## FORM 4 END TERM 1 EXAMS MATHS

**Class of KCSE March 2022.** 

For Marking Schemes Call Mr Machuki 0795491185

### Kenya Educators Contacts: +254795491185

kenyaeducators@gmail.com

# For More e-learning resources contact Kenya educators via the above contacts.

For Marking Schemes Call/Text/Whatsapp 0795491185

1

NAME.		INDEX NO
CLASS	ADM NO:	DATE

SIGNATURE.....

121/1 MATHEMATICS PAPER 1 END TERM 1 TIME: 2<sup>1</sup>/<sub>2</sub> HOURS

#### Kenya Certificate of Secondary Education (K.C.S.E.) Mathematics paper 1 INSTRUCTION TO CANDIDATE'S:

- ✓ Write your name, index number in the spaces provided at the top of this page.
- ✓ Sign and write the date of examination in spaces provided above.
- ✓ This paper consists of **TWO** sections: Section I and Section II.
- ✓ Answer ALL the questions in Section I and any five questions from Section II.
- ✓ Answers and working must be written on the question paper in the spaces provided below each question.
- ✓ Marks may be given for correct working even if the answer is wrong.
- ✓ Non-programmable silent electronic calculators and KNEC Mathematical tables may be used, except where stated otherwise.

#### FOR EXAMINER'S USE ONLY

D	SECTION 1																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
-																	

#### **SECTION II**

17	18	19	20	21	22	23	24	TOTAL

#### **GRAND TOTAL**



This paper consists in 16 printed pages. Candidates should ensure that all the pages are printed as indicated and that no question is missing.

#### **SECTION I: (50 MARKS)**

Answer all the question in this section in the spaces provided: 1.Evaluate

$$\frac{(2\frac{1}{4} - \frac{3}{4}) \times 3\frac{2}{3} \div 2\frac{1}{5}}{1\frac{4}{6} \div 1\frac{1}{4}}.$$
 (3mks)

2.Use square roots, reciprocal and square tables to evaluate to 4 significant figures the expression;  $(0.06458)^{\frac{1}{2}} + \left(\frac{2}{0.4327}\right)^2$ (4mks)

3. Three similar 21 inch television sets and five similar 17 inch television cost Ksh. 129, 250. The difference between the cost of two 21inch television sets and four 17inch television sets is Ksh. 22,000. Calculate the price of a 21- inch television set and that of 17-inch television set. (3mks)

4.Simplify:  $\left[\frac{a^3 - ab^2}{a^4 - b^4}\right]^{-1}$ 

(3 marks)

(3 Marks)

5. Solve for x in the equation.  $9^{(2x-1)} \times 3^{(2x+1)} = 243$ 

6. A classroom measures (x + 2) m by (x - 5)m. If the area of the classroom is 60m<sup>2</sup>. Find its length. (3 mks )

7.A tourist exchanged X US dollars for Kenya shilling when he arrived in Kenya. He spent three days in the country and paid Ksh 45,600 for expenses. He later left the country and exchanged the remainder back to US dollars. He went back with 1200 dollars. Find the value of X to the nearest dollar.

Buying 1 US dollar = Ksh.98.36 Selling 1US dollar = Ksh.98.54

(3mks)

8. Three similar pieces of timber of length 240cm, 320cm and 380cm are cut into equal pieces. Find the largest possible area of a square which can be made from any of the three pieces. (3mks)

9.A regular polygon is such that its exterior angle is one eighth the size of interior angle. Find the number of sides of the polygon. (3 mks)

10.Given that  $\sin (2\Theta + 30) = \cos (\Theta - 60)$ . Find the value of  $\tan \Theta$  to two decimal places. (2 mks)





12. A straight line  $L_1$  is perpendicular to another line  $L_2$  whose equation is 3y+4x=12. If the two lines meet at point P which lies on the x-axis, find:

(i) The co-ordinate of point P

(ii) The equation of line L1 in the form y=mx+c

#### Call/ whatsapp/text 0795491185 for Marking Schemes

(3mks)

(1mk)

13. The heights of two similar pails are 12cm and 8cm. The larger pail can hold 2 litres. What is the capacity of the smaller pail? Give your answer to 2 decimal places. (3mks)

