KAKAMEGA CENTRAL SUB COUNTY JOINT EVALUATION EXAM.
121/1
MATHEMATICS PAPER 1
MARKING SCHEME

1.
2. 11/2 – 8/7 (6/5 + 9/10) + 1/3 of (2/3 x 6/5)
   11/2 – 8/7 (21/10) + 1/3 x 4/5
   11/2 – 8/7 x 21/10 + 1/3 x 4/5 — M1 Removing brackets
   11/2 + 4/5 – 12/5 — M1 BODMAS
   101/30 = 3 11/30 — A1 Simplified
3. (4x – 5) + (4x +5) + 3x + (4x+26) + 2x + 2x + 5 = 720 — M1
   19 x + 31 = 720 — M1
   19x = 689
   X = 689 / 19 = 36.26 — A1
4. A) cos 54 = x/10
   X = 10 cos 54
   AB = 2 x 10 cos 54 — M1
   = 11.76 cm — A1
   B) Area of unshaded region
   (144 /360 x 3.142 x 10 x 10) + (1/2 x 10 x 10 sin 72 x 3) — Follow through
   = 268.34 cm^2
   Area of circle = 3.142 x 10 x 10 = 314.2 cm^2
   Area of shaded part = 314.2 -268.34 — M1
   = 45.86 cm^2 — A1
5. 4x – 3 $\leq$ 6x -1
   -2 $\leq$ 2x
   -1 $\leq$ x — M1
   6x – 1 < 3x + 16
   3x < 17
   X < 17/3 — M1
   -1 $\leq$ x < 5 2/3
   -1, 0, 1, 2,3,4,5 — A1
6. 3p + 5b = 111 — M1
   4p + 3b = 93
   12 p + 20b = 444
   12p + 9b = 279
   11b = 165
   B = 15, p = 12 — M1 Simplification
   Each book costs 15/- and each pen costs 12 /- — A1 Both values

7. Area of triangle = $\sqrt{}$10.5 (10.5 – 6 (10.5 – 7) 10.5 -8) — M1
   = 20.33 cm2

   1 cm^2 rep $(500m)^2$

20.33 cm^2 rep 20.33 x $\frac{500}{100}$ x $\frac{500}{100}$ — M1

= 508.25

= 508 ha A1

8. Monday 0545 h to Friday 1945 h
   (24 x 4) + 14 hrs = 110 hrs B1
   1 hr looses 30 secs
   110 hrs looses 110 x $\frac{30}{60}$ = 55 mins M1
   1945 – 55 = 1850
   = 6.50PM A1
9. 1 Uk£ = 125.30
   960 UK£ = 9600 x 125.30 = 1,202,880
   95/100 x 1,202,880 = 1,142,736 M1
   ¼ x 1,142,736 = 285,684 /=
   1 US dollar = 63.20 /=
   = $\frac{285,684 \times 1}{63.20}$ M1
   = 4,520.32
   = 4520 us dollars A1
10. Xxxxx
11. 3 $(6.047 \times 10^{-2}) = 3 (0.1654 \times 10^{2}) = 49.62$ M1
    $23.9156^{2} = (2.39156 \times 10^{1})^{2} = 572.1$ M1
    $\sqrt{49.62 + 572.1} = \sqrt{6.2172} = \sqrt{6.2172 \times 10^{2}}$ M1
    $= 4.4934 \times 10 = 44.934$ A1
12. Sin ɵ = 3/5 = 0.6
    Ɵ = sin -1 0.6 = 36.87 A1
13. $2^{2x} \times 2^{3-3x} = 2 \times 35$ M1
    $2^{2-x} = 3^{5+2x}$
    $\frac{2-x}{5+2x} = \frac{\log 3}{\log 2} = 1.5849$ M1
    4.1698x = -5.9245 M1
    X = -1.4028 A1
14. $\frac{100}{120} \times 12,500$ = Shs. 10, 416.70 M1 A1
15. 9t – 25a2 = (3t-5a) (3t +5a) B1
    6t2 + 19at + 15a2 = (3t + 5a) (2t + 3a) M1
    $\frac{3t - 5a}{2t + 3a}$ A1
16. Volume = $\frac{M}{D} = \frac{1.05 \times 1000}{8.4}$ M1
    = 125 cm^3

