

THE LAINAKU FORM THREE MATHEMATICS PAPER I YEAR 2013
MARKING SCHEME

1	$1725 - 125 + 169 \times 450$ $= 1725 - 125 + 76500$ $= 77,650$ $\Rightarrow 6 \times 100 = 600$	M 1 A1 B1	Working out Value of 6
2	$3^{2(x^2)} = 3^{3(2x+12)}$ $2x^2 = 6x + 36$ $2x^2 - 6x - 36 = 0$ $x^2 - 3x - 18 = 0$ $(x+3)(x-6) = 0$ $x = -3 \text{ or } 6$	M 1 M 1 M 1 A1	both
3	<p>8.00a.m 400km 9.00a.m</p> <p>A————— B</p> <p>60km/hr 60km/hr</p> <p>After 1 hr = 60km=1 hour</p> <p>Remaining distance = 400-60=360</p> <p>Relative speed (60+60)=120km/hr</p> <p>T = D/S 360/120= 3Hours</p> <p>9.00a.m.</p> <p>3</p> <p>12.00</p> <p>= 12.00p.m.</p>		
4	<p>(a) Swiss Franc = $\frac{52}{1.28}$ M1</p> <p>= 40.625</p> <p>(b) Kenya shillings = 40.625 x 45.21</p> <p>= 1837</p>		
5	<p>Cos 62° = 15/h</p> <p>h = 15/cos 62° = 31.951</p> <p>Cos 30° = JT/31.951</p> <p>JT = 31.951 cos 30°</p> <p>JT = 27.67</p> <p>JP = 27.67 - 15</p> <p>= 12.67M</p>		
		B	Solving

6	$4ax = 3y + 12 \quad m_1 = \frac{4a}{3}$ $7bx - 2 = 3y \quad m_2 = \frac{7b}{3}$ $m_1 = m_2 \quad \frac{4a}{3} = \frac{7b}{3}$ $4a = 7b$ $a : b = 7 : 4$	1 M 1 A1	g for both m1
7	$2.6 \times 4.8 \times 3.2 = 39.936 \text{ m}^3$ $\frac{39.936 \times 100 \times 100 \times 100}{1000} = 39936 \text{ litres}$		
8)			
9.	$\frac{3(x+y) - (x-y)}{x^2 - y^2}$ $= \frac{3x + 3y - x + y}{x^2 - y^2}$ $= \frac{2(x+2y)}{x^2 - y^2}$		

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10	<p>Numerator = $36 - 4$ $= 32$</p> <p>Denominator = $10 - 6 + 4$ $= 14 - 6 = 8$</p> <p>Combine = $\frac{32}{8} = 4$, $4 = 2^2$ $\therefore m = 2$</p>	<p>B1</p> <p>B1</p>	<p>Solving the numerator</p> <p>Solving the denominator</p> <p>Value of m</p>
11	<p>v.s.f $\frac{540}{160} = \frac{27}{8}$</p> <p>lsf = $\frac{3}{2}$</p> <p>asf = $\frac{9}{4}$</p> <p>area of large container = $\frac{25}{4} \times 9 = 56.25$</p> <p>height of larger container = $56.25 \times h = 540$</p> <p>$h = \frac{540}{56.25}$</p>	<p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>04</p>	<p>4 sf 9.600</p>

	h=9.600		
12	Let profit be P $\frac{13}{19}P = 60,000$ $P = 60,000 \times \frac{19}{3}$ $= 20,000 \times 19$ <u>380,000</u>	M1 M1 A1	
		03	