14. Two matrices A and B are such that  $A = \begin{pmatrix} k & 4 \\ 3 & 2 \end{pmatrix}$  and  $B = \begin{pmatrix} 1 & 3 \\ 3 & -4 \end{pmatrix}$  Given that the determinant of AB = 10, find the value of k. (3mks)

15.1000cm<sup>3</sup> of milk was shared by three children, Nick, Soita and Swalleh in the ratio <sup>1</sup>/<sub>4</sub>: <sup>1</sup>/<sub>2</sub> : <sup>1</sup>/<sub>5</sub>, What volume did Soita get: (2mks)

16. Given that log a = 0.30 and log b = 0.48 find the value of  $\log \frac{b^2}{a}$ . (2 mks)

#### **SECTION II**

#### Answer any five questions in this section.

17.The distance between two towns **A** and **B** is 760 km. A minibus left town **A** at 8:15a.m and traveled towards **B** at an average speed of 90km/h. A matatu left **B** at 10:35a.m and on the same day and travelled towards **A** at an average speed of 110km/h.

(a)(i) How far from **A** did they meet?

(4mks)

(ii) At what time did they meet?

(2mks)

(b) A motorist starts from his home at 10:30 a.m on the same day and traveled at an average speed of 100km/h. He arrived at **B** at the same time as the minibus. Calculate the distance from **B** to his home. (4mks)

18. The coordinates of a triangle ABC are A(1, 1) = B(3, 1) and C(1, 3).

Plot the triangle ABC. (a)

Triangle ABC undergoes a translation vector  $\begin{pmatrix} 2 \\ 2 \end{pmatrix}$ . Obtain the image of A' B' (b) C' under the transformation, write the coordinates of A' B' C'. (2 marks)

(1 mark)

- A' B' C' undergoes a reflection along the line X = 0, obtain the coordinates and (c) plot on the graph points A" B" C", under the transformation (2 marks)
- The triangle A" B" C", undergoes an enlargement scale factor -1, centre (d) origin. Obtain the coordinates of the image A" B" C". (2 marks)
- The triangle A"' B"' C"' undergoes a rotation centre (1, -2) angle 120<sup>0</sup>. Obtain (e) the coordinates of the image A<sup>iv</sup> B<sup>iv</sup> C<sup>iv</sup>. (2 marks) (1 mark)

Which triangles are directly congruent. (f)



19. The income tax rates in a certain year are as shown below.

Income (k£ – p.a	Rate (KSh. per £)
1 - 4200	2
4201 - 8000	3
8001 - 12600	5
12601 - 16800	6
16801 and above	7

Omar pays Sh. 4000 as P.A.Y.E per month. He has a monthly house allowance of KSh.10800 and is entitled to a personal relief of KSh. 1,100 per month. Determine: (i) his gross tax per annum in Kshs (2 Marks)

(ii) his taxable income in K£ per annum

(iii) his basic salary in Ksh. per month

(iv) his net salary per month

#### Call/ whatsapp/text 0795491185 for Marking Schemes

(2marks)

(2 marks)

(2 marks)

20.The diagram below shows two circles, centre A and B which intersect at points P and Q. Angle  $PAQ = 70^{\circ}$ , angle  $PBQ = 40^{\circ}$  and PA = AQ = 8cm.



(d)	Area of the minor	segment of the	circle whose centre	is B	(2mks)
· /		0			· · · ·

(e) Area of the shaded region.

#### (2mks)

21. Three Kenyan warships A, B and C are at sea such that ship B is 450km on a bearing of  $030^{\circ}$  from ship A. Ship C is 700km from ship B on a bearing of  $120^{\circ}$ . An enemy ship D is sighted 1000km due south of ship B.

(a) Taking a scale of 1cm to represent 100km locate the position of the ships A, B, C and D. (4 Marks)

<ul><li>(b) Find the compass bearing of:</li><li>(i) Ship A from ship D</li></ul>	(1 Mark)
(ii) Ship D from ship C	(1 Mark)
<ul><li>(c) Use the scale drawing to determine</li><li>(i) The distance of D from A</li></ul>	(1 Mark)
(ii) The distance of C from D	(1 Mark)
<ul><li>(d) Find the bearing of:</li><li>(i) B from C</li></ul>	(1 Mark)
Call/ whatsapp/text 0795491185 for Marking Schemes	



(a) Given that OP = p and OQ = q, express the following vectors in terms of p and q.
 (i) SR (1 Mark)

