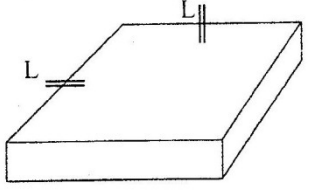
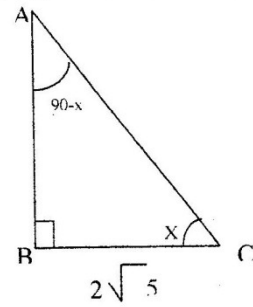
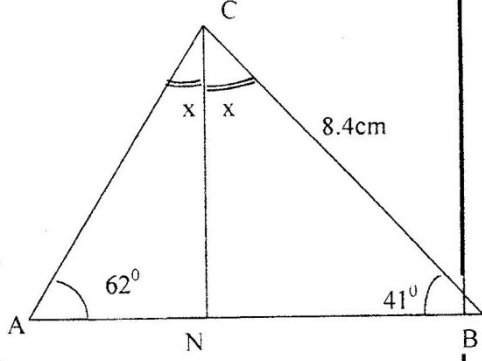
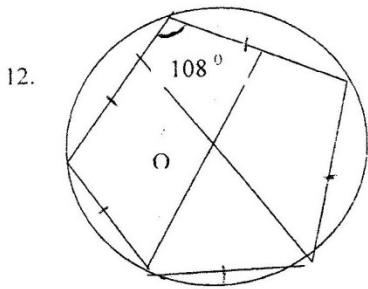


MATHEMATICS

PAPER 1 OCT/NOV. 2007 2½Hours

<p>1. $\frac{0.0084 \times 1.23 \times 3.5}{2.87 \times 0.056} = \frac{84 \times 123 \times 35 \times 10^{-7}}{28 \times 56 \times 10^{-7}}$ $= 0.225$</p>	<p>M₁ A₁</p>
<p>2. $3x^0 + (x-20)^0 = 180^0$ $4x^0 - 20 = 180^0$ $4x^0 = 160^0$ $X = 40^0$</p>	<p>Let n = no of sides $360^0 = 40^0$ n $40^0 n = 360^0$ $n = 9$</p> <p>M_½ M₁ A₁</p>
<p>3. $(x^2 - y^2)(x^2 + y^2)(x^4 - y^4) = (x+y)(x-y)(x^2+y^2)(x^2-y^2)$ $x^4 + x^2y^2 - y^4 - x^2y^2 \Rightarrow (x^4 - y^4)(x^4 - y^4)$ $x^8 - x^4y^4 - x^4y^4 + y^8$ $x^8 - 2x^4y^4 + y^8$</p>	<p>M₁ A₁</p>
<p>4. 118 yens = Kshs.76 $\therefore 2,950,000 \text{ yens} = \frac{2,950,000 \times 76}{118} = \text{Kshs.}1,900,000$ The duty paid = $\frac{20}{100} \times 1,900,000 = \text{Kshs.}380,000$</p>	<p>M₁ M₁ A₁</p>
<p>5. $\frac{dy}{dx} = 3ax^2 + b = -5$ When x = 1 and y = 1 $3a + b = -5$ (i) $Y = ax^3 + bx \Rightarrow a + b = 1$ (ii) Solving (i) - (ii) : a = -3 and b = 4</p>	<p>M₁ M₂ A₁</p>
<p>6. $\frac{15a^2b - 10ab^2}{3a^2 - 5ab + 2b^2} = \frac{5ab(3a-2b)}{3a^2 - 3ab - 2ab + 2b^2} = \frac{5ab(3a-2b)}{(a-b)(3a-2b)} = \frac{5ab}{a-b}$</p>	<p>M₁ M₁ A₁</p>
<p>7. Volume = $\frac{\text{Mass}}{\text{Density}}$ $= \frac{1050 \text{ cm}^3}{8.4} = 125 \text{ cm}^3$ $\therefore L \times L \times 0.2 \text{ cm} = 125 \text{ cm}^3$ $L^2 = \frac{125 \text{ cm}}{0.2} = 625$ $L = \sqrt{625} = 25 \text{ cm}$</p> <div style="text-align: center;">  </div>	<p>M₁ M₁ A₁</p>