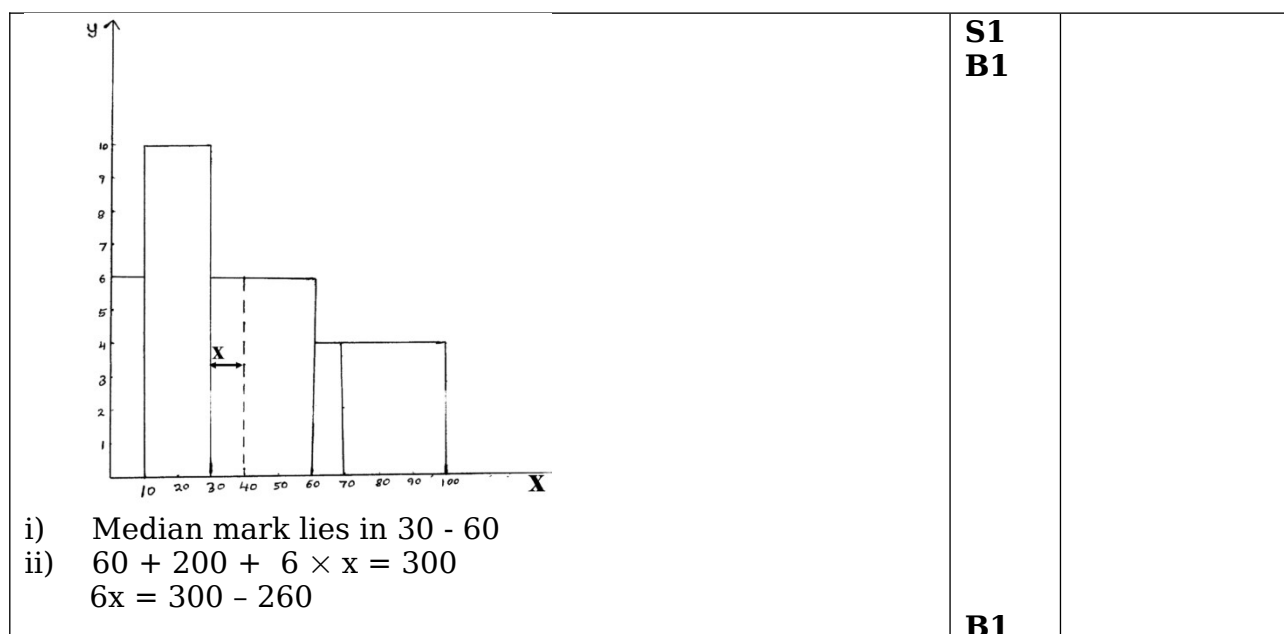
13	$2s + 3t = 1750 \times 2$ $3s + 2t = 1500 \times 3$ $4s + 6t = 3500$ <u>$9s + 6t = 4500$</u> $-5s = -1000$ Shirt =shs.200 Trouser =shs. 450	M1 M1 A1	
		3	
14.	$y = 180^0 - 130^0 = 50^0$ $x = 180^0 - (50^0 + 83^0) = 47^0$ $z = 180^0 - 47^0 - 133^0$	B1 B1 B1 3	
15	$ \begin{array}{rrrrrr} 2 & 20, & 24, & 26, & 28 & \\ \underline{2} & 10 & 12 & 13 & 14 & \\ 2 & 5 & 6 & 13 & 7 & \\ \underline{3} & 2 & 3 & 13 & 7 & \\ 5 & 5 & 1 & 13 & 7 & \\ \underline{7} & 1 & 1 & 13 & 7 & \\ 13 & 1 & 1 & 13 & 1 & \\ \underline{1} & 1 & 1 & 1 & & \end{array} $ $ \begin{aligned} \text{Size of the land} &= (2^3 \times 3 \times 5 \times 7 \times 13) + 7) \text{ aces} \\ &= 10920 + 7 = 10,927 \text{ aces} \end{aligned} $		
16.	$P(3i+0j + K) \quad Q(0i +2j-K)$ $Q-P$ $= -2i + 2j-2K$ $ P Q = \sqrt{(-2)^2+2^2+(-2)^2}$ $=\sqrt{4+4+4}=3.464$	M1 M1 A1 03	

1
7.