(ii) QS	(2 Marks)
(iii) P <sub>2</sub> T	(2 Marks)
(iv) TR	(2 Marks)

(v) show that point PTR are collinear. (3mks)

23. In the figure below DA is a diameter of the circle ABCDE centre O. TCS is a tangent to the circle at C, AB = BC and angle  $DAC = 38^{\circ}$ 



#### (e) ∠*BOA*

(2 marks)

Х	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4
$2x^2$	128					18				2			32
5x	-40					-15				5			20
-12	-12					-12				-12			-12
у	76					-9				-5			40

24 (a) (i) Fill the table below for the function.  $y = 2x^2 + 5x - 12$  for  $-8 \le x \le 4$ 

(ii) Using the table, draw the graph of the function  $y = 2x^2 + 5x - 12$ . Use the scale 1cm to 1 unit on the x-axis and 1cm for 10 units for the y - axis (4 marks)

1111	L i	1.1		111	1.1		I I I I	1.1.1	111		L i L	111	1.1.1		i L		I = I		$i \perp \perp$		111	 L Ì L		111	111	111	
++++		++		+++		+++		+++	+++			+++				+++								+++	+++	+++	
++++	++	++		+++	+	+++	++++	+++	+++			+++		$\rightarrow$	++	+++		$\mapsto$	<u>+ + +</u>		-+++	 	+++	+++	+++	+++	
$\mapsto$	++	++	$\square$	+++	++	+++	$\downarrow$	$\rightarrow$				+++		$\rightarrow$		$\square$		$\square$					$\mapsto$	+++	+++	+++	
$\Box$		$\vdash$		+++	<b>:</b>	$\square$	$\square$	$\rightarrow$			$ \rightarrow $	+++				$\square$							$\square$	$\vdash$		+++	
	44.				+								+++			LLL	$\downarrow \downarrow \downarrow$			- + 4 -		 				+	_ _ _  _ !
TETT																FFT											
++++	++	++		+++	++	++++		+++	+++			+++		+++		+++								+++	+++	+++	
++++	++	++-	$\rightarrow$	+++	+ + +	+++	++++	+++	+++			+++		$\mapsto$		+++		$\mapsto$	<u>+ + +</u>				+++	+++	+++	+++	
+++		$\vdash$		+++		$\square$		$\rightarrow$				$\rightarrow$				$\square$							$\square$	$\vdash$	$\rightarrow$	+	
	11																		! I I I					111			
																$\square$											
i+++	++	++-		+++	++	++++	++++	+++	+++			+++		$\rightarrow$		+++								+++	+++	+++	
i+++	++	++	$\rightarrow$	+++		+++	++++	++				+++		$\rightarrow$		+++	+++	$\mapsto$	<u>+ + -</u>				+++	++	+++	+++	
	1																		!					111			
TETT	111			. L L L	17	- - - -	FFFT			 			TTT			FFT	TTT					 	17-1-			777	
		++				++++						+++				+++								<u> </u>	+++		
i+++	++	++-	+++	+++	++	+++	++++	+++	+++			+++		+++		+++		$\mapsto$					$\mapsto$	+++	+++	+++	
i H H H		++	+++	+++	11	+++	++++		++			+++	++	$\vdash$		+++	+	$\square$					+++	++	+++	+++	
	1							11							!									111			
															1												
		++		+++	++			+++				+++		++		+++		$\vdash$	:				+++	+++	+++	+++	
++++	++	++		+++	+	+++	++++	+++	+++			+++		$\rightarrow$		+++		$\mapsto$	<u>+ + +</u>		-+++	 	+++	+++	+++	+++	
$\downarrow \downarrow \downarrow$	++	++	+++	+++	+	+++	++++	++	+	$\square$	+++	+++	++	$\rightarrow$	++	+++	+	$\square$	+++		$\rightarrow$	$\rightarrow$	+++	++	+++	+++	
