

BUKAKA CLUSTER EXAMINATIONS

Pre-Kenya Certificate of Secondary Education

MATHEMATICS

PAPER 1

2 ½ HOURS

FORM 4

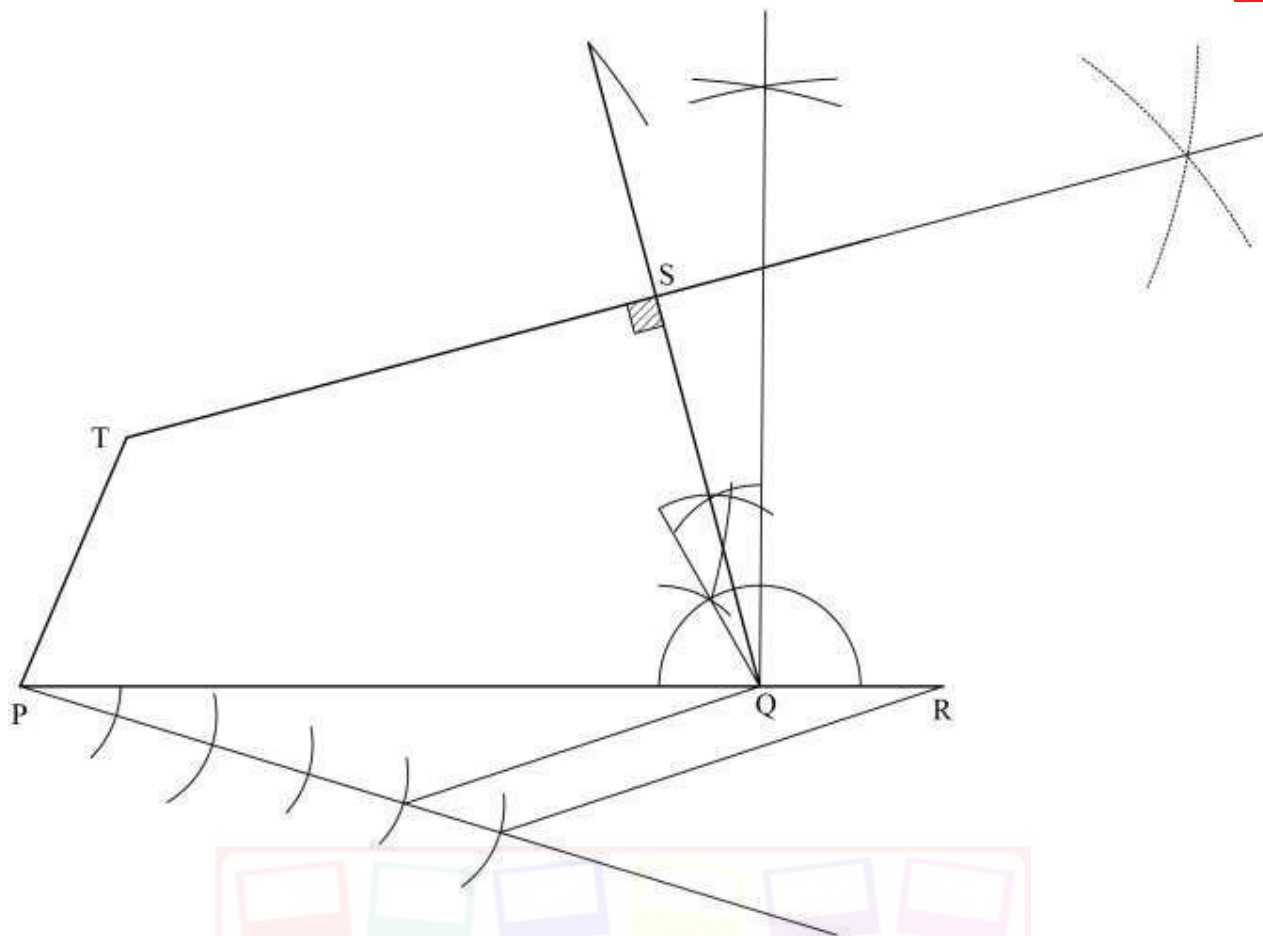
END OF TERM 1, 2025



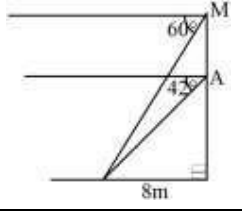
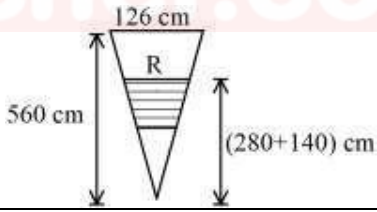
CONFIDENTIAL

