| NAME | CANDIDATE'S |
|--------------|-------------|
| SIGNATURE | |
| INDEX NUMBER | DATE |
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121/2 **MATHEMATICS (Alt.1)** PAPER2 **SEPT/OCT** 2 ¹/₂ HOURS

KIKUYU SUB-COUNTY KCSE TRIAL EXAMINATION pastpapers.com 2017

SEPTEMBER 2017 **MATHEMATICS (Alt.1)**

PAPER2

2¹/₂ HOURS

Instructions to the candidates

- Write your name and index number in the spaces provided above.
- Sing and write the date of examination in the spaces provided above. •
- This paper contains two section; I and Section II.
- Answer ALL the questions in section I and only FIVE questions from section II
- All workings and answers must be written on the question paper in the spaces provided bellow each questions.
- Show all the steps in your calculation, giving your answer at each stage in the spaces below each question.
- Marks may be given for correct working even if the answer is wrong
- Non programmable sitent electronic calculators and KNEC mathematical tables may be use EXCEPT where stated otherwise.
- Candidates should check the questions paper to ascertain that all the pages are printed as indicated and that no questions are missing.

For examiner's use only.

| SECTION 1 | 1 |
|------------------|---|
| | |

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

SECTION II

| Question | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | TOTAL |
|----------|----|----|----|----|----|----|----|----|-------|
| Marks | | | | | | | | | |

Grand **Total**

(3marks)

1) Make A the subject of the formula

$$B = \frac{\sqrt{A^2 + C}}{AC}$$

- 2) A man uses a rod which he thinks is one metre long for measuring some timber. The rod is treekcsepastpapers.con vertly vr vner actually 99.4 cm long. Find his percentage error in measuring what he think to be 285 metre (3 marks)
- 3) Quantity P partly varies as the square of Q and partly varies as Q when Q=3, P=48 and when Q = 5, P = 110. Determine the equation which connects P and Q (4 marks)
- .1 wi wi visiti visiti visiti visiti visiti visiti visiti visiti 4) Grade I tea costs Shs. 240 per kg, while Grade II tea costs Shs. 144 per kg. Jane mixed the two grades of tea to make a blend which she sold at Shs. 252 per kg. in so doing she made a profit of 40%. Determine the ratio in which Jane mixed grade I with grade II tea (3marks)

5) The points P' (5, -1) Q' (0, 7), R' (-5, -6) and S' (8, -3) are the images of P', Q', R' and S' under a transformation given by the matrix $M = \begin{pmatrix} 3 & 2 \\ -2 & 1 \end{pmatrix}$. Find the coordinates of P,Q,R and S (3marks)

6) The table below shows the masses to the nearest kilogram of 40 students in a class.

| Mass(kg) | Frequency |
|--|--|
| 40 -44 | 3 |
| 45 - 49 | 8 |
| 50 - 54 | 17 |
| 55 – 59 | 10 |
| 60 - 64 | 2 |
| The figure below shows a circle center O. PT is $R = \frac{100 - 04}{0}$ | a tangent to the circle at P and angle QPT = |
| 40 T | |
| 40°. | |
| Determine the size of angle | |
| $_{2}$ DPO | (Imark) |
| a. rry | (Imark) |

7)

| | b. Reflex POQ | (2marks) |
|----|---|----------|
| 8) | Solve for O in the equation $\tan^2 A + \tan A = 2$ where $O^\circ \le A \le 180^\circ$ | (4marks) |

9) Given that
$$\frac{\sqrt{3} + \sqrt{2}}{\sqrt{3} - \sqrt{2}} = a + b\sqrt{c}$$
, find the values of a, b and c. (3marks)

10) Three years ago a car was valued at Shs. 750, 000. The car has been depreciating at a constant rate over the three years period. If the present value is Shs.663,552, calculate the percentage rate of depreciation of the car per year. (3 marks)