    Base area = $\frac{\text{volume}}{\text{Height}} = \frac{125}{0.2}$ = 625 cm^2

Length = $\sqrt{625}$ M1

= 25 cm A1

17. 10/6 x 7 = 11.7 = 12 days M1
12-7 = 5 days M1A1

SECTION B

18. A) (120,000 X 3) : (150,000 X 3) : (90,000 X 2) M1
360,000:450,000:180,000 M1
4 :5 : 2 A1
B) 70/100 X 187,000 = 130,900 B1
Samantha = 4/11 x 130,900 = 47,600 B1
Meshi = 5/11 x 130,900 = 59,500 B1
Fuki = 2/11 x 130,900 = 23,800 B1
C) Samatha = 360,000 + 47,600 = 407,600 B1
Meshi = 450.000 + 59,500 = 509,500 B1
Fuki = 180,000 + 23800 = 203,800 B1

19 A: Taxable income = 25,000 + 10,480 M1

= 35,480/=

B: First 4350 x 2/20 = 435

Next 4350 x 3/20 = 682.50 B1

Next 4555 x 4/20 = 911

Next 4550 x 5/20 = 1137.50 B1

Remaining 17475 x 6/20 = 5242.50 B1

8408.50 M1

Less relief 800

Net tax 7608.50 A1

C) 140 x 35480 = 49672 M1

(31667 x 6) + 435 + 682.50 + 911 + 1137.50 = 12666.10

Less relief 800

11,866.10 M1

% increase = $\frac{11866.10 - 7608.50}{7608.50}$ x 100 = 55.96% A1

20.

a) i) Accel = $\frac{\triangle \text{ in velocity}}{\triangle \text{in time}} = \frac{12 - 0}{10 - 0}$ M1

= 1.2 M/s^2 A1

ii) -1.5 = 0-12 M1

$\triangle$ t = $\frac{-1.2}{-1.5}$ = 8 secs A1

b) i) 60+ (5 x 12) = 120M M1

$\frac{120 \times 100}{588}$ = 20.41 % A1

21 a (i) $\frac{480,000}{X}$ B1

ii) $\frac{480,000}{X-4}$ B1

b) $\frac{480,000}{X-4} - \frac{480,000}{x}$ = 20,000 M1

480,000 – 480,000 + 1920,000 = 20,000

X(x-4)

$X^2 – 4x – 96$ = 0 M1

$X^2 + 8x – 12x – 96$ = 0

(x+8) (x-12) = 0 M1

X = 12 or

x = -8

Number who contributed = 12-4 M1

= 8 members A1

c) $\frac{480,000}{12}$: $\frac{480,000}{8}$

4 : 6 = 2:3 B1

d) $\frac{480,000}{80,000}$ = 6 ha $\frac{= 6}{8}$ = 0.75 ha M1A1

22

a) <RTU = 60º (angles in the alternate segment) B1

<TUO = 60 º (TO= UO)
< TOU = 180 – 120 = 60º

b) <XUP = RTU = 60º
(Angles on a transversal equal) B1

c) STR = SUR = 25º B1
(Angles subtended by same chord in same segment) B1

d) Reflex <SXU = 360 – 95
= 265º (UXR = 120º B1
(Opposite angles in a cyclic quadrilateral
SXR = 25º
UXS = 95º) B1

e) <RUP = 180 – 90 = 90
< RPU = 180 – (90 + 60) B1
= 30º B1

23

b)

i) 4.9 x 50 = 245 Km M1A1

ii) 356 B1

iii) 4.8 x 50 = 240KM M1A1

24.

a) Volume of cylinder $= \pi r^2$h

= 3.142 x 3x3x4

= 113.112 cm^3 M1

Vol. of cone = 1/3 πr^2h

= 1/3 x 3.142 x 3 x 3 x 5

= 47.13 cm^3 M1

Total volume = 47.13 + 113.112 M1

= 160.24 cm^3 A1

b) Mass = Density x volume

= 2.6 x 160.24 M1

= 416.63 g A1

c) $4/3\pi 3$ =160.24 M1

r3 = $\frac{160.24 \times 3}{4 \times 3.142}$ = 38.25 M1

$r = \sqrt[3]{38.25}$ M1

$= 3.369$ cm A1

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121/2 MARKING
MATHEMATICS
MARKING SCHEME.

