



Province of the  
**EASTERN CAPE**  
EDUCATION

**NATIONAL  
SENIOR CERTIFICATE**

**GRADE 11**

**NOVEMBER 2011**

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

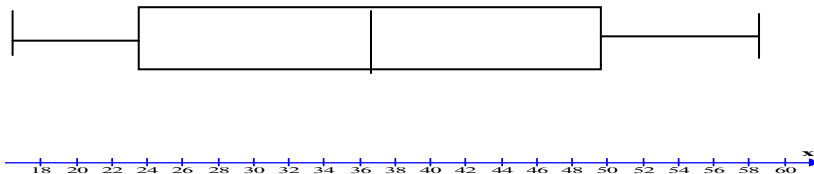
**MARKS: 150**

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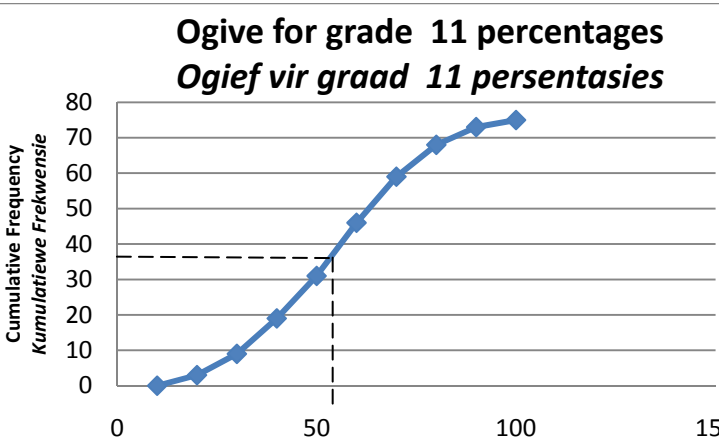
This memorandum consists of 10 pages.  
*Hierdie memorandum beslaan 10 bladsye.*

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## QUESTION/VRAAG 1

1.1	1.1.1	Mode/Modus = 25	✓ Answer/ Antwoord	(1)																																										
	1.1.2	18; 19; 25; 25; 31; 36; 42; 44; 49; 53; 55; 60 Min = 18 Q <sub>1</sub> = 25 Q <sub>2</sub> = 39 Q <sub>3</sub> = 51 Max/ Maks = 60	✓ Min ✓ Q <sub>1</sub> ✓ Q <sub>2</sub> ✓ Q <sub>3</sub> ✓ Max/ Maks	(5)																																										
	1.1.3	IQR/ IKW = 51 – 25 = 26	✓ Answer/ Antwoord	(1)																																										
1.2			✓ min and/en max ✓ Q <sub>1</sub> and/en Q <sub>3</sub> ✓ Q <sub>2</sub>	(3)																																										
1.3	Data is skewed to the left/ negatively skewed Data is skeef na links /negatief geskeef		✓ Answer/ Antwoord	(1)																																										
1.4	Mean/ Gemiddelde = $\frac{18+19+25+25+31+36+42+44+49+53+55+60}{12}$ $= \frac{457}{12}$ $= 38,08$ <table border="1"><thead><tr><th>x</th><th>x – <math>\bar{x}</math></th><th>(x – <math>\bar{x}</math>)<sup>2</sup></th></tr></thead><tbody><tr><td>18</td><td>- 20,08</td><td>403,2064</td></tr><tr><td>19</td><td>- 19,08</td><td>364,0464</td></tr><tr><td>25</td><td>- 13,08</td><td>171,0864</td></tr><tr><td>25</td><td>- 13,08</td><td>171,0864</td></tr><tr><td>31</td><td>- 7,08</td><td>50,1264</td></tr><tr><td>36</td><td>- 2,08</td><td>4,3264</td></tr><tr><td>42</td><td>3,92</td><td>15,3664</td></tr><tr><td>44</td><td>5,92</td><td>35,0464</td></tr><tr><td>49</td><td>10,92</td><td>119,2464</td></tr><tr><td>53</td><td>14,92</td><td>222,6064</td></tr><tr><td>55</td><td>16,92</td><td>286,2864</td></tr><tr><td>60</td><td>21,92</td><td>480,4864</td></tr><tr><td colspan="2">Sum/ Som</td><td>2322,9166</td></tr></tbody></table> Standard deviation/ Standaardafwyking = $\sqrt{\frac{2322,9166}{12}}$ $= 13,91$		x	x – $\bar{x}$	(x – $\bar{x}$ ) <sup>2</sup>	18	- 20,08	403,2064	19	- 19,08	364,0464	25	- 13,08	171,0864	25	- 13,08	171,0864	31	- 7,08	50,1264	36	- 2,08	4,3264	42	3,92	15,3664	44	5,92	35,0464	49	10,92	119,2464	53	14,92	222,6064	55	16,92	286,2864	60	21,92	480,4864	Sum/ Som		2322,9166	✓ $\frac{457}{12}$ 12 ✓ Answer/ Antwoord Answer only/ Antwoord alleenlik: 2/2  ✓ $\sqrt{\frac{2322,9166}{12}}$ ✓ Answer/ Antwoord  Answer only/ Antwoord alleenlik: 2/2	(2)
x	x – $\bar{x}$	(x – $\bar{x}$ ) <sup>2</sup>																																												
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1.5	The mean age is very similar but the ages at the other voting station are more widely spread as the standard deviation is greater./ Die gemiddelde ouderdomme is soortgelyk, maar die ouderdomme by die ander stembus is wyer verspreid omdat die standaard afwyking groter is		✓ mean age similar/ gemiddelde ouderdom soortgelyk ✓ ages more widely spread/ ouderdomme wyer verspreid	(2)																																										
				[17]																																										