11) A matrix m is given by
$$M = \begin{pmatrix} 5 & -2 \\ 4 & 3 \end{pmatrix}$$

a. Find the inverse of M (1 mark)
b. Hence solve the simultaneous equation below using the matrix method.
 $5x - 2y = 8$
 $4x + 3y = 11$ (3marks)
12. (a) Expand and simplify $\left(6 + \frac{1}{x}\right)^5$ (1 mark)

b) Use the expansions in (a) above to find the exact value of
$$8^5$$
 (2marks)

13.
$$S = 2t^3 - 6t^2 - 11t + 1$$
 find $\frac{ds}{dt}$ when $t = -3$ (3marks)

14. In the figure below ST is a tangent to the circle of T. QR is chord of the circle produced to meet ST at S. Given that QR = 7.5cm and ST = 9cm Calculate the length of RS

(3marks).



16. The velocity of a train was taken every 30 seconds. The results are shown below

| Velocity m/s | 5 | 8 visit | 12 | 12 | 10 | 8 |
|-----------------|---|---------|----|----|-----|-----|
| Time (s) | 0 | 30 | 60 | 90 | 120 | 150 |

Use trapezium rule to estimate the total distance travelled by the train after 150 seconds (3marks)

17. The table below shows income tax rates for a certain year

| Monthly taxable income | Tax Rates (%) |
|------------------------|---------------|
| 1 - 8500 | 10 |
| 8501 -16800 | 15 |
| 16801 -25100 | 20 |
| 25101 -33400 | 25 |
| 33401 -41700 | 30 |
| 41701 - 50000 | 35 |
| Above 50000 | 37.5 |

A chief executive officer earns a basic salary of Kshs. 54600 and house allowance of Kshs. 20000 per month. He is also paid monthly taxable allowances as follows

- Kshs 10720 Car allowances

Medical Allowances – Kshs. 5680 Water and electricity – Kshs 3400

- a. Calculate his monthly taxable income in Kshs. (2marks)
- b. Calculate the gross tax payable per month (5marks)
- c. If the CEO is given family tax relief of Kshs 1260 per month, find his Net monthly income (3marks)
- 18. The figure below shows a triangle PQR inscribed in a circle centre O. PQ = 9cm, QR = 12cm and PR = 10



(3marks)

- ii. The size of angle QOR (2 marks)
- iii. The radius of the circle (2marks)
- iv. Area of the shaded part (3marks)

| 19. The curve $y = 2x^2 - 6x + 9$ passes through the point P(2, 5) a Determine the gradient of the Curve at point P | (2marks) |
|--|----------------|
| a. Determine the gradient of the Curve at point 1 | (2111d1 K5) |
| b. Find the equation of the | |
| i. Tangent to the curve at P | (2marks) |
| | |
| ii. Normal to the curve at P | (3marks) |
| | |
| | |
| c. Find the coordinate of the curve at the turning point. | (3marks) |
| STI . | |
| 20. A pilot flew from an airport P (15S,20E) due north to a northern airport Q | |
| Civer that the distance between D and O is 1500 neuties biles determine | |
| a. Given that the distance between P and Q is 4500 hauticardines determines $i_{\rm c}$ The latitude difference between P and Q | (2marks) |
| 1. The failude difference between 1 and Q | (211101K3) |
| | |
| ii. The position of airport Q | (2marks) |
| W.II | |
| ww | |
| b. After a stopover of $1\frac{1}{2}$ hours at Q the pilot flew a distance of 1350 naut | ical miles due |
| i. The longitude differences between O | (Imarka) |
| 1. The longitude differences between Q | (2111a1KS) |
| * 80* | |
| ii. The position of town R | (2marks) |
| | |
| and the | |
| | |
| c. The average speed of the aircraft between P and Q was 600Knots and its speed between Q and P is 750km/h , calculate to the pagrost minute the t | s average |
| specu between Q and K is / Jokin/n. calculate to the heatest minute the t | otal time the |

