



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE / GRAAD 11

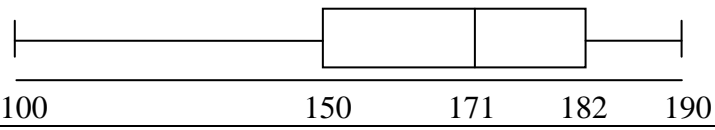
NOVEMBER 2013

**MATHEMATICS P2 /
WISKUNDE V2
MEMORANDUM**

MARKS / PUNTE: 150

This memorandum consists of 9 pages./
Hierdie memorandum bestaan uit 9 bladsye.

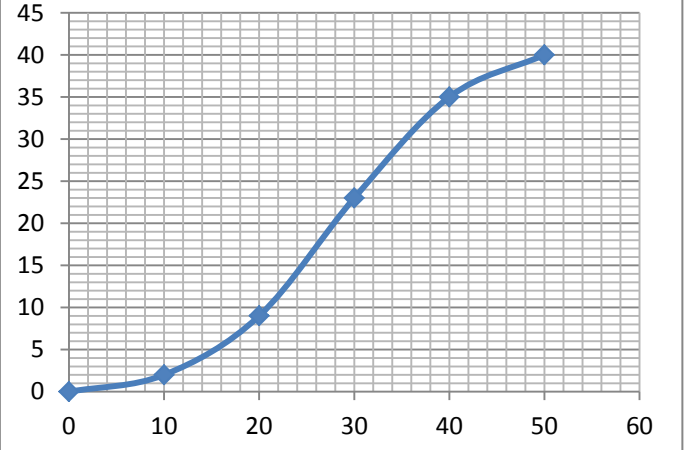
QUESTION / VRAAG 1

1.1	100;143;150;155;164;171;171;180;182;188;190 min = 100, $Q_1=150$, $Q_2=171$, $Q_3=182$, max / maks=190 	✓ min and max / <i>min en maks</i> ✓ Q_1 ✓ Q_2 ✓ Q_3 (4)
1.2	Skewed to the left / <i>skuins na links</i>	✓ answer / <i>antwoord</i> (1)
1.3	100	✓ answer / <i>antwoord</i> (1) [6]

QUESTION / VRAAG 2

2.1	Mean / <i>Gemiddelde</i> = $\frac{25+47+40+34+28+x+37+28+55+30}{10}$ = $\frac{324+x}{10}$	✓ answer / <i>antwoord</i> (1)
2.2	$\frac{324+x}{10} = 36$ $x = 36$	✓ equating / <i>gelykstel</i> ✓ answer / <i>antwoord</i> (2)
2.3	8,88	✓✓ answer / <i>antwoord</i> (2)
2.4	outside / <i>buite</i> [36 – 8,88 ; 36 + 8,88] = [27,12 ; 44,88] ∴ 3 people / <i>persone</i>	✓ method / <i>metode</i> ✓ answer / <i>antwoord</i> (2) [7]

QUESTION / VRAAG 3

3.1	<table border="1"> <thead> <tr> <th>Interval</th> <th>Frequency <i>Frekwensie</i></th> <th>Cumulative frequency <i>Kumulatiewe frekwensie</i></th> </tr> </thead> <tbody> <tr> <td>$0 \leq x < 10$</td> <td>2</td> <td>2</td> </tr> <tr> <td>$10 \leq x < 20$</td> <td>7</td> <td>9</td> </tr> <tr> <td>$20 \leq x < 30$</td> <td>14</td> <td>23</td> </tr> <tr> <td>$30 \leq x < 40$</td> <td>12</td> <td>35</td> </tr> <tr> <td>$40 \leq x < 50$</td> <td>5</td> <td>40</td> </tr> </tbody> </table>	Interval	Frequency <i>Frekwensie</i>	Cumulative frequency <i>Kumulatiewe frekwensie</i>	$0 \leq x < 10$	2	2	$10 \leq x < 20$	7	9	$20 \leq x < 30$	14	23	$30 \leq x < 40$	12	35	$40 \leq x < 50$	5	40	✓ first three correct / <i>eerste drie korrek</i> ✓ remaining two correct / <i>oorblywende twee korrek</i> (2)
Interval	Frequency <i>Frekwensie</i>	Cumulative frequency <i>Kumulatiewe frekwensie</i>																		
$0 \leq x < 10$	2	2																		
$10 \leq x < 20$	7	9																		
$20 \leq x < 30$	14	23																		
$30 \leq x < 40$	12	35																		
$40 \leq x < 50$	5	40																		
3.2		✓ (0;0) ✓ points accurate / <i>punte akkuraat</i> ✓ shape / <i>vorm</i> (3)																		