<p>8. $\cos x = \frac{\text{Adjacent}}{\text{Hypo}}$</p> $= \frac{2\sqrt{5}}{5}$ <p>Pythagoras':</p> $AB = \sqrt{5^2 - (2\sqrt{5})^2} = \sqrt{5}$ <p>$\tan(90^\circ - x) = \frac{\text{Opp}}{\text{Adj}}$</p> $\frac{2\sqrt{5}}{\sqrt{5}} = 2$	 <p>M₁</p> <p>A₁</p>
<p>9. $x - \text{Area} = \pi DL$</p> $= 3.142 \times 10 \times 12$ $= 377.04 \text{ cm}^2$ <p>$X - \text{Area in Contract} = 377.04 \times \frac{2.5}{10}$</p> $= 94.26 \text{ cm}^2$	<p>B₁</p> <p>M₁</p> <p>A₁</p>
<p>10. $\angle ACB = 180^\circ - (62^\circ + 41^\circ)$</p> $= 77^\circ$ $\therefore x = \frac{77^\circ}{2} = 38.5^\circ$ <p>$\angle CNB = 180^\circ - (41^\circ + 38.5^\circ)$</p> $= 100.5^\circ$ $\frac{8.4}{\sin 100.5} = \frac{CN}{\sin 41^\circ}$ $\therefore CN = \frac{8.4 \sin 41^\circ}{\sin 100.5} = 5.6 \text{ cm}$	 <p>M₁</p> <p>A₁</p> <p>M₁</p> <p>A₁</p>
<p>11. Let Mother's years be x and son's be y now:</p> <p>$x + 14 = 2(y + 14)$ (i)</p> <p>$x + 14 = 2y + 28$</p> <p>$x - 2y = 14$ (ii)</p> <p>$(x - 4) + (y - 4) = 30$</p> <p>$X + y = 38$ (iii)</p> <p>(iii) - (ii)</p> $\begin{array}{r} x + y = 38 \\ + -x + 2y = -14 \\ \hline 3y = 24 \\ y = 8 \\ x = 30 \end{array}$ <p>At son's birth: mother's age = $30 - 8 = 22$ years</p>	<p>M₁</p> <p>M₁</p> <p>M₁</p> <p>A₁</p>



12. (i). Construct $\angle 108^\circ$, sides 4cm
 (ii). Bisect two angles to produce centre O.
 (iii). Draw a circle touching the vertices

Drawing M_1

Accuracy

M_1

Explanation

A_1

13. $x + y = 40$
 $y = 40 - x$

$$x^2 + (40-x)^2$$

$$x^2 - 80x + x^2 + 1600$$

$$2x^2 - 80x + 1600$$

$$\frac{dy}{dx} = 4x - 80$$

for min. value $\frac{dy}{dx} = 0$

$$\therefore 4x - 80 = 0$$

$$X = 20$$

Subst. $y = 20$

$$X^2 + y^2 = 400 + 400$$

$$= 800$$

M_1

M_1

M_1

A_1

14. Area of Sector QPR = $\frac{60}{360} \times 6 \times 6 \times 3.142 = 18.852 \text{ cm}^2$

Area of triangle QPR = $\frac{6 \times 6 \sin 60^\circ}{2} = 15.559 \text{ cm}^2$

