

NANDI NORTH FORM FOUR DISTRICT MOCK 2006.

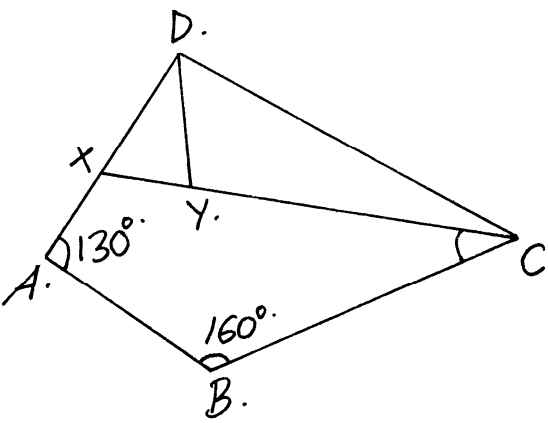
121 / 1

MATHS

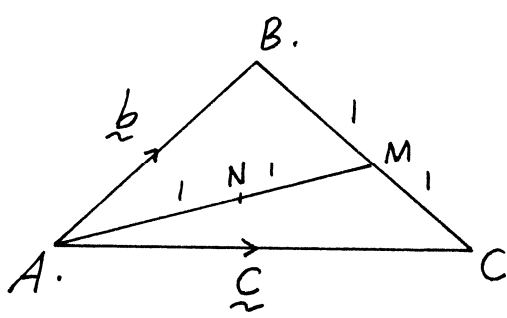
PAPER 1

MARKING SCHEME.

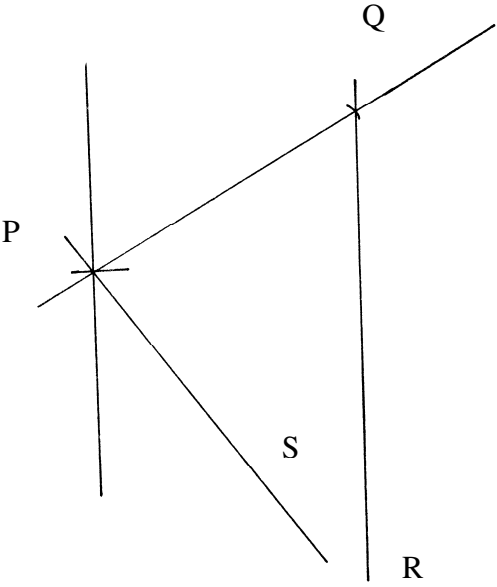
	SOLUTION	MR K	REMARK
	SECTION I (50 MRKS)		
1.	$\sqrt[3]{\frac{(0.064 \times 0.125 \times 100\,000)}{0.008 \times 0.001 \times 1000,000}}$ $= \sqrt[3]{\left(\begin{array}{l} 8 \\ \cancel{64} \times 125 \\ \cancel{8} \times 1 \\ 1 \end{array} \right)}$ $= 2 \times 5$ $= 10$	M1 M1 A1	✓ removal of decimals ✓ elimination of $\sqrt[3]{}$
		3	
2.	$5(3b + 7e = 128)$ <p style="text-align: center;">-</p> $3(5b + 5e = 120)$ $20e = 280$ $\longrightarrow e = \text{sh. } 14$ $3b + 7 \times 14 = 128$ $3b = 30 \longrightarrow B = \text{Sh. } 10$ <p>∴ an ex. bk = sh 14, A biro pen = sh 10</p>	B1 M1 A1	✓ formulation of both eqns. ✓ elimination of one unknown (This could be by substitution) both
		3	
3.	$\frac{2(x-2)}{3(4-x^2)} - \frac{1}{3(x+2)}$ $= \frac{2(x-2)}{3(2-x)(2+x)} - \frac{1}{3(x+2)}$ $= \frac{-2(\cancel{x-2})}{3(\cancel{x-2})(2+x)} - \frac{1}{3(x+2)}$ $= \frac{3}{3} \left\{ \frac{-3}{(2+x)} \right\} = \frac{-1}{x+2}$	M1 M1 A1	✓ factorization of $12 - 3x^2$ ✓ identification of like terms and cancellation.