3.3	35 learners / <i>leerders</i> Accept 36 or 34 learners / <i>Aanvaar 36 of 34 leerders</i>	✓✓ answer / <i>antwoord</i> (2) [7]
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QUESTION / VRAAG 4

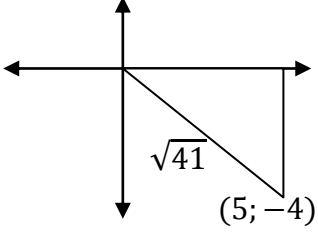
4.1	4.1.1 A(-4 ; 1), B(-1 ; -2), F(k ; p) $-1 = \frac{-4+k}{2}$ $k = 2$ $-2 = \frac{1+p}{2}$ $p = -5$	✓ method / <i>metode</i> ✓ $k = 2$ ✓ $p = -5$ (3)
	4.1.2 $m_{AF} = \frac{y_2 - y_1}{x_2 - x_1}$ $m_{AF} = \frac{-5 - 1}{2 + 4}$ $m_{AF} = -1$ OR / OF $m_{AF} = \frac{y_2 - y_1}{x_2 - x_1}$ $m_{AF} = \frac{-2 - 1}{-1 + 4}$ $m_{AF} = -1$	✓ formula / <i>formule</i> ✓ substitution / <i>instelling</i> ✓ answer / <i>antwoord</i> ✓ formula / <i>formule</i> ✓ substitution / <i>instelling</i> ✓ answer / <i>antwoord</i> (3)
	4.1.3 B(-1 ; -2) and / <i>en</i> $m_{perp} \times m_{AF} = -1$ $m_{perp} = 1$ $y - y_1 = m(x - x_1)$ $y + 2 = 1(x + 1)$ $y = x - 1$	✓ $m_{perp} = 1$ ✓ formula / <i>formule</i> ✓ substitution / <i>instelling</i> ✓ equation in any form / <i>vergelyking in enige vorm</i> (4)
4.2	C(2 ; 5), A(-4 ; 1), F(2 ; -5) $CA = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $CA = \sqrt{(-4 - 2)^2 + (1 - 5)^2}$ $CA = \sqrt{52}$ $CF = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $CF = \sqrt{(2 - 2)^2 + (-5 - 5)^2}$ $CF = \sqrt{100} = 10$ $FA = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $FA = \sqrt{(-4 - 2)^2 + (1 + 5)^2}$ $FA = \sqrt{72}$ ΔCAF is scalene / <i>ongelyksydig</i>	✓ formula / <i>formule</i> ✓ substitution / <i>instelling</i> ✓ $CA = \sqrt{52}$ ✓ $CF = 10$ ✓ $AF = \sqrt{72}$ ✓ scalene / <i>ongelyksydig</i> (6)
4.3	$\tan\theta = m$ $\tan\theta = -1$ $\theta = 135^\circ$ $\hat{AFC} = 135^\circ - 90^\circ$ $\hat{AFC} = 45^\circ$	✓ $\tan\theta = -1$ ✓ $\theta = 135^\circ$ ✓ $\hat{AFC} = 135^\circ - 90^\circ$ ✓ $\hat{AFC} = 45^\circ$ (4)

4.4	If BC were perpendicular to AF, the triangle would have to be isosceles. / As BC loodreg op AF was, sou die driehoek gelykbenig moes wees. OR / OF C does not satisfy the equation of the perpendicular bisector. / C maak nie die vergelyking van die middelloodlyn waar nie.	✓✓ explanation / verduideliking (2)
4.5	$y = 0$ as D must be the midpoint of FC / aangesien D die middelpunt van FC is.	✓✓ $y = 0$ (2) [24]

