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Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE
NASIONALE SENIORSERTIFIKAAT

GRADE/*GRAAD* 12

JUNE/*JUNIE* 2023

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

MARKS/*PUNTE*: 150

This marking guideline consists of 12 pages.
Hierdie nasienriglyn bestaan uit 12 bladsye.

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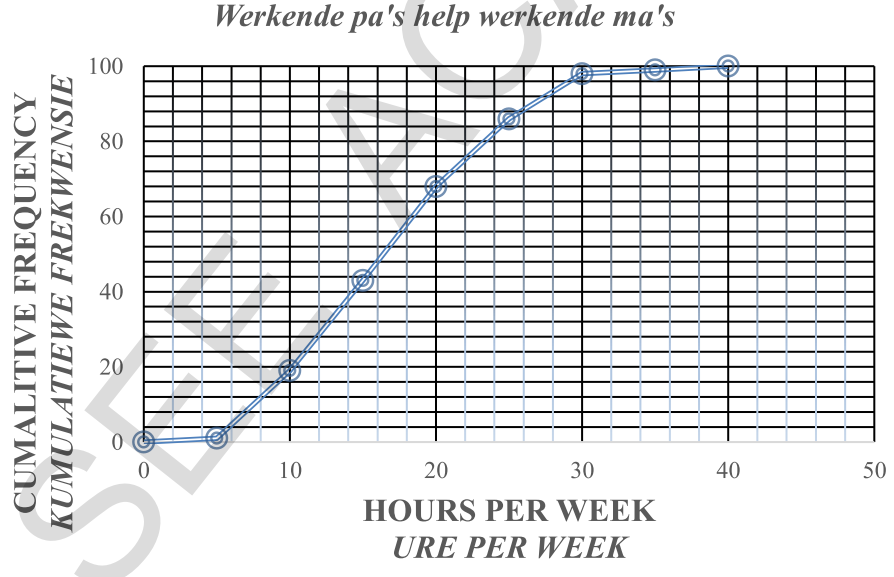
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QUESTION 1/*VRAAG 1*

1.1	16	✓✓ answer / *antwoord*	(2)
1.2	$sd = 5{,}83$	✓ ✓answer / *antwoord*	(2)
1.3	$16 + 5{,}83 = 21{,}83$ ∴ 2 above/*bokant*.	✓ ✓answer / *antwoord*	(2)
1.4	$16 - 5{,}83 = 10{,}17$ $\frac{3}{11} \times 100 = 27{,}27\%$	✓✓	(2)
			[8]

QUESTION 2/*VRAAG 2*

	Hours / *Ure*	**Number of dads *Aantal pa's***	**Cumulative frequency *Kumulatiewe frekwensie***
	$0 < x \leq 5$	1	1
	$5 < x \leq 10$	18	19
	$10 < x \leq 15$	24	43
	$15 < x \leq 20$	25	68
	$20 < x \leq 25$	18	86
	$25 < x \leq 30$	12	98
	$30 < x \leq 35$	1	99
	$35 < x \leq 40$	1	100

2.1		✓ table / *tabel* ✓ anchor point / *ankerpunt* (0;0) ✓ (10; 19) (25; 86) ✓ (40; 100)	(4)
2.2	±16 (Accept values from 14 to 18) / (*Aanvaar waardes vanaf 14 tot 18*)	✓✓ answer *antwoord*	(2)
2.3	$15 < x \leq 20$	✓ answer / *antwoord*	(1)
2.4	$\bar{x} = 16{,}8$	✓✓ answer / *antwoord*	(2)
2.5	Mean ≈ Median and lies in the Modal class. Data is symmetrical / Normal / Data not skewed. *Gemiddelde ≈ Mediaan en lê in die Modale klas* *Data is simmetries / Normaal / Data nie skeef nie.*	✓ ✓✓ reason / *rede*	(3)
			[12]

