GATUNDU FORM FOUR EVALUATION EXAMINATION 2018

MATHEMATICS PAPER I ALT A

121/1

MARKING SCHEME

1	SECTION I $\frac{1}{2}$ of $\frac{7}{2} + 3/2\left(\frac{5}{2} - \frac{2}{3}\right)$ $\frac{1}{2}$ of $\frac{7}{2} + \frac{3}{2}\left(\frac{11}{6}\right)$ $\frac{7}{4} + \frac{11}{4} = \frac{18}{4} = \frac{9}{2}$ $\frac{3}{4} \times 5/2 + \frac{1}{2}$ $\frac{15}{8} + \frac{1}{2} = \frac{15+4}{8} = \frac{19}{8}$ $\frac{9}{2} \times 8/19 = 1\frac{17}{19}$	M1 M1 A1	
2.	$3^{3(x-1)} = 3^{4(2x)} \cdot 3^{2x-1}$ $3x - 3 = 8x + 2x - 1$ $-2 = 7x$ $x = -2/7$	M1 M1 A1	
3.	$\frac{1}{3}x + x = 180$ $\frac{4}{3}x = 180$ $x = \frac{180 \times 3}{4} = 135°$ Exterior angle $= 180 - 135 = 45°$ $\frac{360}{45} = 8$ $\therefore$ Octagon	M1 A1 B1	(3)

(1)

4(i)	$43521 \times 85.86 = Sh\ 3,736,713.06$	B_1	
(ii)	$3736713.06 - 2437821.00 = 1,298,892.06$	M_1	
	$\frac{1,298,892.06}{142.73}$	M_1	
	UK £ 9,100.343		
	$\simeq$ UK£ 9100.	A_1	(4)
5.	$A(1,1)\quad B(x,y) = (3,5)$		
	$\frac{1+x}{2} = 3 \qquad \frac{1+y}{2} = 5$		
	$x = 5 \qquad y = 9$		
	$\therefore (x,y) = (5,9)$	B_1	
	$M_1 = \frac{9-1}{5-1} = 2$		
	$M_2 = -\frac{1}{2}$	M_1	
	$\frac{y-9}{x-5} = -\frac{1}{2}$	M_1	
	$2y + x - 23 = 0.$	A_1	(4)
6.	2 | 54 | 72 3 | 27 | 36 3 | 9 | 12 | 3 | 4		
	G.C.D $= 2 \times 9 = 18$	M_1	
	Area $= 18 \times 18$	M_1	
	$= 324\ M^2$	A_1	(3)
7.	$360 - 120 = 240°$	M_1	
	$\frac{240}{360} \times 3.142 \times 2 \times 6.25$	M_1	
	$\simeq 26.18$	A_1	
			(2)

8. V.S.F $= \frac{6750}{2000} = 3.375$ M1

L.S.F $= 1.5$ M1

Radius $= \frac{15.5 \times 1.5}{2} = 11.625$

$= 11.6$ A1 (3)

9. Num: $6x^2 + 3xy - 12xy - 6y^2$

$3(x-2y)(2x+y)$ M1

Deno. $2(4x^2 - y^2)$

$2(2x-y)(2x+y)$ M1

$\frac{3(x-2y)(2x+y)}{2(2x+y)(2x+y)}$

$= \frac{3(x-2y)}{(2x-y)}$ A1 (3)

10. $\frac{1}{20.95} = \frac{1}{2.095 \times 10^1}$

$= 0.4773 \times 10^{-1}$

$= 0.0477$ B1 4 dp.

$\frac{5}{20.95} = 5 \times 0.0477 = 0.2385$ M1 A1 (3)

11. (i) $y \geq 0$

(ii) $y \leq 2x+4$ or $y - 2x \leq 4$

(iii) $y \leq -x+4$ or $y + x \leq 4$

(3)

12.