## QUESTION/VRAAG 2

2.1	<table><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>10 \leq x &lt; 20</math></td><td>3</td><td>3</td></tr><tr><td><math>20 \leq x &lt; 30</math></td><td>6</td><td>9</td></tr><tr><td><math>30 \leq x &lt; 40</math></td><td>10</td><td>19</td></tr><tr><td><math>40 \leq x &lt; 50</math></td><td>12</td><td>31</td></tr><tr><td><math>50 \leq x &lt; 60</math></td><td>15</td><td>46</td></tr><tr><td><math>60 \leq x &lt; 70</math></td><td>13</td><td>59</td></tr><tr><td><math>70 \leq x &lt; 80</math></td><td>9</td><td>68</td></tr><tr><td><math>80 \leq x &lt; 90</math></td><td>5</td><td>73</td></tr><tr><td><math>90 \leq x &lt; 100</math></td><td>2</td><td>75</td></tr></tbody></table>	Interval	Frequency/ <i>Frekwensie</i>	Cumulative frequency/ <i>Kumulatiewe frekwensie</i>	$10 \leq x < 20$	3	3	$20 \leq x < 30$	6	9	$30 \leq x < 40$	10	19	$40 \leq x < 50$	12	31	$50 \leq x < 60$	15	46	$60 \leq x < 70$	13	59	$70 \leq x < 80$	9	68	$80 \leq x < 90$	5	73	$90 \leq x < 100$	2	75	<ul style="list-style-type: none"><li>✓ first 3 correct/ <i>eerste 3 korrek</i></li><li>✓ next 3 correct/ <i>volgende 3 korrek</i></li><li>✓ last 3 correct/ <i>laaste 3 korrek</i></li></ul>	(3)
Interval	Frequency/ <i>Frekwensie</i>	Cumulative frequency/ <i>Kumulatiewe frekwensie</i>																															
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$80 \leq x < 90$	5	73																															
$90 \leq x < 100$	2	75																															
2.2	<div><p><b>Ogive for grade 11 percentages</b> <b>Ogief vir graad 11 persentasies</b></p></div>	<ul style="list-style-type: none"><li>✓ grounding at (10;0)</li><li>✓ first 4 correct/ <i>eerste 4 korrek</i></li><li>✓ shape/ <i>vorm</i></li></ul>	(3)																														
2.3	<div><p>Median/ <i>Mediaan</i> <math>\approx 53\%</math> New median/ <i>Nuwe mediaan</i> <math>\approx 58\%</math> Accept answers from 56% to 60%/ <i>Aanvaar antwoorde van 56% tot 60%</i></p></div>	<ul style="list-style-type: none"><li>✓ median/ <i>mediaan</i></li><li>✓ new median/ <i>nuwe mediaan</i></li></ul> <p>Answer only/ <i>Slegs antwoord: 2/2</i></p>	(2)																														
			[8]																														