	14.											_ L L L															
TETT																FFT											
																$\square$											
i+++	++	++		+++	++	++++	++++	+++	+++			+++		$\mapsto$		+++								+++	+++	+++	
i+++	++	++	$\mapsto$	+++	++	+++	++++	+++				+++		$\mapsto$	++-	+++		$\mapsto$	<u>+ + -</u>				+++	+++	+++	+++	
		$\vdash$		+++		$\square$		$\rightarrow$				+++				$\square$							$\square$	$\vdash$		+++	
																			! I I I					111			
		++										+++				+++								<u> </u>			
i+++	++	++		+++	++	+++	++++	+++	+++			+++		$\rightarrow$		+++	+++	$\mapsto$				 	$\mapsto$	+++	+++	+++	
i+++		++	+++	+++		+++	++++					+++		$\rightarrow$		+++		$\vdash$	!				$\mapsto$	+++	+++	+++	
	1																		!					111			
TETT	111			. L L L	17	- - - -	FFFT			 			TTT			FFT	TTT					 	17-1-			777	
		++		+++	++	++++			+++			+++				+++			· · · · ·					<u>+ + + +</u>	+++	+++	
i+++		++	+++	+++		+++	++++		+++			+++		$\rightarrow$		+++	+++	$\mapsto$					+++	+++	+++	+++	
$ \rightarrow \rightarrow$		++	$\rightarrow$	+++		+++	++++		+	$\square$		+++		$\rightarrow$	-	+++	+	$\square$	-				+++		+++	+++	
	1.1				1			1 1																1 1 1			
																			!								1111
	1															+++			!					T			
i+++	<u>++</u>	++	+++	+++	++	+++	++++	+++	++			+++		$\mapsto$		+++		$\mapsto$				+++	+++	+++	+++	+++	
i+++		++	+++	+++	++	+++	++++	++	++			+++	++	$\mapsto$		+++	+	$\mapsto$				 $\vdash$	+++	++	+++	+++	
					1																						
	++-									 			++-		-!-!-	-++	+ + -					 - +			- + + +		!
i								111											111								
	1	++				+++						+++				+++			!					<u>+ + + + + + + + + + + + + + + + + + + </u>	+++	+++	
++++	++	++		+++	+ !	++++			+++			+++		$\rightarrow$		+++			!					+++	+++	+++	
i+++	1	++	$\mapsto$	+++		+++	++++					+++		$\rightarrow$		+++	+	$\mapsto$	!				+++	+++	+++	+++	
$i \rightarrow i$		++	$\square$	+++								+++			-	$\square$							+++		+++	+++	$\rightarrow$
	11				11			111											!					111			1111
																$\square$											
		++-		+++	++	++++			+++			+++				+++								+++	+++	+++	++++
	++	++		+++	++	++++	++++		+++			+++		+++		+++		$\mapsto$					+++	+++	+++	+++	
$\mapsto$	1	++	$\square$	+++	1	+++	++++		$\rightarrow$			+++		$\rightarrow$	-	$\square$	+	$\square$					$\mapsto$		+++	+++	
LLLL	11-		L	. L L L	11.			444			1-1-1-		111		_!_!_				노노노						. L L L	444	
TTT				TT			TTT	[]]]				FFT			1	$\Gamma T T$			1.1.1					ΤĒĒ	ITT.		
																+++			1 1 1				++	1 1			
	-+-	++-		+++	++	+++		+++				+++			++-	+++		$\vdash$	+				+++	+++	+++	+++	
+++		++	+++	+++	++	+++	++++	+++	+++		+++	+++		$\mapsto$		+++		$\mapsto$				+++	+++	+++	+++	+++	
$\downarrow \downarrow \downarrow$	1	++		+	1	+++	$\downarrow$					+++		$\square$	-	$\square$			1				$\square$		+	+	
					. ـ ـ .								111		_1_1_	느느ㅗ	T T T					 					

