Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE/ *NASIONALE SENIOR SERTIFIKAAT*

GRADE/*GRAAD* 11

NOVEMBER 2020

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

MARKS/*PUNTE*: 150

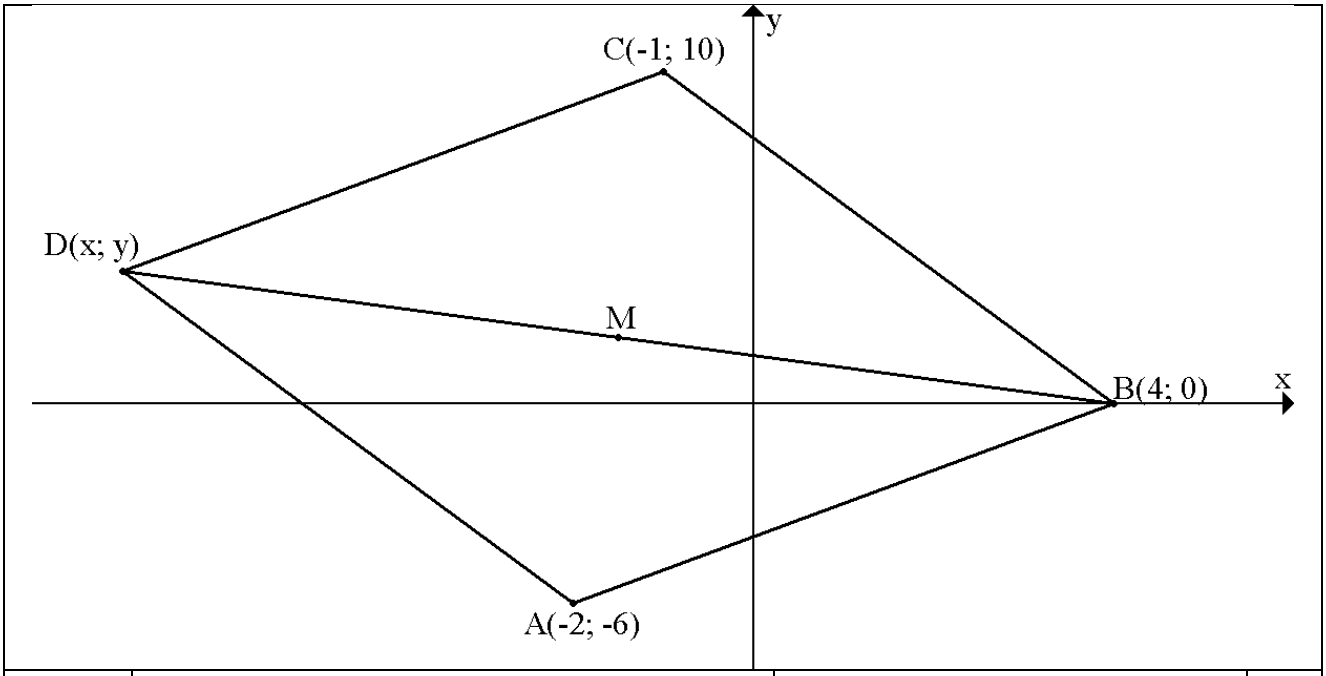
This marking guideline consists of 14 pages./
Hierdie nasienriglyn bestaan uit 14 bladsye.

