KENYA NATIONAL EXAMINATION COUNCIL
REVISION MOCK EXAMS 2016
TOP NATIONAL SCHOOLS

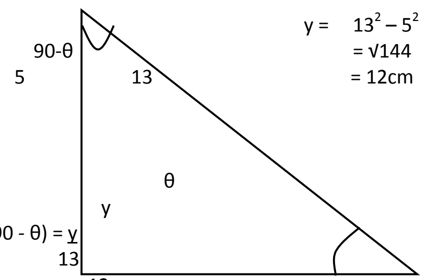
ALLIANCE GIRLS HIGH SCHOOL
MATHEMATICS
PAPER 1

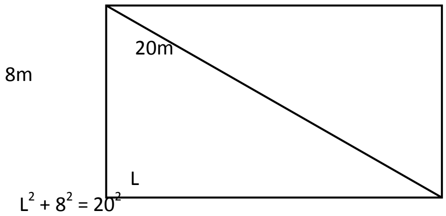
SCHOOLS NET KENYA
Osiligi House, Opposite KCB, Ground Floor
Off Magadi Road, Ongata Rongai | Tel: 0711 88 22 27
E-mail:infosnkenya@gmail.com | Website: www.schoolsnetkenya.co

ALLJANCE GIRLS HIGH SCHOOL KCSE TRIAL AND PRACTICE EXAM 2016

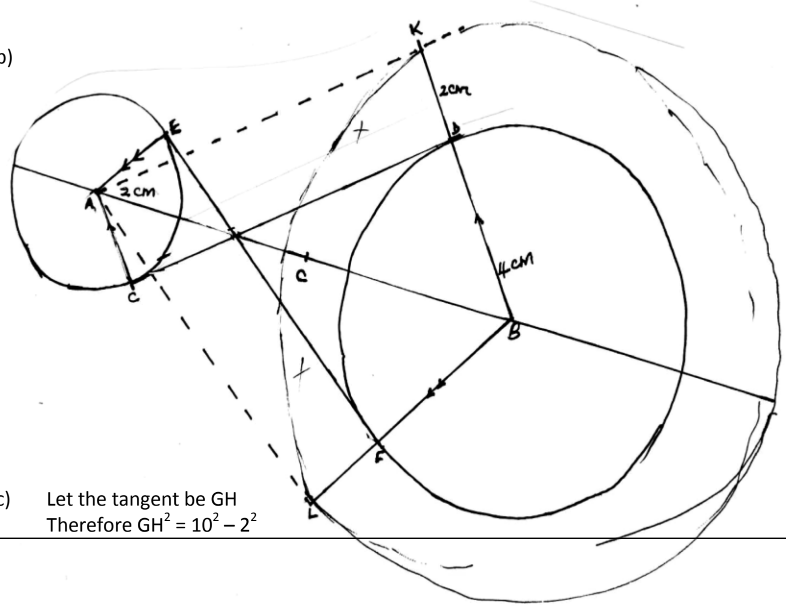
PAPER 1

MARKING SCHEME

NO	WORKING	MARKS	COMMENTS
1	$\frac{17}{2} - \frac{20}{3} = \frac{51-40}{6} = \frac{11}{6}$		
	$\frac{11}{6} \times \frac{9}{4} = \frac{33}{8}$	B1	
	$\frac{2}{5} \times \frac{25}{4} + \frac{5}{4} = \frac{5}{2} + \frac{5}{4} = \frac{10}{4} + 5$	B1	
	$= \frac{15}{4}$	B1	
	$\frac{33}{8} \times \frac{4}{15} = \frac{11}{10}$ or $1^1/_{10}$		
		03	
2 (a)	(1 U.S Dollar = Shs. 78.45 2500 U.S Dollars = $\left(\frac{2500 \times 78.45}{1}\right)$	M1	
	= Shs. 196,125.	A1	
(b)	(196,125 – 80,000)/= = 116,125/= 1 Sterling pound – 120.45 ← 116,125 $\frac{116,125}{120.45} \times 1 = 964.09$	M1	
	= 964.09 Sterling pounds	A1	
		04	
3	Let exterior angle be x Interior angle = 5x $x + 5x = 180^0$ $6x = 180^0$ $x = 30^0$	B1	
	No of sides $= \frac{360^0}{30^0}$	M1	
	= 12 sides	A1	
		03	
4	 $y = \sqrt{13^2 - 5^2}$ $= \sqrt{144}$ = 12cm	B1	
	$\cos(90 - \theta) = \frac{y}{13}$ $= \frac{12}{13}$	B1	
		04	
