KENYA NATIONAL EXAMINATION COUNCIL
REVISION MOCK EXAMS 2016
TOP NATIONAL SCHOOLS

PRECIOUS BLOOD HIGH SCHOOL

MATHEMATICS

PAPER 2

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PRECIOUS BLOOD KCSE TRIAL AND PRACTICE EXAM 2016
PAPER 2
MARKING SCHEME

<table>
<tr><td>1.</td><td>
<table>
<tr><th>No</th><th>Std form</th><th>Log</th></tr>
<tr><td>72.36
0.69^2

Log 168.4
= 15.47</td><td>7.236×10^1
$(6.9 \times 10^{-1})^2$

1.547×10^1</td><td>1.8595
=
$\underline{1.6776 +}$
1.5371
0.3475-
$\underline{0.3475}$
1.1896</td></tr>
</table>
$\left(\bar{1}.8388 \times 2\right)$
</td><td>M1

M1

M1

A1</td><td>Logs

Operations

Root</td></tr>
<tr><td></td><td></td><td>04</td><td></td></tr>
<tr><td>2.</td><td>$t^2 = \frac{4m^2}{n^2}\left(\frac{4m^2}{3k}\right)$
$t^2 = \frac{4m^2 l - 4m^2 A}{3n^2 k}$
$3n^2 t^2 k = 4m^2 l - 4m^2 A$
$4m^2 A = 4m^2 l - 3n^2 t^2 k$
$A = \frac{4m^2 l - 3n^2 t^2 k}{4m^2}$</td><td>M1

M1

A1</td><td></td></tr>
<tr><td></td><td></td><td>03</td><td></td></tr>
<tr><td>3.</td><td>$let\ x = 4.37272$
$10x = 43.72$
$100x = 437.2$
$1000x = 4372.72$
$1000x - 10x = 4372.72 - 43.72$
$990x = 4329$
$x\frac{4329}{990} = \frac{481}{110}$</td><td>M1

A1</td><td></td></tr>
<tr><td></td><td></td><td>02</td><td></td></tr>
<tr><td>4.</td><td>$Amplitude = \frac{2}{3}$
$period = 360 \times \frac{5}{2} = 900^0$
$phaseangle = 40^0$</td><td>B1

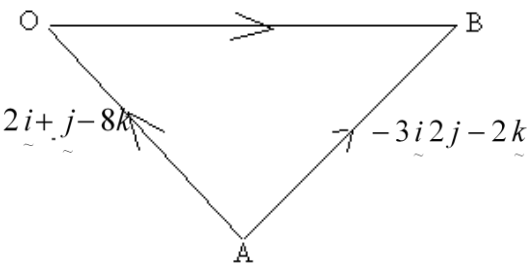
B1

B1</td><td></td></tr>
<tr><td></td><td></td><td>03</td><td></td></tr>
</table>

5.	$\frac{3(3-\sqrt{5})+3\sqrt{5}(3+\sqrt{5})}{9-5}$ $=\frac{9-3\sqrt{5}+9\sqrt{5}+15}{4}$ $=\frac{24+6\sqrt{5}}{4}$ $=6+\frac{3}{2}\sqrt{5}$ $\therefore a=6 \text{ and } b=\frac{2}{3}$	M1 M1 A1	
		04	
6.	Maximum volume = 4.55 x 3.55 x 2.5 = 40.38125 cm^3 Minimum volume = 4.45 x 3.45 x 1.5 = 23.02875 cm^3 Actual volume = 4.5 x 3.5 x 2 = 31.50000 cm^3 Absolute error = $\frac{1}{2}(40.38125-23.02875)$ = 8.67625 Percentage error = $\frac{4.67625}{31.5}\times 100 = 27.54365\%$ = 28 % (2 s.f)	M1 B1 A1	
		03	
7.	$250{,}000 = 500{,}000\left(1-\frac{12}{100}\right)^n$ $0.5 = 0.88^n$ $n\log 0.88 = \log 0.5$ $n=\frac{\log 0.5}{\log 0.88}=5.42227$ $=5.4 yrs$	M1 M1 A1	
		03	
8.	$4(6-x)-6x=0$ $20-4x-6x=0$ $10x=20$ $x=2$	M1 A1	
		02	