QUESTION 1/*VRAAG 1*

1.1	$m_{PS}=\frac{0-(-2)}{3-6}=-\frac{2}{3}$ **OR/*OF*** $3y+2x=6$ $3y=-2x+6$ $y=-\frac{2}{3}x+2$ $m_{PS}=-\frac{2}{3}$	✓ substitution / *vervanging* ✓ answer / *antwoord* **OR/*OF*** ✓ $y=-\frac{2}{3}x+2$ ✓ answer / *antwoord*	(2)
1.2	$m_{MR}=\frac{4-0}{10-3}=\frac{4}{7}$ $\tan R\hat{Q}X=\frac{4}{7}$ $R\hat{Q}X=29,74°$	✓$\frac{4-0}{10-3}$ ✓gradient / *gradiënt* ✓$\tan R\hat{Q}X=m_{RM}$ ✓answer / *antwoord*	(4)
1.3	$\tan P\hat{Q}X=-\frac{2}{3}$ $P\hat{Q}X=146,31°$ $\theta=146,31°-29,74°$ $\theta=116,57°$	✓$\tan P\hat{Q}X=-\frac{2}{3}$ ✓ $P\hat{Q}X=146,31°$ ✓answer / *antwoord*	(3)
1.4	$m_{RN}=\frac{3}{2}$ $m_{RN}\times m_{PS}=\frac{3}{2}\times-\frac{2}{3}=-1$ $RN\perp PS$	✓m_{RN} ✓product / *produk* ✓-1	(3)
1.5	$NR=\sqrt{(10-6)^2+(4+2)^2}$ $NR=\sqrt{52}$ $QN=\sqrt{13}$ $\text{Area}=\frac{1}{2}\times QN\times NR$ $\text{Area}=\frac{1}{2}\times\sqrt{13}\times\sqrt{52}$ Area = 13 units^2 / *eenhede*^{2}	✓substitution / *vervanging* ✓answer / *antwoord* ✓length QN / *lengte* QN ✓choosing correct sides / *kies korrekte sye* ✓substitution / *vervanging* ✓answer / *antwoord*	(6)

1.6	$\frac{y-0}{x-3}=\frac{4}{7}$ $7y=-12$ $y=-\frac{12}{7}$ **OR/*OF*** $y=\frac{4}{7}x+c$ Subst./*vervang* (3; 0) $0=\frac{4}{7}(3)+c$ $c=-\frac{12}{7}$ $y=-\frac{12}{7}$	✓$x=0$ ✓substitution / vervanging ✓equation / vergelyking ✓y-coordinate / *y-koördinaat* **OR/*OF*** ✓equation / *vergelyking* ✓substitution / *vervanging* ✓value of *c / waarde van c* ✓y-coordinate / *y-koördinaat*	(4)
			[22]

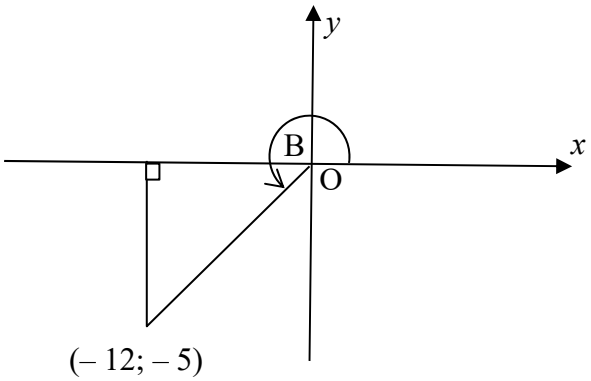
QUESTION 2/*VRAAG 2*



2.1	$BC = \sqrt{(-1-4)^2+(10-0)^2}$ $BC = \sqrt{25+100}$ $BC = \sqrt{125} = 5\sqrt{5}$	✓substitution / *vervanging* ✓answer / *antwoord*	(2)
2.2	$m_{AB} = \frac{-6-0}{-2-6}$ $m_{AB} = \frac{3}{4}$	✓substitution / *vervanging* ✓answer / *antwoord*	(2)
2.3	$m_{CD} = m_{AB} = \frac{3}{4}$ $y = mx + c$ $y = \frac{3}{4}x + c$ Sub $C(-1;10)$ $10 = \frac{3}{4}(-1) + c$ $c = \frac{43}{4}$ $y = \frac{3}{4}x + \frac{43}{4}$	✓gradient / *gradiënt* ✓substitution / *vervanging* ✓answer / *antwoord*	(3)

2.4	M is the midpoint of both BD and AC */ is die middelpunt van beide BC en AC* Midpoint of AC and BD /*Middelpunt van AC en BD* $M\left(\frac{-1-2}{2};\frac{10-6}{2}\right)$ $M\left(\frac{-3}{2};2\right)$	✓ statement / *stelling* ✓ substitution / *vervanging* ✓answer / *antwoord*	(3)
2.5	$\frac{x+4}{2}=\frac{-3}{2};\frac{y+0}{2}=2$ $x+4=-3; y+0=4$ $x=-7; y=4$	✓ substitution / *vervanging* ✓*x- value/waarde* ✓*y-value/waarde* Answer only: Full marks/ *Slegs antwoord: Volpunte*	(3)
			[13]