1. $2x2 - 7x + 6 = 0$

   $X^2 - 7x = -3$

   $X^2 - \frac{7}{2}x + \left(\frac{7}{4}\right)^2 = -3 + \left(\frac{7}{4}\right)^2$ M1

   $\left(x - \frac{7}{4}\right)^2 = \frac{-48 + 49}{16}$

   $\sqrt{\left(X - \frac{7}{4}\right)2} = \sqrt{\frac{1}{16}}$

   $X - \frac{7}{4} = \pm 1/4$

   $X = -\frac{1}{4} + 7/4$ or $\frac{1}{4} + 7/4$ M1

   $= 6/4$ or 84

   $= 1.5$ or 2 A1

2. $(3x+1/8x)4 = (3x)^4 + 4(3x)^3 (1/8x) + 6(3x)^2 1/8x)^2$

   $+ 4(3x) (1/8x)^3 + 1/8x)^4$ M1

   $= 81x^4 + \frac{27x^2}{2} + \frac{27}{32} + \frac{3}{128x^2} + \frac{1}{4096}$ A1

   The term independent of x = 27 / 32 B1

3. $\frac{r}{p} = \frac{m}{\sqrt{n-1}}$ M1

   $\frac{r^2}{p^2} = \frac{m^2}{n^{-1}}$

   $n-1 = m^2 \times \frac{p^2}{r^2}$ M1

   $n = \frac{m^2p^2}{r^2} + 1$ or

   $n = \frac{p^2m^2 + r^2}{r^2}$ A1

4. $<ACB = 180 - (62 + 41)$

   $= 180 - 103$

   $= 77^o$

   $<BCN = 77/2 = 38.5^o$

   $<CNB = 180 - (41 + 38.5)$ B1

   $= 100.5$

   $CN = 8.45 \sin 41$ M1

Sin 100.5

CN = 5.6047= ≈5.6 (1 D.P.) A1

5. A) $\frac{1}{5}\begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$ B1

B) $\frac{1}{5}\begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}\begin{pmatrix} 4 & -1 \\ -3 & 2 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix}$

$= \frac{1}{5}\begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}\begin{pmatrix} 8 \\ -1 \end{pmatrix}$ M1extraction of matrix

$= \frac{1}{5}\begin{pmatrix} 5 & 0 \\ 0 & 5 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix}$

$= \frac{1}{5}\begin{pmatrix} 15 \\ 20 \end{pmatrix}$ M1 Premulptn by universe on both sides

$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}\begin{pmatrix} 3 \\ 4 \end{pmatrix}$

X = 3

Y = 4

6. $\frac{1}{\sqrt{2}-1} - \frac{\sqrt{2}}{\sqrt{2}+1} = \frac{\sqrt{2}+1-\sqrt{2}(\sqrt{2}-1)}{(\sqrt{2}-1)(\sqrt{2}+1)}$ M1

$= \frac{\sqrt{2}+1-4+\sqrt{2}}{2-1}$ M1

$= 2\sqrt{2}-3$ A1

7. $7a^2xy$ B2

8. 600 x 0.005 = 3 B1

578 x 0.005 = 2.89

Error = 3.00 – 2.89 = 0.11 M1

% error = $\frac{0.11}{2.89}$ x 100% A1

= 3.806%

9. OD = 1/3 a + 2/3b

$= \frac{1}{3}\begin{pmatrix} 4 \\ 4 \\ -6 \end{pmatrix} + 2\begin{pmatrix} 10 \\ 4 \\ 12 \end{pmatrix}$ M1

$= \begin{pmatrix} 4/3 \\ 4/3 \end{pmatrix} + \begin{pmatrix} 20/3 \\ 8/3 \end{pmatrix} = \begin{pmatrix} 8 \\ 4 \end{pmatrix}$ M1