5	P = b + 2c – d $P = \begin{pmatrix}1\\2\\3\end{pmatrix} + 2\begin{pmatrix}4\\-2\\3\end{pmatrix} - \begin{pmatrix}0\\3\\-2\end{pmatrix}$ $= \begin{pmatrix}1\\2\\3\end{pmatrix} + \begin{pmatrix}8\\-4\\6\end{pmatrix} \begin{pmatrix}0\\-3\\2\end{pmatrix}$	m1	
	$P = \begin{pmatrix}9\\-5\\11\end{pmatrix}$	A1	
	$\lvert P \rvert = \sqrt{9^2 + (-5)^2 + (11)^2}$ $= \sqrt{81 + 25 + 121}$ $= \sqrt{227}$		

	= 10 x 1.5067 = 15.067	 B1	
		03	
6.	$2y - x < 8$, $x < 8$, $y \geq 0$, $y + x \geq 4$	B1 B1 B1 B1	
		04	
7	 $L^2 + 8^2 = 20^2$ $L = \sqrt{20^2 - 8^2}$ $= \sqrt{400 - 64}$ $= \sqrt{336}$ = 18.33 Perimeter = 2(8 + 18.33) = 2 (26.33) = 52.66	M1 M1 A1	
		03	
8	(√5 + √3) (√5 – √3) = √25 – √9 = 5 – 3 = 2 $\frac{\sqrt{2}}{\sqrt{5} + \sqrt{3}} = \frac{\sqrt{2}(\sqrt{5} - \sqrt{3})}{(\sqrt{5} + \sqrt{3})(\sqrt{5} - \sqrt{3})}$ $= \frac{\sqrt{10} - \sqrt{6}}{5 - 3}$ $= \frac{\sqrt{10} - \sqrt{6}}{2}$	 B1 M1 A1	
		03	
9	$y^2 = \begin{pmatrix} c & 0 \\ 4 & d \end{pmatrix} = \begin{pmatrix} c & 0 \\ 4 & d \end{pmatrix}$ $y^2 = \begin{pmatrix} c^2 & 0 \\ 4c+4d & d^2 \end{pmatrix}$ $y^2 \Rightarrow \begin{pmatrix} c^2 & 0 \\ 4c+4d & d^2 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ $c^2 = 1$ $d^2 = 1$ $c = \pm 1$ $d = \pm 1$	 B1 B1 B1	 ✓values of matrix y^2 ✓value of c ✓value of d
		03	
10	$0.2\dot{4}^{0}$ Let x = 0.2444…. 10x = 2.444 9x = 2.2 $x = \frac{22}{90}$ $= \frac{11}{45}$ Let x = 3.0444 10x = 30.444…. 9x = 27.4 $X = \frac{274}{90}$	 B1	 Expressing 0.24 as a fraction. Expressing 3.04 as a fraction.