## QUESTION/VRAAG 3

3.1		✓ first 3 points correct/ <i>eerste 3 punte korrek</i> ✓ next 3 points correct/ <i>volgende 3 punte korrek</i> ✓ last two points correct/ <i>laaste twee punte korrek</i>	(3)
3.2	See graph/ <i>Sien grafiek</i>	✓ line/ <i>lyn</i> ✓ line/ <i>lyn</i>	(2)
3.3	Yes. The line of best fit shows it. <i>Ja. Die lyn van beste pas toon dit.</i>	✓ Yes/ <i>Ja</i> ✓ Reason/ <i>Rede</i>	(2)
			[7]

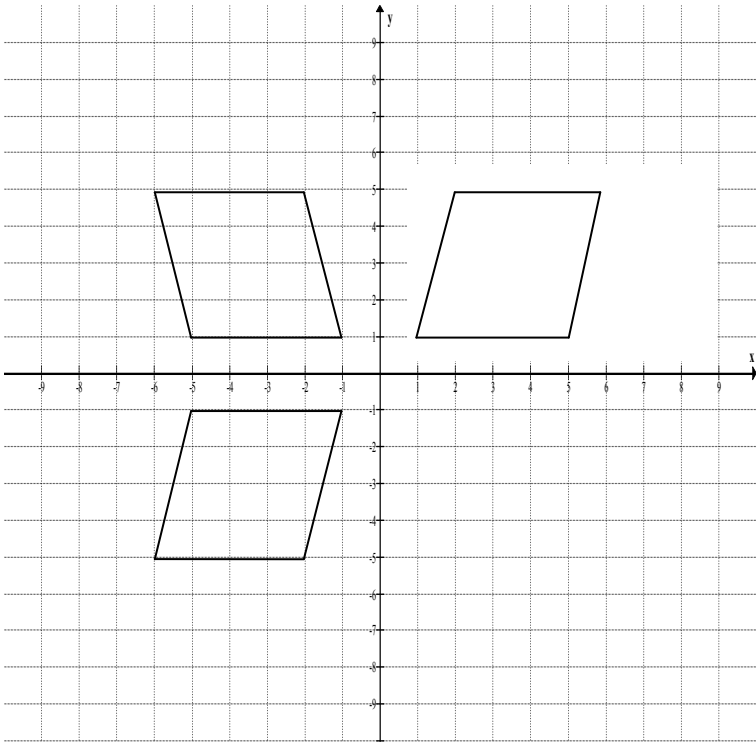
## QUESTION/VRAAG 4

4.1	4.1.1	$m_{MN} = \frac{-1-3}{2-6}$ $m_{MN} = \frac{-4}{-4}$ $m_{MN} = 1$	✓ Substitution/ <i>Instelling</i> ✓ Simplification/ <i>Vereenvoudiging</i> ✓ Answer/ <i>Antwoord</i>	(3)
	4.1.2	$G(\frac{2+2}{2}; \frac{7-1}{2})$ $G(2; 3)$	✓ x-value/waarde ✓ y-value/waarde	(2)
	4.1.3	$m_{KL} = m_{MN} = 1$ and/ <i>en</i> L(2;7) $y - 7 = 1(x - 2)$ $y = x + 5$	✓ gradient of/ <i>gradiënt</i> van KL ✓ substituting <i>instel</i> van x and/ <i>en</i> y ✓ substituting gradient/ <i>instel</i> van <i>gradiënt</i> ✓ Answer/ <i>Antwoord</i>	(4)
	4.1.4	$G(2; 3)$ , K(p;q) and/ <i>en</i> M(6;3) $\frac{p+6}{2} = 2$ and/ <i>en</i> $\frac{q+3}{2} = 3$ P = - 2 and/ <i>en</i> q = 3	✓ value of/ <i>waarde</i> van p ✓ value of/ <i>waarde</i> van q Answer only/ <i>Slegs antwoord</i> : 2/2	(2)
4.2	L(2;7), M(6;3), N(2;-1) $LM = \sqrt{(6-2)^2 + (3-7)^2}$ $LM = \sqrt{32}$ $MN = \sqrt{(6-2)^2 + (3+1)^2}$ $MN = \sqrt{32}$ LM = MN, hence/ <i>dus is</i> KLMN is a rhombus/ <i>n ruit</i>		✓ substitution/ <i>instelling</i> ✓ answer for/ <i>antwoord</i> vir LM ✓ answer for/ <i>antwoord</i> vir MN ✓ KLMN is a rhombus/ <i>is ruit</i>	(4)
				[15]