-6/3 24/3 6

D (8,4,6) A1

10. 24 x ST = 9 x 16 M1

ST = $\frac{9 \times 16}{24}$

= 6 cm A1

11. Log (5x4) = $\log\begin{pmatrix}2^5\\2\\5\end{pmatrix}$ M1

$5x^4 = 2^5 \times 5/2$ M1

$X^4 = 2^4$

X = 2 A1

12. A) Centre $\left(\frac{6 + -4}{2}, \frac{1+9}{2}\right)$ B1

= (1,5)

B) $r^2 = (6-1)2 + (1-5)2$ B1

= 25+16

= 41

$(x-1)^2 + (y-5)^2 = 41$ M1

(x-1) (x-1) + (y -5) (y-5) – 41

X2-2x+1+y-10y+25 = 41

X2 + 72 – 2x -10y = 15 A1

13. V= c + K

14= c + $\frac{k}{4}$ ……(i) B1 equations

9 = c + $\frac{k}{9}$ ……..(ii)

56 = 4c + k M1V attempt to solve

81 = 9c + k

-25 = - 5c

C=5

K= 36 A1 eqn

V= 5+ $\frac{36}{w2}$ = 5+$\frac{36}{36}$

= 6 B1

14. $\frac{80x + 60y}{X+y}$ = 75 M1

80x + 60y = 75x + 75y

80x-75x = 75y-60y M1

5x = 15y

$\frac{X}{Y} = \frac{15}{5}$

X:y = 3:1 A1

15. A = 60,000 (1 + 8 x1)4 M1

= 60,000 (1.04)4 M1

= 70,191.51 A1

16.

X	F	Deviation	Fd
90	2	16	-12
91	1	-5	-5
94	2	-2	-4
95	2	-1	-2
96	2	0	0
98	1	2	2
99	3	3	9
100	1	4	4
102	3	6	18
105	3	9	27
	20		37

$\bar{X}$ = $96 + \frac{37}{20}$ M1

= 96 + 1.85

= 97.85 A1

17

a) i) $\frac{2}{9} + \frac{1}{3} = \frac{2+3}{9} = \frac{5}{9}$ M1

$\frac{9}{5} \times 1$ = 1 4/5 hrs or I hour 48 mins A1

ii) $\frac{2}{9} + \frac{1}{3} - \frac{1}{2} = \frac{4 + 6 - 9}{18} = \frac{10-9}{18} = \frac{1}{18}$ M1

18 / 1 x 1 = 18 Hrs A1

b) i) At 8:45 ¾ x 2/9 = 1/6 of tank B1

At 9:00: ¼ (5/9) + 1/6 M1

= 5/30 + 1/6

= 11/36 A1

ii) Remaining fractions = 25/36 B1

1/18 = 1 hr

25/36 = 25/36 x 18/1 = 12.5 Hrs M1

0900 + 1230 = 2130 Hrs A1

Or 9:30 Pm

18

Class	Mid Pt x	Deviation d= x-a	F	D^2	Fd	Fd^2
5-9	7	-20	5	400	-100	2000
10-14	12	-15	6	225	-90	1350
15-19	17	-10	8	100	-80	800
20-24	22	-5	13	25	-65	325
25-29	27	0	25	0	0	0
30-34	32	5	23	25	115	575
25-39	37	10	17	100	170	1700
40-44	42	15	10	225	150	2250
45-49	47	20	8	400	160	3200
50-54	52	25	5	625	125	3125
			120		385	15325

Mean = 27 + 385 /120 M1

= 27 + 3.208

= 30.21 A1

SD = $\sqrt{\left(\frac{15325}{120}\right)} - 10.2932$ B1

M1

= 10.84 A1

19

a) p (fails) = 1/5 B1

b) P (get a job after failing)

= (1/5 x ¼ x 6/7) + 1/5 x ¾ x 2/9) M1

= 8/105 A1

c) P (she joined university

= (4/5 x 2/3) + (1/5 x ¼) M1

= 7/12 A1

d) P (She did not get a job)