SECTION I (50 marks)

NO.	WORKINGS	MARKS	COMMENTS
1	$\frac{2.4 \times 10^{-5}}{9.6 \times 10^{-3}} = \frac{2.4}{9.6} \times 10^{-5-(-3)}$ $= 0.25 \times 10^{-2} = 2.5 \times 10^{-3}$	M1 A1	✓ Division CAO
		2	
2.	Food = $\frac{1}{2}$ Trans = $\frac{1}{20}$ Rem = $\frac{1}{4}$ Fraction of saving $= 1 - \left(\frac{1}{2} + \frac{1}{20} + \frac{1}{4}\right) = 1 - \frac{16}{20} = \frac{4}{20}$ Salary = $3400 \times \frac{20}{4}$ = KSh. 17000	M1 M1 A1	□ Fraction
3	The numbers are 37, 43, 43, 49, 55, 61 $\bar{x} = \frac{37 + 43 + 43 + 49 + 55 + 61}{6}$ $\bar{x} = 48$	B1 M1 A1	✓ Values of the 6 numbers CAO
		3	
4	$108 \text{ km/h} = 108 \times \frac{5}{18} = 30 \text{ m/s}$ $\frac{x+120}{30} = 7$ $x = 210 - 120 = 90\text{m}$	B1 M1 A1	
		3	



5		B1 B1 B1 B1	✓ Division of line PR ✓ construction of 75° ✓ dropping of $\perp$ ar from T ST = 7.3 cm
		4	
6	$3^{4(x-1)} \div 3^{-2(x+2)} = 3^{\frac{3}{2}}$ $4(x-1) + -2(x+2) = 1.5$ $4x - 4 - 2x - 4 = 1.5$ $2x = 9.5$ $x = 4.75$	M1 M1 A1	✓ Exp. with base 3 ✓ Equating the pwr
		3	

7	$\tan 42^\circ = \frac{h}{8} \Rightarrow h = 8 \tan 42^\circ = 7.203 \text{ m}$ $\tan 60^\circ = \frac{H}{8} \Rightarrow H = 8 \tan 60^\circ = 13.856 \text{ m}$ $AM = 13.856 - 7.203 = 6.653 \approx 6.65$	M1 M1 A1	
		3	
8	$(2x+1)(x-1) = x^2 + 29 \Rightarrow 2x^2 - x - 30 = 0$ $(x-6)(x+5) = 0$ $x = 6 \text{ or } x = -5(\text{ignore})$ $P = 2\{[2(6)+1] + [6-1]\} = 36 \text{ cm}$	M1 M1 A1 B1	✓ Eqn formed ✓ Factorization ✓ CAO ✓ Perimeter
		4	
9	$\Delta ABC = \sqrt{21(21-13)(21-14)(1-15)} = 84 \text{ cm}^2$ $\frac{1}{2} \times 15 \times h = 84$ $h = 11.2 \text{ cm}$ $DC = \sqrt{13^2 - 11.2^2} = 6.6 \text{ cm}$ $\text{Area of the trapezium} = \frac{1}{2} \times 11.2 \times 6.6 + 84$ $= 120.96 \text{ cm}^2$	M1 M1 M1 A1	✓ Area of ABC ✓ Finding height ✓ Area of trap. CAO
		4	
10	$\frac{280+h}{h} = \frac{126}{63} \Rightarrow h = 280 \text{ cm}$ $\frac{R}{140+280} = \frac{126}{560}$ $R = 94.5 \text{ cm}$	M1 M1 A1	
		3	
11	$\text{LCM} = 2 \times 2 \times 3 \times 5 = 60 \text{ sec}$ $\text{Time} = 2630 - 2330 = 3 \text{ hrs}$ $\text{No. of times} = \frac{3 \times 60 \times 60}{60}$ $= 180$	B1 M1 A1	
		3	
12	$\text{Interior angle of P} = 360^\circ - (108^\circ + 90^\circ) = 162^\circ$ $\text{Exterior angle of P} = 180^\circ - 162^\circ = 18^\circ$ $\text{No. of sides of P} = \frac{360^\circ}{18^\circ}$ $= 20 \text{ sides}$	M1 M1 A1	
		3	