No	log
32.4	1.5105
0.04352	$\overline{2}.6387$ +
	0.1492
5.24^2	$0.7193 \times 2 = 1.4386$
	0.1492
	-1.4386
2.266×10^{-1}	$\overline{2}.7106 = T.3553$
	$\frac{2}{}$

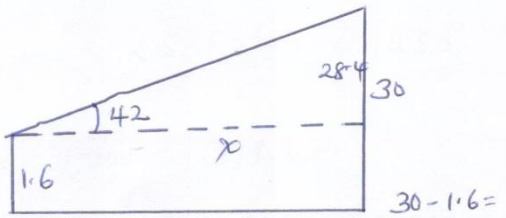
$0.2266 = 0.2266$

M1 ✓ All logs
M1 Addition and subtraction.
M1 Division by 2
A1
(4)

13 Area of $\Delta = \frac{1}{2} \times 14 \times 22 \sin 75 = 148.75$ M1
Area of sector $= \frac{75}{360} \times \frac{22}{7} \times 14^2 = 128.33$ M1

Shaded Area = 20.42 A1 (3)

14



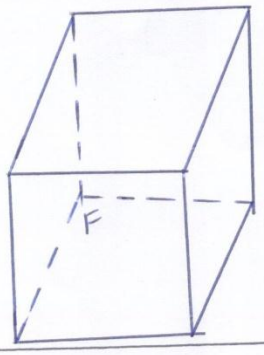
$30 - 1.6 = 28.4$

$\tan 42° = \frac{28.4}{x}$ M1
M1

$x \tan 42 = 28.4$

$x = 31.54$ A1 (3)

15



B1 Point F properly located.
B1 Broken lines
B1 Complete and Labelled diagram
(3)

(4)

16. $\underset{\sim}{p} = \begin{pmatrix}10\\20\end{pmatrix} - \begin{pmatrix}6\\10\end{pmatrix} = \begin{pmatrix}4\\10\end{pmatrix}$

$\underset{\sim}{q} = \begin{pmatrix}x\\12\end{pmatrix} - \begin{pmatrix}-10\\-18\end{pmatrix} = \begin{pmatrix}x+10\\30\end{pmatrix}$ M1

$\therefore \underset{\sim}{q} = 3\underset{\sim}{p}$ M1

$x+10 = 12$

$x = 2.$ A1

17 a) $48,000 - 20,000 = 28000$ M1

$\frac{8}{10}x = 28,000.$ M1

$x = 350,000$

$350,000 + 100,000 = 450,000$ M1 A1

b) $\frac{118}{100} \times 450,000 = 531,000$ M1

Comm. $\frac{8}{100} \times 531,000 = 42,480.$ M1 A1

c) $\frac{75}{100} \times 531,000 = 398,250$ M1

Comm: $\frac{8}{100} \times 398250 = 31860$

Total: $20,000 + 31,860$ m1

$= 51,860.$ A1 (10)

(5)

18. a) $\begin{pmatrix} 2 & 5 \\ 4 & 3 \end{pmatrix}$ Det $(2\times3)-(4\times5)=-14$

$$\frac{-1}{14}\begin{pmatrix} 3 & -5 \\ -4 & 2 \end{pmatrix} = \begin{pmatrix} -3/14 & 5/14 \\ 4/14 & -2/14 \end{pmatrix}$$ B1

b) $2L+5B = 156{,}000$ M1

(i) $4L+3B = 137{,}000$ M1

(ii) $\begin{pmatrix} 2 & 5 \\ 4 & 3 \end{pmatrix}\begin{pmatrix} L \\ B \end{pmatrix} = \begin{pmatrix} 156{,}000 \\ 137{,}000 \end{pmatrix}$ M1

$$-\frac{1}{14}\begin{pmatrix} 3 & -5 \\ -4 & 3 \end{pmatrix}\begin{pmatrix} 2 & 5 \\ 4 & 3 \end{pmatrix}\begin{pmatrix} L \\ B \end{pmatrix} = -\frac{1}{14}\begin{pmatrix} 3 & -5 \\ -4 & 2 \end{pmatrix}\begin{pmatrix} 156000 \\ 137,000 \end{pmatrix}$$ M1 Premultiplication

$$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}\begin{pmatrix} L \\ B \end{pmatrix} = -\frac{1}{14}\begin{pmatrix} -217000 \\ -350{,}000 \end{pmatrix} = \begin{pmatrix} 15{,}500 \\ 25{,}000 \end{pmatrix}$$ M1