QUESTION / VRAAG 5

5.1	$x + 2y - 6 = 0$ $y = -\frac{1}{2}x + 3$ $m = -\frac{1}{2}$ $y - y_1 = m(x - x_1)$ OR / OF $y = mx + c$ $y - 5 = -\frac{1}{2}(x + 2)$ $5 = -\frac{1}{2}(-2) + c$ $y = -\frac{1}{2}x + 4$	✓ $y = -\frac{1}{2}x + 3$ ✓ $m = -\frac{1}{2}$ ✓ substitution / instelling ✓ answer / antwoord (4)
5.2	K(-3 ; 5), L(2 ; -3), N(5 ; -9) $m_{KL} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3 - 5}{2 + 3} = -\frac{8}{5}$ $m_{KN} = \frac{-9 - 5}{5 + 3} = -\frac{14}{8} = -\frac{7}{4}$ OR / OF $m_{LN} = \frac{-9 + 3}{5 - 2} = -2$ K, L, M are NOT collinear / is NIE saamlynig NIE.	✓ substitution / instelling ✓ $m_{KL} = -\frac{8}{5}$ ✓ $m_{KL} = -\frac{7}{4}$ OR / OF $m_{LN} = 2$ ✓ not collinear / nie saamlynig nie (4) [8]

QUESTION 6 / VRAAG 6

6.1	6.1.1	$5 \tan \alpha + 4 = 0$ $\tan \alpha = -\frac{4}{5}$ $r^2 = x^2 + y^2$ $r^2 = (5)^2 + (-4)^2$ $r = \sqrt{41}$ $y = -5$ $2 \cos(180^\circ - \alpha) = -2 \cos \alpha$ $= -2 \times \frac{5}{\sqrt{41}}$ $= -\frac{10}{\sqrt{41}}$		✓ $x = 5, y = -4$ in diagram ✓ $r = \sqrt{41}$ ✓ $-2 \cos \alpha$ ✓ answer / antwoord (4)
	6.1.2	$\sin^2(\alpha - 90^\circ) - \sin^2 \alpha = \cos^2 \alpha - \sin^2 \alpha$ $= \left(\frac{5}{\sqrt{41}}\right)^2 - \left(\frac{-4}{\sqrt{41}}\right)^2$ $= \frac{9}{41}$	✓ $\cos^2 \alpha$ ✓ substitution / instelling ✓ answer / antwoord (3)	

6.2	$4\cos^2 x - \tan 45^\circ = 0$ $4\cos^2 x = 1$ $\cos^2 x = \frac{1}{4}$ $\cos x = \pm \frac{1}{2}$ $x = 60^\circ \text{ or / of } x = 120^\circ \text{ or / of } x = 240^\circ \text{ or / of } x = 300^\circ$	<ul style="list-style-type: none"> ✓ $\tan 45^\circ = 1$ ✓ $\cos x = \pm \frac{1}{2}$ ✓ any two correct angles / enige twee korrekte hoeke ✓ remaining two correct angles / oorblywende twee korrekte hoeke <p style="text-align: right;">(4) [11]</p>
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QUESTION / VRAAG 7

7.1	$\frac{\sin 117^\circ}{\cos 27^\circ} + \cos(-x) \cdot \tan(180^\circ - x) \cdot \sin(360^\circ + x)$ $= \frac{\cos 27^\circ}{\cos 27^\circ} + \cos x \cdot (-\tan x) \cdot \sin x$ $= 1 - \sin^2 x$ $= \cos^2 x$	<ul style="list-style-type: none"> ✓ $\cos 27^\circ$ ✓ $\cos x$ ✓ $-\tan x$ ✓ $\sin x$ ✓ $1 - \sin^2 x$ ✓ $\cos^2 x$ <p style="text-align: right;">(6)</p>	
7.2	7.2.1	$LHS = \frac{\cos x}{1 - \sin x} - \frac{\cos x}{1 + \sin x}$ $LHS = \frac{\cos x + \sin x \cos x - \cos x + \sin x \cos x}{(1 - \sin x)(1 + \sin x)}$ $LHS = \frac{2\sin x \cos x}{1 - \sin^2 x}$ $LHS = \frac{2\sin x \cos x}{2\sin x \cos x}$ $LHS = \frac{\cos^2 x}{2\sin x}$ $LHS = \frac{\cos x}{\cos x}$ $LHS = 2\tan x$ $= RHS$	<ul style="list-style-type: none"> ✓ $(1 - \sin x)(1 + \sin x)$ ✓ $2\sin x \cos x$ ✓ $1 - \sin^2 x$ ✓ $\cos^2 x$ ✓ $\frac{2\sin x}{\cos x}$ <p style="text-align: right;">(5)</p>
	7.2.2	$x = -90^\circ$ $x = 90^\circ$	<ul style="list-style-type: none"> ✓ -90° ✓ 90° <p style="text-align: right;">(2)</p>
7.3	$\sqrt{\tan \theta} = x + \frac{1}{x} \quad \text{if } x^2 + \frac{1}{x^2} = 1$ $\tan \theta = \left(x + \frac{1}{x}\right)^2$ $\tan \theta = x^2 + 2 + \frac{1}{x^2}$ $\tan \theta = 2 + 1 \quad (x^2 + \frac{1}{x^2} = 1)$ $\tan \theta = 3$ $\theta = 71,57^\circ + k \cdot 180^\circ \quad (k \in \mathbb{Z})$		<ul style="list-style-type: none"> ✓ $\tan \theta = \left(x + \frac{1}{x}\right)^2$ ✓ $x^2 + 2 + \frac{1}{x^2}$ ✓ $\tan \theta = 3$ ✓ $\theta = 71,57^\circ + \checkmark k \cdot 180^\circ$ ✓ $k \in \mathbb{Z}$ <p style="text-align: right;">(6) [19]</p>

