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 $= \frac{6750}{2000} = 3.375$

L.S.F $= 1.5$ M1

Radius $= \frac{15.5 \times 1.5}{2} = 11.625$ M1

$= 11.6$ 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	$\bar{2}.6387$ +
	0.1492
5.24^2	$0.7193 \times 2 = 1.4386$
	0.1492
	-1.4386
2.266×10^{-1}	$\bar{2}.7106 = T.3553$
	2

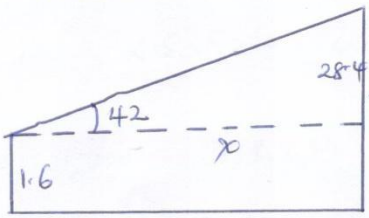
$0.2266 = 0.2266$

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.



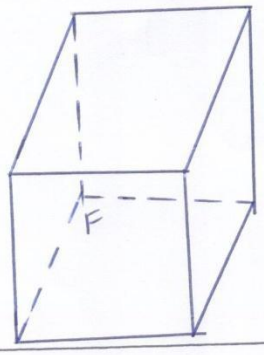
$30 - 1.6 = 28.4$

$\tan 42° = \frac{28.4}{x}$ M1

$x \tan 42 = 28.4$ M1

$x = 31.54$ A1 (3)

15.



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

(4)

16. $\underset{\sim}{p} = \begin{pmatrix}10\\20\end{pmatrix} - \begin{pmatrix}6\\10\end{pmatrix} = \begin{pmatrix}4\\10\end{pmatrix}$ M1

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

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

$x+10 = 12$

$x = 2.$ A1

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

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

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

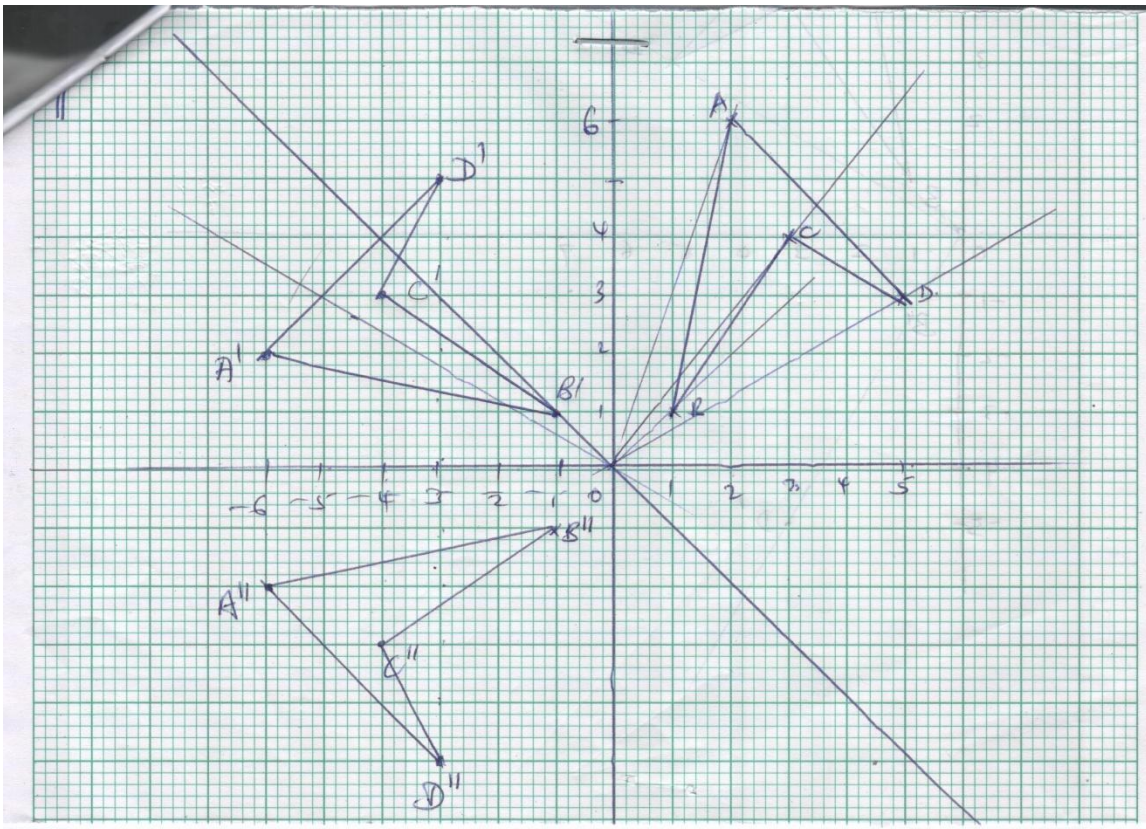
$-x^2+2x+1=0.$

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

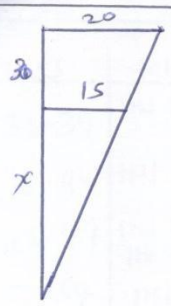
A'B'C'D' B^2

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. Subtraction.

