

SUNSHINE SECONDARY SCHOOL

MATHEMATICS

Mathematics Paper 1

Name.....Admission Number.....

121/1

Mathematics

Form 4

March 2017

Pre-mock 1

Class.....

Date.....

Candidates signature.....

Instructions to candidates

1. Write your name and admission number in the spaces provided above
2. Sign and write the date of examination in the spaces provided above
3. The paper contains **Two** sections: **Section I and II.**
4. Answer **ALL** the Questions in Section I and any five questions in section II
5. All answers and working must be written on the question paper in the spaces provided below each question
6. **Show all the steps in your calculations, giving your answer at each stage in the spaces below each question.**
7. Marks may be given for correct working even if answer is wrong.
8. Non-programmable silent electronic calculators and KNEC Mathematical tables may be used , except where stated otherwise

For Examiner's 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

This paper consists of 16 printed pages.

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

Turn over

SECTION I(50Marks)

Answer all the questions in this section

1. Without using a calculator, evaluate $\frac{-8+(-5)\times(-8)-(-6)}{-3+(-8)\div 2\times 4}$ (2Marks)

2. (a) A rhombus has diagonals of 12 cm and 18cm. Calculate the area of the rhombus (2Marks)

(b) Calculate the lengths of the rhombus correct to 2 decimal places. (2Marks)

3. Simplify $\frac{27^{\frac{2}{3}} \div 2^4}{32^{\frac{-3}{5}}}$ (3Marks)

4. Simplify the expression $\frac{a^4 - b^4}{a^3 - ab^2}$ (3Marks)

5. Mapesa travelled by train from Butere to Nairobi. The train left Butere on a Sunday at 23 50hours and travelled for 7 hours 15 minutes to reach Nakuru. After a 45 minutes stop in Nakuru, the train took 5 hours 40minutes to reach Nairobi. Find the time, in the 12 hour clock system and the Mapesa arrived in Nairobi. (2Marks)

6. Given the ratio $a:b=3:4$, find the ratio $(6a - b):(3a+3b)$ (3Marks)

7. A fuel dealer makes a profit of Ksh 520 for every 1 000 litres of petrol sold and Ksh480 for every 1 000 litres of diesel sold. In a certain month the dealer sold twice as much diesel as petrol. If the total fuel sold that month was 900 000 litres, find the dealer's profit for that month. (3Marks)

8. A liquid spray of mass 384 g is packed in a cylindrical container of internal radius 3.2 cm. Given that the density of the liquid is $0.6g/cm^3$, calculate to two decimal places the height of the liquid in the container. (3Marks)

9. A cylinder has a radius equal to its height and its volume is 134.2cm^3 . Determine
(a) Its radius using mathematical table only (2Marks)

- (b) Its surface area assuming it is open at one end (2Marks)

10. Solve the equation: $2 \cos 2\theta = 1$ for $0^\circ \leq \theta \leq 360^\circ$. (4Marks)

11. The equation of the line L_1 is $2y - 5x - 8 = 0$ and L_2 passes through the points $(-5,0)$ and is perpendicular to L_1 . Find the equation of L_2 leaving it in double intercept form. (3Marks)

12. Calculate the area of a triangle with sides 9 cm, 6 cm and 7 cm correct to 2 decimal places (3Marks)

13. A solid metal sphere of radius 4.2 cm was melted and the molten materials used to make a cube. Find to 3 significant figures the length of the side of the cube. (3Marks)

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

15. Given that $\log_{10} 3 = 0.4771$, $\log_{10} 5 = 0.6990$ and $\log_{10} 2 = 0.3010$, without using tables or calculators evaluate $\log_{10} 0.243$ (3Marks)

16. An angle of 1.8 radians at the centre of a circle subtends an arc of length 23.4cm.

Find : (a) the radius of the circle

(2Marks)

(b) the area of the sector enclosed by the arc and the radii

(2Marks)

SECTION II (50 Marks)

Answer any **five** questions in this section

17. (a) The ratio of Juma's and Akinyi's earnings was 5:3. Juma's earnings rose to Ksh 8 400 after an increase of 12%

Calculate the percentage increase in Akinyi's earnings given that the sum of their new earnings was Ksh 14 100. (6Marks)

(c) Juma and Akinyi contributed all the new earnings to buy maize at Ksh 1 175 per bag. The maize was then sold at Ksh 1 762.50 per bag. The two shared all the money from the sales of the maize in the ratio of their contributions. Calculate the amount that Akinyi got. (4Marks)

18. Patrick at point A is 100 km East of Mellissa who is at point B. Patrick travels on a bearing of 040° at a speed of 30km/h and Mellissa starts off at the same time travelling on a bearing of 320° and a speed of 20km/h.

(a) Draw an accurate scale diagram to show their current initial positions (4Marks)

(b) Determine the distance and bearing of Mellissa from Patrick after two hours (3Marks)

(c) After two hours, they decided to head straight for one another using their original speeds. How long will it take them to meet? (3Marks)

19. A group of people planned to contribute equally towards a water project which needed Ksh 2 000 000 to complete. However, 40 members of the group withdrew from the project. As a result, each of the remaining members was to contribute Ksh 2 500 more.

(a) Find the original number of the members in the group (5Marks)

(b) Forty five percent of the value of the project was funded by Constituency Development Fund (CDF). Calculate the amount of contribution that would be made by each of the members of the group. (3Marks)

(c) Members' contributions were in terms of labour provided and money contributed. If the ratio of the value of labour to the money contributed was 6:19, calculate the total amount of money contributed by the members. (2Marks)

20. A triangle ABC has vertices A (3, 4), B (1, 3) and C(2, 1).

- (a) Draw triangle $A'B'C'$ the image of triangle ABC under a rotation of $+90^\circ$ about (0,0) (2Marks)
- (b) