KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

MATHEMATICS P2

NOVEMBER 2023

MARKING GUIDELINE

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NATIONAL SENIOR CERTIFICATE

GRADE 10

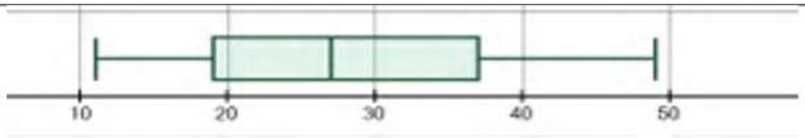
MARKS: 100

This marking guideline consists of 14 pages.

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QUESTION 1

1.1	$\text{range} = 49 - 11$ $= 38$	✓ Answer	(1)
1.2	$Q_2 = 27$	✓ Answer	(1)
1.3	$IQR = Q_3 - Q_1$ $= 37 - 19$ $= 18$	✓ Q_1 and Q_3 ✓ Answer	(2)
1.4		✓ max and min ✓ Q_1, Q_2 and Q_3 ✓ box and whiskers	(3)
			[7]

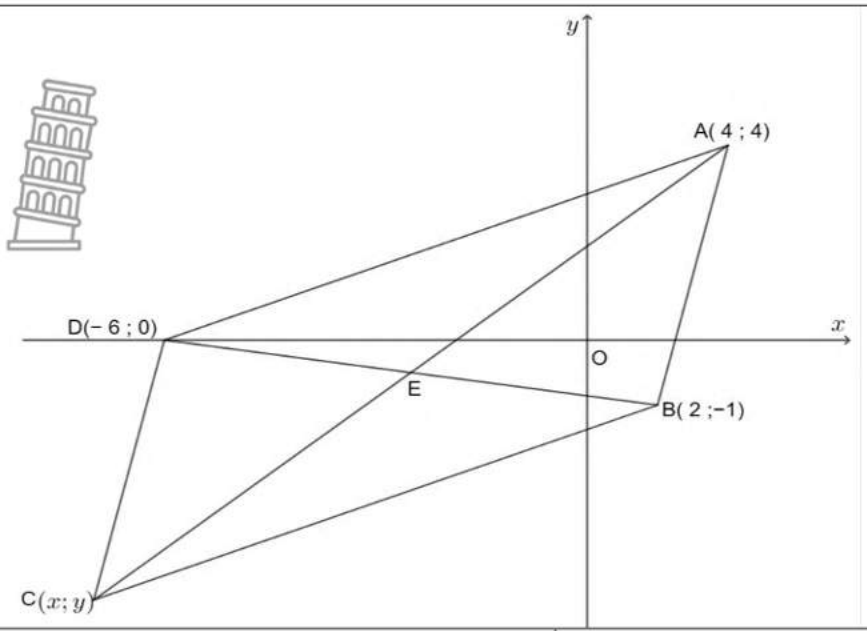
QUESTION 2

2.1	45	✓ answer	(1)
2.2	$\bar{x} = \frac{\sum x.f}{\sum f}$ $= \frac{837,5}{45}$ $= 18,61$	✓837,5 ✓45 ✓ Answer	(3)
2.3	$15 \leq x < 20$	✓ Answer	(1)
2.4	$15 \leq x < 20$	✓ Answer	(1)
2.5	$\frac{6}{45} \times 100\%$ $= 13,33\%$	✓ 6 ✓ Answer	(2)
			[8]

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QUESTION 3



3.1.1

$$m_{AD} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m_{AD} = \frac{4-0}{4-(-6)}$$

$$= \frac{4}{10}$$

$$= \frac{2}{5}$$

✓ substitution

✓ Answer

(2)

3.1.2

$m_{BC} = m_{AD} = \frac{2}{5}$ ….. BC || AD

$y = \frac{2}{5}x + c$

$-1 = \frac{2}{5}(2) + c$

$c = -\frac{9}{5}$

$\therefore y = \frac{2}{5}x - \frac{9}{5}$

OR

✓ m_{BC}

✓ substitution of $(2;-1)$

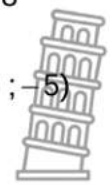
✓ value of c

✓ Answer

(4)

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	$m_{BC} = m_{AD} = \frac{2}{5}$ .....BC || AD $\frac{y-(-1)}{x-2} = \frac{2}{5}$ $\frac{y+1}{x-2} = \frac{2}{5}$ $5(y+1) = 2(x-2)$ $5y+5 = 2x-4$ $5y = 2x-9$ $y = \frac{2}{5}x - \frac{9}{5}$	✓ S ✓ R ✓ equating ✓ Answer	(4)
	OR		
	$m_{BC} = m_{AD} = \frac{2}{5}$ ... BC || AD $y - y_1 = m(x - x_1)$ $y-(-1) = \frac{2}{5}(x-2)$ $y+1 = \frac{2}{5}(x-2)$ $y = \frac{2}{5}x - \frac{9}{5}$	✓ S ✓ R ✓ substitution ✓ Answer	(4)
3.1.3	midpt of BD=$E\left(\frac{2+-6}{2} ; \frac{0+-1}{2}\right)$ $= E\left(-2 ; -\frac{1}{2}\right)$	✓ x-coordinate ✓ y-coordinate	(2)
	OR		
	$x = \frac{-6+2}{2}$, $y = \frac{0+(-1)}{2}$ $x = \frac{-4}{2}$ $y = \frac{-1}{2}$ $x = -2$ $y = -\frac{1}{2}$ $E\left(-2 ; -\frac{1}{2}\right)$	✓ x-coordinate ✓ y-coordinate	(2)
3.1.4	midpt of BD = midpt of AC ... diagonals of a parm	✓ S/R	

	$\frac{x+4}{2}=-2$ $\qquad$ $\frac{y+4}{2}=-\frac{1}{2}$ $x=8$ $\qquad$ $y=-5$ $\therefore$ C$(-8;-5)$ 	✓ $\frac{x+4}{2}=-2$ and $\frac{y+4}{2}=-\frac{1}{2}$ ✓ $x=-8$ ✓ $y=-5$	(4)
	OR		
	Transformation Rule is C		
	C$(x-10;y-4)$ C$(2-10;-1-4)$ C$(-8;-5)$	✓✓Rule ✓ $x=-8$ ✓ $y=-5$	
	OR		
	Equation of line BC: $y=\frac{2}{5}x-\frac{9}{5}$ (from 3.1.2) Equation of line DC $m_{DC}=m_{AB}$ ... DC $\|\|$ AD $m_{DC}=\frac{4-(-1)}{4-2}$ $m_{DC}=\frac{5}{2}$ $y=\frac{5}{2}x+c$ $0=\frac{5}{2}(-6)+c$ $c=15$ $\therefore y=\frac{5}{2}x+15$	✓ equation of line DC	
	$\frac{2}{5}x-\frac{9}{5}=\frac{5}{2}x+15$ $-\frac{21}{10}x=\frac{84}{5}$ $x=-8$ when $x=-8$ $y=\frac{5}{2}(-8)+15$ $y=-5$ $\therefore$ C$(-8;-5)$	✓ equating ✓ $x=-8$ ✓ $y=-5$	(4)

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3.2	$m_{PQ}.m_{RS} = -1$ .... $PQ \perp RS$ $\left(\frac{4-3}{1-(-2)}\right).\left(\frac{4-1}{x-(-4)}\right) = -1$ $\frac{1}{x+4} = -1$ $1 = -x-4$ $x = -5$	✓ $m_{PQ}.m_{RS} = -1$ ✓ substitution ✓ Answer	(3)
			[15]

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QUESTION 4

4.1.1(i)

$\sqrt{3}\text{cosec}\,\theta + 2 = 0$

$\text{cosec}\,\theta = -\frac{2}{\sqrt{3}}$

$\sin\theta = -\frac{\sqrt{3}}{2}$

OR

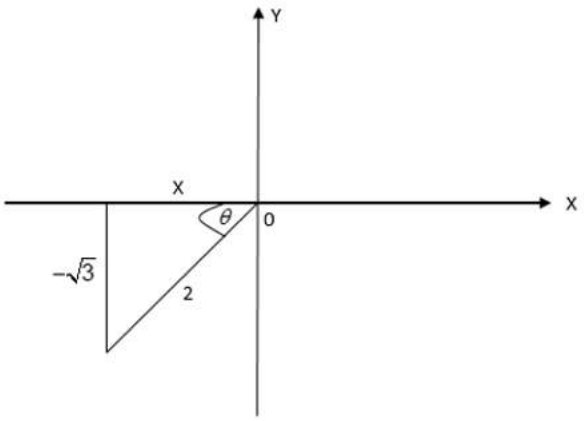
$\text{cosec}\,\theta = -\frac{2}{\sqrt{3}}$

$\frac{1}{\sin\theta} = -\frac{2}{\sqrt{3}}$

$-2\sin\theta = \sqrt{3}$

$\sin\theta = -\frac{\sqrt{3}}{2}$

✓ $\sin\theta = -\frac{\sqrt{3}}{2}$ or $\text{cosec}\,\theta = -\frac{2}{\sqrt{3}}$



✓ diagram

$x^2 + \left(-\sqrt{3}\right)^2 = 2^2$ [Theorem of pythagoras]

$x = -1$

$\therefore \cos\theta = -\frac{1}{2}$

✓ $x = -1$

✓ $\cos\theta = -\frac{1}{2}$

(4)

4.1.1(ii)

$$\frac{\sin\theta\tan\theta}{\cos\theta} = \frac{\left(-\frac{\sqrt{3}}{2}\right)\left(\frac{-\sqrt{3}}{-1}\right)}{\left(-\frac{1}{2}\right)}$$

$= 3$

✓ $-\frac{\sqrt{3}}{2}$ ✓ $\frac{-\sqrt{3}}{-1}$

✓ $-\frac{1}{2}$

✓Answer

(4)

OR

$$\frac{\sin\theta\left(\frac{\sin\theta}{\cos\theta}\right)}{\cos\theta} = \frac{\sin^2\theta}{\cos\theta} \times \frac{1}{\cos\theta}$$

$$= \frac{\left(-\frac{\sqrt{3}}{2}\right)}{\left(-\frac{1}{2}\right)} \times \frac{1}{\left(-\frac{1}{2}\right)}$$

$= 3$

✓ $\frac{\sin\theta}{\cos\theta}$

✓ $-\frac{\sqrt{3}}{2}$

✓ $-\frac{1}{2}$

✓ Answer

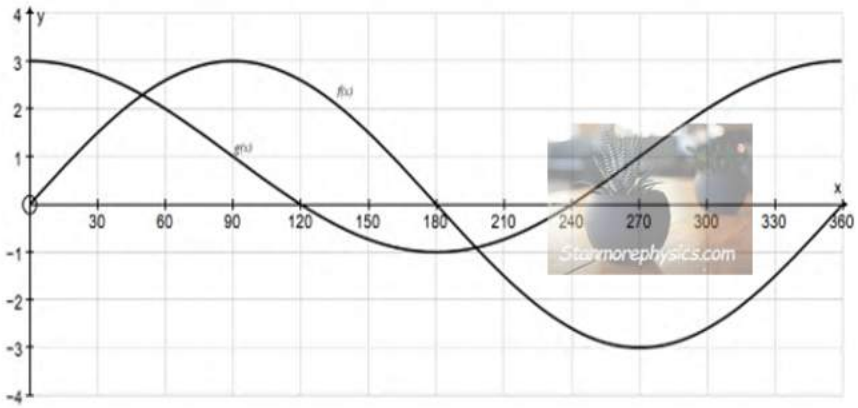
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	OR $\frac{\sin^2\theta}{\cos^2\theta} = \left(\frac{\sqrt{3}}{2}\right)^2 \div \left(-\frac{1}{2}\right)^2$ $= 3$	✓ $\frac{\sin^2\theta}{\cos^2\theta}$ ✓ $-\frac{\sqrt{3}}{2}$ ✓ $-\frac{1}{2}$ ✓ Answer	(4) (4)
4.1.2	$\cos(2\alpha-\theta)$ $= \cos\left[2(38°)-25°\right]$ $= \cos 51°$ $= 0,6$	✓ substitution ✓ $\cos 51°$ ✓ Answer	(3)
4.2	$\text{cosec}^2 60° + \tan^2 45° + \sec 60°$ $= \frac{1}{\sin^2 60°} + \tan^2 45° + \frac{1}{\cos 60°}$ $= \frac{1}{\left(\frac{\sqrt{3}}{2}\right)^2} + (1)^2 + \frac{1}{\left(\frac{1}{2}\right)}$ $= \frac{4}{3} + 1 + 2$ $= \frac{13}{3}$	✓ $\frac{1}{\sin^2 60°}$ ✓ $\frac{1}{\cos 60°}$ ✓ $\frac{\sqrt{3}}{2}$ ✓ 1 ✓ $\frac{1}{2}$ ✓ Answer	(6)
	OR $\text{cosec}^2 60° + \tan^2 45° + \sec 60°$ $= \frac{1}{\sin^2 60°} + \tan^2 45° + \frac{1}{\cos 60°}$ $= \left(\frac{2}{\sqrt{3}}\right)^2 + (1)^2 + 2$ $= \frac{13}{3}$	✓ $\frac{1}{\sin^2 60°}$ ✓ $\frac{1}{\cos 60°}$ ✓ $\frac{2}{\sqrt{3}}$ ✓ 1 ✓ 2 ✓ Answer	(6)

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4.3	$2\tan(\theta-45°)=1$ $\tan(\theta-45°)=\frac{1}{2}$ $\theta-45°=26,57°$ $\theta=71,57°$	✓ $\tan(\theta-45°)=\frac{1}{2}$ ✓ $\theta-45°=26,57°$ ✓ Answer	(3)
			[20]

QUESTION 5

5.1		f(x) ✓x-intercepts ✓turning points ✓shape g(x) ✓x-intercepts ✓turning points ✓shape	(6)
5.2.1	Amplitude $=\frac{3-(-1)}{2}$ $=2$	✓ Answer	(1)
5.2.2	Period $=360°$	✓ Answer	(1)
5.3.1	$g(x)-f(x)=4$ $1-(-3)=4$ $x=270°$	✓✓ answer	(2)
5.3.2	$0° \le x \le 120°$ or $180° \le x \le 240°$ **OR** $x \in [0° ; 120°] \cup [180° ; 240°]$	✓ end points ✓end points ✓ notation	(3)
			[13]

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QUESTION 6

6.1	$\cos 2\theta = \frac{x}{2x}$ $\cos 2\theta = \frac{1}{2}$ $2\theta = 60°$ $\therefore \quad \theta = 30°$	✓ $\cos 2\theta = \frac{x}{2x}$ ✓ $\cos 2\theta = \frac{1}{2}$ ✓ $2\theta = 60°$ ✓ Answer	(4)
6.2	$\frac{x}{5} = \cos 30°$ $x = 5\cos 30°$ ladder $= 2x$ $= 2(5\cos 30°)$ $= 5\sqrt{3}$m	✓ trig ratio ✓ $x = 5\cos 30°$ ✓ substitution in 2x ✓ Answer	(4)
			[8]

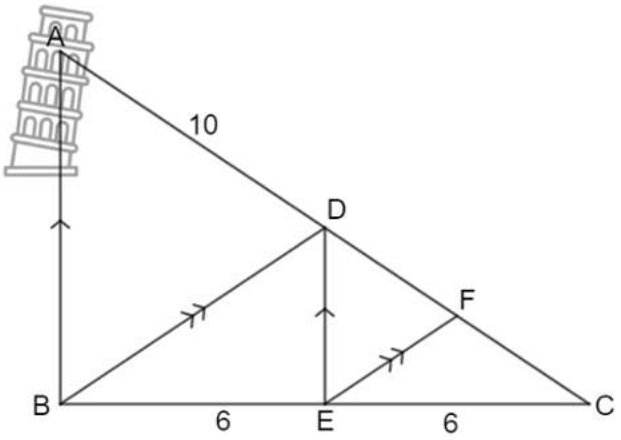
QUESTION 7

7.1	r = 25mm = 2,5cm $V = \pi r^2 h$ $250 = \pi(2,5)^2 h$ $h = \frac{250}{19,63}$ $h = 12,736$ cm	✓ r in cm ✓substitution in correct formula ✓ Answer	(3)
7.2	$h_{water} = 0,65 \times 12,736 = 8,034$ $TSA = \pi r^2 + (2\pi r \times h)$ $= \pi(2,5)^2 + [2\pi(2,5) \times 8,034]$ $= 70,11 cm^2$	✓ $h_{water} = 0,65 \times 12,736 = 8,034$ ✓ TSA formula ✓ substitution ✓ Answer	(4)
			[7]