	$= \frac{137}{45}$ $\frac{411}{44} \times \frac{11}{45} \times \frac{45}{137}$ = ¾	B1 B1	Expression as fraction in its simplest form.
		03	
11	xy – zy – xw + 2w = y = (x – z) – w(x – z) = (x – z) (y – w) $\frac{(y - w)(x - 2)(y + w)}{(w - y)(w + y)}$ $\frac{-1(y - w)\, x - 1\,(x - z)}{(w - y)}$ $= \frac{(w - y)(z - x)}{(w - y)}$ = (z – x)	 M1 M1 A1	✓Factorization Multiplication by -ve
		03	
12	/ n / min $\frac{1}{20} + \frac{1}{30} + \frac{1}{40} = \frac{6 + 4 - 3}{120}$ $= \frac{7}{120}$ of the tank Full tank $= \frac{120}{7} \times 1$ ( ) $= 17\frac{1}{7}$ minutes Pipe R closed after 10 minutes $= 10\left(\times \frac{7}{120} = \right) \frac{70}{120}$ of the tank. Empty $= 1 - \frac{70}{120}$ $= \frac{50}{120}$ R closed $\frac{1}{20} - \frac{1}{40} = \frac{1}{40}$ in 1m $\frac{1}{40}$ ___________ 1 min $\frac{50}{120} \quad - \quad \frac{50}{120} \times 40$ $= 16\frac{2}{3}$	 M1 M1 M1 A1	
		04	
13	$\frac{dy}{dx} = ax^2 + 3x$ at x = 2 $a(2)^2 + 3 \times 2 = 8$ 4a = 2 a = ½	 M1 A1	Substitution of x = 2
		02	
14 (a) (b)	Acc (i) CD $= \frac{70 - 40}{5} = 6ms^{-2}$ (ii) DE $= \frac{0 - 70}{10} = 7ms^{-2}$ Distance ½ (10x40) + (15x40) + ½ (5 x 30) + ½ (10 x 70) $= (200 + 600 + 275 + 350)^2$M = 1425M	B1 B1 M1 A1	
		04	
15	2, 5, 8, 11 ………, n Sn = 301, d = 3, a = 2 $Sn = \frac{n}{2}\,[2a + (n\text{-}d)]$ $301 = \frac{n}{2}\,[4 + 3(n - 1)]$ $602 = 4n + 3n^2 - 3n$..	 M1 M1	 ✓substitution

	$3n^2 + n - 602 = 0$ $n = \frac{-1 + \sqrt{1-(4 \times 3 \times -602)}}{6}$ ⇨ $n = \frac{-1 \pm 85}{6}$ n = 14	A1	Formation of quadratic equation. ✓Value of n after descrimination
		03	
16	Since AB = DC are opposide sides of a parallelogram. <BAE = < DCF – opposite angles of a parallelogram. AE = EC since BE is parallel to D. Therefore ΔABD is congruent to ΔCDF.	B1 B1 B1	
		03	
17	(a) (i) r – original radius $\frac{104r}{100}$ = 1.04 new radius Therefore $\frac{1.04r}{r} = \frac{1.04}{1}$ $\frac{\text{New surface area}}{\text{Original surface area}} = \frac{(1.04)^2}{(1)^2}$ = 1.0816 Percentage increase % = 108.16 – 100 = 8.16% (ii) Volume = $\frac{(1.04)^3}{(1)^3}$ = 1.1249 % change = 12.49% (b) (i) <PXS = <QXR – Vertically opposite angles. <PSX = <QRX – Alternate angles hence the triangles are similar. (ii) $\frac{SP}{RQ} = \frac{SX}{RX}$ $\frac{8}{RQ} = \frac{4}{3}$ $RQ = \frac{8 \times 3}{4}$ = 6cm (iii) $\frac{PX}{QX} = \frac{SX}{RX}$ => $\frac{6}{QX} = \frac{4cm}{3cm}$ $RQ = \frac{6 \times 3}{4}$ = 4.5cm	M1 A1 M1 A1 B1 B1 M1 A1 M1 A1	For squaring Accurate value Cubic value Correct value Angle and reason Angle and reason Process of getting length / equation Correct length Substitution Correct value
		10	
18	(a) (b)  (c) Let the tangent be GH Therefore $GH^2 = 10^2 - 2^2$	B1 B1 B1 B1 B1 B1 M1	Circle 2cm Circle 4cm Centre C and radius CK used (line AK, AL). Parallel lines drawn (AE//BL) Parallel lines drawn (AC//BK) EF and CD (both) shown Application of Pythagoras theorem.