Area of Segment = $18.852 - 15.559 = 3.2935 \text{ cm}^2$

Area of Shaded region = $2 \times 3.2935 + 15.559 = 22.15 \text{ cm}^2$

M_1

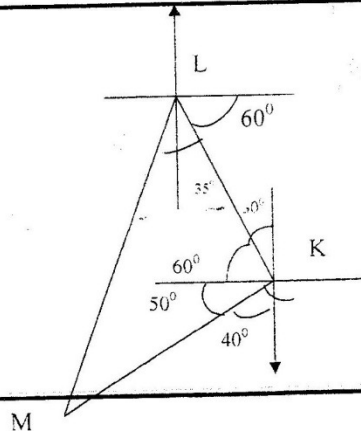
M_1

M_1

A_1

15. ΔLKM IS Isosceles
 $KL = KM$ (Given)
 $\angle LKM = 50^\circ + 60^\circ = 110^\circ$ (Construction)
 $\angle KML = \angle KLM$ (Base \angle s)
 $= 35^\circ$

Bearing of m from L
 $= 90^\circ + 60^\circ + 35^\circ = 185^\circ$



M_1

B_1

A_1

16. $2\text{h } 40\text{min} = 2 \frac{2}{3}$
 $= \frac{8}{3}\text{h}$

$1\text{h} = 120\text{km}$

$\therefore \frac{8}{3}\text{h} = \frac{8}{3} \times 120 = 320\text{km}$

4Km cost = Kshs.59

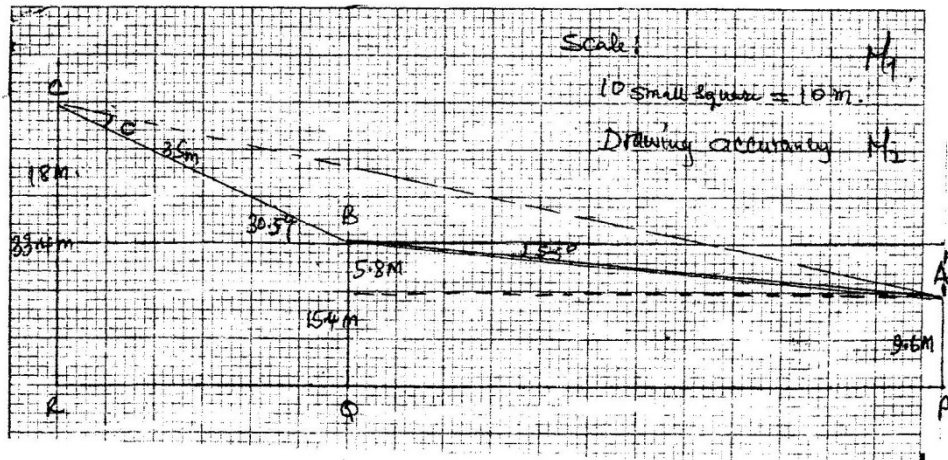
$\therefore 320\text{Km would cost} = \frac{320 \times 59}{4}$
 $= \text{Kshs.4,720}$

B_1

M_1

A_1

17a.	Retained profit = $225,000 \times \frac{25}{100}$	= <u>Kshs.56,250</u>	M ₁
	Remaining after retained	= $225,000 - 56,250$	= <u>Shs.168,750/=</u>
	Taxes and insurance	= $168,750 \times \frac{40}{100}$	M ₁
		= <u>Shs.67,500</u>	
	Remaining	= $168,750 - 67,500$	= <u>Shs.101,250</u>
	Cherop's share of profit	= $\frac{105,000}{250,000} \times 101,250$	A ₁
		= <u>Kshs.42,525</u>	
	Nangila's share of profit	= $\frac{85,000}{250,000} \times 101,250$	
		= <u>Kshs.34,425</u>	
	Asha's Share of Profit	= $\frac{60,000}{250,000} \times 101,250$	M ₁
		= <u>Kshs.24,300</u>	
	Cherop's - Asha's	= $42,525 - 24,300$	A ₁
		= <u>Kshs.18,225</u>	
(b).	Profit 2 nd Year	= $\frac{10}{9} \times 225,000$	B ₁
		= <u>Kshs.250,000</u>	M ₁
	Nangila's share of Profit	= $\frac{110,000}{275,000} \times 250,000$	M ₂
		= <u>Kshs.100,000</u>	A ₁