## QUESTION/VRAAG 5

5.1	5.1.1	AB: $m_{AB} = \frac{10+1}{1+10}$ $= 1$ $y - 10 = 1(x - 1)$ $y = x + 9$  CO: $m_{CO} = \frac{9}{-6} = -\frac{3}{2}$ $y = -\frac{3}{2}x$	✓ substitution into gradient formula/ instelling in gradiënt formule ✓ gradient of/ gradiënt van AB ✓ substitution into equation of a line formula/ instelling in formule vir lyn ✓ equation of/ vergelyking van AB ✓ gradient of/ gradiënt van CO ✓ equation of/ vergelyking van CO	(6)
	5.1.2	At/ By E: $x + 9 = -\frac{3}{2}x$ $2x + 18 = -3x$ $x = -\frac{18}{5} = -3,6$ $y = -3,6 + 9$ $= 5,4$ E(-3,6; 5,4)	✓ equating/ gelykstel  ✓ simplification/ vereenvoudig ✓ x-value/waarde ✓ y-value/waarde	(4)
	5.1.3	$\tan \theta = -\frac{3}{2}$ $\theta = 123,69^\circ$	✓ $\tan \theta = -\frac{3}{2}$ ✓ Answer/ Antwoord	(2)
	5.1.4	$\tan \alpha = 1$ $\alpha = 45^\circ$ $\widehat{AED} = 123,69^\circ - 45^\circ$ $\widehat{AED} = 78,69^\circ$	✓ $\tan \alpha = 1$ ✓ $\alpha = 45^\circ$ ✓ Method/ Metode ✓ Answer/ Antwoord	(4)
5.2	P(-3;5), Q(x;-3) and/ en R(x+5;-9)	$m_{PQ} = m_{PR}$ $\frac{-3-5}{x+3} = \frac{-9-5}{x+5+3}$ $-8(x+8) = -14(x+3)$ $-8x - 64 = -14x - 42$ $6x = 22$ $x = \frac{22}{6}$	✓ $m_{PQ} = m_{PR}$ ✓ substitution/ instel  ✓ Simplification/ Vereenvoudig  ✓ Answer/ Antwoord	(4)
				[20]