13	$9600 \times 125.30 = \text{kshs } 1,202,880$ <i>Given</i> $= \text{kshs } 1,142,736$ <i>Spent</i> $= \frac{3}{4} \times 1,142,736$ $= \text{ksh } 857,052$ <i>Back to US \$</i> $= \frac{1,142,736 - 857,052}{63.20}$ $= 4520.3164 \text{ dollars}$ $\approx \$ 4520$	M1 M1 A1	
		3	
14.	$4x - 3 \leq \frac{1}{2}(x + 8) < x + 5$ $8x - 6 \leq x + 8 < 2x + 10$ $8x - 6 \leq x + 8$ $8x - x \leq 14$ $7x \leq 14$ $x \leq 2$ $x + 8 < 2x + 10$ $x - 2x < 10 - 8$ $-x < 2$ $x > -2$ $= -2 < x \leq 2$ 	B1 B1 B1	
		3	
15	Volume of object = $165 - 110 = 55\text{ml} = 55\text{cm}^3$ Mass of water and object = $642.3 - 238.6 = 403.7\text{g}$ Mass of object = $403.7\text{g} - 110\text{g} = 293.7\text{g}$ $p = \frac{293.7\text{g}}{55\text{cm}^3}$ $p = 5.34\text{g/cm}^3$	M1 M1 A1	✓ Volume of object ✓ Mass of object (HINT: Density of water = 1g/cm^3) CAO
		3	

16	$6ax - 3ay - 4bx + 2by = (3a - 2b)(2x - y)$ $8ay + 2by - 16ax - 4bx = 2(4a + b)(y - 2x)$ $\frac{(3a - 2b)(2x - y)}{2(4a + b)(y - 2x)} = \frac{-(3a - 2b)}{2(4a + b)} = \frac{2b - 3a}{8a + 2b}$	M1 M1 A1	$\frac{3a - 2b}{-8a - 2b}$
		3	



SECTION II (50 marks)			
17	(a) $Comm. = \frac{5}{100} \times 100000 + \frac{6}{100} \times 150000 + \frac{8}{100} \times 120000$ $= 5000 + 9000 + 9600 = \text{Ksh } 23600$ Total earnings = 30000 + 23600 = Ksh 53600 (b) $Comm. = 57600 - 30000 = 27600$ Let sales be Ksh x $27600 = 5000 + 9000 + \frac{8}{100}(x - 250000)$ $13600 = \frac{8}{100}(x - 250000)$ $x = \text{Ksh } 420000$ (c) S.P per computer = $\frac{93}{100} \times 42000$ = Ksh 39060 $Commission = 73872 - \left(\frac{110}{100} \times 30000 \right) = 40872$ $40872 = 5000 + 9000 + \frac{8}{100}(S - 250000)$ Sales = 585900 $n = \frac{585900}{39060}$ = 15 computers	M1 M1 A1 M1 M1 A1 B1 M1 A1	
		10	
18	(a) $QRS = 90^\circ$ (Subst. by the remainder) $PRS = 90 - 70 = 20^\circ$ (b) $POQ = 2 \times 70^\circ = 140^\circ$ at centre is twice at circumference (c) $\angle RQP = \frac{180-70}{2} = 55^\circ$ (Base angles of a $\triangle$) RQP and PSE are supplementary (cyclic quadrilateral) $4 \text{ PSR} = 180 - 55 = 125^\circ$ $QSR = 125 - 70 = 55^\circ$ (d) $\angle PSQ = \angle PRQ = 70^\circ$ (Subst. by same arc) $QSP = SPO = 70^\circ$ (base angles of isoscles $\triangle$) Reflex POS = 360 - 40 = 320°	B1 B1 B1 B1 B1 B1 B1 B1 B1 B1	
		10	



