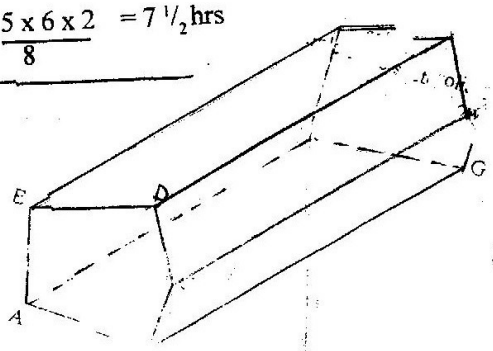
K.C.S.E 2004 MATHEMATICS PAPER 121/2 MARKING SCHEME

SOLUTION	MARKS	ALTERNATIVE METHOD
1. $5.25 \rightarrow 0.7202$ $0.042 \rightarrow \underline{2.6232}$ ✓ $\bar{1}.3424$ $\underline{\quad\quad}$ ✓ 1.6717 $34.33 - 1.5357$ $\underline{\bar{1}.6717}$ ✓ 1.8640 $= 73.11$ ✓	M1 M1 M1 A1	
2. $\frac{92}{100} \times 400{,}000 \times \frac{100}{115}$ ✓ $= \text{Sh. } 320.000$ ✓	M1 A1	
3. $a = 2,\ d = 4$ $S_n = n(2 \times 2 \times (n-1)4) = 800$ $n(4 + (n-1)4) = 1600$ ✓ $4n = 1600$ $n2 \cdot 400$ $n = 0$ ✓	M1 A1	
4. Distance $= 72 + 78 = 150$ m ✓ Speed $= 108 + 72 = 180$ km/h ✓ Time $= \frac{50 \times 60 \times 60}{80 \times 1000}$ ✓ $= 3$ sec ✓	M1 M1 A1	
5. $2\log_{10} 5 - 1/2\log_{10} 16 + 2\log_{10} 40$. ✓ $\text{Log}\left(\frac{25 \times 40}{4} \div 40\right) = \log 10000$ ✓ $= 4$ ✓		
6. $\frac{60\times2 + 75\times1 + 48\times4 + 66\times3}{10} =$ ✓ $\frac{120 + 75 + 192 + 198}{10} =$ ✓ $= \frac{585}{10} = 58.5\%$ ✓	M1 A1	

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SOLUTION	MARKS	ALTERNATIVE METHOD
7. $4x + 3y = 18$ $5x - 2y = 11$ $\begin{pmatrix} 4 & 3 \\ 5 & -2 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 18 \\ 11 \end{pmatrix}$ $\frac{-1}{23}\begin{pmatrix} -2 & -3 \\ -5 & 4 \end{pmatrix}\begin{pmatrix} 4 & 3 \\ 5 & -2 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{23}\begin{pmatrix} -2 & -3 \\ -5 & 4 \end{pmatrix}\begin{pmatrix} 18 \\ 11 \end{pmatrix}$ $\begin{pmatrix} x \\ y \end{pmatrix} = \frac{-1}{23}\begin{pmatrix} -69 \\ -46 \end{pmatrix}$ $= \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ $x = 3 \quad y = 2$	1	
8. $(1 + x)^5 = 1 + 5x + 10x^2 + 10x^3 + 5x^4 + x^5$ (b) $x = -0.02$ $1 + 5(-0.02) + 10(-0.02)$ $= 1 + -0.1 + 0.04$ $= 0.904$	2	
9. $a = \sqrt{(b \cdot d)}$ $a^2 = \frac{b^2 d^2}{b^2 - d}$ $a^2 b^2 - a^2 d = b^2 d$ $a^2 b^2 - b^2 d^2 = a^2 d$ $b = x\sqrt{\frac{a^2 d}{a^2 - d^2}}$		
10. $\frac{5 \times 6 \times 2}{8} = 7\ ^1/_2$ hrs		
11. 	B2 B1	

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SOLUTION	MARKS	ALTERNATIVE METHOD
1. $0.7 \times 450 + 0.9x$ or $0.75(450 + x)$ $0.7 \times 450 + 0.9x = 0.75(450 + x)$ $0.9x - 0.75x = 450(0.75 - 0.7)$ $0.15x = 0.05 \times 450$ $x = \frac{0.05 \times 450}{0.15}$ $= 150$	B1 M1 M1 A1	
13. $y = 3x^2 - 8x + 2$ $\frac{y}{a}$ $y = x^3 - 4x^2 + 2x + c$ At $x = 0$ $y = 2$ $2 = 0 - 0 + 0 + C$ $C = .$ $\Rightarrow y = x. - 4x2 + 2x + 2$	 M1 M1 A1	
14. Euros o Ksh $= 84.15 \times 500$ $= 420\,750$ Balance n Ksh $= 420750 - 289850$ $= 130900$ Balance in Japn yen $= \frac{130000 \times 100}{645}$ $= 200{,}000$	M1 M1 M1 A1	
15. $Y > x$ $Y < -x + 4$ $7 \leq 3x + 3$		
16. $\frac{2}{3-7} - \frac{2}{3+7} = 2(3+\sqrt{7}) - 2(3-\sqrt{7})$ $= \frac{6 + 2\sqrt{7} - 6 + 2\sqrt{7}}{9 - 3\sqrt{7} + 3\sqrt{7} - \sqrt{7}}$ $= \frac{4\sqrt{7}}{2} = 2\sqrt{7}$	M1	