Marks	0 - 10	10 - 30	30 - 60	60 - 70	70 - 100
Frequency	12	40	36	8	24
Area of rectangle	60	200	180	40	120
Height of rectangle	6	10	6	4	4

B2 ✓ for all B1 ✓ for 3 correct values

B2 ✓ for all B 1 ✓ for 3 correct values

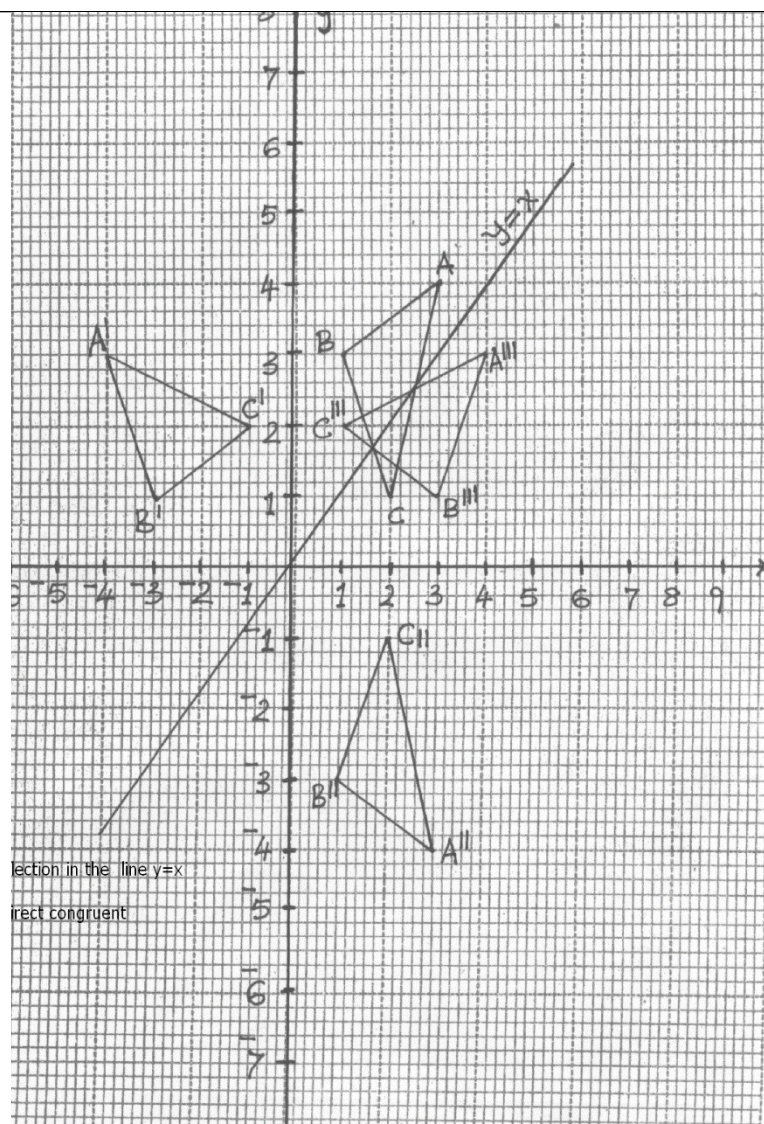


S1
B1

B1

	$6x = 40$ $x = 6 \frac{2}{3}$ $\therefore$ Median mark lies at $6 \frac{2}{3} + 30$ $= 36 \frac{2}{3}$	M1 A1 B1 10	
18	<p>a) Grade A be 2 kg " B be 1 kg $\frac{85 \times 2 + 70 \times 1}{3} = 80$ / per kg $\therefore$ for 2 kg it cost = 160 /</p> <p>$\frac{x - 160}{160} \times 100 = 30\%$ $x - 160 = \frac{4800}{100}$ $x = 208$ /</p> <p>b) $\therefore$ s.p = 208 / $\frac{208 - 125}{208} \times 100$ = 39.90%</p> <p>c) = 39.90%</p> <p>d) Total kgs. $\Rightarrow 200 + 100$ = 300kg s.p = (208 + 120) + (125 x 30) = 28,710 C.P + (160 x 150) = 24,00 % profit = $\frac{28,710 - 24,000}{24,000} \times 100$ = 19.625%</p>	M1 M1A1 M1 A1 M1 M1 A1	✓ operation ✓ answer ✓ answer

