KAPSABET HIGH SCHOOL

121/1 **(*Kenya Certificate of Secondary Education*)** **Paper 1**

INTERNAL MOCK EXAM

MATHEMATICS

ALT A

Dec. 2020– 2 ½ Hours

MARKING SCHEME

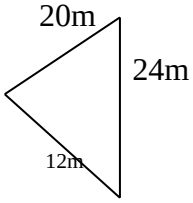
Instructions to candidates

(a) Write your name, admission number and stream in the spaces provided above.
(b) Sign and write the date of examination in the spaces provided above.
*(c) This paper consists of **two** sections: **Section I** and **Section II.***
*(d) Answer **all** the questions in **Section I** and only **five** questions from **Section II**.*
*(e) **Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.***
(f) Marks may be given for correct working even if the answer is wrong.
*(g) **Non-programmable** silent electronic calculators **and** KNEC Mathematical tables may be used, except where stated otherwise.*
*(h) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.***
*(i) Candidates should answer the questions in **English***

SECTION A (50 marks)

1.	$\frac{42}{-14} - \frac{-96-12}{-9x3}$ $\frac{42}{-14}$ - $\frac{-108}{-27}$ -3 -4 -7	 M1 M1 A1	Simplification with single numerator and denominator
2.	$LCM\ \ 2\ X\ 3\ X\ 5$ 30minutes $\frac{30}{3} + \frac{30}{5} + \frac{30}{6}$ 21 customers $\frac{210}{21}$ x 30 300minutes	M1 M1 M1 A1 4	
3.	$(2^{y+2y}$ x $5^{3y})^{1/3}$ $(2^{3y}$ x $5^{3y})^{1/3}$ 2^y x 5^y $(2x5)^y$ 10^y	 M1 A1 2	For removal of cube root
4.	$\frac{2.4}{100}$ x 200,000 Sh. 4800 2.4 + 1.2 $\frac{3.6}{100}$ x 180,000 Sh. 6480 6480 + 4800 Sh. 11,280.	 M1 M1 A1 3	For calculation of exterior angle.
5.	Exterior angle $\frac{2}{9}\ x\ 180^0$ 40^0 n=$\frac{360}{40}$ 9sides	 M1 M1 A1 3	

6.	n+n+2+n+4+n+6 >248 4n+12>248 4n>236 n>59 60,62,64,66	M1 A1 B1 3	
7.	$\frac{L}{\sin 60^\circ}$ = 2 x8 L= 16sin60^0 L=13.86cm	M1 A1 2	
8.	$\begin{pmatrix} 0 & 1 \\ 2 & x \end{pmatrix}\begin{pmatrix} -\frac{3}{2} & -\frac{1}{2} \\ x & x-2 \end{pmatrix}$ $\begin{pmatrix} x & x-2 \\ -3+x2 & -1+x(x-2) \end{pmatrix}$ x(-1 +x^2-2x) – (-3+x^2)(x-2) = 0 -x+x^3 – 2x^2 – (-3x+6+x^3-2x^2) =0 -x+x^3-2x^2 +3x-6-x^3+2x^2 =0 2x-6=0 2x=6 X=3	B1 M1 M1 A1 4	For the product of the matrices For determinant and equating it to 0 For √removal of brackets
9.	Long diff $120^\circ + 143^\circ = 263^\circ$ Minir arc $360^\circ - 263^\circ = 97^\circ$ 97^0 x 60cosx = 5068 X=29.45^0 =29.45^{0}s	B1 B1 M1 A1 4	For 263^0 For 97^0
10.	3c +4s=648 …x1 5c=2s = 456…x2 3c+4s=648 10c – 4s =912 13c =1560 1 cup costs sh.120 1spoon costs sh. 72	B1 M1 A1 3	For the two equations √attempt to eliminate one unknown
11.	1,2,4,4,5,6,6,7,7,8,9 1,2,4,4,5,6 Q1 = $\frac{4+4}{2}$ 4	 B1	 For Q_1=4