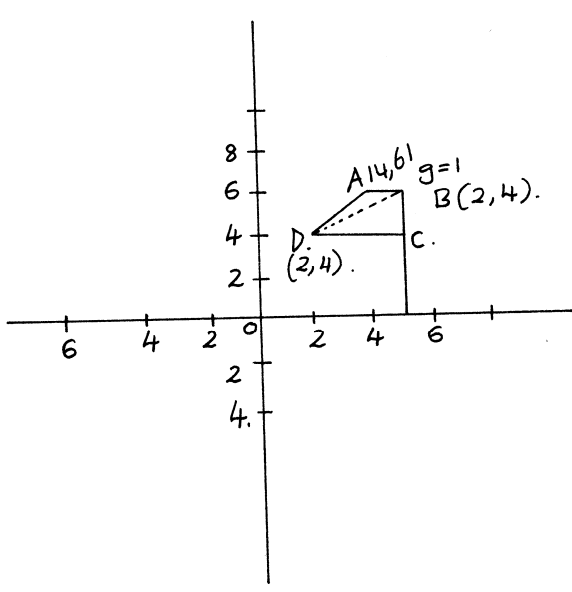
		3	
4.	<p>90,000, 1000, 30</p> $\begin{array}{r} \cancel{3000} \\ \cancel{90,000} \times 1000 \\ \hline 30 \\ 1 \\ \hline = 3,000,000 \end{array}$	B2 M1 A1	✓ All values if at least 2✓
5	 <p>BCY = YCD = 20 Given</p> <p>$\hat{A}XC = 360 - (130 + 160 + 20) \dots\dots <s \text{ in a quadric.}$</p> <p>$= 50^\circ$</p> <p>$\hat{YXD} = 180 - 50 = 130 \dots\dots <s \text{ in a line}$</p> <p>$\hat{XDY} = 180 - (130 + 20) = 30^\circ$</p> <p>$\therefore XDY = 30 \div 2 = 15^\circ$</p> <p>Thus $\hat{XYD} = 180 - (130 + 15)$ $= 35^\circ$</p>	B1 B1 B1	
6	$\frac{\frac{1}{2} \times \frac{2}{5} + \frac{1}{3} \times \frac{2}{7}}{\frac{8}{9} + \frac{8}{3} - \frac{9}{5}}$ $\frac{\frac{1}{5} + \frac{2}{21}}{\frac{40}{45} + \frac{120}{45} - \frac{81}{45}}$ $\frac{31/105}{79/45}$ $\frac{31}{105} \times \frac{45}{79}$	B1 B1 B1	✓ ev. Of numerator ✓ ev. Of denominator

	21 7 = 93 / 553		c.q.o									
		3										
7	$P^1Q^1 = \sqrt{(7-4)^2 + (3-6)^2} = \sqrt{18}$ $PQ = \sqrt{(1-0)^2 + (1-2)^2} = \sqrt{2}$ <p>Scale factor $= \frac{\sqrt{18}}{\sqrt{2}} = 3$</p> <p>Let centre be at (x, y)</p> $3 \begin{pmatrix} 0-x \\ 2-y \end{pmatrix} = \begin{pmatrix} 4-x \\ 6-y \end{pmatrix}$ $-3x = 4-x \rightarrow x = -2$ $3(2-y) = 6-y$ $6-3y = 6-y \rightarrow y = 0$ <p>\therefore centre is (-2, 0)</p>	B1 B1 M1 A1										
		4										
8	$6696 = 2^3 \times 3^3 \times 31$ $1080 = 2^3 \times 3^3 \times 5$ <p>GCD = $2^3 \times 3^3 = 216$ Length = 216</p>	B1 B1 B1	✓ Factors of both									
		3										
9	$\sqrt{317.9 - 2 \times 31.93}$ $= \sqrt{254.04}$ $= 15.94$	B1 M1 A1	✓ reading of reciprocals									
		3										
10	<table border="0"> <tr> <td>Men</td> <td>Hrs/ day</td> <td>#of days</td> </tr> <tr> <td>9</td> <td>8</td> <td>$\frac{15}{5}$</td> </tr> <tr> <td>27</td> <td>x</td> <td>5</td> </tr> </table> $X = \frac{1}{9} \times \frac{3}{15} \times 8$ $= 8 \text{ hours a day}$	Men	Hrs/ day	#of days	9	8	$\frac{15}{5}$	27	x	5	M1 A1	
Men	Hrs/ day	#of days										
9	8	$\frac{15}{5}$										
27	x	5										