- speed between Q and R is 750km/n. calculate to the nearest minute the total time the pilot takes to fly from P to R via Q. (Take radius of the earth R =3670km and 1 Nautical miles = 1.85km) (2marks)
- 21. An arithmetic progression (A.P) has the first term a and Common difference d.
 - a. Write down the first, third, and eleventh terms of the AP (2marks)

| | of the AP | is 80 | | | | | | | | | | |
|------------------|---|--|-------------------|-----------|------------------|---------------|------------|-------------|--|--|--|--|
| | i. Fir | nd the first te | rm and th | ne comm | on differenc | e of the A.F |) | (4marks) | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | ii Wa | rite down the | aighth a | nd tonth | terms of the | ۸D | | (marke) | | | | |
| | ii. write down the eighth and tenth terms of the AP | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | ~ | | | | | |
| | iii. Ca | lculate the st | um of the | first 15 | terms of the | AP | .01 | (2marks) | | | | |
| | | | | | | S. | | | | | | |
| | | | | | | els | | | | | | |
| | | | | | | wax | | | | | | |
| 22 The di | agram a alo | nasida show | ve alright | nyramid | XABC stor | ding on a t | riongular | base ABC | | | | |
| ZZ. The un | agiaiii a aiù | | | | AADC Stat | uling on a u | i angulai | Min the | | | | |
| Each | of the triang | ular faces of | the pyra | mia is an | equilaterar | triangle of s | side 12cm | . M is the | | | | |
| midpo | oint of BC a | nd the vertic | al height | OX of th | e pyramid is | s 9.6cm. Ca | lculate to | one decimal | | | | |
| place. | | | | | K100 | | | | | | | |
| | | | | h. | | | | | | | | |
| a. | The volum | ne of the pyr | amid | NR | | | | (3marks) | | | | |
| | | 17 | | it. | | | | × / | | | | |
| | | | ji | 5 | | | | | | | | |
| | | | S | | | | | | | | | |
| | | 2 | ~0 ⁶ ` | | | | | | | | | |
| b. | The total s | surface area | of the pyr | amid | | | | (2marks) | | | | |
| | | S. | | | | | | | | | | |
| | | , Q'O | | | | | | | | | | |
| | | | | | | | | | | | | |
| C. | The angle | between XC | and plar | ne ABC | | | | (2marks) | | | | |
| | | | and pro- | | | | | () | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| d. | Find angle | between the | e planes X | KBC and | ABC | | | (3marks) | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| 23 Given | the function | ns v = 9 + 3x | $-2x^2$ com | nlete the | table below | 1 | (| (2marks) | | | | |
| V | 2 | $\frac{13}{2} = \frac{1}{2} + \frac{3}{3}$ | | | 1 | 2 | 3 | 1 | | | | |
| | -3 | -2 | -1 | 0 | 0 | 0 | 0 | 0 | | | | |
| 9 2 | 9 | 7 | 7 | 9 | 7 | 7 | 7 | 12 | | | | |
| 3X 22 | ۲ 10 | | | 0 | | | | 12 | | | | |
| -2X ² | -18 | | - | U | | | | -52 | | | | |
| Ŷ | 0 | | | | | | | -11 | | | | |

b. The AP above is such that it is increasing and its first, third, and eleventh terms form the first three terms of a geometric progression. The sum of the fifth and ninth terms

- b) On the grid provided draw the graph $y = 9 + 3x 2x^2$ for $-3 \le x \le 4$ (3marks)
- c) In the same grid draw the straight line y = 2x 5(2 marks)
- d) Use your graph to solve the quadratic equation

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- Heekcsepastpapers.com i) $2x^2 - x - 14 = 0$ (1 mark) ii) $2x^2 - 3x - 4 = 0$ (1 mark)
- 24. Using ruler and compasses only construct a triangle ABC for which AB = 5cm, AC = 7cmand angle $BAC = 60^{\circ}$ (2marks)
 - pers visit. a. Measure BC (1mark)
 - b. Construct the circumcircle of ABC measure the radius as the circle.
 - c. Find a point P on the Same side of BC as A, for which angle BPC = 30° and PC = 5cm (4marks)

9