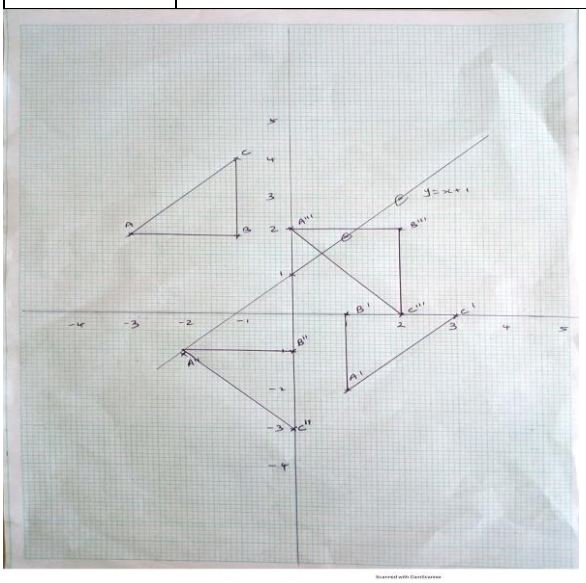
	6,6,7,7,8,9 Q3 = $\frac{7+7}{2}$ 7 QD= $\frac{7-4}{2}$ =1.5	 B1 B1 3	 For Q_3=7
12.	3,133,792+5293476+7672598+4257348 20,357,214 20360000 20,357,214 – 20360000 - 2786	 B1 M1 A1 3	 Corrected to the nearest 10,000
13.			
14.	$\frac{x}{10}+\frac{x}{12}=1\frac{5}{6}$ $\frac{x}{10}+\frac{x}{12}=\frac{11}{6}$ 6x+5x=110 11x=110 X=10km	M1 M1 A1 3	For total time taken Removal of denominator
15.	y=-6x-p qy + 4x -10=0 y=$\frac{-4}{q}x+\frac{10}{q}$ -6 x -4/q=-1 24/q =-1 Q=-24 -2=6x4-p -2=-24-p P=-22	 M1 A1 M1 A1 4	
16.	$\frac{3}{14}$ X 56 12m $\frac{5}{14}$ X56 20m $\frac{6}{14}x$56 24m Cos $\theta = \frac{12^2 + 24^2-20^2}{2x12x24}$ $\theta = 56.25^0$	 M1 M1 A1 3	For 3/14 x 56,5/14x56,6/14x56 For cosine rule or equivalent

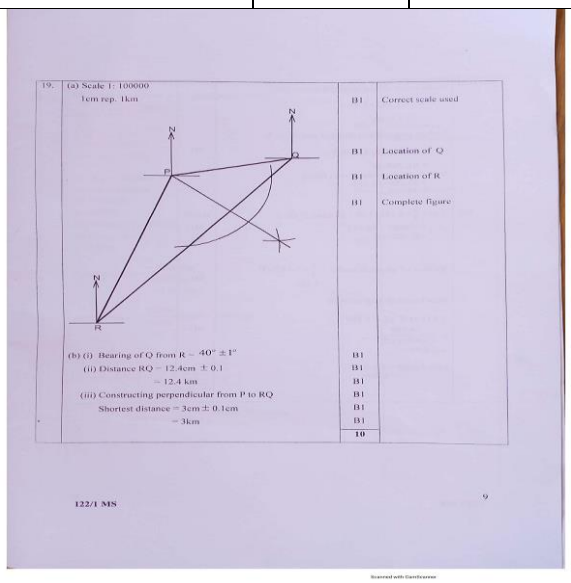
	SECTION B		
17.	a.) $(3x+9)(x-3)=648$ $3x^2-675=0$ b.) $3x^2-675=0$ $X^2-225=0$ $(x-15)(x+15)=0$ $x-15=0$ $x=15m$ 54m by 12m c.) A.s.f=648:2592 1:4 l.s.f = 1:2 54x2= 108m 12x2 =24m	M1 A1 M1 M1 A1 B1 M1 A1 B1 A1 B1	For 108m and 24m
18.	a.) ΔPQR b.) $(i) plotting\ of\ points\ of\ line\ y = x + 1$ (ii) One point correctly reflected c.) One point correctly rotated through -90^0 about (0,0) $\begin{pmatrix}2\\3\end{pmatrix} + \begin{pmatrix}-2\\-1\end{pmatrix} = \begin{pmatrix}0\\2\end{pmatrix}$ (T, P^{II}, P^{III}) $\begin{pmatrix}2\\3\end{pmatrix} + \begin{pmatrix}0\\-1\end{pmatrix} = \begin{pmatrix}0\\-1\end{pmatrix}$ (Q^{II}, Q^{III}) $\begin{pmatrix}2\\3\end{pmatrix} + \begin{pmatrix}0\\-3\end{pmatrix} = \begin{pmatrix}0\\-3\end{pmatrix}$ (R^{II}, R^{III}) $P^{III}(0,2)\ Q^{III}(0,-1)\ R^{III}(0,-3)$ i.) $P^{1II}\ Q^{III}\ R^{III}$	B1 P1 L1 B1 B1 B1 B1 M1 A1 B1 10	√drawn At least two points plotted. Line y=x+1 correctly drawn. $\Delta P^1 Q^I R^I$ correctly drawn. $\Delta P^{1I} Q^{II} R^{II}$ correctly drawn. √attempt to find P^{III} Q^{III} R^{III} √co-ordinates $\Delta P^{1II} Q^{III} R^{III}$ √drawn