						2																																									
11.	$W_x = uv = 100 \sin 30 = 50m$ $V_w = 100 \cos 30 = 86.6m$					B1																																									
	$V_x = 50 + 86.6 = 136.6$					M1																																									
	$Area = \frac{1}{2} \times 136.6 \times 50$ $= 3415m^2$					A1																																									
						3																																									
12.	$(5^2)^{4x} \div 5^{2x} = 5^5$ $8x - 2x = 5$ $6x = 5$ $\longrightarrow X = 5/6$					M1																																									
						A1																																									
						2																																									
13.	<table border="1"> <thead> <tr> <th>C.I</th> <th>F</th> <th>X</th> <th>xf</th> </tr> </thead> <tbody> <tr> <td>4.5 - 9.5</td> <td>6</td> <td>7</td> <td>42</td> </tr> <tr> <td>9.5 - 14.5</td> <td>20</td> <td>12</td> <td>240</td> </tr> <tr> <td>14.5 - 19.5</td> <td>12</td> <td>17</td> <td>204</td> </tr> <tr> <td>19.5 - 24.5</td> <td>10</td> <td>22</td> <td>220</td> </tr> <tr> <td>24.5 - 29.5</td> <td>5</td> <td>27</td> <td>135</td> </tr> <tr> <td>29.5 - 34.5</td> <td>6</td> <td>32</td> <td>192</td> </tr> <tr> <td>34.5 - 39.5</td> <td>2</td> <td>37</td> <td>74</td> </tr> <tr> <td>39.5 - 44.5</td> <td>1</td> <td>42</td> <td>42</td> </tr> <tr> <td></td> <td>62</td> <td></td> <td>1149</td> </tr> </tbody> </table>	C.I	F	X	xf	4.5 - 9.5	6	7	42	9.5 - 14.5	20	12	240	14.5 - 19.5	12	17	204	19.5 - 24.5	10	22	220	24.5 - 29.5	5	27	135	29.5 - 34.5	6	32	192	34.5 - 39.5	2	37	74	39.5 - 44.5	1	42	42		62		1149						
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	$Mean = \frac{1149}{62}$ $= 18.53$					M1																																									
						A1																																									
						4																																									
14.						B1																																									
	$AM = b + \frac{1}{2}(c - b)$ $= \frac{1}{2}b + \frac{1}{2}c$																																														

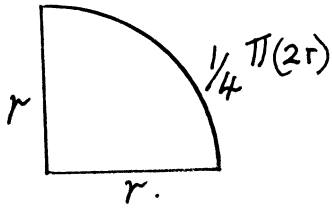
	$AN = \frac{1}{2} \left(\frac{1}{2}b + \frac{1}{2}c \right)$ $= \frac{1}{4} (b + c)$ $BN = -b + \frac{1}{4}b + \frac{1}{4}c$ $= \frac{1}{4}c - \frac{3}{4}b$	B1 B1	
		3	
15	<p>a) $2\pi r = 132$</p> $R = \frac{132 \times 7}{2 \times 22} = 21$ <p>\therefore radius = 21cm</p> <p>b) $h = \sqrt{18^2 - 10.5^2} = 14.62$</p> $\text{vol.} = \frac{1}{3} \times \frac{22}{7} \times 10.5^2 \times 14.62$ $= 1688.61 \text{ cm}^3$ $= 1.6886 \text{ litres}$	M1 A1 M1 A1	
		4	
16.		B1	✓ All lengths