QUESTION 3 / *VRAAG 3*

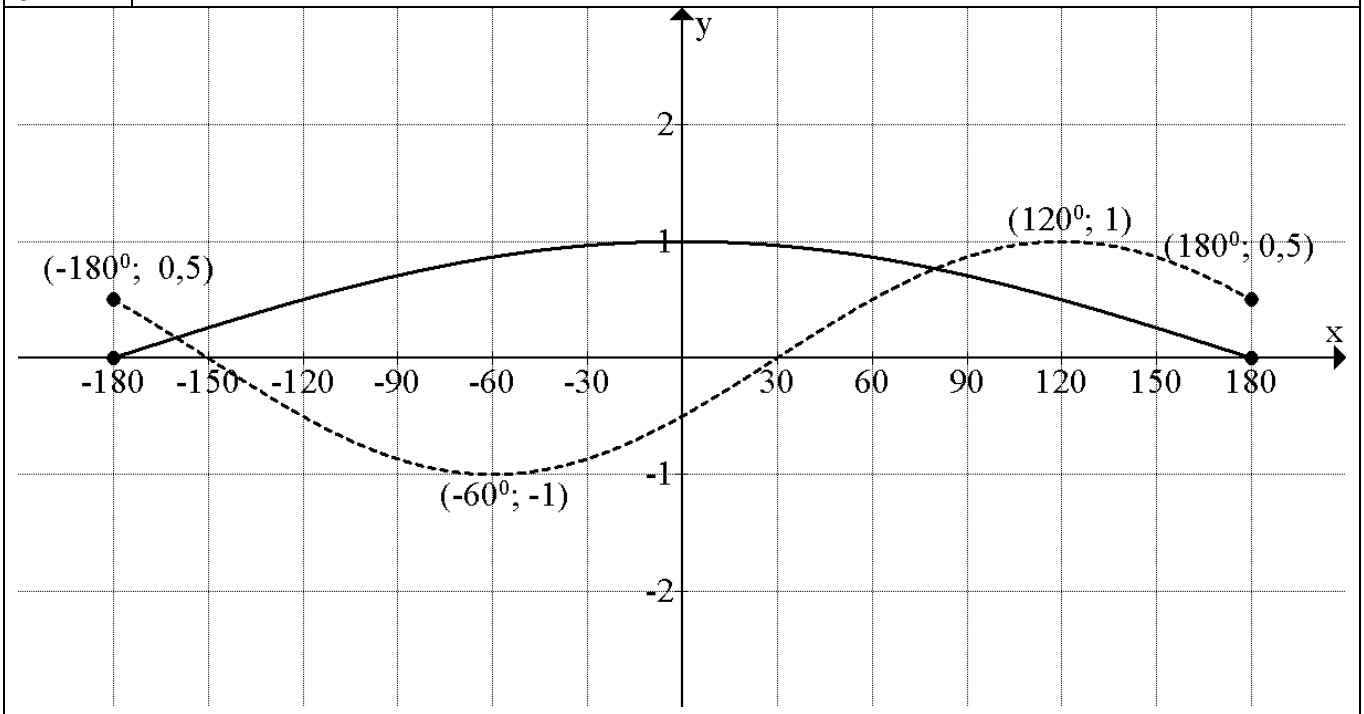
3.1	 $(-12;-5)$ Therefore/*d.w.s*: $r = 13$ $\sin B + \cos B$ $= \frac{-5}{13} + \frac{-12}{13}$ $= \frac{-17}{13}$	✓diagram / *diagram* ✓value of *r* / *waarde van r* ✓✓substitution / *vervanging* ✓answer / *antwoord*	(5)
3.2	$\sin 43° = p$		
3.2.1	$\cos 133°$ $\cos(90° + 43°)$ $= -\sin 43°$ $= -p$	✓ $-\sin 43°$ ✓answer / *antwoord*	(2)
3.2.2	$\tan(-43°)$ $= -\tan 43°$ $= -\frac{p}{\sqrt{1-p^2}}$	✓ $-\tan 43°$ ✓✓answer / *antwoord*	(3)
3.3.1	$\frac{\sin(360° - x)}{\sin(90° - x)} \div \tan(x - 180°)$ $= \frac{-\sin x}{\cos x} \div \tan x$ $= -\tan x \div \tan x$ $= -1$	✓ $-\sin x$ ✓ $\cos x$ ✓ $\tan x$ ✓ $-\tan x$ ✓ answer / *antwoord*	(5)
3.3.2	$\frac{\sin 210°.\cos 150°.\tan 25°}{\tan 205°.\cos 315°.\sin 135°}$ $= \frac{-\sin 30°.-\cos 30.\tan 25°}{\tan 25°.\cos 45°.\sin 45°}$ $= \frac{\frac{1}{2}.\frac{\sqrt{3}}{2}}{\frac{1}{\sqrt{2}}.\frac{1}{\sqrt{2}}}$ $= \frac{\sqrt{3}}{2}$	✓ $-\sin 30°$ ✓ $-\cos 30°$ ✓ $\tan 25°$ ✓ $\cos 45°$ ✓ $\sin 45°$ ✓special angles / *spesiale hoeke* ✓answer / *antwoord*	(7)
			[22]