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SOLUTION	MARKS	ALTERNATIVE METHOD
SECTION II		
17. A & B in 1 hr = $\frac{1}{2\frac{1}{2}}$ $= \frac{2}{5}$	B1	
b) Part done in 1 hr 10 min $= \frac{2}{5} \times \frac{7}{6} = \frac{7}{15}$	M1	
Remaining = $1 - \frac{7}{15} = \frac{8}{15}$	M1 A1	
(c) 1hr A does $\frac{8}{15} \times \frac{1}{4} = \frac{2}{15}$ Time taken by A = $15 = 7\frac{1}{2}$ hr Work done by B in 1 hr $= \frac{2}{5} - \frac{2}{15} = \frac{4}{15}$	A1 M1	
Time taken by B = $15 \div 4 = 3\frac{3}{4}$ hr	A1	
18. Q1 = $39.5 + \frac{15 - 10}{12} \times 10$ $= 43.67$	M1 A1	
Q3 = $59.5 + \frac{45 - 40}{17} \times 10$ $= 62.44$	M1 A1	
Interquartile range $= 62.44 - 43.67$ $= 18.77$	B1	
b) Let x be no. of people in class 50 - 59 with ages < 54.5 $49.5 + \frac{x}{18} \times 10 = 54.5$ $x = 9$ Percentage = $\frac{22 + 9}{60} \times 100$ $= 51.67\%$ ($51\frac{2}{3}\%$)	M1 A1	

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20. (a) $A^{-1} = \begin{pmatrix} -4 & 3 \\ 3 & -2 \end{pmatrix}$ ✓ B1

(b) i) $200x + 300y = 850{,}000$ ✓
$90x + 120y = 360{,}000$ ✓ B1 B1

ii) $2x + 3y = 8500$
$3x + 4y = 12{,}000$

$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -4 & 3 \\ 3 & -2 \end{pmatrix} \begin{pmatrix} 8500 \\ 12000 \end{pmatrix}$ ✓ M1

$x = 2000$ and $y = 1500$ ✓

c). Discount on rice
$\frac{2}{100} \times 1{,}500 \times 360 = 10800$ ✓ A1

% discount on sugar M1

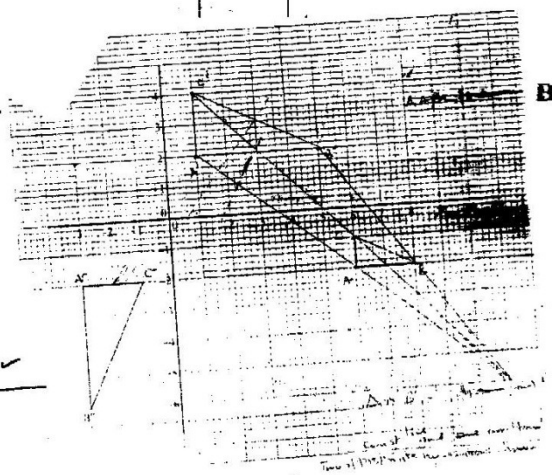
$\frac{33300 - 10800}{225 \times 2000} \times 100$ ✓ A1

$= 5\%$ ✓

21) $\begin{pmatrix} 2 & 4 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} P & Q & R \\ 5 & 6 & 4 \\ -1 & -1 & -0.5 \end{pmatrix}$ ✓

$= \begin{pmatrix} A & B & C \\ 6 & 8 & 6 \\ -2 & -2 & -1 \end{pmatrix}$ ✓

c) Centre (-3,2) angle of rotation 270^0 or -90^0 ✓



22) $V = \int (6t + 4)\, dt = 3t^2 + 4t + c$ ✓

At $t = 0, 5 = 3 \times 0^2 + 4 \times 0 + c$ ✓
$C = 5$

$V = 3t^2 + 4t + 5$ ✓

b) at $t = 3$. $V = 3 \times 3^2 + 4 \times 3 + 5$ ✓
$= 44$m/s ✓

ii) distance from $t = 2$ to $t = 4$

$= \int_2^4 (3t^2 + 4t + 5)\, dt$

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$\left\{t^3 + 2t^2 + 5t\right\}_2^4$ ✓ M1

$= 4^3 + 2(4^2) + 5 \times 4) - (2^3 + 2 \times 2^2 + 5 \times 2)$ ✓ M1

$= 116 - 26$

$= 90m$ ✓ A1

23 (a).

$p = KQ^2/\sqrt{R}$

when Q= 5, and R=9, P= 20

$\frac{K5^2}{\sqrt{9}} = 20$ ✓ $\Rightarrow$ $K = \frac{20 \times 3}{25} = \frac{60}{25}$ or 2.4 ✓ M1

when Q =7 and R = 25 M1

$P = \frac{2.4 \times 7^2}{\sqrt{25}} = 23.52$ ✓ A1

b) $Q^1 = 1.2Q$ and $R^1 = 0.64R$ ✓

$P^1 = \frac{K(1.2Q)^2}{\sqrt{0.64R}}$ ✓

Increase $\frac{K(1.2Q)^2}{\sqrt{0.64R}} - \frac{KQ^2}{\sqrt{R}}$ ✓ M1

% increase $= \left(\frac{1.44KQ^2}{0.8\sqrt{R}} - \frac{KQ^2}{\sqrt{R}}\right) \times 100\%$ ✓ M1

$= 80\%$ ✓ A1

24 a) (i) $YM = \sqrt{14^2 - 7^2}$ ✓ B1

$= \sqrt{147} = 12.12$

ii). $YL = \sqrt{147} - 10^2$ ✓

$= 6.856$ A1

b) Identifying angle θ ✓

$\tan \theta = \frac{6.856}{7}$ ✓ B1

$= 0.9794$ M1

(.9804)

$\theta = 44^0\ 24^1$ ✓

c). $\tan x = \frac{7}{16}$ ✓

$= 0.4375$

$x = 23^0\ 38^1\ (23.63^0)$ ✓