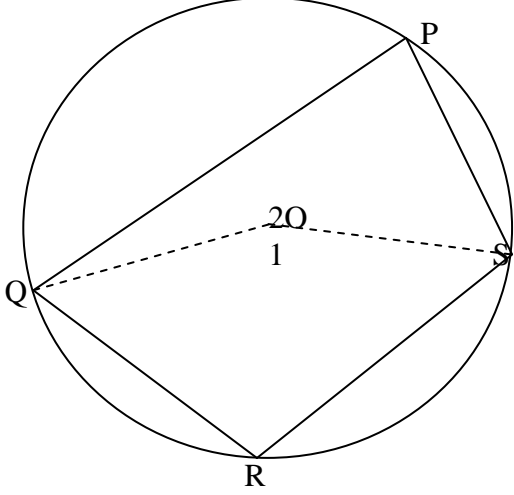
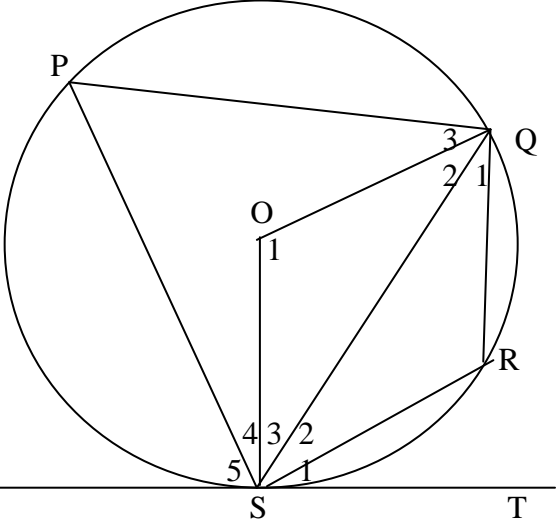
QUESTION / VRAAG 8

8.1	$a = -2$ $b = 1$ $p = 1$ $r = 45^\circ$	$\checkmark a = -2$ $\checkmark b = 1$ $\checkmark p = 1$ $\checkmark r = 45^\circ$	(4)
		\checkmark	
8.2	$f(x) - g(x) = 0$ $f(x) = g(x)$ $x = -75^\circ$ or / of 105°	$\checkmark -75^\circ$ $\checkmark 105^\circ$	(2)
8.3	360°	$\checkmark 360^\circ$	(1)
8.4	$g(x) = \sin(x + 45^\circ)$ $h(x) = \sin \frac{1}{2}(x + 45^\circ - 45^\circ)$ $\therefore h(x) = \sin \frac{x}{2}$	$\checkmark \frac{1}{2}$ $\checkmark -45^\circ$ answer only: full marks / slegs antwoord: vol punte	(2)
			[9]

