

Name: Index No:

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Muungano KCSE Trial Exam*121/2***MATHEMATICS****PAPER 2****July 2017****2½ Hours****INSTRUCTIONS:**

1. Write your **Name** and **Index Number** in the spaces provided at the top of this page.
2. The paper consists of two Sections, Section **I** and Section **II**.
3. Answer **all** questions in Section **I** and any five in Section **II**.
4. All answers and workings must be written on the question paper on the spaces provided below each question.

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

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This paper consists of 13 printed Pages

Candidates should check the question paper to ensure that all the pages are printed as indicated and no questions are missing

Turn Over

SECTION 1 (50Marks)

Answer All questions from this section.

1. **Simplify** completely $\frac{\log 49 - \log \sqrt{7}}{\frac{2}{3} \log 7}$ (3mks)

2. **Factorize** completely $12x^3 + y^2n - 4nx^2 - 3xy^2$ (2mks)

3. Five years ago, Joseph was twice as old as his daughter. In fourteen years time he will be one and one half times as old as the daughter. **Find** the sum of their present ages. (3mks)

4. An 800m long train moving at 30km/h takes 2 minutes to go through a tunnel. **Calculate** the length of the tunnel. (3mks)

5. **Make** T the subject of the formula $a = y - \sqrt[3]{\frac{pbh - 4T^2}{T^2}}$ (3mks)

6. **Solve** the equation $2^{2x+3} - 2^{x+4} = 17(2^x) - 4$ (4mks)

7. P varies as the square of M and inversely as the square root of N . **Find** the percentage change in P when M increases by 20% and N decreases by 36% (3mks)

8. The mean weight of 36 students is 45kg; two of the students leave and the mean weight increases by 0.5kg. If one of the students who left weighed 43kg, **find** the weight of the other one. (3mks)

9. The fifth and eighth terms of a G.P. are -48 and 384 respectively. **Find** the sum of all the terms between the 4th and the 9th inclusive (4mks)

10. Evaluate $\int_{-3}^{-1} \left(3x^2 - \frac{4}{x^2} \right) dx$ (3mks)

11. A radio costs Sh. 8000 when new. Its value depreciates at the rate of 5% p.a. for the first 2 years then it appreciates at the rate of 3% p.a. for the next 5 years. **Express** its value 6years after it was bought as a percentage of its value when new (3mks)

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

13. **Solve for x** given that $\sin 2x + 2 \cos 2x = 0$ for the domain $0^\circ \leq x \leq 360^\circ$ (3mks)

14. Under a transformation defined by $M = \begin{pmatrix} x & x \\ 5 & 2x \end{pmatrix}$, an object 3.2cm^2 in area is mapped onto an image whose area is 19.2cm^2 . **Find** the value of x . (3mks)

15. **P** divides **AB** in the ratio 5:-3. Given that $a = 3i - 5j + 4k$ and $b = 2i - 6k$, **find** the co-ordinates of point **P**. (3mks)

16. **Find** the term in x^3 in the expansion of $\left(x^2 - \frac{1}{2x^3}\right)^9$ (2mks)

SECTION II (50Marks)

Answer Any Five questions from this section. ALL questions carry equal marks

- (a) **Find** the gradient of the curve $y = (x^2 - 9)(x + 3)$ at the points where it intersects with the x axis. (4mks)

- (b) **Find** the equation of the tangent to the curve at the point where $x = 1$ (2mks)

- (c) **Find** the coordinates of its turning points and distinguish them (4mks)

17. Two tanks of equal volume are connected in such a way that one tank can be filled by pipe *A* in 1 hour 20 minutes. Pipe *B* can drain one tank in 3 hours 36 minutes but pipe *C* alone can drain both tanks in 9 hours. **Calculate:**

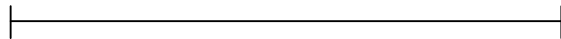
a) The ***fraction of one tank*** that can be ***filled*** by pipe *A* in one hour. (2mks)

b) The ***fraction of one tank*** that can be ***drained*** by both pipes *B* and *C* in one hour. (4mks)

c) Pipe *A* closes automatically once both tanks are filled. Assuming that initially both tanks are empty and all pipes opened at once, calculate how long it takes before pipe *A* closes. (4mks)