9.	$FE \times ED = GE \times EB$ $7.8x = 4.1 \times 6.9$ $7.8x = 28.29$ $x = 3.627$ $= 253.4224\,cm$ $BC^2 = CD \times CF$ $y^2 = 11.2 \times 22.627$ $= 253.4224$ $y = \sqrt{253.4224} = 15.92cm$	M1 B1 M1 A1	
		04	
10.	$x^2 + y^2 = 6x - 10y - 18$ $x^2 - 6x + y^2 + 10y = -18$ $x^2 - 6x + 9 + y^2 + 10y + 25 = -18 + 9 + 25$ $(x-3)^2 + (y+5)^2 = 16$ $compareto\ (x-9)^2 + (y-b)^2 = r^2$ $a = 3, b = -5\ and\ r = \sqrt{16} = 4$ $\therefore c(3,-5)\ and\ r = 4\ units$	M1 M1 B1	Factorization C and r
		03	

11.a)	$p \pm \times t \ \ and \ \ p \times t^2$ $\therefore p = mt + nt^2$ $45 = 20m + 400n$ $60 = 24m + 576n$ $9 = 4m + 80n.....(i) \times 2$ $5 = 2m + 48n.....(ii) \times 4$ $18 = 8m + 160n$ $20 = 8m + 192n -$ $-2 = \quad -32n$	M1	

	$n = \frac{2}{32} = \frac{1}{16}$ $and\ m = 5 - \left(48 \times \frac{1}{16}\right)\frac{1}{2} = \frac{7}{2}$ $hence\ p = \frac{7}{2}t + \frac{1}{16}t^2$	B1	
b)	$p = \left(\frac{7}{2} \times 32\right) + \left(\frac{1}{16} \times 32 \times 32\right) = 112 + 64 = 176$	M1 A1	
		04	
12.	 $\underset{\sim}{AB} = \underset{\sim}{AO} + \underset{\sim}{OB}$ $= -2\underset{\sim}{i} - j + 8k - 3\underset{\sim}{i} + 2\underset{\sim}{j} - 2\underset{\sim}{k}$ $= -5\underset{\sim}{i} + j + 6k$ $\left\lvert \underset{\sim}{AB} \right\rvert = \sqrt{5^2 + 1^2 + 6^2}$ $= \sqrt{62} = 7.876\,units$	M1 M1 A1	
		3	

13.	$\left(2-\frac{1}{5}x\right)^6 = 1.2^6\left(\frac{-x}{5}\right)^0 + 6.2^5\left(\frac{-x}{5}\right)^1 + 15.2^4\left(\frac{-x}{5}\right)^2 + 20.2^3\left(\frac{-x}{5}\right)^3 + 15.2^2\left(\frac{-x}{5}\right)^4$ $= 64 - \frac{192x}{5} + \frac{48x^2}{5} - \frac{32x^3}{25} + \frac{12x^4}{125} + \ldots\ldots\ldots\ldots$ $= 64 - 38.4x + 9.6x^2 - 1.28x^3 + 0.096x^4 + \ldots\ldots\ldots\ldots$ $\left(2-\frac{1}{5}x\right)^6 = (2-0.04)^6$ $\frac{1}{5}x = 0.04$ $x = 0.2$ $\therefore 1.96^6 = 64 - 38.4(.2) + 9.6(.2)^2 - 1.28(.2)^3 + 0.096(.2)^4$ $= 64 - 7.68 + 0.384 - 0.01024 + 0.0001536$ $= 56.6939 \approx 56.694 (d.p)$	M1 A1 M1 A1	
		04	
14.	Men hours days 5 8 3 12 5 x $x = \frac{5\times 8\times 3}{12\times 5}$ $= 2\ days$	M1 A1	
		04	
15.	$6 \le 2x+1$ $2x \ge 5$ $x \ge \frac{5}{2}$ and $5x - 29 < -4$ $5x < 25$ $x < 5$ $2.5 \le x < 5$ $x = 3 and 4$	M1 A1 B1	
		03	