QUESTION 4 / *VRAAG 4*

4.1	$\frac{\sin\theta-\cos\theta.\sin\theta}{\cos\theta-(1-\sin^2\theta)}=\tan\theta$ LHS $=\frac{\sin\theta(1-\cos\theta)}{\cos\theta-\cos^2\theta}$ $=\frac{\sin\theta(1-\cos\theta)}{\cos\theta(1-\cos\theta)}$ $=\tan\theta$	✓factorising / *faktorisering* ✓ $\cos^2\theta$ ✓common factor / *gemene faktor* ✓answer / *antwoord*	(4)
4.2	$2\sin x\cos x-\cos^2 x=0$ $\cos x(2\sin x-\cos x)=0$ $\cos x=0$ or/*of* $2\sin x=\cos x$ $\cos x=0$ or/*of* $\tan x=\frac{1}{2}$ $x=90°+360°.k$ or/*of* $x=270°+360°.k$ or/*of* $x=26,57°+180°.k$	✓factors / *faktore* ✓ $\cos x=0$ ✓ $\tan x=\frac{1}{2}$ ✓ $x=90°+360°.k$ ✓ $x=270°+360°.k$ ✓ $x=26,57°+180°.k$	(6)
4.3	$2.\sqrt{\sin\alpha}=1$ $\sqrt{\sin\alpha}=\frac{1}{2}$ $\sin\alpha=\frac{1}{4}$ $\alpha=14,48°$ or/*of* $\alpha=165,52°$	$\sin\alpha=\frac{1}{4}$ $\alpha=14,48°$ $\alpha=165,52°$	(3)
4.4	$\tan\left(\frac{x+y}{2}\right)=1$ and/*en* $\cos(x-y)=\frac{\sqrt{3}}{2}$ $\frac{x+y}{2}=45°$ and/*en* $x-y=30°$ $x+y=90°$ .....(1) $x-y=30°$ .....(2) $2x=120°$ $x=60°$ $y=30°$	✓ $\frac{x+y}{2}=45°$ ✓ $x-y=30°$ ✓setting up equations/ *opstel van vergelykings* ✓ *x-value/waarde* ✓*y-value/waarde*	(5)
			[18]

QUESTION 5 / *VRAAG 5*

5.1.1	$0 \le y \le 1$ or $[0;1]$	✓0 ✓1	(2)
5.1.2	Period = 720°	✓answer	(1)
5.2			



✓ shape / *vorm*
✓ *x*-intercept / *x-afsnit*
✓ *y*-intercept / *y-afsnit*
✓ turning points / *draaipunte*

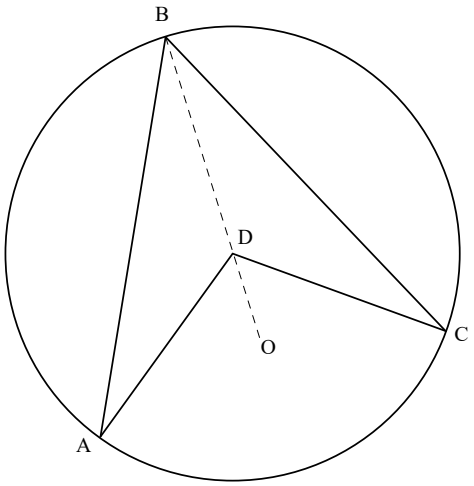
(4)