$= 50272 - 21208.5$

$= 29063.5\ cm^3$

$= 29.0635$ 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 111	8
40-44	𝍸 1111	9
45-49	𝍸 𝍸 1	16
50-54	𝍸 1	6
55-59	1	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

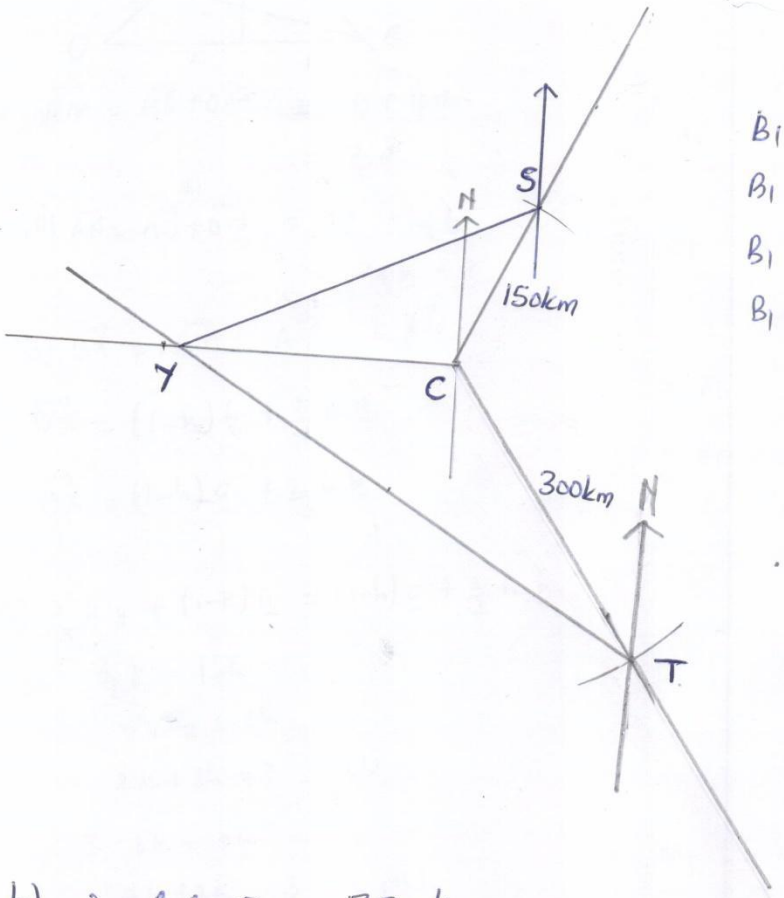
$$= 44.875$$ B_1

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

$$= 45.4375$$

B_1 – CF
M_1
A_1

22)



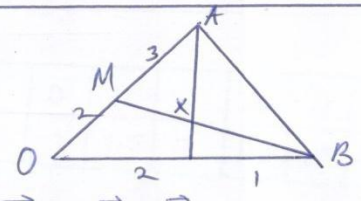
B_1 for S ✓ located
B_1 for T ✓ located
B_1 for Y ✓ located
B_1 for Complete drg.

b) (i) $6.6 \times 50 = 330$ km
245° ± 0.1 M1 A1

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

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

$3-3k = 2h$

$2k+2h = 3$ --(ii) M1

(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) $A = \frac{1}{2} \times 1 \{(1+31) + 2(3.5+7+11.5+17+23.5)\}$ M_1

$= \frac{1}{2} \times (32+125)$ M_1

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

$= 78.5$ A_1

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

$= \left[\frac{x^3}{6} + x^2 + x\right]_0^6$ M_1

$= \frac{(6)^3}{6} + 6^2 + 6.$ M_1

$= 78$ sq. units A_1

c) $\frac{78.5-78}{78} = \frac{0.5}{78} \times 100$ M_1 M_1

0.64% A_1