	= 100 – 4 GH = √96 = 9.798cm = 9.80cm	M1 A1	Use of square root sign. Correct value to 3s.f.
		10	
19	(a) Volume of cuboid $= 8 \times 10 \times 14 = 1120cm^3$ Volume of cylinder $= 560cm^3$ $V = \pi r^2 h$ $= {}^{22}/_7 \times 4.2 \times 4.2 \times h = 560$ $h = \frac{560}{22 \times 4.2 \times 0.6} = 10.1$ Surface area of cylinder $2\pi rh + \pi r^2$ $= (2 \times {}^{22}/_7 \times 4.2 \times 10.1) + ({}^{22}/_7 \times 4.2^2)$ $= 266.64 + 54.44$ $= 322.08cm^2 = 322.1cm^2$ (b) Sphere (i) $V = {}^4/_3 \pi r^3$ $560 = {}^4/_3 \times {}^{22}/_7 \times r^3$ $r = \sqrt[3]{133.68}$ $r = 5.1cm$ (ii) $S.A = 4\pi r^2$ $4 \times {}^{22}/_7 \times (5.1)^2$ $= 326.98cm$ $= 327.0cm^2$	M1 A1 M1 M1 A1 M1 A1 M1 M1 A1	Process of finding the height For height to 1d.p. For substitution of the two surfaces. For addition Correct surface are (1d.p) For substitution in the formula. Correct value Substitution Multiplication To 1d.p.
		10	

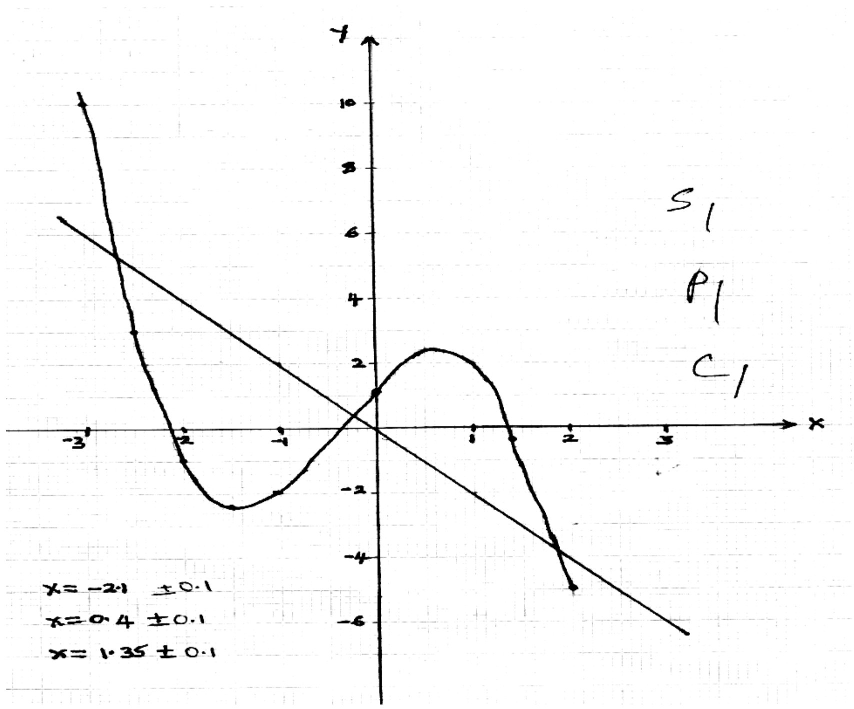
20 (a)