18. a	$\frac{5.8}{\sin 5.5^\circ} = \frac{x}{\sin 84.5^\circ}$	$x = \frac{5.8 \sin 84.5^\circ}{\sin 5.5^\circ} = 60.2m$	$\frac{105.8}{\sin 149.5^\circ} = \frac{60.2}{\sin C}$	$\sin C = \frac{60.2 \sin 149.5^\circ}{105.8}$	$\sin C = 0.2988$	$\therefore \angle BCA = 16.8^\circ$	M ₁
	(b)(i).	$60mm = 33.4m$					M ₁
		$\therefore 190mm = \frac{190 \times 33.4}{60} = 105.77m$					A ₁
	(iii).	$\angle CBA = 180^\circ - 30.5^\circ$					M ₁
							A ₁

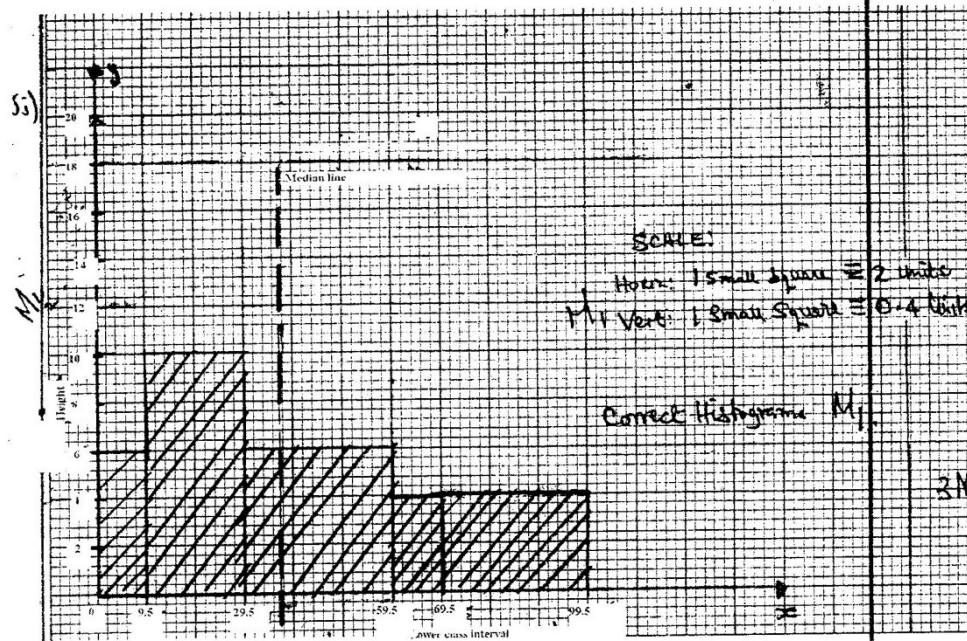
19.(i)

Marks	0-10	10-30	30-60	60-70	70-100
Frequency	12	40	36	8	24
Area of rectangle	60	200	130	40	120
Height of rectangle	6	10	6	4	4

(i) NB: Area (A) = $\frac{C.I}{2} \times F$ when C.I is double the frequency, (F) is halved