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QUESTION 3/*VRAAG 3*

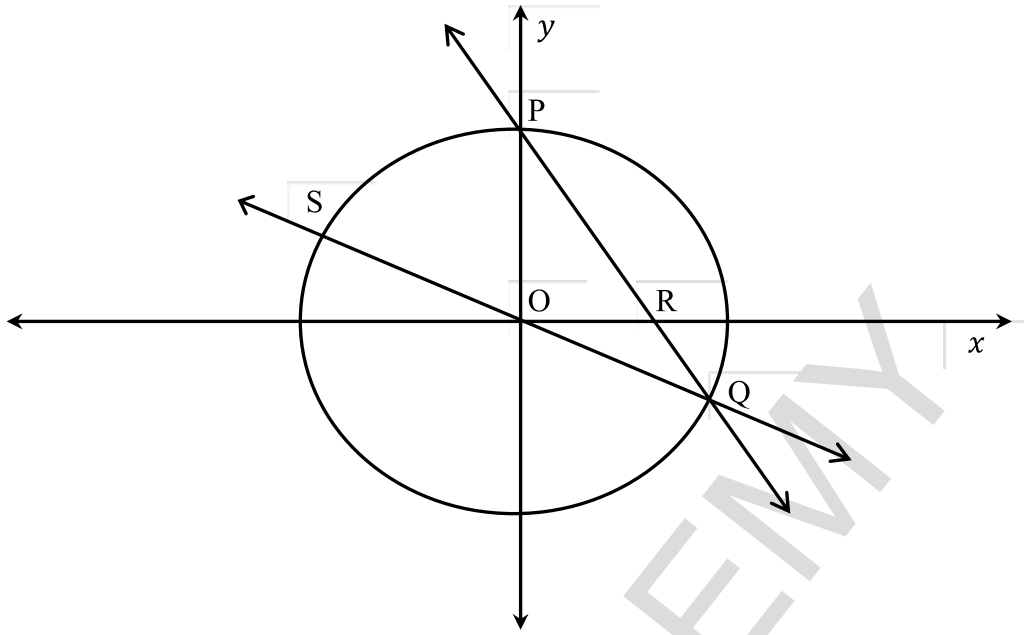
3.1	$y = -\frac{1}{3}x + 10 \qquad (m_1 \times m_2 = -1)$ $\frac{p}{2} = -\frac{1}{3}(4) + 10$ $p = \frac{52}{3}$	✓ equation of line / *verg. van lyn* ✓substitution of point / *vervanging van punt* ✓ answer / *antwoord*	(3)
3.2	O(0;0) and/*en* $P(-2; p-1)$ and/*en* OP = 2 units/*eenhede*. $OP^2 = (-2-0)^2 + (p-1-0)^2$ $(2p)^2 = 4 + p^2 - 2p + 1$ $4p^2 = p^2 - 2p + 5$ $3p^2 + 2p - 5 = 0$ $(3p+5)(p-1) = 0$ $p = -\frac{5}{3}$ or $p = 1$ (*slegs*) $p = 1$ only	✓ substitution / *vervanging* ✓ simplification / *vereenvoudiging* ✓standard form / *standaardvorm* ✓factors / *faktore* ✓ answer / *antwoord*	(5)
3.3.1	$m_{BD} = 2$	✓✓answer / *antwoord*	(2)
3.3.2	Midpoint of BD : *Middelpunt van BD* $(0; -1)$ $y = -\frac{1}{2}x - 1$	✓ ✓midpoint / *middelpunt* ✓ answer / *antwoord*	(3)
3.3.3	$x^2 + y^2 = 25$	✓✓answer / *antwoord*	(2)
3.3.4	$x^2 + (-\frac{1}{2}x - 1)^2 = 25$ $x^2 + \frac{1}{4}x^2 + x + 1 = 25$ $4x^2 + x^2 + 4x + 4 = 100$ $5x^2 + 4x - 96 = 0$ $(5x+24)(x-4) = 0$ $x = -\frac{24}{5}$ or/*of* $x = 4$ $\therefore y = \frac{7}{5}$	✓substitution / *vervanging* ✓simplification / *vereenvoudiging* ✓standard form / *standaardvorm* ✓factorisation / *faktorisering* ✓ x-values / *x-waardes* ✓answer / *antwoord*	(6)
			[21]