x	-4	-3	-2.5	-2	-1.5	-1	0	0.5	1	1.5	2.0
y		10	2.5	-1	-2.4	-2	1	2.4	2	-0.2	-5

B_2 – At least 8 correct values

B_1 – Correct values

(b) GRAPH



(c) x = -2.1, x = -0.4, x = 1.4

B2 – for all correct vallues
B1 – for any two correct

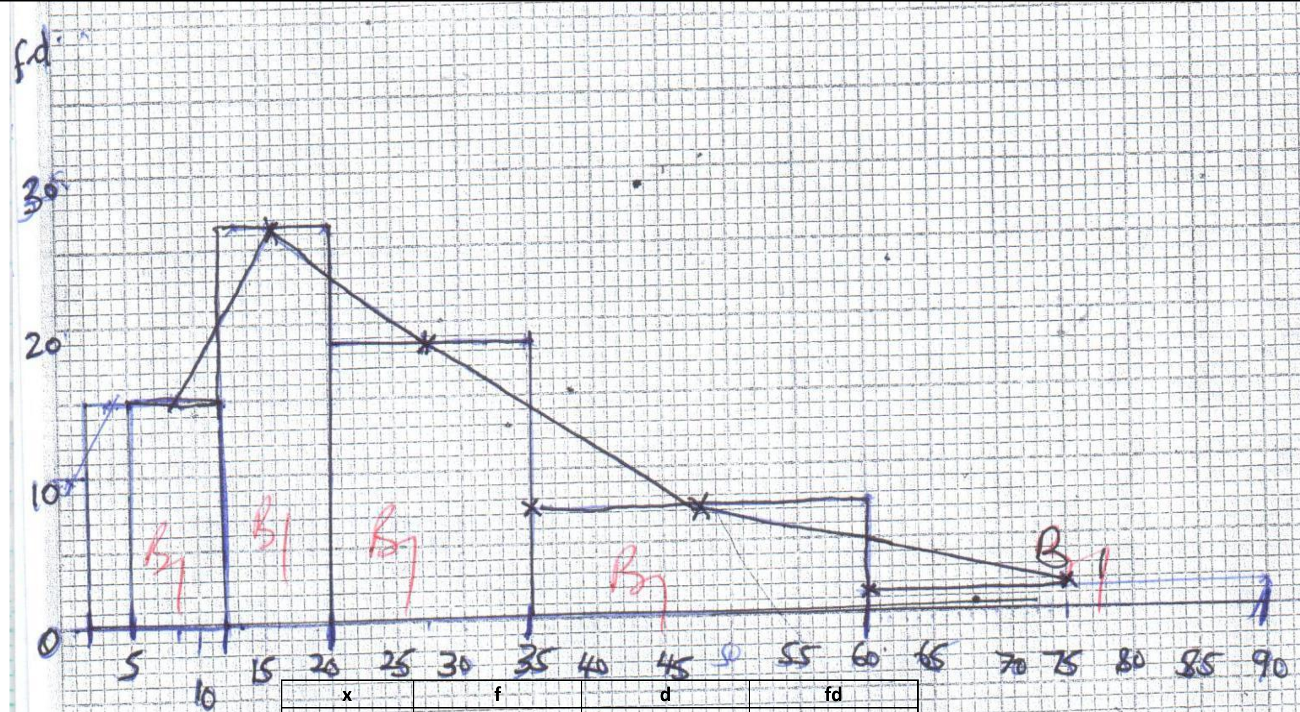
(d) y = -2x

x	0	-1	1
y	0	2	-2

B1 – Table value
B1 – Line drawn
B1 – correct values read

		10	
21		B1	For density
		B1	For upper limit

	f	fd	Upper limit
0 – 2	3	$^3/_3 = 1$	2
2 – 5	6	$^6/_4 = 1.5$	5
5 – 12	12	$^{12}/_8 = 1.5$	12
12 – 20	24	$^{24}/_9 = 2.66$	20
20 – 35	30	$^{30}/_{16} = 1.86$	35
35 – 60	20	$^{20}/_{26} = 0.769$	60
60 - 90	5	$^5/_{31} = 0.16$	90