	 <p>RS = 5m ± 0.5m</p>	<p>B1</p> <p>B1</p>	<p>✓ All bearings</p>
		<p>3</p>	
	<p>SECTION II (50 MARKS)</p>		
<p>17</p>	<p>a) $5 \times 1250 + 20 \times 650$ $= \text{Ksh } 19,250$</p> <p>b) Selling price = $5 \times 1400 + 20 \times 700$ $= \text{sh. } 21,000$ Profit = $21,000 - 19250$ $= 1750$ % profit = $\frac{1750}{19250} \times 100$ $= 9.091 \%$</p> <p>c) (i) value of returned goods $= \frac{90}{100} (1 \times 1250 + 10 \times 650)$ $= \text{ksh } 6,975$ (ii) Purchases = $1500 \times 5 + 800 \times 20$ $= \text{Ksh. } 23,500$ To add : $23,500 - 6,975$ $= \text{Ksh } 16,525$</p>	<p>M1</p> <p>A1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	
		<p>10</p>	
<p>18</p>	<p>a) volume = vol. of cylinder + vol. frustrum of cone height of cut of section of cone</p> $\frac{h+5}{h} = \frac{7}{3.5}$		

	<p>→ $h = 5$ $\text{Vol} = \frac{1}{3} \times \frac{22}{7} \times 7 \times 7 \times 10 - \frac{1}{3} \times \frac{22}{7} \times 3.5 \times 3.5 \times 5$ $+ \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 10$</p> $= 513.3 - 64.17 + 385$ $= 834.17 \text{cm}^3$ <p>b) L: S: F = 15:6000 = 1:400</p> <p>V: S: F = 1:64,000,000</p> $\text{Vol} = \frac{64,000,000 \times 834.17 \text{m}^3}{1000,000}$ $= 53390 \text{m}^3$ <p>c) 0.832g/cm^3</p> $= \frac{0.832}{1000} \times 1000 \text{000 kg/m}^3$ $= 832 \text{kg/m}^3$ <p>Mass = $\frac{53390 \times 832}{1000}$</p> $= 44,420 \text{tonnes}$	<p>B1 M1 M1 M1</p> <p>A1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>Each expression of vol ✓</p>
		10	
19.	On graph paper		
20.	<p>Diagram</p>  <p>a) $3y = x + 10$ $x = 5$ $\therefore 3y = 5 + 10 = 15$</p>	<p>M1 A1 B1</p>	

	$Y = 5$ $\therefore B(5,5)$ b) gradient of DC = -1 $\frac{y-4}{x-2} = -1$ $y-4 = -x+2$ $y+x = 6$ $x = 5$ $\therefore y+5 = 6$ $\rightarrow Y = 1$ $\therefore C(5,1)$ c) $AD = \sqrt{2^2 + 2^2} = 2\sqrt{2} = 2.828$ $AC = \sqrt{1^2 + (-5)^2} = 2\sqrt{6} = 5.099$ $DC = \sqrt{3^2 + (-3)^2} = 3\sqrt{2} = 4.243$ Area $S = \frac{1}{2} (2.828 + 5.099 + 4.243)$ $A = \sqrt{6.085 (3.257) (0.986) (1.842)}$ $= 6\text{cm}^2$	B1 B1 M1 A1 B1 M1 M1 A1	
		10	
21.	a) i) $\frac{1}{10} \times \frac{22}{7} \times r^2 = 52.83$ $r^2 = \frac{52.83 \times 10 \times 7}{22}$ $r^2 = 168.1$ $r = 12.97\text{cm}$ ii) \angle at centre = $\frac{1}{10} \times 360$ $= 36^\circ$ i) $\frac{36}{360} \times \frac{22}{7} \times 12.97^2 - \frac{1}{2} \times 12.97^2 \sin 36$ $= 52.83 - 49.44$ $= 3.39\text{cm}^2$	M1 M1 A1 B1 M1 M1 A1	

b)



$$\begin{aligned} \text{Perimeter} &= 2r + \frac{11}{22} \times \frac{1}{4} \times \frac{1}{2} \times 2r \\ &= 2r + \frac{11}{7}r \end{aligned}$$