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QUESTION 4 / *VRAAG 4*



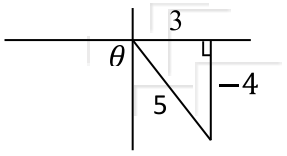
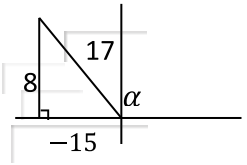
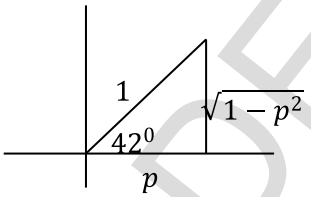
4.1	$x^2 + y^2 = 16 \qquad y = 4 - 2x$ $x^2 + (4 - 2x)^2 = 16$ $x^2 + 16 - 16x + 4x^2 = 16$ $5x^2 - 16x = 0$ $x(5x - 16) = 0$ $x = 0$ or/*of* $x = \frac{16}{5} = 3{,}2$ $y = 4 - 2(0) \qquad y = 4 - 2(3{,}2)$ $y = 4 \qquad y = -2{,}4$	✓ $y = 4 - 2x$ ✓substitution / *vervanging* ✓standard form / *standaardvorm* ✓factors / *faktore* ✓x-values / *x-waardes* ✓substitution / *vervanging* ✓ y-values / *y-waardes*	(7)
4.2	$S(-3{,}2\,;2{,}4)$	✓✓ answer / *antwoord*	(2)
4.3	$y = 4 - 2x$ $0 = 4 - 2x$ $2x = 4$ $x = 2$ $R(0\,;2)$ ∴ radius = 2 units / *eenhede* $(x - 2)^2 + y^2 = 4$	✓equating to 0 / *gelyk stel aan* 0 ✓ $x = 2$ ✓ radius = 2 units/*eenhede* ✓ answer / *antwoord*	(4)
4.4	$(x - y)^2 + y^2 - y = 12$ $(x - 6)^2 + y^2 - y + \frac{1}{4} = 12 + \frac{1}{4}$ $(x - 6)^2 + (y - \frac{1}{2})^2 = \frac{49}{4}$ Centre/*Middelpunt* $(6\,;\frac{1}{2})$ and/*en* $O(0\,;0)$ $d = \sqrt{36 + \frac{1}{4}}$ $d \approx 6{,}02 \;/\; \frac{\sqrt{145}}{2}$	✓completing the square *vierkantsvoltooiing* ✓simplification / *vereenvoudiging* ✓coordinates of midpoint *koördinate van middelpunt* ✓substitution in distance formula *vervanging in afstand formule* ✓answer / *antwoord*	(5)
			[18]

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QUESTION 5/*VRAAG 5*

5.1	$5\cos\theta - 3 = 0$ $\cos\theta = \frac{3}{5}$  	$17\sin\alpha = 8$ $\sin\alpha = \frac{8}{17}$  	✓$\cos\theta = \frac{3}{5}$ ✓$\sin\alpha = \frac{8}{17}$ ✓ -4 in correct quadrant *in korrekte kwadrant* ✓-15 in correct quadrant *in korrekte kwadrant* ✓correct values / *korrekte waardes*	(6)
	$\tan\alpha + \tan\theta$ $= -\frac{8}{15} + (-\frac{4}{3})$ $= -\frac{28}{15}$		✓ answer / *antwoord*	
5.2	$\cos 42^0 = p$  			
5.2.1	$\sin 48^\circ = p$		✓✓answer / *antwoord*	(2)
5.2.2	$\sin(-2202^0)$ $= \sin(-42^0)$ $= -\sin 42^0$ $= -\sqrt{1-p^2}$		✓$-\sin(42^\circ)$ ✓answer / *antwoord*	(2)
5.2.3	$\cos 84^0$ $= \cos 2(42^0)$ $= 2\,cos^2 42^0 - 1$ $= 2p^2 - 1$		✓$\cos 2(42^\circ)$ ✓answer / *antwoord*	(2)
5.3	$\frac{\tan 300^0 + \cos(90^0 + x)}{\sin(180^0 - x) + 2\cos(-30^0)}$ $= \frac{-\tan 60^0 - \sin x}{\sin x + 2(\frac{\sqrt{3}}{2})}$ $= \frac{-\sqrt{3} - \sin x}{\sin x + \sqrt{3}}$ $\frac{-(\sin x + \sqrt{3})}{(\sin x + \sqrt{3})}$ $= -1$		✓$-\tan 60^\circ$ ✓$-\sin x$ ✓$\sin x$ ✓ $\frac{\sqrt{3}}{2}$ ✓ taking out of negative sign. *uithaal van negatiewe teken* ✓answer / *antwoord*	(6)