$\therefore$ $L = 15{,}500$

$B = 25{,}000$ A1 both

c) $\begin{pmatrix} 2x-1 & 1 \\ x^2 & 1 \end{pmatrix}$ Det

$(2x-1)-(x)^2 = 0.$ M1

$2x-1-x^2 = 0.$

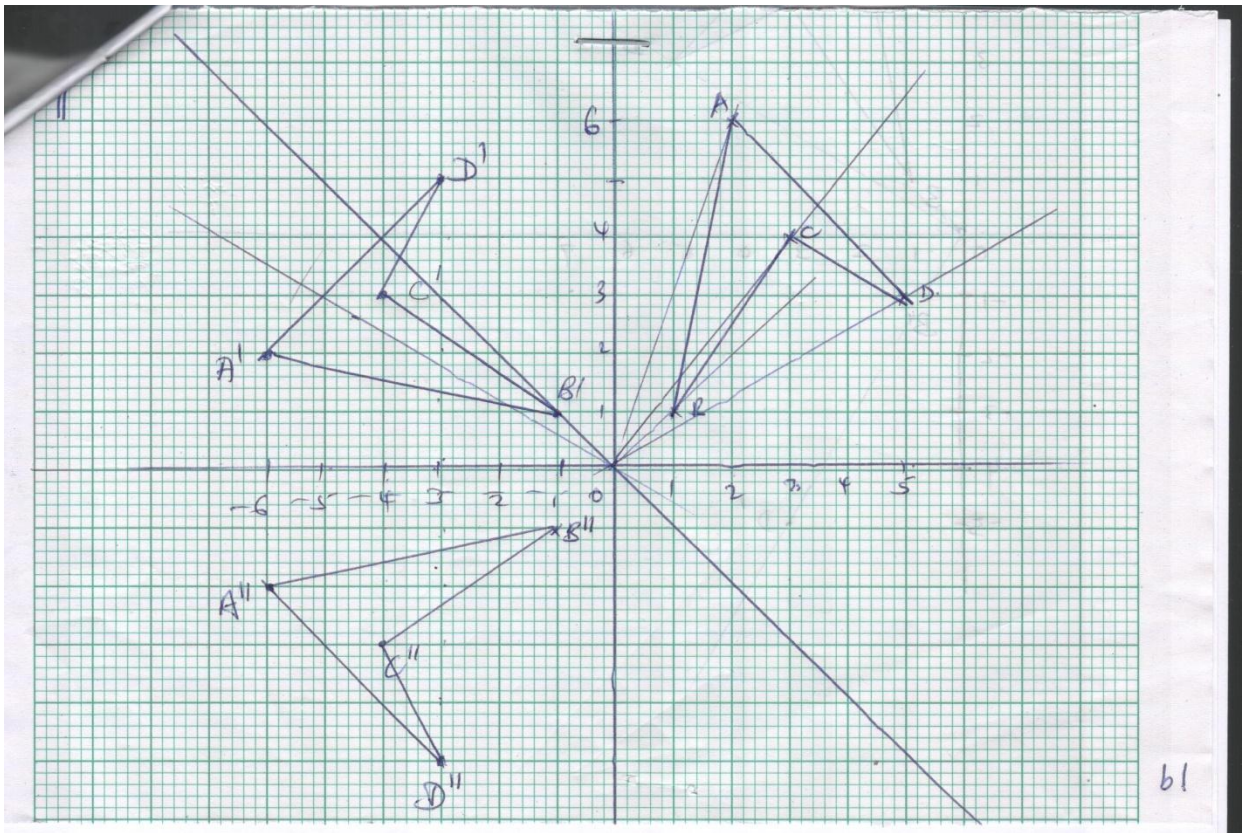
$-x^2+2x-1 = 0.$

$x^2-2x+1 = 0.$ M1

$(x-1)(x-1) = 0.$

$x = 1$ A1 (10)