4mks

ii) Height (H) = $\frac{\text{Area}}{C.I}$



b) Median mark = 30 - 60
or = 29.5-59.6

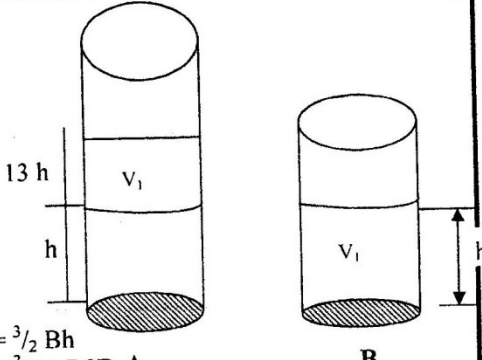
M1

ii) $\frac{(35.5)}{2} + \frac{(39.5)}{2} = 17.5 + 19.75 = 37.5$
 $= 37.5$

M1

A1

3mks

<p>22a. (A.S.F.)^{1/2} = (L → S.F.)</p> $\text{L.S.F.} = \left(\frac{45}{20}\right)^{1/2} = 1.5$ <p>(L.S.F.)³ = (V.S.F.) $\therefore \text{V.S.F.} = (1.5)^3 = 3.375$</p> $\frac{0.945}{3} = 3.375$ $\therefore y = \frac{0.945}{3.375} = 0.28 \text{ Litres}$	<p>M₁</p> <p>M₁</p> <p>M₁</p> <p>A₁</p>										
<p>b. From A.S.F. $A = \frac{3}{2}B$ Both volumes are equal $\therefore \frac{3}{2}B(13-h) = Bh$</p> $2 \times \frac{3}{2}(13-h) = h \times 2$ $39 - 3h = 2h$ $5h = 39$ $h = \frac{39}{5} = 7.8 \text{ cm}$ <p>(c). Volume in larger Cylinder = $\frac{3}{2}Bh$ $= \frac{3}{2} \times 7.8B$ $= 11.7B \text{ cm}^3$</p> <p>(iii). $\frac{1}{5}$ of $11.7B = 2.34B \text{ cm}^3$ Total volume of juice in smaller container = $2.34B + Bh$ $= 2.34B + 7.8B$ $= 10.14B$</p> <p>$10.14B = h_1B$ where $h_1 =$ new height $\therefore h_1 = 10.14 \text{ cm}$</p> 	<p>B₁</p> <p>M₁</p> <p>A₁</p> <p>M₁</p> <p>A₁</p> <p>M₁</p> <p>A₁</p>										
<p>23a. $\begin{pmatrix} 9 & 8 \\ 7 & 6 \end{pmatrix}$ det. = $(9 \times 6) - (8 \times 7)$ $= 54 - 56$ $= -2$</p> $A^{-1} = \begin{pmatrix} 6 & -8 \\ -7 & 9 \end{pmatrix}^{-1/2} = \begin{pmatrix} -3 & 4 \\ 3.5 & -4.5 \end{pmatrix}$	<p>M₁</p> <p>A₁</p>										
<p>b. Let price of bicycle be x and radio be y</p> <table border="0" style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">Bicycle</td> <td style="text-align: center;">Radio</td> <td></td> <td></td> </tr> <tr> <td>$A =$</td> <td>$\begin{pmatrix} 36 & 32 \\ 28 & 24 \end{pmatrix}$</td> <td>$\begin{pmatrix} x \\ y \end{pmatrix}$</td> <td>$=$</td> <td>$\begin{pmatrix} 227,280 \\ 174,960 \end{pmatrix}$</td> </tr> </table> <p>Det = $(36 \times 24) - (32 \times 28) = 864 - 896 = -32$</p>		Bicycle	Radio			$A =$	$\begin{pmatrix} 36 & 32 \\ 28 & 24 \end{pmatrix}$	$\begin{pmatrix} x \\ y \end{pmatrix}$	$=$	$\begin{pmatrix} 227,280 \\ 174,960 \end{pmatrix}$	<p>M₁</p>
	Bicycle	Radio									
$A =$	$\begin{pmatrix} 36 & 32 \\ 28 & 24 \end{pmatrix}$	$\begin{pmatrix} x \\ y \end{pmatrix}$	$=$	$\begin{pmatrix} 227,280 \\ 174,960 \end{pmatrix}$							