b) Use the graph drawn above to solve the following equations. (i)  $2x^2 + 5x - 12 = 0$ 

(2 marks)

(ii) 
$$3 - 7x - 3x^2 = 0$$

(2 marks)

Name.....Adm No.....Class.....

Index No......Date.....Date.

121/2 Mathematics Paper 2 Form 4 End Term 1 TIME: 2 <sup>1</sup>/<sub>2</sub> Hours

#### Kenya Certificate of Secondary Education (K.C.S.E)

#### **INSTRUCTIONS TO CANDIDATES**

- > Write your name and Admission number in the spaces provided at the top of this page.
- > This paper consists of two sections: Section I and Section II.
- > Answer <u>ALL</u> questions from section I and <u>ANY FIVE</u> from section II
- All answers and workings must be written on the question paper in the spaces provided below each question.
- Show all the steps in your calculation, giving your answer at each stage in the spaces below each question.
- Non Programmable silent electronic calculators and KNEC mathematical tables may be used, except where stated otherwise.

#### FOR EXAMINERS USE ONLY

#### **SECTION I**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL

**SECTION II** 

17	18	19	20	21	22	23	24	TOTAL

**GRAND TOTAL** 



Call/Text/Whatsapp 0795491185 for Marking Schemes

#### **SECTION I:** Answer all questions from this section

1. Use logarithm tables to evaluate

(4 Marks)

2. Solve for x in the equation 
$$2Sin^2x - 1 = Cos^2x + Sinx$$
 for  $0^0 \le x \le 360^0$  (3 Marks)

3. (a) Expand 
$$\left(1 + \frac{3}{x}\right)^5$$
 up to the fifth term (2 Marks)

(b)Hence use your expansion to evaluate the value of  $(2.5)^5$  to 3 d.p. (2 Marks)

4. Make p the subject of the formula

$$\mathbf{E} = \sqrt{\frac{p - 3u}{y - 3xp}}$$

Call/Text/Whatsapp 0795491185 for Marking Schemes

(3 Marks)

5. The figure below shows a rectangular based right pyramid. Find the angle between the planes ABCD and ABV. (2marks)



6. A object A of area  $10\text{cm}^2$  is mapped onto its image B of area  $60\text{cm}^2$  by a transformation whose matrix is given by  $P = \begin{cases} x & 4 \\ 3 & x+3 \end{cases}$ . Find the possible values of x (3 Marks)

7. The position vectors of A and B are a = 4i + 4j - 6k and b = 10i + 4j + 12k. D is a point on AB such that AD:DB is 2:1. Find the co-ordinates of D (3 Marks)

8. A dealer has two types of grades of tea, A and B. Grade A costs Sh. 140 per kg. Grade B costs Sh. 160 per kg. If the dealer mixes A and B in the ratio 3:5 to make a brand of tea which he sells at Sh. 180 per kg, calculate the percentage profit that he makes (3 marks)

9. A variable Z varies directly as the square of X and inversely as the square root of Y. Find the percentage change in Z if X increased by 20% and Y decreased by 19% (3 Marks)

10. By rounding each number to the nearest tens, approximate the value of  $\frac{2454 \times 396}{66}$  Hence calculate the percentage error arising from this approximation to 4 significant figures (3 Marks)

11. Find the centre and radius of the circle whose equation is  $2x^2 + 2y^2 - 8x + 12y - 2 = 0$  (3 Marks)

12. In the figure below AB = 8cm and O is the centre of the circle. Determine the area of the circle if angle  $OAB = 15^0$  (3 Marks)



- 13. Pipe A can fill a tank in 2 hours; pipes B and C can empty the tank in 5 hours and 6 hours respectively. How long would it take:
  - (a) To fill the tank if A and B are left open and C closed (2 Marks)

(b) To fill the tank with all the pipes open (2 Marks)

14. (a) Find the inverse of the matrix 
$$\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$$
 (1 Mark)

(b)Hence solve the simultaneous equation below using matrix method (3 Marks) 4x + 3y = 65y + 3x - 5 = 0 15. Evaluate by rationalizing the denominator and leaving your answer in surd form.(2 Marks)

 $\frac{\sqrt{8}}{1+\cos 45^0}$ 

16. Form the three inequalities that satisfy the given region R



(3 Marks)

#### <u>SECTION II – 50 MARKS</u> <u>Answer any FIVE questions from this section</u>

- 17. (a)P, Q and R are three quantities such that P varies directly as the square of Q and inversely as the square root of R.
  - i) Given that P = 12 when Q = 24 and R = 36, find P when Q = 27 and R = 121. (3 Marks)

ii) If Q increases by 10% and R decreases by 25%, find the percentage increase in P. (4 marks)

b) If Q is inversely proportional to the square root of P and P = 4 when Q = 3. Calculate the value of P when Q = 8. (3 marks)

18. (a) complete the table for the curves  $y = 3\sin(2x + 30^{0})$  and  $y = \cos 2x$  ,use the range  $0 \le x \le 180^{0}$ 

Х	0	15	30	45	60	75	90	105	120	135	150	165	180
y=3sin	1.5		3		1.5		-1.5			-2.60	-1.00		1.5
(2x+30)													
y=Cos	1			0		-		-	-0.5			0.86	1
2x						0.8		0.86				6	
						66		6					