16.	$men = \frac{7}{9} \times 45 = 35$ $women = \frac{2}{9} \times 45 = 10$ $let\ the\ additional\ number\ of\ women\ be\ x$ $\frac{35}{10+x} = \frac{5}{4}$ $50 + 5x = 140$ $5x = 90$ $x = 18\ women$	B1 M1 A1	
		03	
17.	Taxable income ksh 50400 p.m $in\ k\tau\ p.a = \frac{50400}{20} \times 12 = k\tau 30240$		

Taxable income (kτ)	Amount in slab (kτ)	Tax in ksh
1- 1980	1980	$1980 \times \frac{10}{100} 20 = 3960$
1981- 3960	1980	$1980 \times \frac{15}{100} \times 20 = 5940$
3961- 5940	1980	$1980 \times \frac{25}{100} \times 20 = 9900$
5941- 7920	1980	$1980 \times \frac{35}{100} \times 20 = 13860$
7921 – 8650	730	$730 \times \frac{45}{100} \times 20 = 6570$
Over 860	21590	$21590 \times \frac{50}{100} \times 20 = 215900$
	Total	=256130

Gross tax p.a is ksh 256130

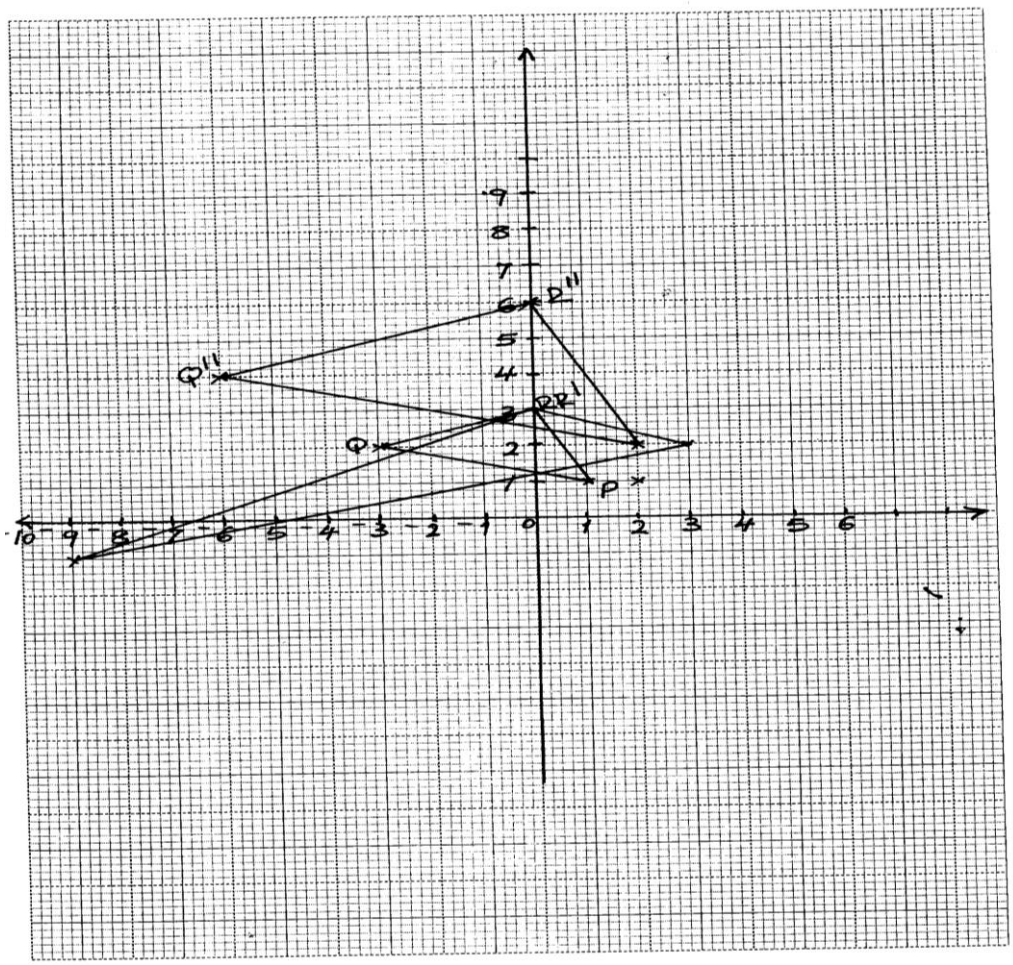
Gross tax p.m is $\frac{256130}{12} = 21344.20$

