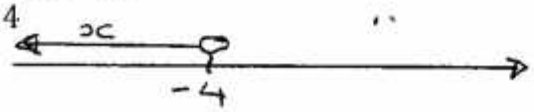
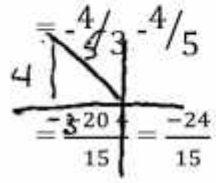
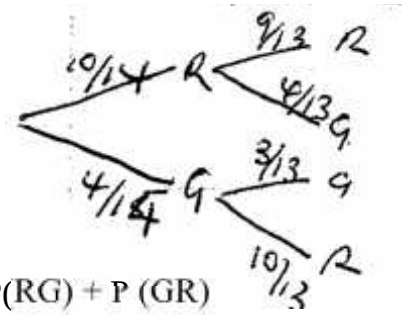
WAKISSHA JOINT MOCK EXAMINATIONS
MARKING GUIDE
Uganda Certificate of Education
UCE August 2016
MATHEMATICS 456/1

SOLUTION	MARKS	COMMENTS
1. $3*2 = 3^2 \times 2 - 3 \times 2^2$ $= 18 - 12 = 6.$ $(3*2) * 4 = 6*4$ $= 6^2 \times 4 - 6 \times 4^2$ $= 144 - 96 = 48$	M_1 A1 M_1 ✓ A_1	 C's 6 cao
2. $(x-3)(x-5) = (x-7)(x-7) + 56$ $x^2 - 8x + 15 = x^2 - 14x + 49 + 56$ $6x = 90$ $x = 15$	M_1 M_1 M_1 ✓ A_1	Correct expression Simplification of both sides
3. $\frac{x-1}{3} + \frac{x}{4} > \frac{2x}{3}$ $4(x-1) + 3x > 4(2x)$ $4x - 4 + 3x > 8x$ $-4 > -4$  	M_1 M_1 A_1 B_1	- Lineas expression - Simplification Correct number line
4. $x2 + 8x - 20$ $= x2 + 10x - 2x - 20$ $= x(x+10) - 2(x+10)$ $= (x-2)(x+10)$ $(x-2)(x+10) = 0$ $x = 2, x = 10$	M_1 A_1 M_1 ✓ A_1	Factorization ✓C's factorization both
5. $\tan\theta - \sin\theta$ $= -4/3 - -4/5$  	B_1 M_1 M_1 ✓ A_1	sketch or implied values OF tanθ, sinθ subtraction of c's values
6. $\frac{13+8+6+0+3+12+x+11+5}{9} = 7$ 58 $x = 5$ 0,3,5,5,6,8,11,12,13 Median = 6	M_1 A_1 M_1 ✓ A_1	Equation CaO Arrangement of c's value.

7.  P(RG) + P (GR) $= \frac{10}{14} \times \frac{4}{13} + \frac{4}{14} \times \frac{10}{13}$ $= \frac{20}{91} + \frac{20}{91}$ $= \frac{40}{91}$	B_1 M_1 M_1✓ A_1	probability tree or implied - for P(RG) + P(GR) - c's probabilities
8. $\frac{x+6}{2} = 4$ $X = 2$ $\frac{y+3}{2} = 5$ y y = 7 Coordinate is P(2, 7)	M_1 M_1 A_1 A_1	for $\frac{x+6}{2} = 4$ for $\frac{y+5}{2} = 3$ Both x = 2, y = 1 Correct coordinate
9. $3qy = 2xr - xq$ $3qy + xq = 2xr.$ $q(3y + x) = 2xr$ $q = \frac{2yx}{3y+x}$	M_1 M_1 M_1 A_1	Multiplication Like terms factorisation
10. $n^2 = 17^2 - 8^2$ n = 15 length of chord = 15 x 2 30	M_1 A1 M_1 ✓ A_1	 C's n CaO.
11. f x cf fx tally 1.0 – 1.4 | 2 | 1.2 | 2 | 2.4 | || 1.5 – 1.9 | 3 | 1.7 | 5 | 5.1 | ||| 2.0 – 2.4 | 4 | 2.2 | 9 | 8.8 | |||| 2.5 – 2.9 | 6 | 2.7 | 15 | 16.2 | 卌 3.0 – 3.4 | 6 | 3.2 | 21 | 19.2 | 卌 3.5 – 3.9 | 9 | 3.7 | 30 | 33.3 | 卌|||| 4.0 – 4.4 | 6 | 4.2 | 36 | 25.2 | 卌 4.5 – 4.9 | 4 | 4.7 | 40 | 18.8 | |||| | 40 | | | 129 |	B_6 ✓	B_1 – for classes B_1 – for f B_1 – for *x* B_1 – for cf B_1 – for fx B_1 – Tally B_1 for each column