$$\frac{25}{7}r = 25$$

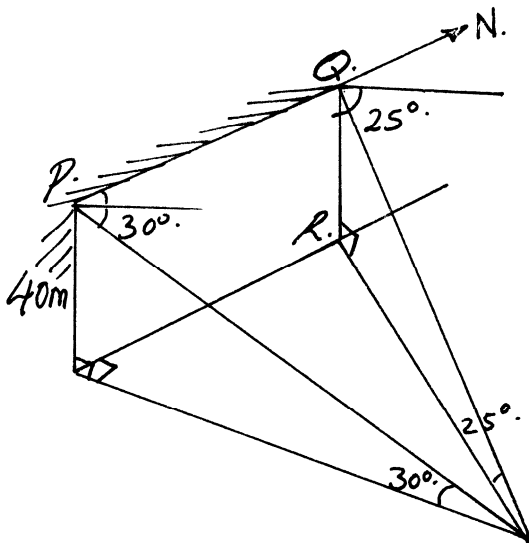
$$R = 7\text{cm}$$

$$\begin{aligned} A &= \frac{1}{4} \times \frac{22}{7} \times 49 \\ &= 38.5 \text{ cm}^2 \end{aligned}$$

B1
M1

A1
10

22. a)



B2

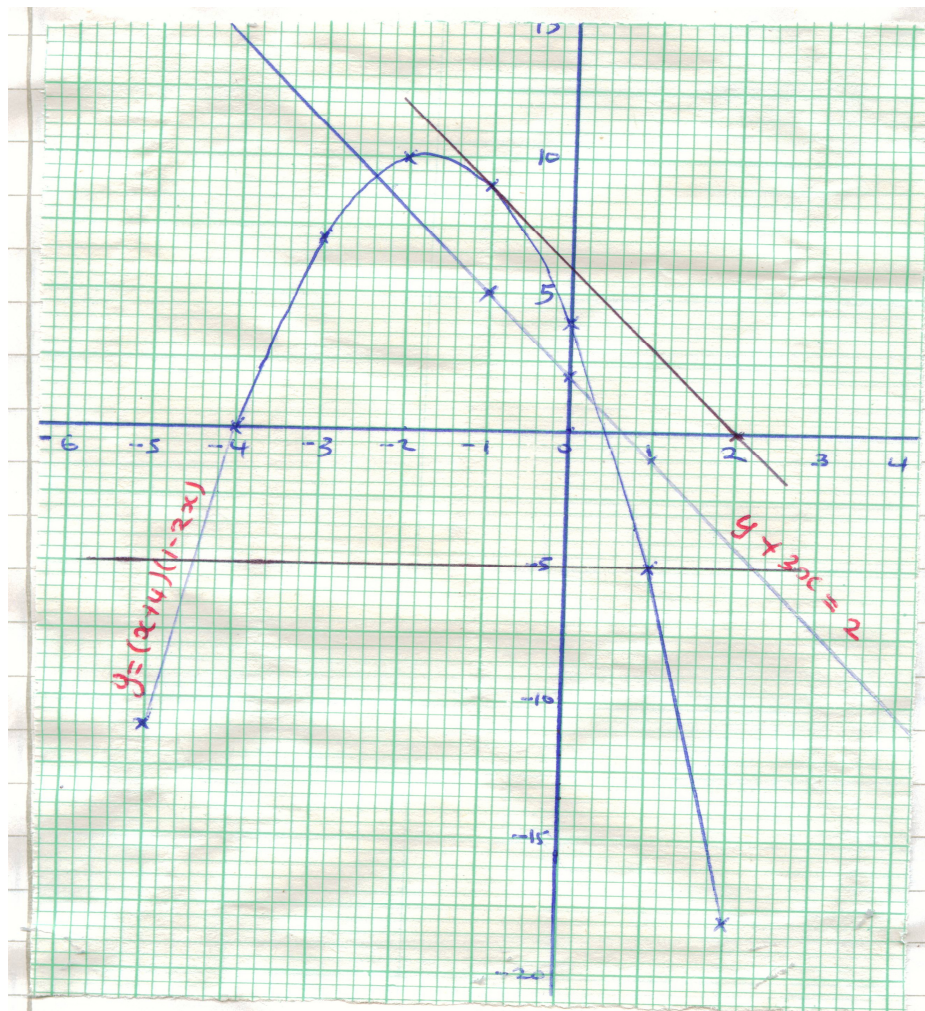
A1

	<p>b) SP:</p> $\tan 30 = \frac{40}{sp}$ <p>$\therefore sp = \frac{40}{\tan 30}$</p> $69.28m$ <p>c) RQB = 66, RQ = 40</p> $\sin 25 = \frac{40}{Rb}$ $QB = \frac{40}{\sin 25}$ $= 94.65m$ <p>d) Δ SRB is right angled at S</p> $SR^2 + SB^2 = BR^2$ $\tan 25 = \frac{40}{Rb}$ $RB = \frac{40}{\tan 25} = 85.78m$ $SR = \sqrt{85.78^2 - 69.28^2}$ $= \sqrt{2559}$ $= 50.59m \text{ in } 1 \text{ minute}$ <p>\therefore speed = $\frac{50.59}{60}$</p> $= 0.84m/s$	<p>M 1</p> <p>A1</p> <p>B1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>M1</p> <p>A1</p>	
		10	
23.	<p>a) \wedge</p> <p>QRP = 25° ...angle subtended by same arc</p> <p>\anglePRT = $\frac{1}{2} \times 120$</p> <p>= 60° ...\angle s at centre and circuit</p> <p>\wedge</p> <p>\therefore QRT = 25 + 60</p> <p>= 85°</p> <p>b) \angle QPT = 180 – 85</p> <p>= 95° opp. \angle s of a cyclic quad.</p> <p>c) \angle RQS = 25°alt to \anglePSQ</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1B1</p> <p>B1</p>	<p>< and reason</p>