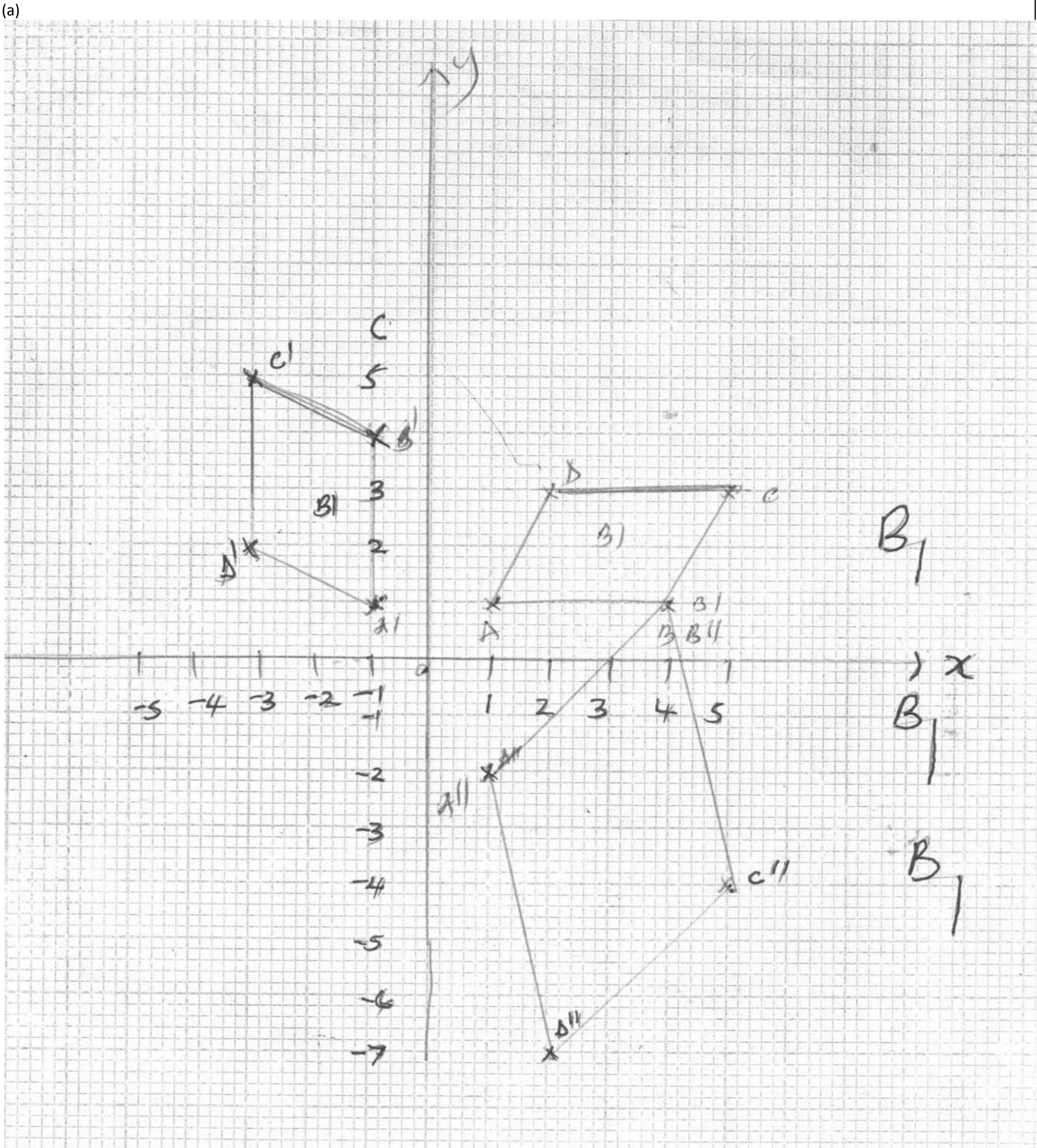
x	f	d	fd
1	3	-15	-45
3.5	6	-12.5	-75
8.5	12	-7.5	-90
16	24	0	0
27.5	30	11.5	345
47.5	20	31.5	630
75	5	59	295
	100		∑fd 1060