= (4/5 x 2/3 x 1/7) + (4/5 x 1/3 x 7/9) + 1/5 x 1/4 /x 1/7) + (1/5 x ¾ x 7/9) M1

= 8/105 + 28/135 + 1/140 + 7/60 M1

= 11/27 A1

20.

a) $\begin{pmatrix} 3 & 1 \\ 1 & 3 \end{pmatrix} \begin{pmatrix} 2 & 1 \\ -1 & -2 \end{pmatrix} = \begin{pmatrix} 5 & 1 \\ -1 & -5 \end{pmatrix}$ M1A1

T-1 = $\frac{1}{-24} \begin{pmatrix} 5 & 1 \\ -1 & -5 \end{pmatrix}$ B1

= $\begin{pmatrix} 5/24 & 1/24 \\ -1/24 & -5/24 \end{pmatrix}$ B1

$1/24 \begin{pmatrix} 5 & 1 \end{pmatrix} \begin{pmatrix} 7 & -7 & -8 & 8 \end{pmatrix}$

-1 -5 -11 -13 16 8 M1

$= 1/24 \begin{pmatrix} 24 & -48 & -24 & 48 \\ 48 & 72 & -72 & -48 \end{pmatrix}$ M1

$= \begin{pmatrix} 1 & -2 & -1 & 2 \\ 2 & 3 & -3 & -1 \end{pmatrix}$ A1

A(1,2) B(-2,3) C(-1, -3) D(2, -2) B1

e) $\begin{pmatrix} 3 & 1 \\ 1 & 3 \end{pmatrix} \begin{pmatrix} 1 & -2 & -1 & 2 \\ 2 & 3 & -3 & -2 \end{pmatrix}$ M1

$= \begin{pmatrix} 5 & -3 & -6 & 4 \\ 7 & 7 & -10 & -4 \end{pmatrix}$

A’ (5, 7) B (-3, 7) C’ (-6,-10) D’ (4,-4) A1

22.

a) $S_n = \frac{a(rn-1)}{r-1}$ M1

$40 = \frac{4(2n-1)}{1}$

$AO = \frac{4(2n-1)}{4}$ M1

$10 = 2n - 1$

$2n = 11$

$N = \frac{\log 11}{\log 2}$

$= 3.459$ A1

Greatest number = 3

b) A + d = 2nd

$A + 3d = 4^{th}$

$A + bd = 7^{th}$

ii) $a + 6d = a + 3d$

$a + 3d \quad a + d$

$(a+d)(a+bd) = (a+3d)(a+3d)$ M1

$A^2+7ad+bd^2 = a^{2+}6ad+9ad^2$

But $d = 2$

~~A^2~~ $+ 14a+24 =$ ~~a^2~~ $+12a+36$ M1

$2a = 12$

$A=b$

Common ration = $\frac{6 + 12}{6 + 6} = \frac{3}{2} = 1\frac{1}{2}$ A1

ii) $S8 = \frac{8(1.5^n - 1)}{1\ 1/2 - 1}$ M1

$= \frac{8(1.5^8 - 1)}{\frac{1}{2}}$ M1

$= 348.0625$ A1

23.

AD = 2.7 cm B1

Area of $\triangle$ ABC $= \frac{1}{2} \times 5.4^2 \sin 120^o$ B3

$= 12.63\ Cm^2$ B1

24.

i) BA = -b+a B1

ii) BN = 1/3 (-b+a) B1

iii) ON = b + 1/3 (-b+a) M1

b-1/3b + 1/3 a A1

= 2/3 b + 1/3 a

OX = b + n (BM)

= b+h(-b + 1/2a)

= b-hb+1/2ha

= b(1-h) + ½ ha ……..i B1

Also OX = K (b-1/3b+1/3a)

= 2/3 kb + 1./3 ka ……ii B1

2/3 K = i-h B1V fnmn of signs

1/2 h = 1/3k

H= 2/3 k BIV attempt to solve

2/3 k = 1-2/3K

2/3k + 2/3 k = 1 A1 for K

K = ¾

H= 2/3 x ¾ B1 for h

= 1/2