Relief is ksh 520

Net tax = ksh 2134420 – 520

= ksh. 20824.20

b)	$\frac{20824.20}{50400} \div 100$ $= 41.3179\%$		
18.a)	Graph		



b)

$$\begin{pmatrix} 3 & 0 \\ 1 & 1 \end{pmatrix}\begin{pmatrix} P & Q & R \\ 1 & -3 & 0 \\ 1 & 2 & 3 \end{pmatrix} = \begin{pmatrix} P^1 & Q^1 & R^1 \\ 3 & -9 & 0 \\ 2 & -1 & 3 \end{pmatrix}$$

c)

$$\begin{pmatrix} \frac{2}{3} & 0 \\ \frac{-2}{3} & 2 \end{pmatrix} \begin{pmatrix} 3 & -9 & 0 \\ 2 & -1 & 3 \end{pmatrix} = \begin{pmatrix} P^{11} & Q^{11} & R^{11} \\ 2 & -6 & 0 \\ 2 & 4 & 6 \end{pmatrix}$$

coordinates $P^{11}(2,2)$ Q^{11}

d) $(-6,4)$ $R^{11}(0,6)$

It is an enlargement centre origin (0,0) scale factor 2

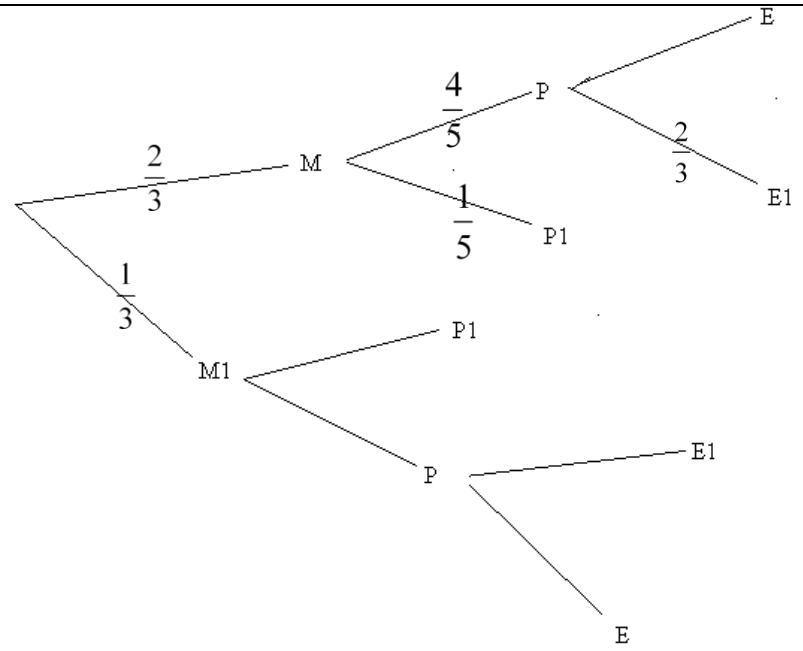
$$\begin{pmatrix} \frac{2}{3} & 0 \\ -\frac{2}{3} & 2 \end{pmatrix} \begin{pmatrix} 3 & 0 \\ 1 & 1 \end{pmatrix} = \begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$$

Note correct the 2nd matrix in (b) from $\begin{pmatrix} -1 & 0 \\ 1 & 3 \end{pmatrix}$ to $\begin{pmatrix} \frac{2}{3} & 0 \\ \frac{-2}{3} & 2 \end{pmatrix}$

19.a)

$$\frac{1}{3}$$

b)



$P(MP) \text{ or } P(M^1P)$

$\left(\frac{2}{8}\times\frac{4}{15}\right)+\left(\frac{1}{3}\times\frac{1}{3}\right)=\frac{8}{15}+\frac{3}{15}$

$=\frac{11}{15}$

ii) $P(Mpt) \text{ or } (M^1pt)$

$=\left(\frac{2}{8}\times\frac{7}{5}\times\frac{1}{3}\right)of\left(\frac{1}{3}\times\frac{3}{5}\times\frac{1}{3}\right)=\frac{8}{45}+\frac{3}{45}$