19	(a)(i) $\text{Grad} = \frac{7+1}{5+3} = 1$ $\frac{y-7}{x-5} = 1$ $y = x + 2$ at x - int, $y = 0$ $\therefore$ x - int. is -2 (ii) $M = \left(\frac{-3+5}{2}, \frac{-1+7}{2} \right) = (1, 3)$ $\frac{y-3}{x-1} = -1$ $y = -x + 4$ (b) $3y = x$ $y = -x + 4$ $m y = -3y + 4$ $y = 1, x = 3$ $B(3, 1)$ Let $D(a, b)$ $\frac{a+3}{b+1} = 1 \therefore a = -1, 2$ $\frac{b+1}{2} = 3 \therefore b = 5$ $D(-1, 5)$	M1 M1 A1 M1 A1 M1 A1 M1 A1	
		10	
20.	$= \frac{2}{3} \times 90 = 210\text{km}$ Remaining distance = $360 - 210 = 150\text{km}$ As = $90 + 110 = 200\text{km}$ Time for meeting = $\frac{150\text{km}}{200\text{km/hr}} = 0.75 \text{ hrs}$ = 45 mins Meeting time = 10.35 $+ \frac{.45}{11.20 \text{ a.m}}$ (ii) Distance from A $210 + (0.75 \times 90)$ $= 210 + 67.5$ $= 277.5 \text{ km}$ (b) Time minibus arrived at B Time = $\frac{D}{S} = \frac{360}{90} = 4 \text{ hrs}$ = $8.15 + 4 \text{ hrs} = 12.15 \text{ p.m}$ Time taken by the tourist to arrive B = $12.15 \text{ pm} - 10.30 \text{ a.m} = 1 \text{ hr } 45 \text{ min}$ $= \frac{145}{60} \times 100$ = 175km 4 Home to B = 175km Home to A = $360 - 175$ = 185km	B1 B1 M1 A1 M1 A1 M1 M1 A1 B1	Distance covered by minibus for $\frac{21}{3} \text{ hrs}$ Ans CAO

21	(a) $A^2 = \begin{pmatrix} 5 & 3 \\ 12 & 7 \end{pmatrix} \begin{pmatrix} 5 & 3 \\ 12 & 7 \end{pmatrix} = \begin{pmatrix} 61 & 36 \\ 144 & 85 \end{pmatrix}$ $A^2 - 12A - I = \begin{pmatrix} 61 & 36 \\ 144 & 85 \end{pmatrix} - 12 \begin{pmatrix} 5 & 3 \\ 12 & 7 \end{pmatrix} - \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ $= \begin{pmatrix} 61 & 36 \\ 144 & 85 \end{pmatrix} - \begin{pmatrix} 60 & 36 \\ 144 & 84 \end{pmatrix} - \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$ (b)(i) $12x + 10y = 22500$ $6x + 5y = 11250$ $10x + 10y = 20100$ $x + y = 2010$ (ii) $\begin{pmatrix} 6 & 5 \\ 1 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 11250 \\ 2010 \end{pmatrix}$ Inverse of $\begin{pmatrix} 6 & 5 \\ 1 & 1 \end{pmatrix}$ is $\begin{pmatrix} 1 & -5 \\ -1 & 6 \end{pmatrix}$ $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1 & -5 \\ -1 & 6 \end{pmatrix} \begin{pmatrix} 11250 \\ 2010 \end{pmatrix} = \begin{pmatrix} 11250 - 10050 \\ -11250 + 12060 \end{pmatrix}$ $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1200 \\ 810 \end{pmatrix}$ Calculator = Ksh 1200, Revision Book = Ks 810 (c) $\begin{pmatrix} 5 & 7 \end{pmatrix} \begin{pmatrix} 1200 \\ 810 \end{pmatrix}$ $(6000 + 5670) = \text{Ksh } 11670$	M1	
		M1	
		A1	
		B1	
		M1	
		M1	
		M1	
		A1	
		M1	
		A1	
		10	