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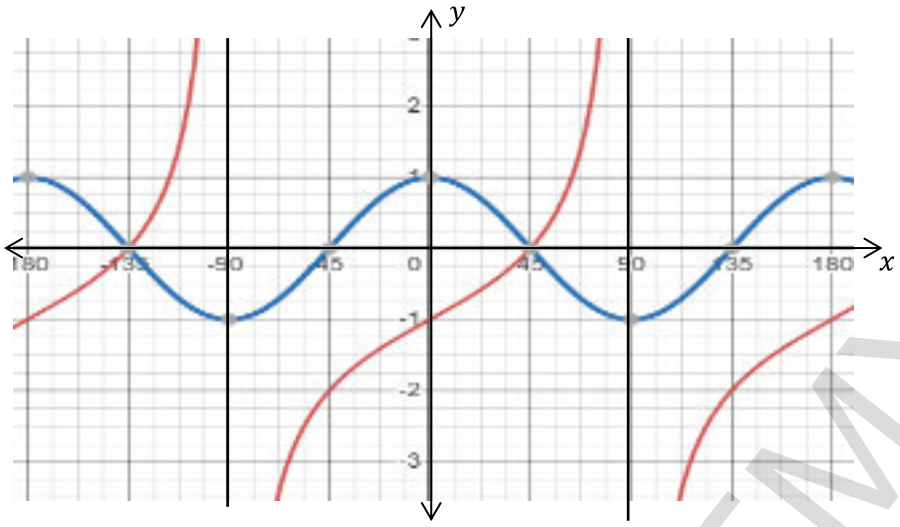
5.4	$\frac{1-\sin 2x}{\cos 2x}=\frac{\cos x-\sin x}{\cos x+\sin x}$ $LHS=\frac{1-2\sin x\cos x}{cos^2x-sin^2x}$ $LHS=\frac{cos^2x-2\sin x\cos x+sin^2x}{cos^2x-sin^2x}$ $LHS=\frac{(\cos x-\sin x)(\cos x-\sin x)}{(\cos x-\sin x)(\cos x+\sin x)}$ $LHS=\frac{\cos x-\sin x}{\cos x+\sin x}$	✓$2\sin x\cos x$ ✓cos^2x-sin^2x ✓$1=\ cos^2x+sin^2x$ ✓factorising / *faktorisering* ✓factorising / *faktorisering*	(5)
5.5	$\cos x-\sin x=\sqrt{2}$ $\frac{1}{\sqrt{2}}\cos x-\frac{1}{\sqrt{2}}\sin x=1$ $\cos 45^0\cos x-\sin 45^0\sin x=1$ $\cos(45^0+x)=1$ $45^0+x=0^0+360^0.k$ $x=-45^0+360^0.k$	✓ division by / *deling deur* $\sqrt{2}$ ✓$\frac{1}{\sqrt{2}}=\cos 45^0/\sin 45^0$ ✓ expansion rule / *reël* ✓$45^0+x=0^0+360^0.k$ ✓answer / *antwoord*	(5)
			[28]

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QUESTION 6/*VRAAG 6*

6.1		✓shape / *vorm* ✓ intercepts / *afsnitte* ✓ starting and end points / *begin en eindpunte*	(3)
6.2	Period / *Periode* = 180^0	✓ answer / *antwoord*	(1)
6.3	$h(x) = \tan x + 2$	✓ answer / *antwoord*	(1)
6.4	$-135^0 \leq x < -90^0$	✓-135^0 ✓-90^0 ✓ answer / *antwoord*	(3)
6.5	$\cos B + 1 = \tan\frac{1}{2}B$ Let/*Laat* $B = 2x$ $\cos 2x + 1 = \tan\frac{1}{2}(2x)$ $\cos 2x = \tan x - 1$ $x = -135^0$ and/*en* $x = 45^0$ $\therefore B = -270^0$ and/*en* $B = 90^0$	✓ $\cos 2x + 1 = \tan\frac{1}{2}(2x)$ ✓ $\cos 2x = \tan x - 1$ ✓ both x-values *beide x-waardes* ✓ both B values / *beide* B *waardes*	(4)
			[12]

