waarde van</i> $h(x) - f(x) = 3$	✓✓ 3	(2)
11.5	$-\sin x = \sin(-x)$	✓ $\sin x$ ✓ $\sin(-x)$	(2)
			[17]

## QUESTION/VRAAG 12

12.1	$\sin 30^\circ = \frac{40}{QS}$ $QS = 80 \text{ m}$	✓ $\sin 30^\circ = \frac{40}{QS}$ ✓ answer/ <i>antwoord</i>	(2)
12.2	$\widehat{PSQ} = 65^\circ$ and/en $\widehat{QPS} = 85^\circ$ $\frac{PQ}{\sin 65^\circ} = \frac{80}{\sin 85^\circ}$ $PQ = 72,78 \text{ m}$	✓ $\widehat{PSQ}$ and/en $\widehat{QPS}$ ✓ sine formula/ <i>sinus</i> <i>formule</i> ✓ answer/ <i>antwoord</i>	(3)
12.3	$Area_{PQS} = \frac{1}{2} \times 80 \times 72,78 \times \sin 30^\circ$ $= 1\,455,60 \text{ m}^2$  $Area_{QRS} = \frac{1}{2} \times 40 \times 80 \sin 60^\circ$ $= 1\,385,64 \text{ m}^2$  $Area_{PQRST} = 2 \times 1\,455,50 + 1\,385,64 \text{ m}^2$ $= 4\,296,84 \text{ m}^2$	✓ substitution into area formula/ <i>instelling in area</i> <i>formule</i> ✓ $Area_{PQS}$ ✓ Substitution/ <i>instelling</i> ✓ $Area_{QRS}$  ✓ answer/ <i>antwoord</i>	(5)
			[10]
<b>TOTAL/TOTAAL:</b>			<b>150</b>