5.3	$-180° \le x \le -150$ or/*of* $30° \le x \le 180°$	✓✓ $-180° \le x \le -150$ ✓ $30° \le x \le 180°$	(3)
			[10]

QUESTION 6 /*VRAAG 6*

6.1	$\sin 60° = \frac{PQ}{PS}$ $\sin 60° = \frac{8}{PS}$ $PS = \frac{8}{\sin 60°}$ $PS = \frac{16\sqrt{3}}{3}$	✓ $\sin 60° = \frac{8}{PS}$ ✓ $PS = \frac{8}{\sin 60°}$ ✓ $PS = \frac{16\sqrt{3}}{3}$	(3)
6.2	In ΔPQS: $\tan 60° = \frac{PQ}{QS}$ $QS = \frac{8}{\tan 60°} = \frac{8\sqrt{3}}{3}$ m $QR = \frac{8\sqrt{3}}{3}$ m In ΔRQS: $RS^2 = QR^2 + QS^2 - 2.QR.QS.\cos 100°$ $= \left(\frac{8\sqrt{3}}{3}\right)^2 + \left(\frac{8\sqrt{3}}{3}\right)^2 - 2.\left(\frac{8\sqrt{3}}{3}\right).\left(\frac{8\sqrt{3}}{3}\right)^2 \cos 100°$ $= 50{,}0756.....$ $RS = 7{,}08$ m	✓ $QS = \frac{8}{\tan 60°}$ ✓ $QS = \frac{8\sqrt{3}}{3}$ m ✓ $QR = \frac{8\sqrt{3}}{3}$ m ✓formula / *formule* ✓substitution / *vervanging* ✓simplification/ *vereenvoudiging* ✓answer / *antwoord*	(7)
			[10]