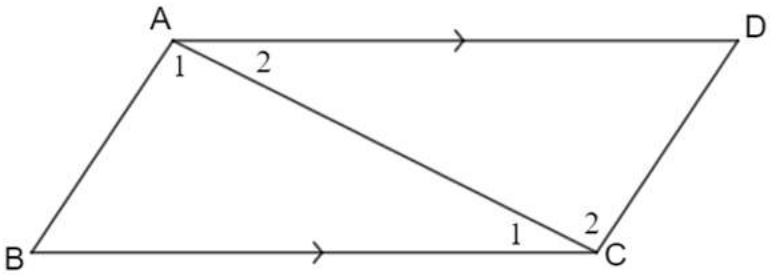
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QUESTION 8



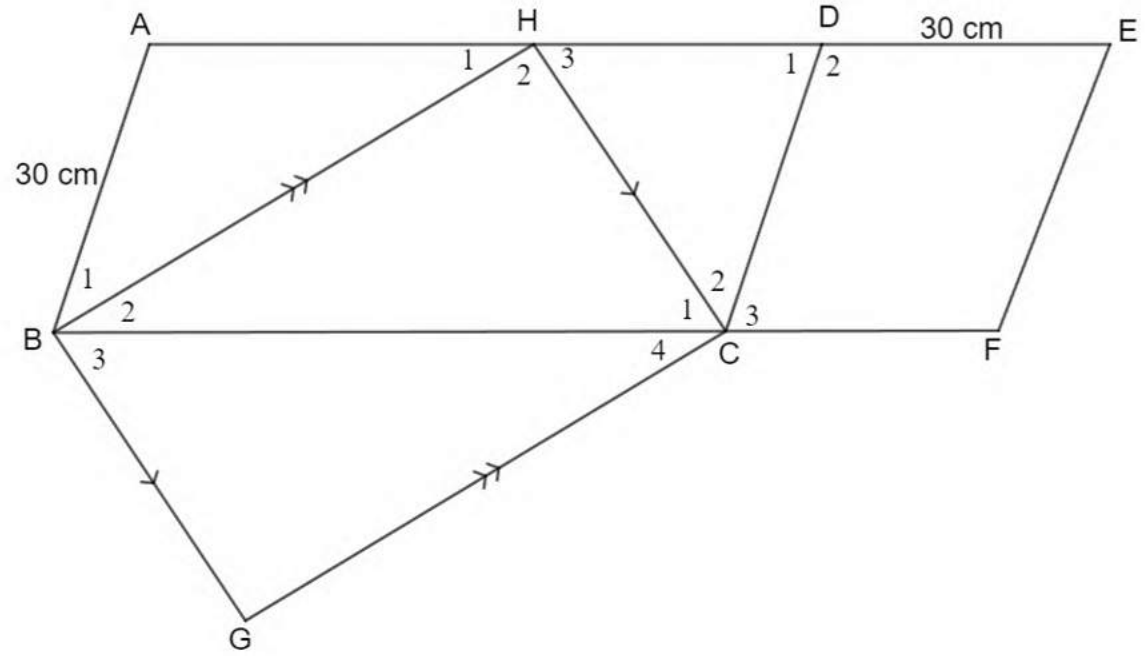
8.1.1	In ΔABC $DC = 10cm$	line through midpt $\parallel$ 2nd side	✓ S/R	(2)
	Similarly, in ΔBDC $FC = 5cm$	line through midpt $\parallel$ 2nd side	✓ R	
8.1.2	$AB = \frac{16}{5} \times 5$ $= 16cm$		✓ value of AB	(3)
	$AC = 20cm$ $\sqrt{16^2 + 12^2} = 20$		✓ $\sqrt{16^2 + 12^2} = 20$	
	$\therefore A\hat{B}C = 90°$	conv Pyth theorem	✓	



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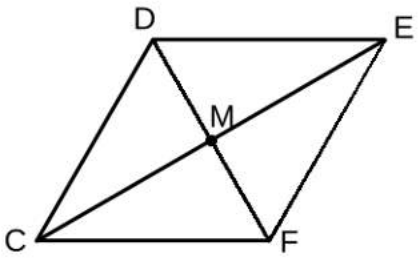
8.2	Consider ΔACD and ΔCAB $\hat{D}=\hat{B}$ (given) $\hat{A}_2=\hat{C}$ (alt $\angle$s, AD $\|\|$ BC) AC is common $\therefore \Delta ACD \equiv \Delta CAB$ (AAS) AD=BC ($\equiv \Delta$s) ABCD is a parallelogram (opp sides = and $\|\|$)	✓ S/R ✓ S ✓ R ✓ S/R ✓ R	(5)
			[10]