QUESTION / VRAAG 9

9.1	$\sin(90^\circ - \beta) = \frac{MN}{LN}$ $MN = LN \cdot \sin(90^\circ - \beta)$ But $\frac{LN}{\sin \alpha} = \frac{x}{\sin(180^\circ - (\alpha + \beta))}$ $LN = \frac{x \cdot \sin \alpha}{\sin(\alpha + \beta)}$ $\therefore MN = \frac{x \cdot \sin \alpha \cdot \cos \beta}{\sin(\alpha + \beta)}$		$\checkmark \sin(90^\circ - \beta) = \frac{MN}{LN}$ $\checkmark MN = LN \cdot \sin(90^\circ - \beta)$ \checkmark Sine rule / sinus reël $\checkmark \sin(180^\circ - (\alpha + \beta)) = \sin(\alpha + \beta)$ $\checkmark LN = \frac{x \cdot \sin \alpha}{\sin(\alpha + \beta)}$ \checkmark answer / antwoord	(6)
9.2	9.2.1	$\alpha = 76^\circ, \beta = 72^\circ$ and / en $x = 48$ metres / meter $MN = \frac{x \cdot \sin \alpha \cdot \cos \beta}{\sin(\alpha + \beta)}$ $MN = \frac{48 \cdot \sin 76^\circ \cdot \cos 72^\circ}{\sin(76^\circ + 72^\circ)}$ $MN = 27,16$ metres / meter	\checkmark substitution / instelling \checkmark answer / antwoord	(2)
	9.2.2	Area of $\triangle KLN = \frac{1}{2}KL \times LN \sin \widehat{KLN}$ $= \frac{1}{2}(48)(88)\sin 72^\circ$ $= 2\,008,63 \text{ m}^2$	\checkmark formula / formule \checkmark substitution / instelling \checkmark answer / antwoord	(3)
			[11]	

QUESTION / VRAAG 10

10.1	10.1.1	Equal to angle in the alternate segment <i>Gelyk aan die hoek in die teenoorstaande segment</i>	✓ answer / <i>antwoord</i> (1)
	10.1.2	Interior opposite angle / <i>teenoorstaande binnehoek</i>	✓ answer / <i>antwoord</i> (1)
10.2	 <p>Constr.: Join OQ and OS / <i>Teken OQ en OS</i> Proof / <i>Bewys</i>: $\widehat{O}_1 = 2 \hat{P}$ (angle at centre / <i>hoek by middelpunt</i>) $\widehat{O}_2 = 2 \hat{R}$ (angle at centre / <i>hoek by middelpunt</i>) But / <i>Maar</i> $\widehat{O}_1 + \widehat{O}_2 = 360^\circ$ $2 \hat{P} + 2 \hat{R} = 360^\circ$ Hence / <i>dus</i> $\hat{P} + \hat{R} = 180^\circ$</p>		✓ construction / <i>konstruksie</i> $\checkmark \widehat{O}_1 = 2 \hat{P}$ ✓ reason / <i>rede</i> $\checkmark \widehat{O}_2 = 2 \hat{R}$ $\checkmark 2 \hat{P} + 2 \hat{R} = 360^\circ$ (5)
10.3	10.3.1	 <p>$\widehat{SQR} = \widehat{S}_1 = 23^\circ$ (tan-chord / <i>raaklyn-koord</i>) $\widehat{QSR} = \widehat{SQR} = 23^\circ$ (QR = RS)</p>	$\checkmark \widehat{Q}_1 = 23^\circ$ ✓ reason / <i>rede</i> $\checkmark \widehat{S}_2 = 23^\circ$ ✓ reason / <i>rede</i> (4)
	10.3.2	$\hat{R} + 23^\circ + 23^\circ = 180^\circ$ (sum of angles of a triangle) $\hat{R} = 134^\circ$	✓ reason / <i>rede</i> $\checkmark \hat{R} = 134^\circ$ (2)
	10.3.3	$\hat{P} + \hat{R} = 180^\circ$ (cyclic quad. / <i>koordevierhoek</i>) $\therefore \hat{P} = 46^\circ$	✓ reason / <i>rede</i> $\checkmark \hat{P} = 46^\circ$ (2)

10.3.4	$\widehat{O}_1 = 2\widehat{P}$ $\therefore \widehat{O}_1 = 92^\circ$	(angle at centre / <i>middelpunthoek</i>)	✓ reason / <i>rede</i> ✓ $\widehat{O}_1 = 92^\circ$ (2)
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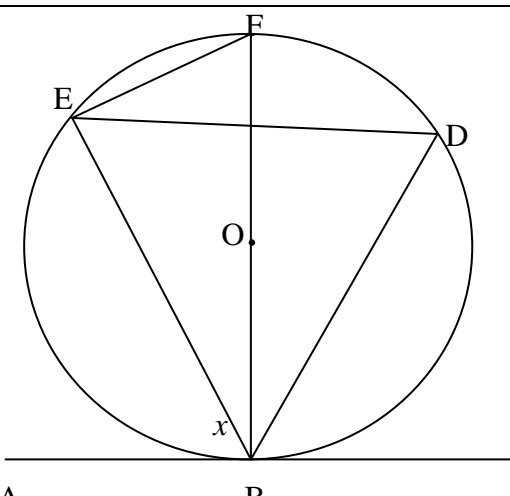
[17]