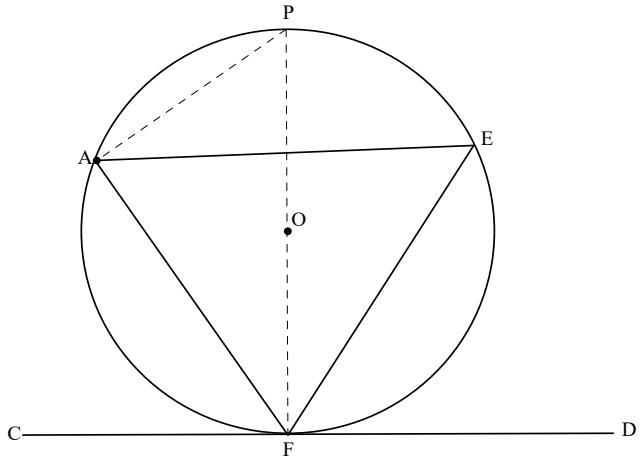
QUESTION 7 / *VRAAG 7*



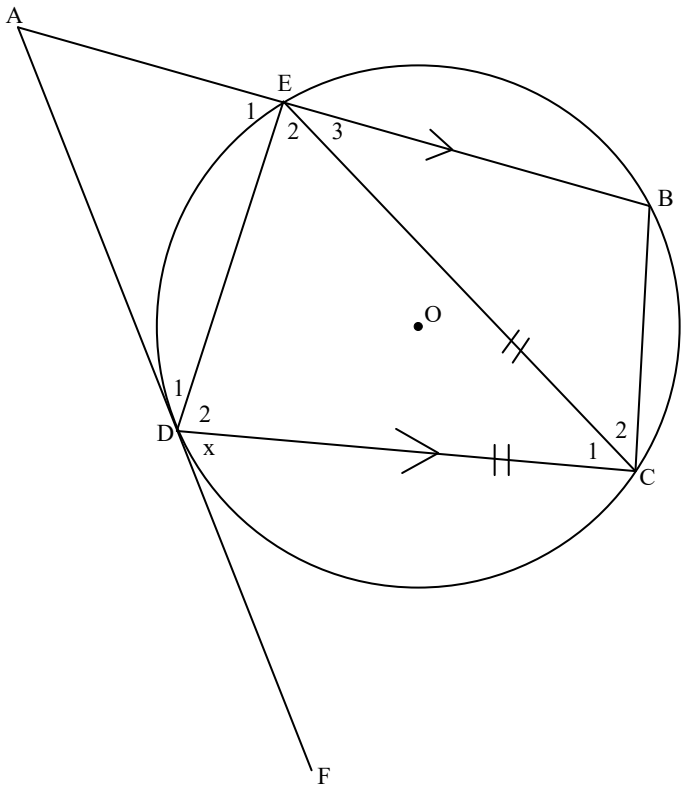
7.1	Let/*Laat* $\hat{A} = x$ $B\hat{A}D = x$ (angles opp = sides)/(*hoeke teenoor = sye*) $A\hat{D}O = 2x$ (angle at the centre)/(*middelpuntshoek*) Similarly, if you let / *Net so, as jy*: $\hat{C} = y$; then/*dan*: $C\hat{D}O = 2y$ $\therefore A\hat{D}C = 2x + 2y = 2(x + y)$ $= 2\ A\hat{B}C$	✓S and/*en* R ✓✓S and/*en* R ✓S ✓S and conclusion *en gevolgtrekking*	(5)
7.2.1	$\hat{B}_3 = 10°$ (angles opp = sides; DB = DF) (*hoeke teenoor = sye*; DB = DF) $\hat{D}_2 = 20°$ (exterior angle of a ΔBDF) (*buitehoek van* ΔBDF)	✓S ✓R ✓S and/*en* R	(3)
7.2.2	$A\hat{B}D = 90°$ (angles in a semi-circle) (*hoek in halwe sirkel*) $\hat{A} = 70°$ (angles of a triangle) (*hoeke van 'n driehoek*)	✓S ✓R ✓S ✓R	(4)
7.2.3	$\hat{O}_2 = 140°$ (angle at the centre) / (*middelpuntshoek*)	✓S ✓R	(2)
7.2.4	$\hat{C}_1 = 110°$ (opposite angles of a c.q.)/(*teenoorst. hoeke van k.v*) OR / *OF* $\hat{O}_1 + \hat{O}_4 + \hat{O}_3 = 220°$ (angles around a point/(*omwenteling*) $\hat{C}_1 = 110°$ (angle at the centre)/(*middelpuntshoek*)	✓S ✓R **OR / *OF*** ✓S and/*en* R ✓S and/*en* R	(2)

7.2.5	$\hat{E} = 70°$ (angles in the same segment)/(*hoeke in dieselfde segment*) OR/*OF* $\hat{E} = 70°$ (opposite angles of a c.q.)/(*teenoorst. hoeke van k.v*)	✓S ✓R **OR/*OF*** ✓S ✓R	(2)
7.2.6	$\hat{C}_2 = 70°$ (ext. ∠ of a c.q.)/ (*buitehoek van k.v*) OR/*OF* $\hat{C}_2 + 110° = 180°$ (∠s on a straight line)/(*hoeke op 'n reguitlyn*) $\hat{C}_2 = 70°$	✓S ✓R **OR/*OF*** ✓S ✓R	(2)
7.2.7	$\hat{O}_4 = \hat{O}_2 = 140°$ (vertically opp. ∠s)/(*regoorstaande ∠e*)	✓S ✓R	(2)
			[22]