18. On the upper part of line **AB**, Using a pair of compasses and ruler only, **construct** locus of points

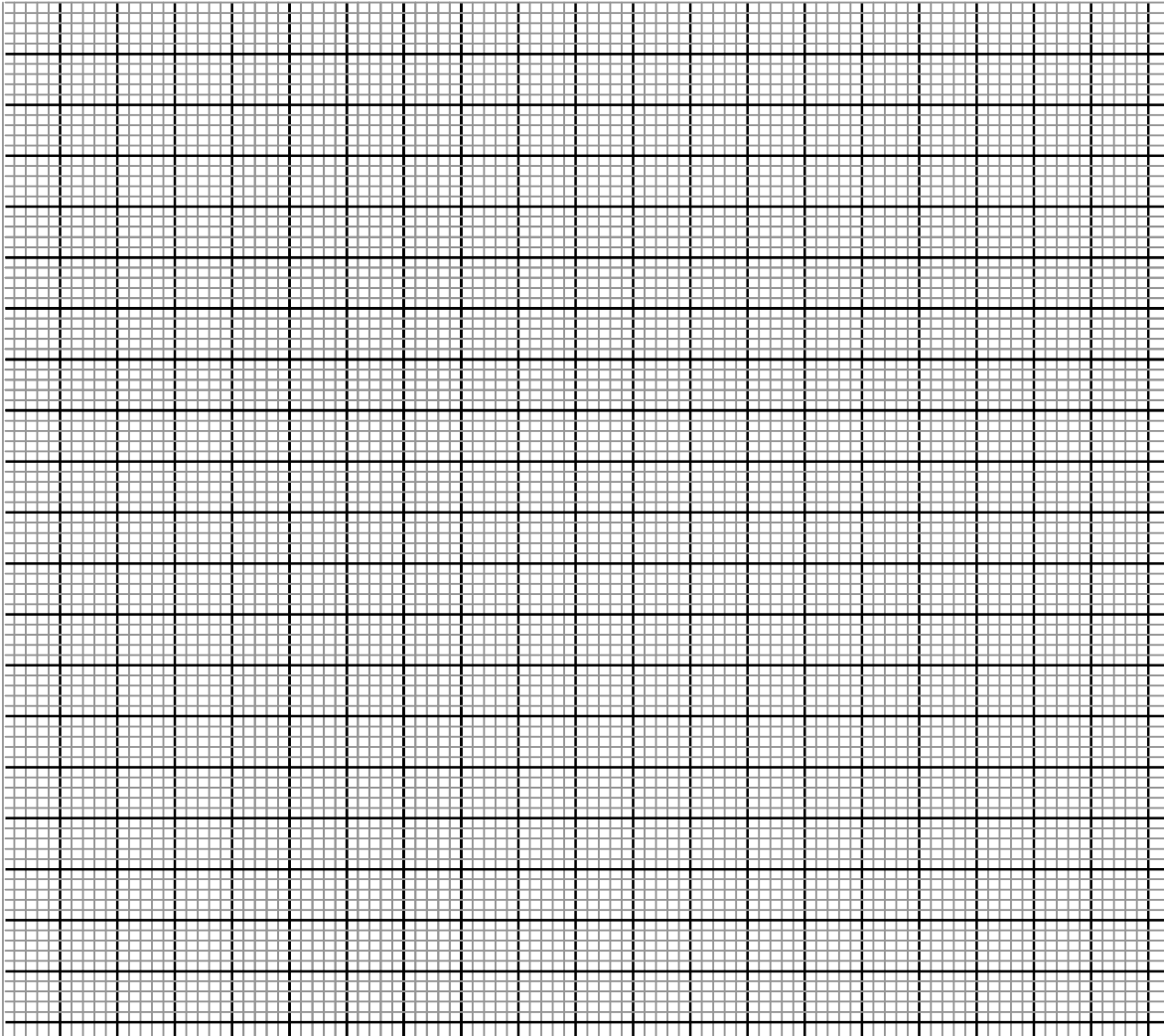
- a) **T** such that angle $ATB = 45^{\circ}$ (3mks)
- b) **M** on AB which is equidistant from **A** and **B**. (2mks)
- c) **S** which is equidistant from **A** and **B** and lies on **T**. (1mk)
- d) Calculate area bounded by loci **T** and line AB. (4mks)



19. A and P are known to be connected by a law of the form $A=kp^n$ where k and n are constants the table below shows values of A and corresponding values of P.

