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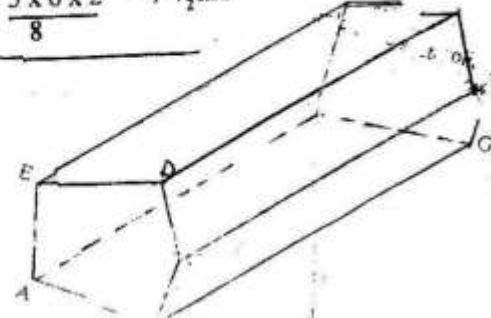
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K.C.S.E 2004 MATHEMATICS PAPER 121/2 MARKING SCHEME

SOLUTION	MARKS	ALTERNATIVE METHOD
<p>1.</p> $\begin{array}{r} 5.25 \rightarrow 0.7202 \\ 0.042 \rightarrow 2.6232 \quad \checkmark \\ \hline 1.3424 \\ -2 \\ \hline 1.6717 \quad \checkmark \\ 34.33 - 1.5357 \quad \checkmark \\ \hline 1.6717 \quad \checkmark \\ \hline 1.8640 \\ = 73.11 \quad \checkmark \end{array}$	<p>M1</p> <p>M1</p> <p>M1</p> <p>A1</p>	
<p>2.</p> $\frac{92 \times 400,000 \times 100}{100} \times \frac{100}{115} \quad \checkmark$ $= \text{Sh. } 320,000 \quad \checkmark$	<p>M1</p> <p>A1</p>	
<p>3.</p> $a = 2, \quad d = 4$ $S_n = n(2 \times 2 + (n-1)4) = 800$ $n(8 + (n-1)4) = 1600 \quad \checkmark$ $4n^2 = 1600$ $n^2 = 400$ $n = 20 \quad \checkmark$	<p>M1</p> <p>A1</p>	
<p>4.</p> $\text{Distance} = 72 + 78 = 150 \text{ m} \quad \checkmark$ $\text{Speed} = 108 + 72 = 180 \text{ km/h} \quad \checkmark$ $\text{Time} = \frac{50 \times 60 \times 60}{80 \times 1000} \quad \checkmark$ $= 3 \text{ sec} \quad \checkmark$	<p>M1</p> <p>M1</p> <p>A1</p>	
<p>5.</p> $2 \log_{10} 5 - \frac{1}{2} \log_{10} 16 + 2 \log_{10} 40$ $\frac{\log(2.5 \times 40)}{4} = \log 10000 \quad \checkmark$ $= 4 \quad \checkmark$		
<p>6.</p> $\frac{60 \times 2 + 75 \times 1 + 8 \times 4 + 66 \times 3}{10} = \checkmark$ $\frac{120 + 75 + 192 + 198}{10} = \checkmark$ $= \frac{585}{10} = 58.5\% \quad \checkmark$	<p>M1</p> <p>A1</p>	

SOLUTION	MARKS	ALTERNATIVE METHOD
<p>7. $4x + 3y = 18$ $5x - 2y = 11$</p> $\begin{pmatrix} 4 & 3 \\ 5 & -2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 18 \\ 11 \end{pmatrix}$ $\frac{-1}{23} \begin{pmatrix} 2 & -3 \\ 5 & 4 \end{pmatrix} \begin{pmatrix} 4 & 3 \\ 5 & -2 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{23} \begin{pmatrix} 2 & -3 \\ -5 & 4 \end{pmatrix} \begin{pmatrix} 18 \\ 11 \end{pmatrix}$ $\begin{pmatrix} x \\ y \end{pmatrix} = \frac{-1}{23} \begin{pmatrix} -59 \\ -46 \end{pmatrix}$ $= \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ <p>$x = 3 \quad y = 2$</p>		
<p>8. $(1+x)^5 = 1 + 5x + 10x^2 + 10x^3 + 5x^4 + x^5$</p> <p>(b) $x = -0.02$</p> $1 + 5(-0.02) + 10(-0.02)^2$ $= 1 - 0.1 + 0.04$ $= 0.94$		
<p>9. $a = \frac{b^2}{\sqrt{b^2 - d}}$</p> $a^2 = \frac{b^2 d^2}{b^2 - d}$ $a^2 b^2 - a^2 d = b^2 d$ $a^2 b^2 - b^2 d^2 = a^2 d$ $b = \sqrt{\frac{a^2 d}{a^2 - d^2}}$		
<p>10. $\frac{5 \times 6 \times 2}{8} = 7 \frac{1}{2} \text{ hrs}$</p>		
<p>11.</p> 		