QUESTION 8 / *VRAAG 8*

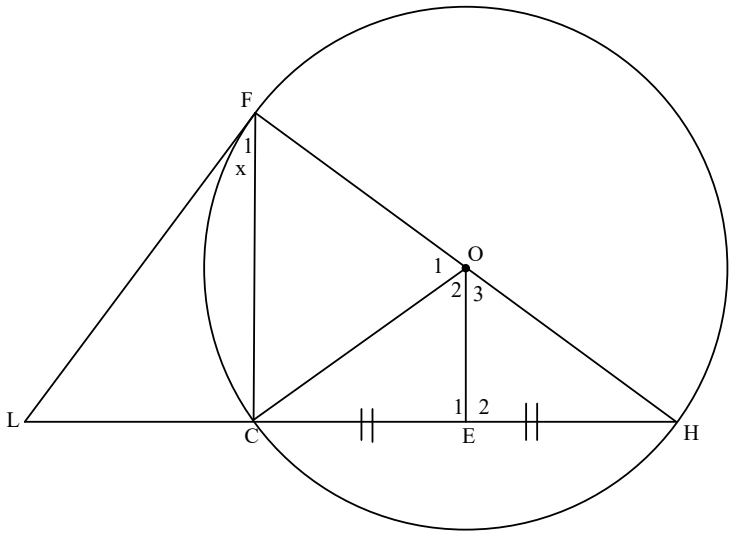


8.1	ENG Draw diameter FP and join PA Let $E\hat{F}D = x$ $O\hat{F}D = 90°$ (tan $\perp$ radius) $\therefore O\hat{F}E = 90° - x$ $\therefore P\hat{A}E = 90° - x$ (angles in the same segment) $P\hat{A}F = 90°$ (angles in a semi circle) $\therefore E\hat{A}F = x$ $\therefore E\hat{F}D = \hat{A} = x$	✓construction ✓S and R ✓S and R ✓S and R ✓conclusion	
8.1 **AFR**	*AFR* *Teken middellyn* FP *en verbind* PA *Laat* $E\hat{F}D = x$ $O\hat{F}D = 90°$ (*raaklyn* $\perp$ *radius*) $\therefore O\hat{F}E = 90° - x$ $\therefore P\hat{A}E = 90° - x$ (*hoeke in dieselfde segment*) $P\hat{A}F = 90°$ (*hoeke in 'n halwe sirkel*) $\therefore E\hat{A}F = x$ $\therefore E\hat{F}D = \hat{A} = x$	✓ *konstruksie* ✓ S *en* R ✓ S *en* R ✓ S *en* R ✓ *gevolgtrekking*	(5)



8.2.1	$\widehat{A} = x$ (corresponding angles; AB ‖ DC)/(*ooreenkomstige hoeke*; AB || DC) $\widehat{E}_2 = x$ (tan-chord) / (*raaklyn-koord*) $\widehat{D}_2 = x$ (angles opposite = sides) / (*hoeke teenoor* = sye) $\widehat{E}_1 = x$ (alternate angles, AB ‖ DC)/(*verwisselende hoeke*; AB || DC) $\widehat{C}_{1+2} = \widehat{E}_1 = x$ (exterior angle of a c.q.)/(*buitehoek van 'n k. v*)	✓S ✓R ✓S ✓R ✓S ✓R ✓S ✓R ✓S ✓R	(10)
8.2.2	$\widehat{B} = 180° - x$ (opposite angles of a c.q.) (*teenoorst. hoeke van 'n k. v*) $\widehat{A} + \widehat{B} = x + (180° - x) = 180°$ ∴ AD ‖ BC (co-interior angles formed =) (*ko-binne hoeke gevorm* = 180°) ∴ ABCD is a parallelogram (opp. sides ‖) ABCD is 'n parallelogram (*teenoorst. sye* ||)	✓S ✓R ✓R ✓R	(4)
			[19]

QUESTION 9 / *VRAAG 9*

9.1.1	**perpendicular** to the chord / ***loodreg*** *op die koord*	✓answer/*antwoord*	(1)
9.1.2	**interior opposite** angle / ***teenoorstaande binnehoek***	✓answer/*antwoord*	(1)
9.2			
9.2.1	$\hat{E}_2 = \hat{E}_1 = 90°$ (line from centre) (*lyn vanaf die middelpunt*) $F\hat{C}H = 90°$ (angles in a semi-circle) (*hoeke in 'n halwe sirkel*) $\therefore F\hat{C}H = \hat{E}_2$ ∴ FC ∥ OE (corresponding angles formed are =) (*ooreenkomstige hoeke wat gevorm word is* =)	✓S ✓R ✓S ✓R ✓R	(5)
9.2.2	$L\hat{F}O = 90°$ (tan ⊥ radius) / (*raaklyn ⊥ radius*) $\hat{E}_2 = 90°$ (proven) / (*reeds bewys*) ∴ OFLE is a c.q. (converse exterior angle of a c.q.) (*omgekeerde buitehoek van k.v stelling*)	✓S and/*en* R ✓S and/*en* R ✓R	(3)
9.2.3	$\hat{H} = x$ (tan - chord) / (*raaklyn - koord*) $\hat{O}_1 = 2x$ (angle at the centre) (*middelpuntshoek*)	✓S ✓R ✓S ✓R	(4)
			[14]
		TOTAL/TOTAAL:	**150**