(b) (i) class interval (2.4 – 2.0) + 0.1 = 0.5	B_1	
(ii) modal class = 3.5 – 3.9 (3.45 – 3.95)	B_1	
(c) (i) mean $= \frac{\varepsilon fx}{\varepsilon f}$ $= \frac{129}{40} = 3.225.$	M_1 ✓ A_1	C's Σfx and Σf
(ii) median $L + \left(\frac{\frac{n}{2} - Cfb}{fm}\right)C$		
$2.95 + \left(\frac{20-15}{6}\right)0.5$	M_1	
$= 2.95 + \left(\frac{5}{6} X\ 0.5\right)$		
= <u>3.3667.</u>	A_1	Accept 3.37 or 3.367
12. (a) (i) $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$	B_1	matrix
(ii) $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$	B_1	matrix
(b) (i) $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}\begin{pmatrix} -1 & -2 & 2 \\ 8 & 9 & 11 \end{pmatrix} =$	M_1 ✓	all correct entries
$\begin{pmatrix} -8 & -9 & -11 \\ -1 & -2 & 2 \end{pmatrix}$	A_1	
X^1 (-8, -1) Y^1 (-9, -2) Z^1 (-11, 2)	B_2	all points
(ii) $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}\begin{pmatrix} -8 & -9 & -11 \\ -1 & -2 & 2 \end{pmatrix}$	M_1 ✓	all correct entries
$\begin{pmatrix} 1 & 2 & -2 \\ 8 & 9 & 11 \end{pmatrix}$	A_1	
X^{11} (1, 8) Y^{11} (2, 9) Z^{11} (-2, 11)	B_2	all points
(C) it is a reflection y axis or x = 0 $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$	B_1	marks
Reflection in y – axis or x = 0	B_1	
	12	

13. (a)

x	-4	-3	-2	-1	0	1	2	3
x^2	16	9	4	1	0	1	4	9
2x	-8	-6	-4	-2	0	2	4	6
-12	-12	-12	-12	-12	-12	-12	-12	-12
y	-4	-9	-12	-13	-12	-9	-4	3
-8	-8	-8	-8	-8	-8	-8	-8	-8
y	-12	-11	-10	-9	-8	-7	-6	-5

B_1
B_1
B_1

B_2
B_1
B_1
B_2

(b) on graph paper — B1

(c) (i) $x = 2.6 \pm 0.1$ — B_1

(ii) $x_1 = -2.6 \pm 0.1$
$x_2 = 1.6 \pm 0.1$ — B_1 B_1

B_1-plotting c's points on curve
B_1- smooth curve through the pts.
B_1- straight line

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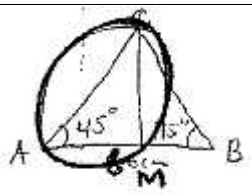
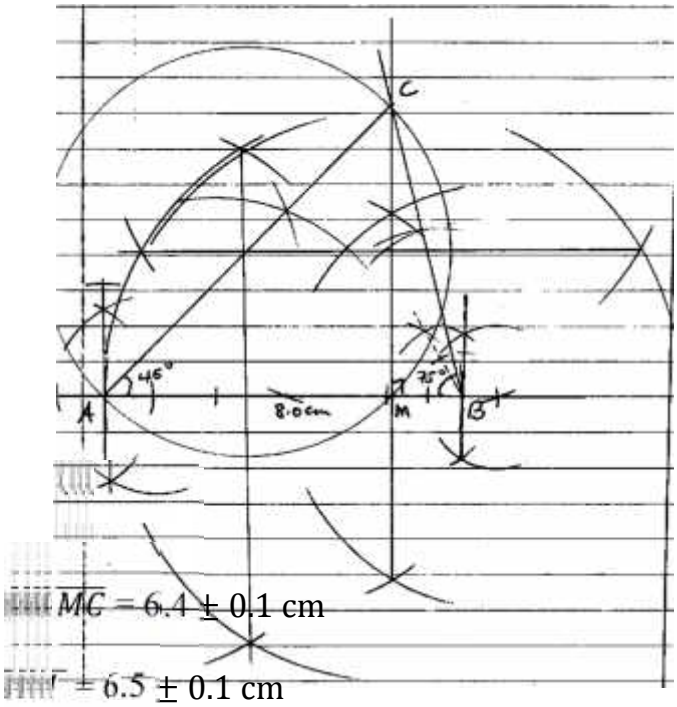
14. Sketch

(a)





B_1 Sketch

B_1 AB = 8cm
B_1 $\angle ABC = 75^0$ (arcs seen)
B_1 $\angle ABC = 45^0$ arcs seen
B_1 Perpendicular from C to AB

B_1 B_1 Perpendicular bisectors from AMC.