$A^{-1} = \frac{-1}{32} \begin{pmatrix} 24 & 32 \\ -28 & 36 \end{pmatrix} = \begin{pmatrix} -0.75 & +1 \\ +0.875 & -1.125 \end{pmatrix}$ $A^{-1}A \begin{pmatrix} x \\ y \end{pmatrix} = A^{-1} \begin{pmatrix} 227,280 \\ 174,960 \end{pmatrix}$ $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -0.75 & 1 \\ 0.875 & -1.125 \end{pmatrix} \begin{pmatrix} 227,280 \\ 174,960 \end{pmatrix}$ $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4,500 \\ 2,040 \end{pmatrix}$	<p>M₁</p> <p>M₁</p> <p>A₁</p>
<p>c. New Costs:</p> <p>Bicycle $\frac{90}{100} \times 4,500 = 4050 \neq$</p> <p>Radio $\frac{110}{100} \times 2040 = 2244 \neq$</p> $\begin{pmatrix} 36 & 28 \\ 22 & 24 \end{pmatrix} \begin{pmatrix} 4050 & 2244 \\ 4050 & 2244 \end{pmatrix} = \begin{pmatrix} 145800 + 1133,400 \\ 71.808 + 53.856 \end{pmatrix}$ <p>Total for Bicycles $\begin{pmatrix} 259,200 \end{pmatrix}$</p> <p>Total for Radios $\begin{pmatrix} 125,664 \end{pmatrix}$</p>	<p>M₁</p> <p>A₁</p> <p>W₁</p> <p>A₁</p>
<p>24.</p>	<p>M₁</p> <p>A₁</p> <p>W₁</p> <p>A₁</p>

<p>(bi). $A_1 = \frac{1}{2} (1 \times 0.2) + \frac{1}{2} (0.2 + 0.6) + \frac{1}{2} (0.6 + 1.3) + \frac{1}{2} (1.3 + 2.4) + \frac{1}{2} (2.4 + 3.7)$ $+ \frac{1}{2} (3.7 + 5.3) + \frac{1}{2} (5.3 + 7.3) + \frac{1}{2} (7.3 + 9.5) + \frac{1}{2} (9.5 + 12)$</p> <p style="text-align: center;">$= 36.36 \text{ sq Units}$</p> <p>$A_2 = \left(\frac{1}{2} \times 4 \times 1 \right) + \frac{1}{2} (4 + 5.7) + \frac{1}{2} (5.7 + 6.9) + \frac{1}{2} (6.9 + 8) + \frac{1}{2} (8 + 9) + \frac{1}{2} (9 + 9.8)$ $+ \frac{1}{2} (9.8 + 1.06) + \frac{1}{2} (10.6 + 11.3) + \frac{1}{2} (11.3 + 2)$</p> <p style="text-align: center;">$= 59.65 \text{ sq units}$</p> <p>Disputed land = $59.65 - 36.36$</p> <p style="text-align: center;">$= 23.35 \text{ sq units}$</p>	<p>M₁</p> <p>A₁</p> <p>M₁</p> <p>M₁</p> <p>A₁</p>
<p>(i) $10,000 \text{ m}^2 = 1 \text{ hectare}$</p> <p>1 unit = 20m</p> <p>$\therefore 1 \times 1 \text{ unit square} = 20 \times 20 \text{ m}^2$</p> <p style="text-align: center;">$= 400 \text{ m}^2$</p> <p>Hence 23.35 unit squared = 23.35×400</p> <p style="text-align: center;">$= 9,340 \text{ m}^2$</p> <p>But $10,000 \text{ m}^2 = 1 \text{ hectare}$</p> <p>$\therefore 9,340 \text{ m}^2 = \frac{9,340 \times 1}{10,000}$</p> <p style="text-align: center;">$= 0.934 \text{ hectares}$</p>	<p>M₁</p> <p>M₁</p> <p>A₁</p>