SOLUTION	MARKS	ALTERNATIVE METHOD
12. $0.7 \times 450 + 0.9x$ 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. $y = 3x^2 - 8x + 2$ $y = x^3 - 4x^2 + 2x + c$ At $x=0$ $y=2$ $2 = 0 - 0 + 0 + c$ $C = 2$ $\Rightarrow y = x^3 - 4x^2 + 2x + 2$	M1 M1 A1	
14. Euros to Ksh = 84.15×500 $= 420750$ Balance in Ksh = $420750 - 289850$ $= 130900$ Balance in Japan yen $= \frac{130900 \times 100}{6545}$ $= 200,000$	M1 M1 M1 A1	
15. $Y > x$ $Y < -x + 4$ $7 < 3x + 3$		
16. $\frac{2}{3-7} - \frac{2}{3+7} = 2(3+\sqrt{7}) - 2(3-\sqrt{7})$ $= \frac{6+2\sqrt{7}-6+2\sqrt{7}}{9-37+3\sqrt{7}\sqrt{7}}$ $= \frac{4\sqrt{7}}{2} = 2\sqrt{7}$	M1	

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 $= \frac{2 \times 7}{5 \times 6} = \frac{7}{15}$	M1	
Remaining = $1 - \frac{7}{15} = \frac{8}{15}$	M1	
	A1	
(c) 1hr A does $\frac{8 \times 1}{15 \times 4} = \frac{2}{15}$ 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 = $15 = 3\frac{3}{4}$ hr $\frac{4}{4}$	A1	
18. Q1 = $\frac{39.5 + 15 - 10 \times 10}{12}$ $= 43.67$	M1	
	A1	
Q3 = $\frac{59.5 + 45 - 40 \times 10}{17}$ $= 62.44$	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 $49.5 + \frac{x}{18} \times 10 = 54.5$	M1	
$x = 9$ Percentage = $\frac{22 + 9}{60} \times 100$		
$= 51.67\% (51\frac{2}{3}\%)$	A1	

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

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

M1

$x = 2000$ and $y = 1500$ ✓

c) Discount on rice
 $2 \times 1,500 \times 360 = 10800$ ✓
 100

A1

% discount on sugar

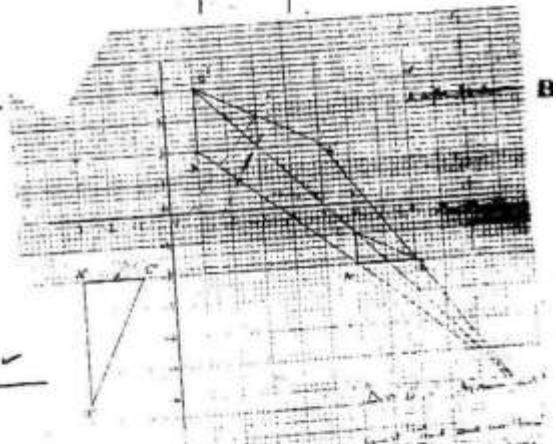
M1

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

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° or -90° ✓

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 $t = 3, V = 3 \times 3^2 + 4 \times 3 + 5$ ✓
 $= 44 \text{ m/s}$ ✓

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

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

$\left\{ t^3 + 2t^2 + 5t \right\}_2^4$ $= 4^3 + 2(4^2) + 5 \times 4 - (2^3 + 2 \times 2^2 + 5 \times 2)$ $= 116 - 26$ $= 90m$	<p>MI</p> <p>MI</p> <p>AI</p>	
<p>23 (a).</p> $p = KQ^2 / \sqrt{R}$ <p>when $Q=5$, and $R=9$, $P=20$</p> $20^2 = \frac{K \times 5^4}{\sqrt{9}} \Rightarrow K = \frac{20^2 \times 3}{25} = 60 \text{ or } 2.4$ <p>when $Q=7$ and $R=25$</p> $P = \frac{4 \times 7^2}{\sqrt{25}} = 23.52$ <p>b)</p> $Q^1 = 2Q \text{ and } R^1 = 0.64R$ $P^1 = \frac{K(2Q)^2}{\sqrt{0.64R}}$ <p>Increase = $\frac{\frac{K \cdot 4Q^2}{\sqrt{0.64R}} - \frac{KQ^2}{\sqrt{R}}}{\frac{KQ^2}{\sqrt{R}}}$</p> $\% \text{ increase} = \frac{1.44 \frac{KQ^2}{\sqrt{R}} - \frac{KQ^2}{\sqrt{R}}}{\frac{KQ^2}{\sqrt{R}}} \times 100$ $= 80\%$	<p>MI</p> <p>MI</p> <p>AI</p> <p>MI</p> <p>MI</p> <p>AI</p>	
<p>24 a) (i)</p> $YM = \sqrt{14^2 - 7^2}$ $= \sqrt{147} = 12.12$ <p>ii). $YL = \sqrt{14^2 - 11^2}$</p> $= 6.856$ <p>b) Identifying angle θ</p> $\tan \theta = \frac{6.856}{7}$ $= 0.9794$ <p>(.9804)</p> $\theta = 44^\circ 24'$ <p>c). $\tan x = \frac{7}{16}$</p> $= 0.4375$ $x = 23^\circ 38' (23.63^\circ)$	<p>BI</p> <p>AI</p> <p>BI</p> <p>MI</p>	