19.	<p>a) ΔABD $\checkmark$ly constructed ΔABP</p> <p>b) i) $AD = 4.5 + 0.1 \text{ cm}$ Distance A + D $= 4.5 \times 10 = 45 \text{ km}$</p> <p>ii) Bearing of (i) from B $= 241 + 1$</p> <p>iii) Bearing P from D $= 123 = 2$</p> <p>iv) $Dp = 12.9 + 0.2 \text{ am}$ Distance D + P = 12.9×10 $= 129 \text{ km}$</p>		
20	<p>(a) PQ $= 2(8 \sin 35)$ $= 9.177$ $= 9.18$</p>	M1 A1	
		02	
	<p>(b) $\frac{8 \sin 35}{\sin 20}$ $= 13.42$ $= 13.42$</p>	M1 A1	Accept $\frac{4.5}{\sin 20}$
		02	
21	<p>(c) Area of minor segment circle centre A $\frac{70}{360} \times 3.142 \times 8 \times 8 - \frac{1}{2} \times 8 \times 8 \sin 70$ $= 9.03$</p> <p>Area of minor segment circle centre B $\frac{40}{360} \times 3.142 \times 13.42 \times 13.42 - 13.42 \times 13.42 \times \sin 40$ 4.99</p> <p>Area of shades region = Area of Δs APQ and PQB - Area of main segments $= (\frac{1}{2} \times 8 \times 8 \sin 70 + \frac{1}{2} \times 13 \times 13 \sin 40) - (9.03 + 4.99)$ $= 73.93$</p>	M1 A1 M1 M1M1 M1 A1	$\frac{40}{360}$ $62.87 - 57.88$ $= 4.99$ M1 for area of Δ M1 sum area of segments M1 for difference



ection in the line $y=x$
irect congruent

- 2 Length of the frame $(x + x + 5) = (2x + 5)$
 2. Width of the frame $(\frac{1}{2}x + \frac{1}{2}x + 5) = (x + 5)$
 Area $= (2x + 5)(x + 5)$
 (a) $75 = 2x^2 + 10x + 5x + 25$
 $2x^2 + 15x - 50 = 0$
 (b) $2x^2 + 15x - 50 = 0$
 $2x^2 + 5x + 20x - 50 = 0$
 $x(2x - 5) + 10(2x - 5) = 0$
 $(x + 10)(2x - 5) = 0$
 $x = -10$ or $2\frac{1}{2}$
 length $(2 \times 5/2 + 5) = 10\text{cm}$
 width $(5/2 + 5) = 7.5\text{cm}$
 (c) Area not covered = area of frame - area of photo
 $= 75 - 25$
 $= 50\text{cm}^2$
 $\% \text{ area} = 50/75 \times 100$

B1
M
1
A1

Dimensio
n with
unknowns

M
1
A1
B1
B1

Factorizat
ion

M

	= 66.67%/66 2/3%	1 M 1 A1	Difference in area
		10	

23.	(a) (i) 800×0.2 $= 160\text{m}^3$ (ii) 160×2000 $= 320,000\text{kg}$ (iii) Cement $= \frac{2}{8} \times 320,000$ $= 80,000$ (b) Bags $= \frac{80,000}{50}$ $= 1600$ (c) Ballast $= \frac{3}{8} \times 320,000$ $= 120,000$ tonnes $= 120$ lorries	M1 A1 M1 A1 M1 A1 B1 B1 M1 A1 B1	
		10	
24	a) $P = \frac{kq}{r^2}$ $Q = k \left(\frac{12}{144} \right)$ $K = \frac{144 \times 9}{12} = 108$ $P = \frac{108q}{r^2} = \frac{108 \times 15}{5^2}$ $P = 64.8$ b) $P = \frac{Kq}{r^2}$ $q = \frac{pr^2}{k} = \frac{pr^2}{108}$ $c = i) = q1 \frac{1.2p \times (0.9r)^2}{k} = \frac{0.972pr^2}{k}$ change $0.9722 \frac{pr^2}{k} - \frac{pr^2}{k} = -0.028 \frac{pr^2}{k}$ ii) percentage change -0.028×100	M1 A1 M1 A1 B1 11 M1 A1 M1 A1 10	

	= -2.8% or reduction of 2.8%	
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