B1

$X = \sum f + \frac{\sum fd}{\sum f}$

$= 16 + \frac{1060}{100} = 16 + 10.6 = 26.6$ A1 M1

22	(a) Let the younger student's age be y.		
	The elder students = (y + 9)	B1	
	The teacher = 2(y + y + 9)	B1	
	= 4y + 18		
	(b) (i) Younger Elder Teacher	M1	
	Now y y + 9 4y + 18		
	19 years time (y + 19) (y + 9 + 19) (4y + 18 + 19)	M1	
	(y + 19) (y + 28) (4y + 37)	A1	

	(y + 19) (y + 28) = 14(4y + 37) y^2 + 47y + 532 = 56y + 518 y^2 – 9y + 14 = 0 (y – 2) (y – 7) = 0 y = 2 or 7 (ii) When the younger is 2 years, the elder is 11 and when the younger is 7, the elder is 16. (iii) Teachers present age = 2 (2 + 1) = 26 years Or 2 (7 + 16) = 46 years In 19 years time he will be (26 + 19) = 45 years or (46 + 19) = 65 years	B1 B1 B1 B1 B1	
		10	
23	(a) 		

	(b) $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} A & B & C & D \\ 1 & 4 & 5 & 2 \\ 1 & 1 & 3 & 3 \end{pmatrix} = \begin{pmatrix} A' & B' & C' & D' \\ -1 & -1 & -3 & -3 \\ 1 & 4 & 5 & 2 \end{pmatrix}$ A'(-1,1), B'(-1,4), C'(-3.5) and D'(-3,2) (c) Let the matrix T = $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$ $\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} A' & B' & C' & D' \\ -1 & -1 & -3 & -3 \\ 1 & 4 & 5 & 2 \end{pmatrix} = \begin{pmatrix} A'' & B'' & C'' & D'' \\ 1 & 4 & 5 & 2 \\ -2 & 1 & -4 & 7 \end{pmatrix}$ $\begin{pmatrix} A'' & B'' \\ -a + b & -a + 4b \\ -c + d & -c + 4d \end{pmatrix} = \begin{pmatrix} 1 & 4 \\ -2 & 1 \end{pmatrix}$ (a) -a + b = 1 -a + 4b = 4 -8b = -3 => b = 1 -a + 1 = 1 -a = 0 a = 0 -c + d = -1 -c + 3 = 1 -3d = -3 d = 1 -c + 1 = -2 -c = -3 c = 3 T = $\begin{pmatrix} 0 & 1 \\ 3 & 1 \end{pmatrix}$ (b) Single matrix of transformation $\begin{pmatrix} 0 & 1 \\ 3 & 1 \end{pmatrix} \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 1 & -3 \end{pmatrix}$	M1 A1 M1 M1 A1 M1 A1	
		10	
24	(a) (i) $\frac{22}{7} \times 3.5^2 \times 5$ $= 192.5m^3$ (ii) ¼ x 2 x 2 x 6 tan 60 x 10 $= 103.92m^3$ (iii) 192.5 + 103.92 $= 296.42m^3$ (b) $(1.5 \times 15)m^3 = 22.5$ 296.42 22.50 - 273.92 = 273.92 $D = \frac{M}{V}$ $= \frac{440}{273.92}$ $= 1.606kg/m^3$	M1 A1 M1M1 A1 M1 A1 M1 M1 A1	
		10	