(6)



b1

b) A'(-6,2) B'(-1,1) C'(-4,3) D'(-3,5) B_1

c) A''(-6,-2) B''(-1,-1) C''(-4,-3) D''(-3,-5) B_1

D) Equation $y = -x$ B_1

ABCD B_2

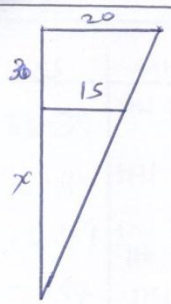
A'B'C'D' B^2

A''B''C''D'' B^2

L_1 for Line

(7)

20.



a) $\frac{20}{15} = \frac{30+x}{x}$ M1

$20x = 450 + 15x$ A1

$x = 90$

$V = \frac{1}{3}\pi R^2 H - \frac{1}{3}\pi r^2 h$.

$= \frac{1}{3} \times 3.142 \times 20^2 \times 120 - \frac{1}{3} \times 3.142 \times 15^2 \times 90$ M1M1 both areas.

$= 50272 - 21208.5$ Subtraction.

$= 29063.5\ cm^3$

$= 29.0635$ litres. A1

b) Volume of tank $= \pi r^2 H$.

$= 3.142 \times 1.2^2 \times 1.35$ M1

$= 6.109\ m^3$ A1

$= 6109$ litres

c) $\frac{2}{5} \times 6109 = 2443.6$ L. M1

$\frac{2443.6}{29.0635} = 84.08$ M1

$= 85$ buckets A1 (10)

(8)

2) a)

Class	tally	F
35-39	𝍸 III	8
40-44	𝍸 IIII	9
45-49	𝍸 𝍸 I	16
50-54	𝍸 I	6
55-59	I	1

B_1 B_1

b) Modal frequency = 16 B_1

c)

Class	Midpt (x)	F	FX	CF
35-39	37	8	296	8
40-44	42	9	378	17
45-49	47	16	752	33
50-54	52	6	312	39
55-59	57	1	57	40

$\Sigma F = 40$ $\Sigma FX = 1795$

B_1 – Mid point x

B_1 – FX column.