P	0.5	1.2	2	4	6	9	15
A	0.25	3.46	16	128	432	1458	6750

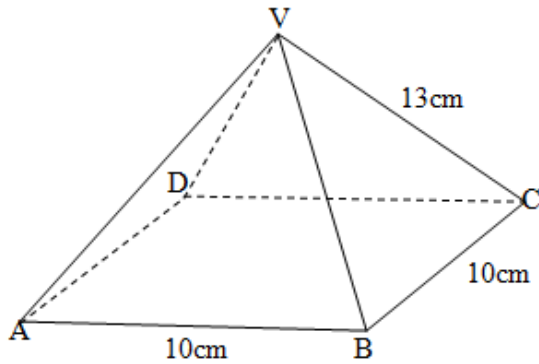
- (a) Express $A=kp^n$ in linear form (1mk)
- (b) Draw the linear graph to represent the information given above (5mks)



- (c) Use your graph to estimate the value of k and n (3mks)

- (d) Find the law connecting A and P (1mk)

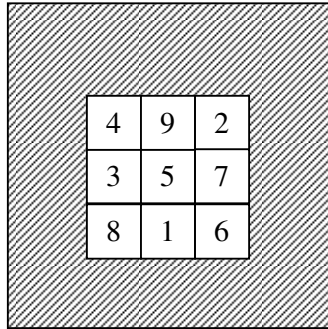
20. The figure below shows a square based pyramid ABCDV in which $AB = 10\text{cm}$ and $VA=VB = VC=13\text{cm}$.



Find;

- (i) The **length** of diagonal AC, leaving your answer as a simplified surd. (2mks)
- (ii) The **height** of the pyramid (2mks)
- (iii) The **acute angle** between VB and base ABCD. (2mks)
- (iv) The **acute angle** between BVA and ABCD. (2mks)
- (v) The **angle** between AVB and DVC. (2mks)

21. In a game of darts, darts are thrown at the board as illustrated in the figure below. The outer square is of side 100cm and each of the nine inner squares is of side 20cm. The number shown in each region is the score obtained by a dart hitting that region. A dart hitting the shaded region scores 0. Assume that all darts hit the board and that each point on the board is equally likely to be hit.



- a) **Find** the probability that with one dart, the score shall be:

(i) 7 (2mks)

(ii) At least 7 (2mks)

(iii) Zero (2mks)

- b) Each turn consists of throwing 3 darts. **Calculate** the probability of scoring

(i) Total of 18 with the first two darts. (2mks)

(ii) A total of at least 25 with the three darts. (2mks)

22. Water flows through a cylindrical pipe of diameter 3.5cm at a speed of 45m/minute.

a) **Calculate** the volume of water delivered by the pipe in one minute in liters. (3mks)