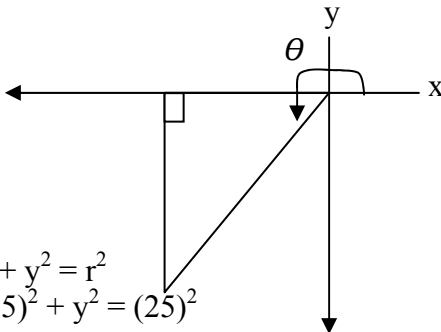
## QUESTION/VRAAG 6

6.1	6.1.1	<p>T(1;1), E(2;5), A(6;5) and/ en M(5;1).  <math>T'(-1;1)</math>, <math>E'(-2;5)</math>, <math>A'(-6;5)</math> and/ en <math>M'(-5;1)</math></p> 	<p>✓ <math>T'(-1;1)</math>          ✓ <math>E'(-2;5)</math>          ✓ <math>A'(-6;5)</math>          ✓ <math>M'(-5;1)</math></p>	(4)
	6.1.2	<p>T(1;1), E(2;5), A(6;5) and/ en M(5;1).  <math>T''(-1;-1)</math>, <math>E''(-2;-5)</math>, <math>A''(-6;-5)</math>, <math>M''(-5;-1)</math></p>	<p>See diagram/          Sien diagram          ✓ <math>T''(-1;-1)</math>          ✓ <math>E''(-2;-5)</math>          ✓ <math>A''(-6;-5)</math>          ✓ <math>M''(-5;-1)</math></p>	(4)
	6.1.3	<p>T(1;1), E(2;5), A(6;5) and M(5;1).          C(2;2), L(4;10), U(12;10) and/ en B(10;2)</p>	<p>✓ C(2;2)          ✓ L(4;10)          ✓ U(12;10)          ✓ B(10;2)</p>	(4)
	6.1.4	<p>Area of/ Area van TEAM = 20 square units/ vierkante eenhede          Area of/ Area van CLUB = <math>4 \times 20</math> square units/ vierkante eenhede          = 80 square units/ vierkante eenhede</p>	<p>✓ Method/          Metode          ✓ Answer/          Antwoord          Answer only/          Slegs          antwoord: 2/2</p>	(2)
6.2	6.2.1	<p><math>D(-\frac{1}{2}; 3)</math>  <math>D'(-3; \frac{1}{2})</math></p>	<p>✓ x-value/          waarde          ✓ y-value/          waarde</p>	(2)
	6.2.2	<p><math>D(-\frac{1}{2}; 3) \rightarrow D'(-3; \frac{1}{2})</math>  <math>(x; y) \rightarrow (x - 2\frac{1}{2}; y - 2\frac{1}{2})</math></p>	<p>✓ <math>x - 2\frac{1}{2}</math>          ✓ <math>y - 2\frac{1}{2}</math></p>	(2)
6.3		<p>P(6;-3) to P'(-3;-6)          Rotation about the origin through <math>90^\circ</math> clockwise.</p>	<p>✓ <math>90^\circ</math>          ✓ clockwise/          kloksgewys</p>	(2)
				[20]

**QUESTION/VRAAG 7**

7.1	Base area/ <i>Basis area</i> = $5,2 \text{ m} \times 5,2 \text{ m}$ $= 27,04 \text{ m}^2$ $V = \frac{1}{3} \text{ area of base/ area van basis} \times H$ $V = \frac{1}{3} \times 27,04 \text{ m}^2 \times 0,6 \text{ m}$ $V = 5,41 \text{ m}^3$ $V = \text{area of base/ area van basis} \times h$ $= 27,04 \text{ m}^2 \times 2,5 \text{ m}$ $= 67,60 \text{ m}^3$ $V_T = 5,41 \text{ m}^3 + 67,60 \text{ m}^3$ $= 73,01 \text{ m}^3$	✓ Substitution/ <i>Instelling</i> ✓ Base area/ <i>Basis area</i> ✓ Substitution into volume formula/ <i>Instelling in volume formule</i> ✓ Volume of a pyramid/ <i>Volume van piramide</i> ✓ Substitution into volume formula/ <i>Instelling in volume formule</i> ✓ Volume of a prism/ <i>Volume van 'n prisma</i> ✓ Total volume/ <i>Totale volume</i>	(7)
7.2	Surface area/ <i>Buite-oppervlakte</i> = $4s.h + s^2$ $= 4 \times 5,2 \text{ m} \times 2,5 \text{ m} + (5,2 \text{ m})^2$ $= 79,04 \text{ m}^2$	✓ Formula/ <i>Formule</i> ✓ Substitution/ <i>Instelling</i> ✓ Answer/ <i>Antwoord</i>	(3)
			[10]