$$\text{Mean } \bar{x} = \frac{\Sigma FX}{\Sigma F} = \frac{1795}{40}$$ B_1

$$= 44.875$$ B_1

d) $44.5 + \frac{20-17}{16} \times 5$

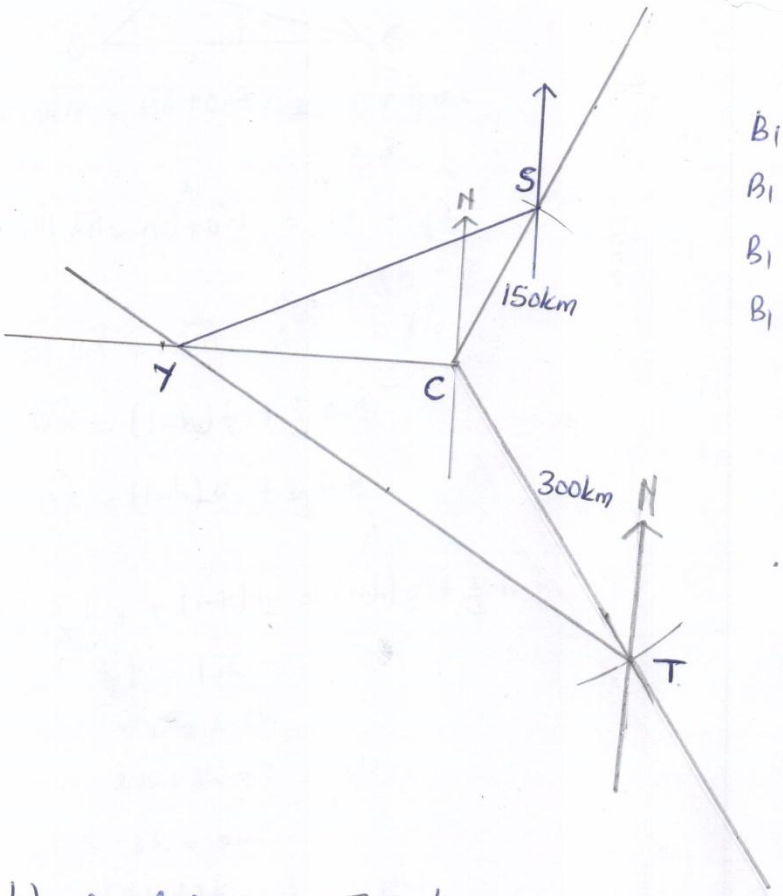
$= 45.4375$

B_1 – C.F

M_1

A_1

22)



B_1 for S ✓ located
B_1 for T ✓ located
B_1 for Y ✓ located
B_1 for Complete drg.

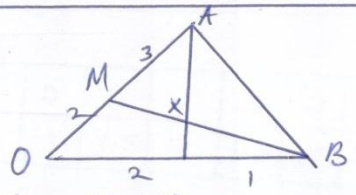
b) (i) $6.6 \times 50 = 330\,km$ ± 0.1 M1 A1

245°

(ii) $7.9 \times 50 = 395\,km$ ± 0.1 M1 A1

(iii) $9.4 \times 50 = 470\,km$ ± 0.9 M1 A1

23



a)(i) $\vec{BM} = \vec{BO} + \vec{OM} = -\underset{\sim}{b} + \frac{2}{5}\underset{\sim}{a}$

$= \frac{2}{5}\underset{\sim}{a} - \underset{\sim}{b}$ B1

(ii) $\vec{AN} = \vec{AO} + \vec{ON} = -\underset{\sim}{a} + \frac{2}{3}\underset{\sim}{b}$

$= \frac{2}{3}\underset{\sim}{b} - \underset{\sim}{a}$ B1

b) $\vec{BX} = k\vec{BM}$ $\quad \vec{AX} = h\vec{AN}$

$\vec{OX} = (1-k)\underset{\sim}{b} + \frac{2}{3}k\underset{\sim}{a}$ M1 A1

$\vec{OX} = (1-h)\underset{\sim}{a} + \frac{2}{3}h\underset{\sim}{b}$ M1 A1

c) $\frac{2}{3}k\underset{\sim}{a} + (1-k)\underset{\sim}{b} = (1-h)\underset{\sim}{a} + \frac{2}{3}h\underset{\sim}{b}$ M1

$\frac{2}{3}k = 1-h$

$2k = 3-3h$

$2k+3h = 3$ - (i)

$3-3k = 2h$ M1

$2k+2h = 3$ - (ii)

(i) ad (ii)

$h = 3/5$ A1

$k = 3/5$ A1 (10)

24.

x	0	1	2	3	4	5	6
y	1	3.5	7	11.5	17	23.5	31

B_1 B_1

a) $A = \frac{1}{2} \times 1 \{(1+31) + 2(3.5+7+11.5+17+23.5)\}$ M1

$= \frac{1}{2} \times (32+125)$ M1

$= \frac{1}{2} \times 157$

$= 78.5$ A1

b) $\int_0^6 (\frac{1}{2}x^2 + 2x + 1)dx$

$= \left[\frac{x^3}{6} + x^2 + x\right]_0^6$ M1

$= \frac{(6)^3}{6} + 6^2 + 6.$ M1

$= 78$ sq. units A1

c) $\frac{78.5-78}{78} = \frac{0.5}{78} \times 100$ M1 M1

0.64% A1