19.	a.) $\frac{120}{20} = \frac{R}{14}$ $6=\frac{R}{14}$ R=84cm b.) $L^2= 120^2 + 84^2$ $L= \sqrt{120^2 + 84^2}$ = 146.5cm $L= 20^2 +14^2$ $L= \sqrt{20^2 + 14^2}$ =24.41cm 146.5-24.41 =122.09cm c.) Curved surface Arc of the frustum $\pi\ x\ 84\ x\ 146.5 - \pi x 14 x 24.41$ 37,601.96 Curved surface of the cylinder $2x\frac{22}{7}\ x\ 14x40 = 3520cm^2$ Base $\pi\ x\ 14^2$= 616cm^2 Top $\pi\ x\ 84^2$= 22,176cm^2 Total surface area 37601.96 +3520 + 616+22176= 63,913.96cm^3	M1 A1 M1 M1 M1 A1 M1 A1 M1 A1 M1 M1 A1 10	Follow through Area of the top and base
20.	a <AOD = 76^0 Angle subtended at the centre by an arc is twice the angle subtended on the circumference by the same arc. b.) <BDC = 28^0 angle subtended by the same arc on the circumference i.e. arc BC c.)<ACB=62^0 angle subtended by a diameter on the circumference is equal to 90^0 d.) <FDC =52^0 Alternate segment theorem e.) <ATD= 42^0 Sum angles of a quadrilateral	B1 B1 B1 B1 B1 B1 B1 B1 B1 B1 10	√ reason √ reason √ reason
21.	a.) i.) $\overrightarrow{PQ}=\overrightarrow{PO}+\overrightarrow{OQ}$ $-\ \mathbf{p}+\mathbf{q}$ $\mathbf{p}-\mathbf{q}+\frac{1}{3}\mathbf{q}$ $\mathbf{p}-\frac{2}{3}\mathbf{q}$	 B1 M1 A1	

	b.) i.) $\overrightarrow{ST}=\overrightarrow{SO}+\overrightarrow{OT}$ $-\frac{4}{3}\mathbf{q} + \mathbf{p} + m\mathbf{p}$ ii.) $\overrightarrow{ST} = n(\mathbf{p} - \frac{2}{3}\mathbf{q})$ $n\,\mathbf{p} - \frac{2}{3}n\,\mathbf{q} = -\frac{4}{3}\mathbf{q} + \mathbf{p}(1+m)$ $n=1+m$ $-\frac{2}{3}n = -\frac{4}{3}$ $n=2$ $m=1$ iii.) $RS=\frac{2}{3}\mathbf{q} + \mathbf{p}$ $ST= 2(-\frac{2}{3}\boldsymbol{q} + \boldsymbol{p})$ $\therefore \overrightarrow{ST} = 2\overrightarrow{RS}$ S is common ST // RS R,S and T are collinear	B1 B1 M1 M1 A1 B1 B1 10	For equating the two vectors For extracting the coefficients For n=2 and m=1
22.	a.) X 0 0.5 1 1.5 2 2.5 Y 3 3.25 4 5.25 7 9.25 X 3 3.5 4 4.5 5 Y 12 15.25 19 23.25 28 X 5.5 6 Y 33.25 39 b.) X 0.5 1.5 2.5 3.5 4.5 Y 3.25 5.25 9.25 15.25 23.25 X 5.5 Y 33.25 Area = 1(3.25+ 5.25 + 9.25 + 15.25 +23.25+33.25 89.5 sq. Units c.) $\int_0^6 (x2+3)dx$ $\left[\frac{x3}{3} + 3x\right]_0^6$ $\frac{6}{3}^3 + 3x6 - 0$ 72+18 90	B2 B1 M1 A1 M1 M1 A1	For all 9 √ values filled .award B1 for at least 6 correctly filled values. For mid-ordinates 3.25,5.25,9.25,15.25,23.25 and 33.25 For √ integration For substitution of limits

	d.) $\frac{0.5}{90}\ x\ 100$ $\frac{5}{9}\%$	M1 A1	Accept 0.55……or 0.5556
23.	a.) $y+2 = bx^n$ log (y+2)=log b +n logx b.) log x 0 0.1761 0.3010 log(y+2) 0.6990 1.2274 1.6021 log x 0.3979 0.4771 0.5441 log (y+2) 1.8928 2.1303 2.3312 log x 0.6021 log (y+2) 2.5051 (0.0.7) (0.3,1.6) n= $\frac{1.6 - 0.7}{0.3}$ n=3 log b = 0.7 b= 5.012 y= -2 +5.012x^3	B1 B2 S1 P1 L1 M1 A1 B1 B1 10	Values of For log x and log (y+2) Linear scale Plotting Line of best fit drawn
24.			





19. (a) Scale 1: 100000
1cm rep. 1km

B1	Correct scale used	
B1	Location of Q	
B1	Location of R	
B1	Complete figure	

(b) (i) Bearing of Q from R = 40° ± 1°
(ii) Distance RQ = 12.4cm ± 0.1
= 12.4 km
(iii) Constructing perpendicular from P to RQ
Shortest distance = 3cm ± 0.1cm
= 3km

B1	
B1	
B1	
B1	
B1	
B1	
10	

122/1 MS