QUESTION 9



9.1	$A\hat{B}C = 60°$ (given) $B\hat{C}D = 120°$ (co-int $\angle$s, AB $\|\|$ DC) But HC bisects $B\hat{C}D$ $\hat{C}_1 = \hat{C}_2 = 60°$ $\therefore \hat{C}_1 = 60°$ (proved) **OR**	✓ S ✓R ✓ $\hat{C}_1 = \hat{C}_2 = 60°$	(3)

	$A\hat{B}C = 60°$ (given) $\hat{D}_1 = 60°$ (app $\angle$s of a parm) $B\hat{C}D = 120°$ (co-int $\angle$s, AD $\|\|$ BC) But HC bisects $B\hat{C}D$ $\therefore \hat{C}_1 = 60°$ (proved)	✓ S /R ✓ S ✓R	(3)
9.2	BH bisects $A\hat{B}C$ (given) $\therefore \hat{B}_1 = \hat{B}_2 = 30°$ $\hat{B}_2 = \hat{C}_4 = 30°$ (alt $\angle$s, BH $\|\|$ GC) $\hat{C}_1 = \hat{B}_3 = 60°$ (alt $\angle$s, BG $\|\|$ HC) $\Rightarrow G\hat{B}H = 60° + 30° = 90°$ $G\hat{C}H = 60° + 30° = 90°$ $\therefore$ BGCH is a rectangle (BGCH is a Parm with $\angle s = 90°$)	✓ $G\hat{B}H/G\hat{C}H = 90°$ ✓ R	(2)
9.3	$\hat{F} = 120°$ (given) $\hat{C}_1 + \hat{C}_2 = 120°$ (calculated in 9.1) $\therefore \hat{F} = \hat{C}_1 + \hat{C}_2$ DC $\|\|$ EF (corr $\angle$s =) **OR** $\hat{C}_3 = 180° - \hat{C}_1 - \hat{C}_2$ (adj $\angle$s on a str.line) $\hat{C}_3 = 180° - 60° - 60°$ $\hat{C}_3 = 60°$ $\hat{C}_3 + \hat{F} = 60° + 120°$ $= 180°$ $\therefore$ DC $\|\|$ EF (co-int Đs supplementary)	✓ $\hat{F} = \hat{C}_1 + \hat{C}_2$ ✓ R ✓ $\hat{C}_3 + \hat{F} = 60° + 120°$ ✓ R	(2)
9.4	AD $\|\|$ BC (ABCD is a parm) ADE and BCF are straight lines (given) $\therefore$ DE $\|\|$ CF DC $\|\|$ EF (proven in 9.3) $\therefore$ DCFE is a parm (both pairs of opp sides $\|\|$) DC=30 cm (opp sides of a parm are=) $\therefore$ DC= DE =30 cm **OR**	✓ S ✓R	(2)

	$DE = AB = 30cm$ (given) $DC = AB = 30cm$ (opp sides of a parm) $\therefore DC = DE$ (both = to AB)	✓ S ✓R	(2)
9.5	$DE = DC = 30cm$ (proven in 9.4) $\therefore$ DCFE is a rhombus (adj sides =)	✓ S ✓ S ✓ R	(3)
	OR		
			
	Construct diagonal CE and consider ΔCDE $\hat{D} = \hat{F} = 120°$ (opp $\angle$s of a parm) $CD = DE = 30cm$ (proven in 9.4) $\therefore D\hat{C}E = D\hat{E}C = 30°$ ($\angle$s opp = sides) $DC \parallel EF$ (proven in 9.3) $\therefore DE = CF = 30cm$ But DC= DE (proven in 9.4) $\therefore DC = CF = 30cm$ (both = DE)		
	Construct diagonal DF and consider ΔCDF $\hat{C}_3 = 60°$ (calculated in 9.3) $C\hat{D}F = C\hat{F}D = 60°$ ($\angle$s opp = sides)		
	consider ΔCDM $D\hat{C}E + C\hat{D}F + C\hat{M}D = 180°$ (sum of $\angle$s in Δ) $30° + 60° + C\hat{M}D = 180°$ $C\hat{M}D = 90°$	✓ $C\hat{M}D = 90°$	
	$\therefore$ DCFE is a rhombus (diagonals bisect at 90°)	✓S ✓R	(3)
			[12]

TOTAL MARKS = 100

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