	<p>$\angle PQS = 90^\circ$... subtended by diameter</p> <p>$\therefore \angle PQR = 90 + 25$ $= 115^\circ$</p> <p>d) $\angle PQR = 115^\circ$ $\angle PTR = 180 - 115$ $= 65^\circ$ Opp \angles of a cyclic quadrilateral</p>	B1 B1 B1	✓ reason
		10	
24.	<p>a)</p> <p>$V = u + at$ $0 = 80 - 8t \rightarrow t = 10 \text{ sec.}$</p> <p>b) acceleration = $\frac{80 - 20}{5}$ $= 12 \text{ m/s}^2$</p> <p>c) distance = area of Δ CD f $= \frac{1}{2} \times 8 \times 80$ $= 320 \text{ m}$</p> <p>d) Total distance traveled $= \frac{1}{2} (20 + 80) \times 5 + 3 \times 80 + 320$ $= 250 + 240 + 320$ $= 810 \text{ m}$</p> <p>Av. Velocity $= \frac{810}{16}$</p> <p>e) $= 50.625 \text{ m/s}$</p>	B1 B1 B1 A1 M1 A1 M1A1 B1 A1	✓ First 2 sections ✓ Third section
		10	

19. $Y = (x+4)(1-2x)$

X	-5	-4	-3	-2	-1	0	1	2
Y	-11	0	7	10	9	4	-5	-18



B1

✓ All entries

SI
P1
C1
L1
L1

✓ $y + 3x = 2$
✓ $y = 6 - 3x$

✓ table

b) $y = -3x + 2$

X	-1	0	1
Y	5	2	1

c) 0i) $y = (x+4)(1-2x)$
 $-5 = (x+4)(1-2x) -$
 $y = -5$
 $x = -5.45$ or 1 ± 0.1

ii) $y = 4 - 7x - 2x^2$
 $0 = -2 - 4x - 2x^2$
 $y = 6 - 3x - 2x^2$
 $y = 6 - 3x$
 $x = -1 \pm 0.1$

B1

B1
B1

B1
10

X	-1	0	1
Y	5	2	1