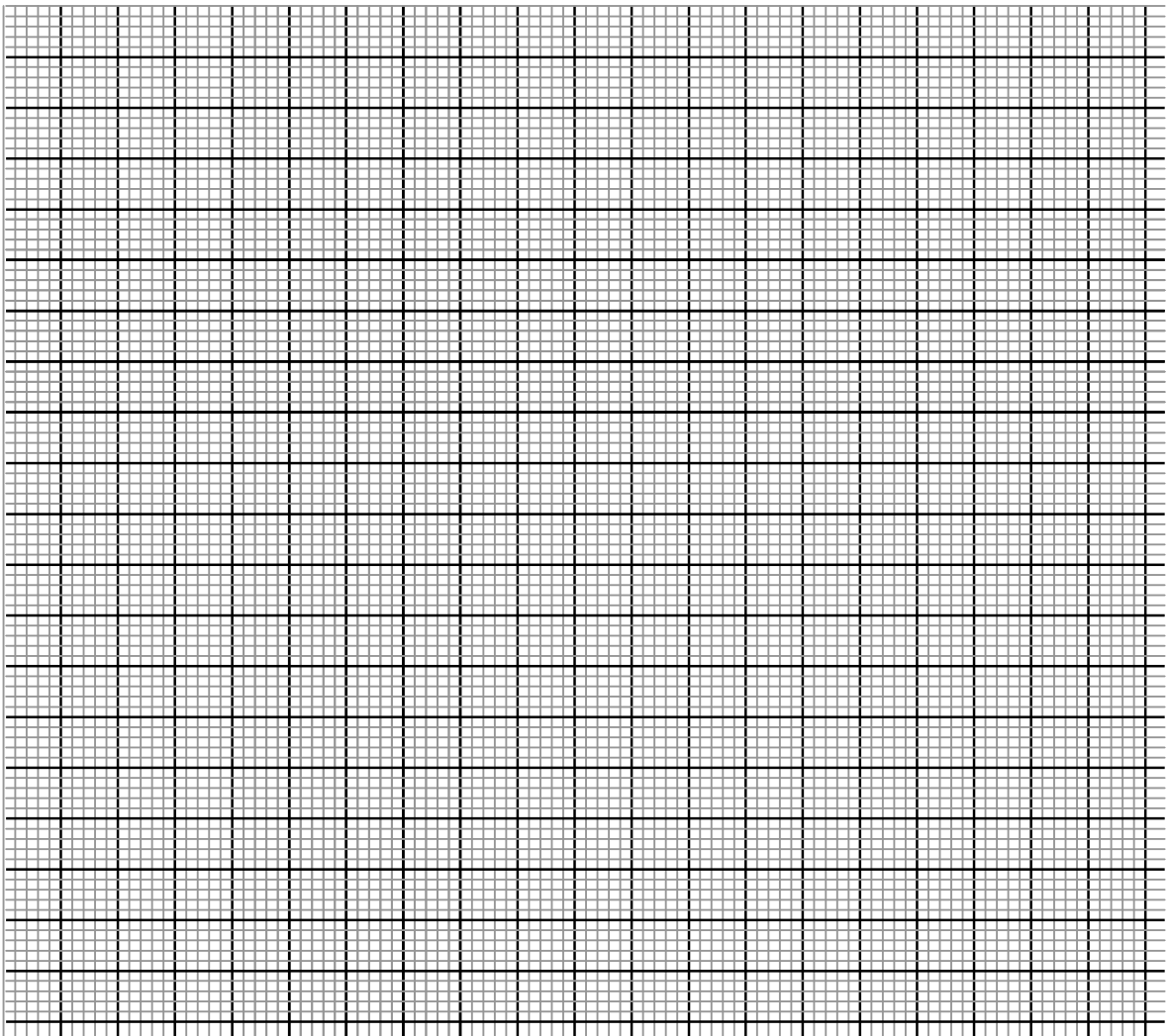
b) A cylindrical storage tank of height 4 meters is filled by water from this pipe at the same rate of flow. Water started flowing at 11.24 a.m. and was filled at 12.50p.m. **Calculate** the area of the cross-section of this tank. (4mks)

c) Water costs sh. 3.50 per every full 20litres jericin plus a fixed standing charge of sh.18.50 per week. **Calculate** the cost incurred by a family which consumes the capacity of this tank in one week. (3mks)

24. Baluto intends to start an electronics outlet specializing in television sets and home theaters. He can stock a maximum of 60 items in his shop. On average, a TV set costs Kshs 16,000 while a home theater costs Kshs 48,000. His initial stock should be at least Kshs 960,000. The number of Home theaters should be at most four times the number of TV sets. He must buy more than 10 home theaters. Taking x and y to represent the number of TV sets and Home theaters purchased respectively;

a) **Form all** inequalities to represent the above information (4mks)

b) **Represent** the inequalities in (a) above in a Cartesian Plane (4mks)



c) If the dealer makes a profit of Ksh.1200 and Ksh.2000 per TV Set and Home theater respectively, **find** the maximum profit he will make. (2mks)