**QUESTION/VRAAG 8**

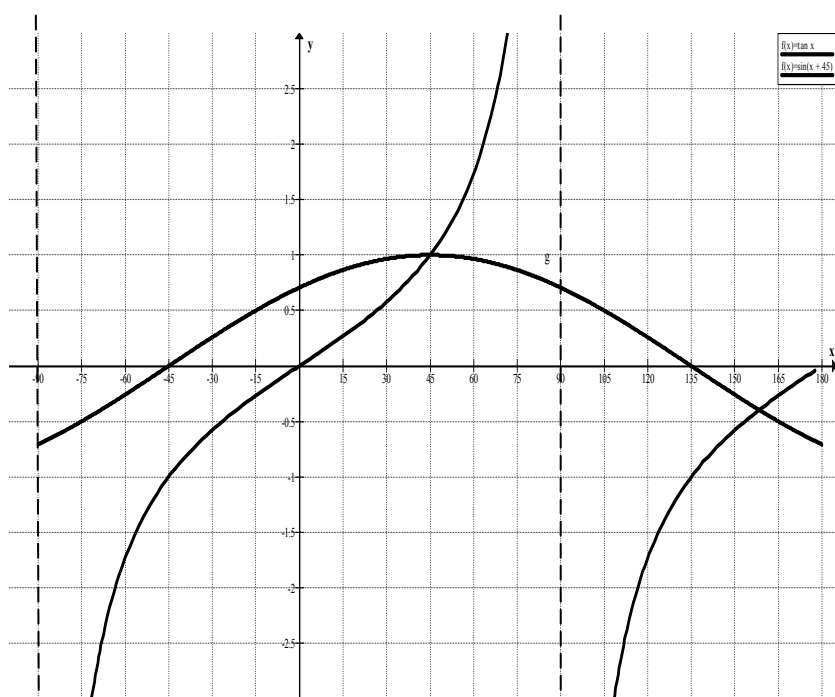
8.1	8.1.1	$\cos \theta = -\frac{15}{25}$ and $\sin \theta < 0$  $x^2 + y^2 = r^2$ $(-15)^2 + y^2 = (25)^2$ $y = -20$ $\cos^2 \theta - \sin^2 \theta = \frac{(-15)^2}{(25)^2} - \frac{(-20)^2}{(25)^2}$ $= -\frac{175}{625}$ $= -\frac{7}{25}$	✓ Diagram in correct quadrant/ <i>Diagram in korrekte kwadrant</i> ✓ y-value/ <i>waarde</i> ✓ Substitution/ <i>Instelling</i> ✓ Answer/ <i>Antwoord</i>	(4)
	8.1.2	$\tan (\theta - 360^\circ) = \tan \theta$ $= \frac{20}{15}$ $= \frac{4}{3}$	✓ $\tan \theta$ ✓ Answer/ <i>Antwoord</i>	(2)
8.2		$\sin \theta = \tan 45^\circ - 1,756$ $\sin \theta = -0,756$ Ref. angle = $49,11^\circ$ $\theta = 180^\circ + 49,11^\circ$ $\theta = 229,11^\circ$	✓ $\sin \theta = -0,756$ ✓ ref. angle/ <i>verw.hoek</i> ✓ $229,11^\circ$	(3)
8.3		$\frac{3}{4} \cos x + 0,2 = 0$ $\cos x = -0,266 \dots \dots$ ref. angle = $74,53^\circ$ $x = 180^\circ - 74,53^\circ + k.360^\circ$ or $x = 180^\circ + 74,53^\circ + k.360^\circ$ $x = 105,47^\circ + k.360^\circ$ or $x = 254,73^\circ + k.360^\circ$ $(k \in \mathbb{Z})$	✓ $\cos x = -0,266 \dots \dots$ ✓ Ref angle/ <i>Verw. hoek</i> ✓ $105,47^\circ + k.360^\circ$ ✓ $254,73^\circ + k.360^\circ$ ✓ $(k \in \mathbb{Z})$	(5)
				[14]

**QUESTION/VRAAG 9**

9.1	9.1.1	$\frac{\cos(90^\circ + x) \cdot \sin(360^\circ + x) - \cos^2(x - 180^\circ)}{\cos(-x)}$ $\frac{-\sin x \cdot \sin x - \cos^2 x}{\cos x}$ $\frac{-\sin^2 x - \cos^2 x}{\cos x}$ $\frac{-(\sin^2 x + \cos^2 x)}{\cos x}$ $\frac{-1}{\cos x}$	✓ $-\sin x$ ✓ $\sin x$ ✓ $\cos^2 x$ ✓ $\cos x$  ✓ $-(\sin^2 x + \cos^2 x)$  ✓ Answer/ <i>Antwoord</i>	(6)
	9.1.2	$\frac{(1 + \cos 510^\circ)(1 + \cos 330^\circ)}{(1 - \cos 30^\circ)(1 + \cos 30^\circ)}$ $\frac{1 - \cos^2 30^\circ}{1 - \left(\frac{\sqrt{3}}{2}\right)^2} \quad \text{OR/OF} \quad \sin^2 30^\circ$ $\frac{1}{4}$	✓ $-\cos 30^\circ$ ✓ $\cos 30^\circ$ ✓ $1 - \cos^2 30^\circ$ ✓ $1 - \left(\frac{\sqrt{3}}{2}\right)^2$ or /of $\sin^2 30^\circ$ ✓ Answer/ <i>Antwoord</i>	(5)
9.2	9.2.1	$\text{LHS} = \frac{1}{\cos^2 A} - \frac{\sin^2 A}{\cos^2 A}$ $= \frac{1 - \sin^2 A}{\cos^2 A}$ $= \frac{\cos^2 A}{\cos^2 A}$ $= \frac{\cos^2 A}{\cos^2 A}$ $= 1 = \text{RHS}$	✓ $\frac{\sin^2 A}{\cos^2 A}$ ✓ $\frac{1 - \sin^2 A}{\cos^2 A}$ ✓ $\frac{\cos^2 A}{\cos^2 A}$ ✓ $\frac{\cos^2 A}{\cos^2 A}$	(3)
	9.2.2	$\cos A = \frac{1}{p} \therefore p = \frac{1}{\cos A}$ $\tan^2 A = p^2 - 1$ $\tan A = -\sqrt{p^2 - 1}$	✓ $p = \frac{1}{\cos A}$ ✓ $\tan^2 A = p^2 - 1$ ✓ Answer/ <i>Antwoord</i>	(3)
				[17]