$=\frac{11}{45}$

$P(p \text{ and } t) \text{ or } p(\text{and } t)$

$\left(\frac{4}{5}\times\frac{1}{3}\right)or\left(\frac{2}{5}\times\frac{1}{3}\right)=\frac{4}{15}+\frac{2}{15}=\frac{6}{15}$

$=\frac{2}{5}$

$\frac{2}{3}\times\frac{4}{5}\times\frac{1}{3}=\frac{8}{45}$

20.a)

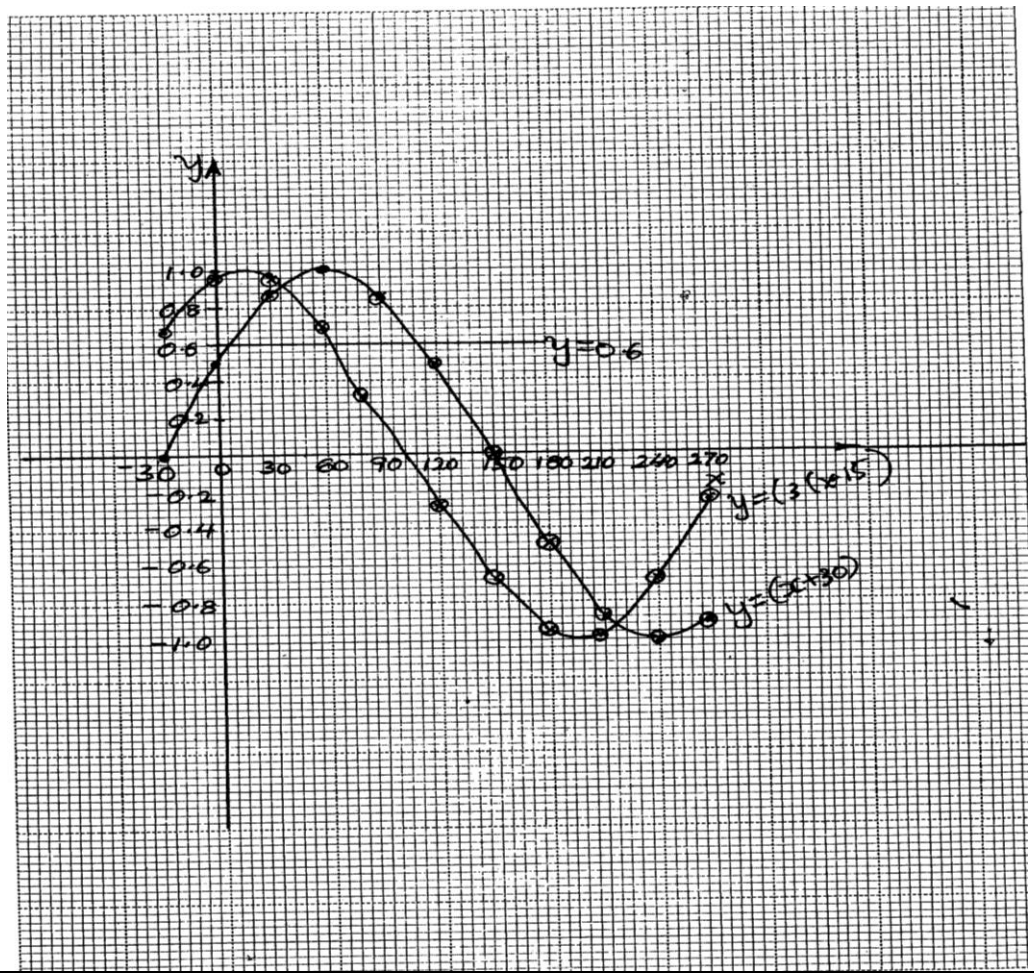
Number of goals	0-9	10-19	20-29	30-39	40-49
Number of matches	2	14	24	12	8
e.f	2	16	40	52	60

i) The medisn = 25±2

ii) 49±2

iii) $Q_1=0$

b)	$Q_3 = 33$ $\text{int } erquartile = \frac{1}{2}(Q_3 - Q_1)$ $= \frac{1}{2}(3)$ $= 6.5$		