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QUESTION 7/*VRAAG 7*

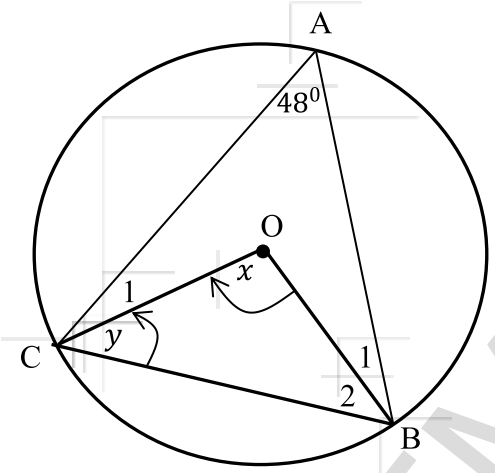
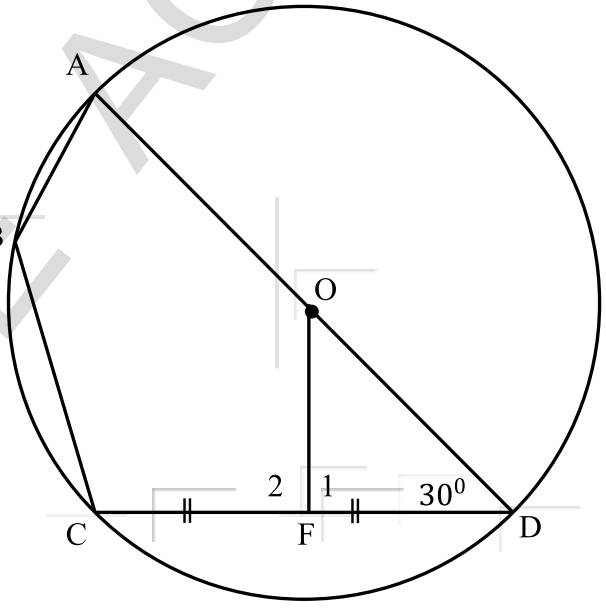
7.1	*In* ΔOAK $\sin x = \frac{AK}{2}$ $AK = 2\sin x$ $2\sin x = 2\,KT\sin x$ $KT = 1$ In ΔKAT $\frac{AK}{\sin 2x} = \frac{KT}{\sin(90^0+x)}$ $AK = \frac{KT2\sin x\cos x}{\cos x}$ $AK = 2KT\sin x$		✓ $\sin x = \frac{AK}{2}$ ✓ $AK = 2\sin x$ ✓ use of sine rule / *gebruik van sinusreël* ✓ $AK = 2KT\sin x$ ✓ $KT = 1$	(5)
7.2	In $\Delta\, KAT$ $T\hat{K}A = 90^0 - 3x$ $\frac{AT}{\sin(90^0-3x)} = \frac{1}{\sin(90^0+x)}$ $AT = \frac{\cos 3x}{\cos x}$		✓$T\hat{K}A = 90^0 - 3x$ ✓ use of sine rule *gebruik van sinusreël*	(2)
7.3	$AT = \frac{\cos 3x}{\cos x}$ $AT = \frac{\cos(2x+x)}{\cos x}$ $AT = \frac{\cos 2x\cos x - \sin 2x\sin x}{\cos x}$ $AT = \frac{\cos 2x\cos x - 2\sin x\cos x\sin x}{\cos x}$ $AT = \frac{\cos x(\cos 2x - 2\,sin^2 x)}{\cos x}$ $AT = 1 - 2sin^2x - 2sin^2x$ $AT = 1 - 4\,sin^2x$		✓ splitting of cos $3x$ and expansion *opbreek van* cos $3x$ *en uitbreiding* ✓ common factor / *gemene faktor* ✓ expansion of cos $2x$ *uitbreiding van* cos $2x$ ✓ answer / *antwoord*	(4)
				[11]

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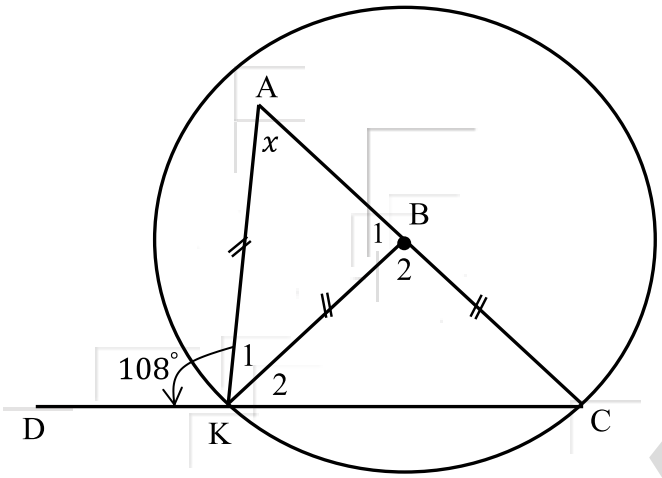
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QUESTION 8/*VRAAG 8*