## QUESTION/VRAAG 10

10.1			$f(x) = \tan x$ ✓ x-intercepts/ <i>afsnitte</i> ✓ shape/ <i>vorm</i> ✓ asymptotes/ <i>asimptote</i>  $g(x) = \sin$ $(x + 45^\circ)$ ✓ x-intercepts/ <i>afsnitte</i> ✓ max value/ <i>maks waarde</i> ✓ shape/ <i>vorm</i>	(6)
10.2	10.2.1	$g(x) - f(x) = 1$ $x = -45^\circ, x = 135^\circ$	✓ $x = -45^\circ$ ✓ $x = 135^\circ$	(2)
	10.2.2	$x \in (-90^\circ; 45^\circ]$ OR/ OF $-90^\circ < x \leq 45^\circ$	✓ $-90^\circ$ ✓ $45^\circ$ ✓ notation/ <i>notasie</i>	(3)
	10.2.3	Period = $90^\circ$	✓ Answer/ <i>Antwoord</i>	(1)
10.3	$g(x) = \sin(x + 45^\circ)$ $h(x) = g(x + 30^\circ) - 2$ $h(x) = \sin(x + 75^\circ) - 2$		✓ $\sin(x + 75^\circ)$ ✓ $-2$	(2)
				[14]

## QUESTION/VRAAG 11

11.1	$CB^2 = BA^2 + AC^2 - 2BA \cdot AC \cdot \cos \hat{CAB}$ $8^2 = 10^2 + 11^2 - 2(10)(11)\cos \hat{CAB}$ $\cos \hat{CAB} = \frac{64 - 100 - 121}{-220}$ $\cos \hat{CAB} = \frac{157}{220}$ $\hat{CAB} = 44,47^\circ$	✓ cosine rule/ <i>kosinus reël</i> ✓ Substitution/ <i>Instelling</i> ✓ $\cos \hat{CAB} = \frac{157}{220}$ ✓ Answer/ <i>Antwoord</i>	(4)
11.2	$\sin 44,47^\circ = \frac{CP}{11}$ $CP = 11 \sin 44,47^\circ$ $CP = 7,71 \text{ m}$  OR/ OF $\frac{CP}{\sin 44,47^\circ} = \frac{11}{\sin 90^\circ}$ $CP = \frac{11 \sin 44,47^\circ}{\sin 90^\circ}$ $CP = 7,71 \text{ m}$	✓ $\sin 44,47^\circ = \frac{CP}{11}$ ✓ Answer/ <i>Antwoord</i>  ✓ sin rule/ <i>sin reël</i> ✓ Answer/ <i>Antwoord</i>	(2)
11.3	area of/ <i>area van</i> $\Delta CAB = \frac{1}{2} (11)(10) \sin 44,47^\circ$ $= 38,55 \text{ m}^2$  OR/ OF area of/ <i>area van</i> $\Delta CAB = \frac{1}{2} \times 10 \times 7,71$ $= 38,55 \text{ m}^2$	✓ Substitution/ <i>Instelling</i> ✓ Answer/ <i>Antwoord</i>  ✓ Substitution/ <i>Instelling</i> ✓ Answer/ <i>Antwoord</i>	(2)
			[8]
		TOTAL/ <i>TOTAAL</i> :	150