22

(a)(i)

x	f	fx
12	11	132
19.5	8	156
32	9	288
42	4	168
49.5	6	297
62	t	$62t$

$$35.7 = \frac{132 + 156 + 288 + 168 + 297 + 62t}{11 + 8 + 9 + 4 + 6 + t}$$

$$37.5 = \frac{1041 + 62t}{38 + t}$$

$$1356.6 + 35.7t = 1041 + 62t$$

$$315.6 = 26.3t$$

$$t = 12$$

B1

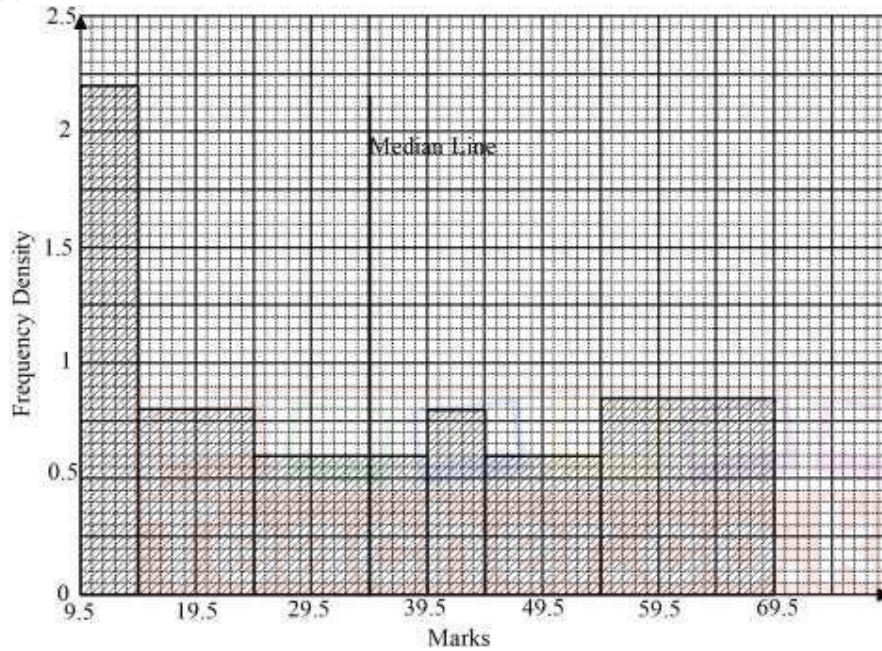
M1

A1

(ii) $69.5 - 54.5 = 15$

B1

(b)