QUESTION / VRAAG 11

11.1	OD = 25 cm \therefore OC = 25 cm – 18cm = 7 cm $AC^2 + OC^2 = OA^2$ $AC^2 + (7)^2 = (25)^2$ $AC^2 = 576$ $\therefore AC = 24$ cm AB = 2 \times AC (OD \perp AB) $\therefore AB = 48$ cm		✓ OC = 7 cm ✓ Pythagoras ✓ AC = 24 cm ✓ reason / <i>rede</i> (OD \perp AB) ✓ answer / <i>antwoord</i> (5)
11.2	11.2.1	$\widehat{BPR} = 25^\circ$ (PR \parallel QB, alt angles / <i>verw. hoeke</i>) $\widehat{RQB} = 25^\circ$ (Subtended by / <i>onderspan deur RB</i>) $\widehat{PRQ} = 25^\circ$ (Subtended by / <i>onderspan deur PQ OR / OF</i> alt angles / <i>verw hoeke</i>)	✓ $\widehat{BPR} = 25^\circ$ ✓ reason / <i>rede</i> ✓ $\widehat{RQB} = 25^\circ$ ✓ reason / <i>rede</i> ✓ $\widehat{PRQ} = 25^\circ$ ✓ reason / <i>rede</i> (6)
	11.2.2 (a)	$\widehat{ROB} = 2 \times \widehat{RQB}$ (angle at centre / <i>middelpunthoek</i>) $\therefore \widehat{ROB} = 50^\circ$	✓ reason / <i>rede</i> ✓ $\widehat{ROB} = 50^\circ$ (2)
	11.2.2 (b)	$\widehat{ORT} + \widehat{ROT} + \widehat{RTO} = 180^\circ$ (angles of / <i>hoeke van</i> Δ) $\widehat{ORT} + 50^\circ + 90^\circ = 180^\circ$ $\therefore \widehat{ORT} = 40^\circ$	✓ $\widehat{ORT} = 40^\circ$ ✓ reason / <i>rede</i> (2)
	11.2.2 (c)	$\widehat{ROS} = 100^\circ$ ($\Delta ROT \cong \Delta SOT$)	✓ 100° ✓ reason / <i>rede</i> (2)
	11.2.2 (d)	$\widehat{RPQ} = 115^\circ$ ($\widehat{BPQ} = 90^\circ$, angle in semi-circle / <i>hoek in half-sirkel</i>)	✓ answer / <i>antwoord</i> ✓ reason / <i>rede</i> (2)

[19]

QUESTION / VRAAG 12

12.1	12.1.1 (a)	 <p>$\widehat{FBE} = 90^\circ - x$ (tangent is perp. to a diameter)</p>	✓ $90^\circ - x$ (1)
	12.1.1 (b)	$\widehat{F} = x$	✓ x (1)

	12.1.2	$\widehat{E\hat{O}B} = 2x$ (angle at centre / <i>middelpunthoek</i>) $\therefore \widehat{A\hat{B}E} \neq \widehat{E\hat{O}B}$	$\checkmark \widehat{E\hat{O}B} = 2x$ \checkmark reason / <i>rede</i> $\checkmark \therefore \widehat{A\hat{B}E} \neq \widehat{E\hat{O}B}$ (3)
12.2	$\widehat{C\hat{A}R} = \widehat{A\hat{B}D}$ (alt angles / <i>verw hoeke</i> , $AC \parallel DB$) $\widehat{C\hat{A}R} = \widehat{C\hat{P}R}$ (subtended by / <i>onderspan deur CR</i>) $\therefore \widehat{R\hat{B}D} = \widehat{C\hat{P}R}$ (both / <i>albei</i> = $\widehat{C\hat{A}R}$) Hence PDBR is a cyclic quadrilateral (Ext. angle = int. opp. angle / <i>buitehoek = teenoor. binnehoek</i>)	$\checkmark \widehat{C\hat{A}R} = \widehat{A\hat{B}D}$ \checkmark reason / <i>rede</i> $\checkmark \widehat{C\hat{A}R} = \widehat{C\hat{P}R}$ \checkmark reason / <i>rede</i> $\checkmark \widehat{R\hat{B}D} = \widehat{C\hat{P}R}$ \checkmark conclusion / <i>slotsom</i> \checkmark reason / <i>rede</i> (7) [12]	

TOTAL: / TOTAAL:**150**