22.a) b)			

23.a) $AC = \sqrt{60^2 + 45^2}$

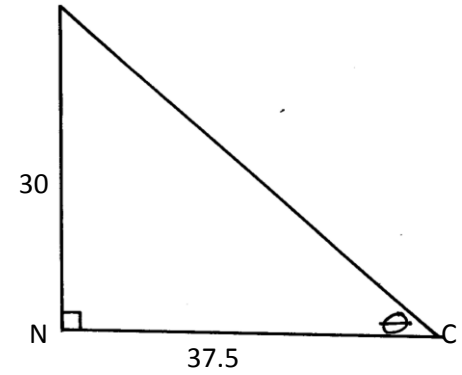
$= 75$

$NC = \frac{1}{2} AC$

$= 37.5m$

b)

P

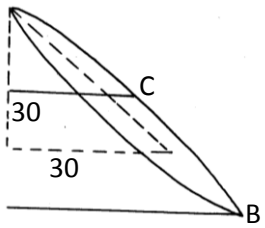


$\tan r = \frac{30}{37.5}$

$r = \tan^{-1}\left(\frac{30}{37.5}\right)$

$= 38.66^0$

c)



$\tan r = \frac{30}{30}$

$= 45^0$

$n^2 = a^2 + b^2 - 2ab\cos n$

$bo^2 = 37.5^2 \cos N$

$\cos^{-1} = -0.28$

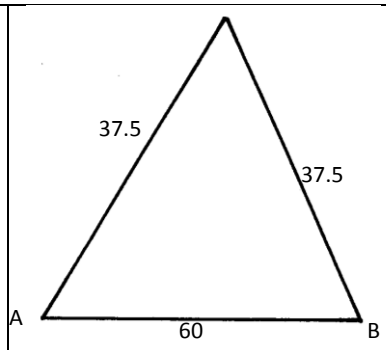
$< N = 106.3^0$

$therefore the bearing of\ B\ from A = 360^0 - 106.3$

$= 253.7^0$

d)

N

			
24.	$S_n = \frac{A}{2}\{2a + (n-1)d\}$ $a = 2,\ n = 8\ and\ S_n = 156, d$ $\frac{8}{2}\{2\times 2 + (8-1)d\} = 156$ $4(4 + 7d) = 156$ $16 + 28d = 156$ $\Rightarrow 28d = 156 - 16$ $28d = 140$ $d = 5$		
	$\frac{n}{2}\{2\times 2 + (n-1)5\} = 416$ $\frac{n}{2}(4 + 5n - 5) = 416$ $4n + 5n^2 - 5n = 416\times 2 \Rightarrow 4n - 5n + 5n^2 = 832$ $5n^2 - n - 832 = 0$ $n = n\frac{1 \pm \sqrt{(-}- 4\times 5 - 832}{10} = \frac{1 \pm 129}{129}$ $n = \frac{1 \pm 129}{10} = \frac{130}{10} = 13$ $n = \frac{1 - 129}{10} = \frac{-128}{10} = n = 12.8$ $ignore n = 12.8$ $\therefore n = 13$		

$\therefore a+2d, a+4d, a+7d$

$$\frac{a+4d}{a+2d} = \frac{a+7d}{a+4d}$$

$$(a+4d)(a+4d) = (a+2d)(a+7d)$$

$$a^2 + 4ad + 4ad + 1bd^2 = a^2 + 2ad + 14d^2$$

$$8ad + 16d^2 = 9ad$$

$$16d^2 = 9ad - 8ad$$

$$\frac{16d^2}{9} = \frac{ad}{d}$$

$$a = 16d$$

$$but\, d = 3$$

$$\Rightarrow a = 16 \times 3$$

$$= 48$$

$$r = \frac{a+4d}{a+2d} = \frac{48 \times 4 \times 3}{48 + (2 \times 3)} = \frac{60}{54} = \frac{10}{9}$$

$$Sn = \frac{a(r^n - 1)}{r-1}$$

p

$$= \frac{48\left(\frac{10}{9}\right) - 1}{\frac{10}{9} - 1}$$

$$= 683.067$$