(b) Using the scale Horizontal axis 1cm represent  $30^{\circ}$ , vertical axis 1cm represent 1 unit, draw the graphs of y = 3 Sin (2x + 30) and y = Cos 2x (4 Marks)



(c)Use your graph to solve the equation 3Sin (2x + 30) = Cos 2x (1 Mark)

<ul><li>(d)Determine the following from your graph</li><li>(i) Amplitude of y = 3Sin (2x + 30)</li></ul>	(1 Mark)		
(ii) Period of $y = 3 Sin (2x + 30)$	(1 Mark)		
(iii) Period of $y = \cos 2x$	(1 Mark)		

19. The 2<sup>nd</sup> and 5<sup>th</sup> terms of an arithmetic progression are 8 and 17 respectively. The 2<sup>nd</sup>, 10<sup>th</sup> and 42<sup>nd</sup> terms of the A.P. form the first three terms of a geometric progression. Find:
(a) The 1<sup>st</sup> term and the common difference. (3 Marks)

b) The first three terms of the G.P and the  $10^{th}$  term of the G.P. (4 Marks)

(c)The sum of the first 10 terms of the G.P.

(3Marks)

20. The probability of passing KCSE depends on the performance in the KCPE. If the candidate passes the KCPE, the probability of passing KCSE is $\frac{4}{5}$ . If the candidate fails in the KCPE, the probability of passing KCSE is $\frac{3}{5}$ . If a candidate passes KCSE the probability that he/she will get employed is $\frac{5}{8}$ . If he/she fails KCSE the probability of getting employed is $\frac{1}{3}$ . The probability of passing KCPE is $\frac{2}{3}$ .

(a) Draw a well labelled tree diagram to represent the above information. (2 Marks)

(b) Using the tree diagram, find the probability that a candidate:-

(i) Passes the KCSE (2 Marks)

(ii) Gets employed (2 Marks)

(iii) Passes KCSE and get employed (2 Marks)

(iv) Passes KCPE and does not get employed (2 Marks)

21. The heights of 100 maize plants were measured to the nearest centimeter and the results recorded in the table shown below.

Height x (cm)	Frequency	d	$d^2$	fd	$fd^2$	cf
25 - 29	5			-15		5
30 - 34	12			-24		17
35 - 39	18	-1	1	-18		35
40 - 44	30	0	0	0		65
45 - 49	17	1	1			
50 - 54	11	2				
55 - 59	7	3				

#### (a) Complete the table

(b) Calculate to 2 d.p.

11 | Page

(i) The mean

(ii) The standard deviation

(c)Using the data above plot an ogive and use it to find the quartile deviation (4 Marks)

(2 Marks)

(2 Marks)

(2 Marks)

22. The figure below shows rectangular plot ABCD with AB =60m and BC=45m. PN is a vertical pole of length 30m to which four taut wire PB<sub>1</sub>, PC1,PD and PA are attached



23. (a) Construct a parallelogram ABCD in which AB = 9cm, AD = 5cm and angle BAD  $= 60^{\circ}$ . Measure the length AC (3 Marks)

- (a) Show the locus of point P which moves so that it is equidistant from A and C.(1 Mark)
- (b) Show the locus of point Q which moves such that angle  $BQD = 90^{\circ}.(2 \text{ Marks})$
- (d) The position of point X such that  $AX \ge XC$  and angle  $BXD = 90^{\circ}(2 \text{ Marks})$
- (c) Shade the region inside the parallelogram such that AX $\ge$ XC and angle BXD  $\ge$ 90<sup>0</sup> (2 Marks)

- 24. a) Draw  $\triangle PQR$  whose vertices are P(1,1), Q(-3,2) and R(0,3) on the grid provided (1 Mark) b) Find and draw the image P'Q'R', image of  $\Delta$ PQR under the transformation whose matrix is  $\begin{pmatrix} 3 & 0 \\ 1 & 1 \end{pmatrix}$ (3 Marks)

 $\begin{pmatrix} -1 & 0 \\ 1 & 3 \end{pmatrix}$  matrix c) P'Q'R' is then transformed into P"Q" R" by the transformation of Find the co-ordinates of P"Q" R" and draw the image (3 Marks)

d) Describe fully the single transformation which maps PQR onto P"Q" R". Find the matrix of this transformation (3 Marks)