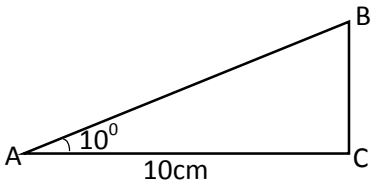
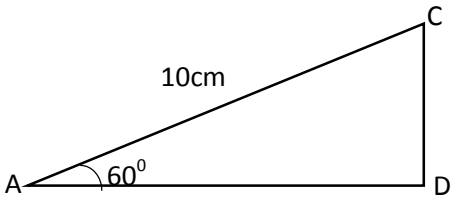
B_1 - the circle

$MC = 6.4 \pm 0.1$ cm

$r = 6.5 \pm 0.1$ cm — B_1

Area = $\frac{1}{2}$ x 6.4 x 6.4 =
$20.48cm^2$/$21.125cm^2$/$19.845cm^2$ — M_1 ✓ A_1 C's values (Accept alternatives)

(c) Radius = 4.6 ± 0.1 cm — B_1

15  $\cos 10^0 = \frac{10}{AB}$ $AB = 10.154$ cm (3.d.p) (b)  $\text{Cos } 60^0 = \frac{AD}{10}$ AD = 10 COS 60^0 AD = 5cm. (c) Area of ABCD = Area of ABC + Area of ADC $= \left(\frac{1}{2} \times 10 \times 10.154 \sin 10^0\right) + \left(\frac{1}{2} \times 5 \times 10 \times \sin 60^0\right)$ = 8.81611798 + 21.65063500 = 30.467 cm^2 (3.d.p) M_1 A_1	M_1 A_1 M_1 A_1 M_2A_1 M_2A_1 $M_1\surd$ A_1	 For 8.81611798 area of ABC 21.65063500 area of ADC C's area Accept alternative.
16.(a) PR = Q (2 X 2).R = (2 x 1) (2 x 2) (a x b) = (2 x 1) 2 = a & b = 1 (i) ∴ order of R is (2 x 1) matrix (ii) $\begin{pmatrix} 4 & 3 \\ -2 & 1 \end{pmatrix}\begin{pmatrix} m \\ n \end{pmatrix} = \begin{pmatrix} 11 \\ 7 \end{pmatrix}$ $\begin{pmatrix} 1 & -3 \\ 2 & 4 \end{pmatrix}\begin{pmatrix} 4 & 3 \\ -2 & 1 \end{pmatrix}\begin{pmatrix} m \\ n \end{pmatrix} = \begin{pmatrix} 1 & -3 \\ 2 & 4 \end{pmatrix}\begin{pmatrix} 11 \\ 7 \end{pmatrix}$ $\begin{pmatrix} 10 & 0 \\ 0 & 10 \end{pmatrix}\begin{pmatrix} m \\ n \end{pmatrix} = \begin{pmatrix} -10 \\ 50 \end{pmatrix}$ 10m = -10 M = -1 10n = 50 n = 5 R = $\begin{pmatrix} -1 \\ 5 \end{pmatrix}$	B_1 M_1 M_1 M_1 A_1 A_1	 Accept alternative simplification for both

(b) $3(x + 2) – 2 (y – 1)$ $= 4$ $3x + 6 – 2y + 2 = 4$ $3x – 2y = -4$ …….(i) $2(1 – y) – 3(x + 2) =$ 0 $2 – 2y – 3x – 6 = 0$ $-3x – 2y = 4$ $3x + 2y = -4$…….(ii) $3x – 2y = -4$ $+3x + 2y = -4$ $6x + 0 = -8$ $X = \frac{-8}{6} = \frac{-4}{3}$. $3x – 2y = -4$ $-3x + 2y = -4$ $-4y = 0$ $Y = 0$ $A = \begin{pmatrix} \frac{4}{3} + 2 & 2 \\ 0 - 1 & 3 \end{pmatrix} = \begin{pmatrix} \frac{2}{3} & 2 \\ -1 & 3 \end{pmatrix}$ $B = \begin{pmatrix} 2 & \frac{-4}{3} + 2 \\ 3 & 1 - 0 \end{pmatrix} = \begin{pmatrix} 2 & \frac{2}{3} \\ 3 & 1 \end{pmatrix}$	M_1 M_1 M_1 A_1 A_1 A_1 12	equation equation Solving the 2 equations Both *x* and y
17. (a) $40x + 80y \geq 400$ $x + y \leq 8$ $y \leq 4$ $x \geq 0$ $y \geq 0$ (b) $40x + 80y = 400$ $x + 2y = 10$ x | 0 | 10 ; y | 5 | 0 — Points are (0.5) & (10,0) $x + y = 8$ x | 0 | 8 ; y | 8 | 0 — Points are (0.8) & (8,0) $y = 4$ $y = 0$ $x = 0$ Region For $x + 2y = 10$ (0, 0) $0 + 0 \leq 0$	B_1 B_1 B_1 B_1 B_1 B_1 B_1 B_1 B_1	correct shading correct line correct shading correct Line line y = 4 correct shading

(c)(3,4) = 200,000(3) + 300,000(4) = 1,800,000 (2,4) = 200,000(2) + 300,000(4) = 1,600,000 (4,4) = 200,000(4) + 300,000(4) = 2,000,000 (4,3) = 200,000(4) + 300,000(4) = 1,700,000 The maximum cost is Shs 2,000,000 when using 4 small vans and 4 large buses.	M_1 A_1 B_1	