8.1			
8.1.1	$x = 96^0$ [∠ at centre $= 2 \times$ ∠ at circumference] [*middelpunte* ∠ $= 2 \times$ *omtrekshoek*]	✓ answer / *antwoord* ✓R	(2)
8.1.2	$\hat{B}_2 = y$ [angles opp = sides] [*hoeke teenoor = sye*] $2y + 96^0 = 180^0$ [sum of angles of Δ] [*som van die hoeke van* Δ] $y = 42^0$	✓ S/R ✓answer / *antwoord*	(2)
8.2			
8.2.1	$\hat{F}_1 = 90^0$ [line from centre bisects chord] [*lyn vanaf middelpunt halveer koord*]	✓ S ✓R	(2)
8.2.2	$A\hat{B}C = 150^0$ [opp angles of cyclic quad] [*teenoorst. hoeke van koordevierhoek*]	✓ S ✓R	(2)

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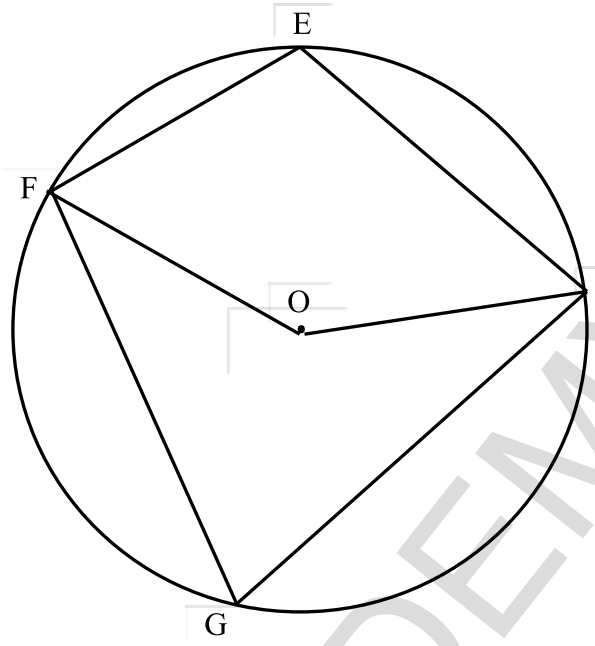
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8.3			
8.3.1	$\hat{B}_1 = x$ [angles opp equal sides] [*hoeke teenoor gelyke sye*]	✓S ✓R	(2)
8.3.2	$\hat{K}_2 + \hat{C} = x$ [ext angle of Δ] / [*buitehoek van* Δ] $\hat{C} = \hat{K}_2$ [angles opp equal sides] [*hoeke teenoor gelyke sye*] $\hat{C} = \frac{x}{2}$	✓S ✓R ✓S/R	(3)
8.3.3	$\hat{K}_1 = 180^0 - 2x$ [sum of angles of Δ] [*som van die hoeke van* Δ] $108^0 + 180^0 - 2x + \frac{x}{2} = 180^0$ [adj angles on str line] [*aangrensende hoeke op reguitlyn*] $x = 72^0$	✓S/R ✓S ✓R ✓answer / *antwoord*	(4)
			[17]