B1

B2

(c) $\frac{\text{Total Area}}{2} = 25$

$$w \times 0.6 = 25 - 19$$

$$w = 10$$

$$\text{Median} = 24.5 + 10$$

$$= 34.5$$

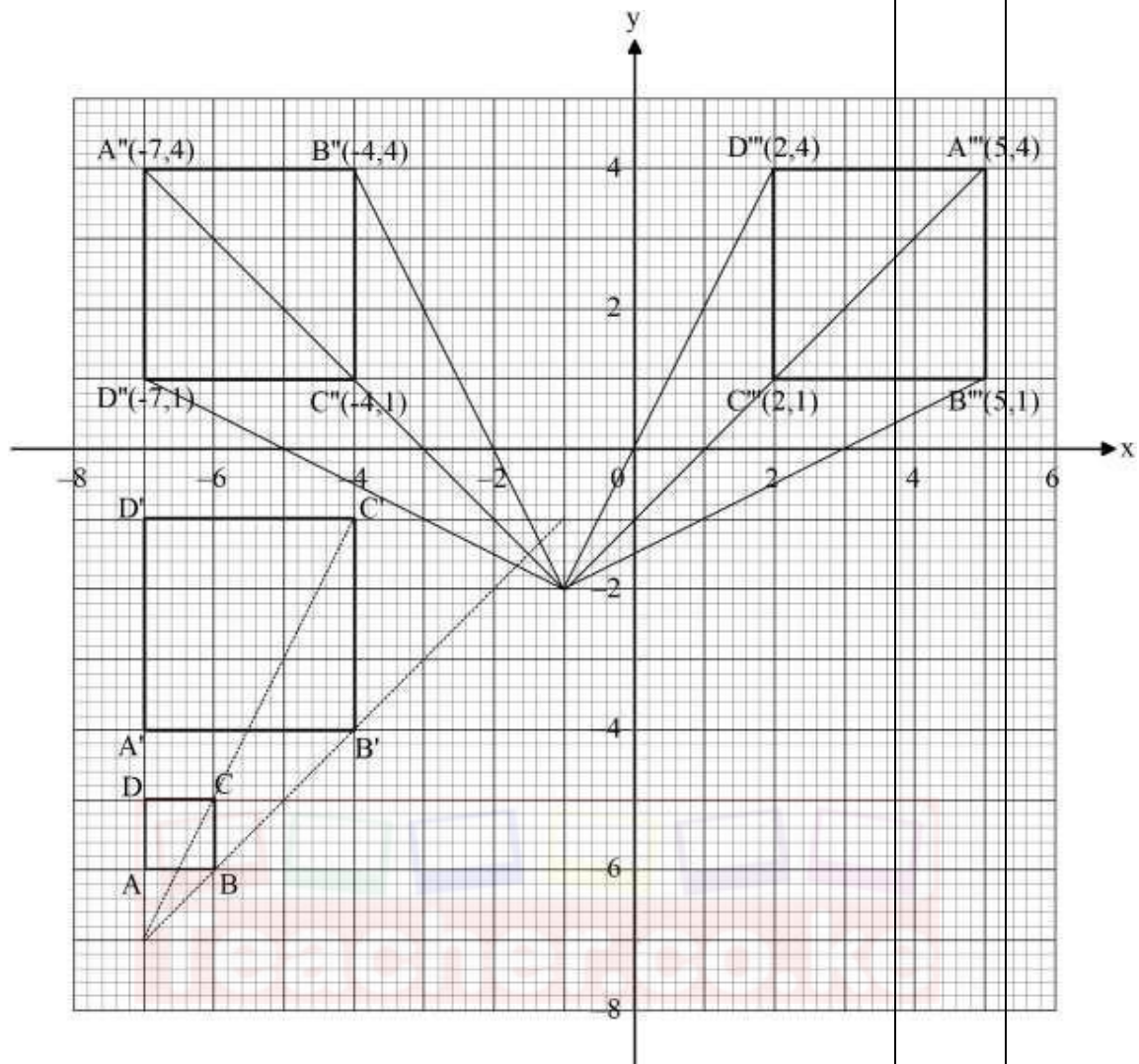
M1

M1

A1

10

23



- (a) Centre of enlargement correctly located
 Vertices of $A'B'C'D'$ correctly located
 $A'B'C'D'$ correctly drawn

B1
 B1
 B1

- (b) $A''B''C''D''$ correctly drawn Correct
 vertices of $A''B''C''D''$

B1
 B1

- (c) (i) -90° turn about centre $(-1, -2)$

B1
 B1
 B1

- (ii) $A'''B'''C'''D'''$ correctly drawn

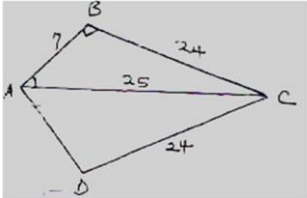
Vertices of $A'''B'''C'''D'''$ correctly labeled

- (d) (i) $A'B'C'D'$ and $A''B''C''D''$

B1
 B1

- (ii) $A'B'C'D'$ and $A'''B'''C'''D'''$

10

24.	(a)  Triangle ABC $b^2 + h^2 = hy^2$ $AB^2 + BC^2 = AC^2$ $7^2 + 24^2 = 25^2$ $49 + 576 = 625$ $625 = 625$ (b) $\angle BAD = 2\angle BAC$ $\sin \angle BAC = \frac{24}{25} = 73.74^\circ$ $\angle BAD = 73.74 \times 2 = 147.48^\circ$ (c) Area of kite = $\frac{1}{2} \times 7 \times 24 \times 2$ $\text{Area of sector ABD} = \frac{147}{360} \times 3.14 \times 7^2$ $= 62.87 \text{ cm}^2$ $\text{Area shaded} = 168 - 62.87$ $= 105.13 \text{ cm}^2$	M1 A1 B1 B1 M1A1 M1 A1 A1 A1	
		10	