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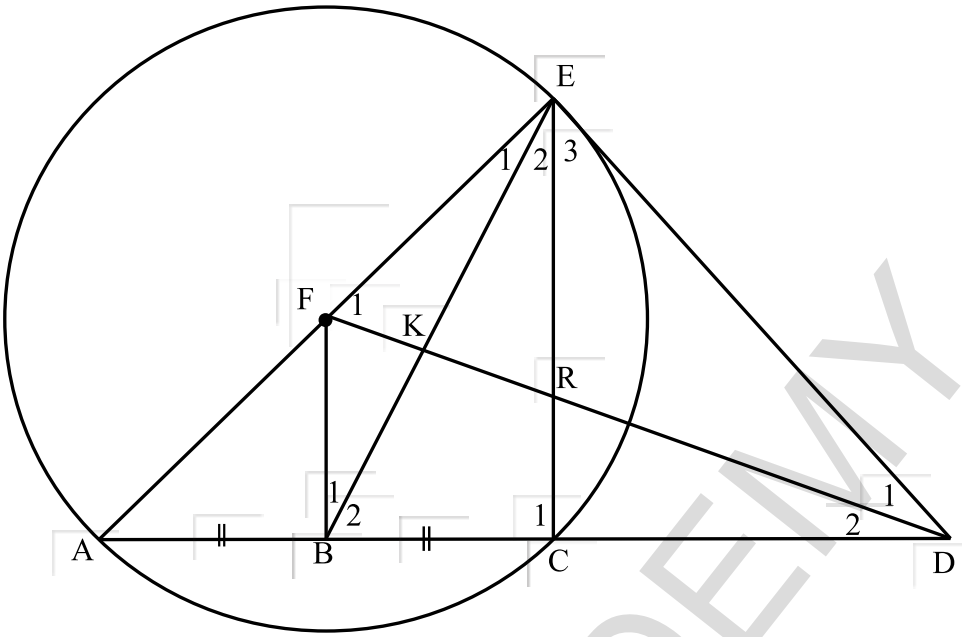
QUESTION 9 / *VRAAG 9*

		
	Construct radii OF and OH. $F\hat{O}H = 2 \times \hat{G}$ [angle at centre = 2 × angle at circum] Reflex $F\hat{O}H = 2 \times \hat{E}$ [angle at centre = 2 × angle at circum] $F\hat{O}H + F\hat{O}H = 2\hat{G} + 2\hat{E}$ but $F\hat{O}H + F\hat{O}H = 360^0$ [angles around a point] $2\hat{G} + 2\hat{E} = 360^0$ $\hat{G} + \hat{E} = 180^0$	✓S ✓S/R ✓S/R ✓S ✓S/R ✓S
	Trek radiusse OF *en* OH. $F\hat{O}H = 2 \times \hat{G}$ [*middelpunte* ∠ = 2 × *omtrekshoek*] *Omwenteling* $F\hat{O}H = 2 \times \hat{E}$ [*middelpunte* ∠ = 2 × *omtrekshoek*] $F\hat{O}H + F\hat{O}H = 2\hat{G} + 2\hat{E}$ maar $F\hat{O}H + F\hat{O}H = 360^0$ [*hoeke rondom 'n punt*] $2\hat{G} + 2\hat{E} = 360^0$ $\hat{G} + \hat{E} = 180^0$	✓S ✓S/R ✓S/R ✓S ✓S/R ✓S
		[6]

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QUESTION 10/*VRAAG 10*



10.1	$FE \perp DE$ [radius ⊥ tang] / [*radius ⊥raaklyn*] $F\hat{E}D = 90^0$ $F\hat{B}A = 90^0$ [line from centre bisects chord [*lyn vanaf middelpunt halveer koord*] ∴ EFBD = cyclic quad [opp angles = 180^0] EFBD *is 'n koordevierhoek* [*teenoorst. hoeke* = 180°]	✓ S/R ✓ S ✓ S/R ✓ S/R	(4)
10.2	$\hat{C}_1 = 90^0$ [angle in semi-circle] / [*hoek in semi-sirkel*] In ΔBCE and */en* ΔFED $\hat{C}_1 = F\hat{E}D$ [90^0] $\hat{B}_2 = \hat{F}_1$ [angles in same segment] [*hoeke in dieselfde segment*] $\hat{E}_2 = \hat{D}_1$ [3rd angle of Δ] / [*3de hoek van* Δ] $\Delta BCE \,\|\|\, \Delta FED$ [∠; ∠; ∠]	✓ S/R ✓S/R ✓S ✓R ✓ S ✓R	(6)
10.3	$\frac{BC}{FE} = \frac{CE}{ED}$ [similar triangles] / [*gelykvormige* Δ*e*] $BC = \frac{FA.CE}{ED}$	✓S ✓R ✓answer *antwoord*	(3)
10.4	$F\hat{B}A = \hat{C}_1$ [proven] / [*bewys*] ∴ $FB \parallel CE$ [corresponding angles equal] [*ooreenkomstige hoeke gelyk*] $\frac{AC}{BC} = \frac{AE}{FE}$ [line parallel to one side of triangle] [*lyn ewewydig aan een sy van driehoek*] $BC = \frac{AC.FE}{AE}$	✓S/R ✓S/R ✓S ✓R	(4)
			[17]
	TOTAL/*TOTAAL*:		**150**

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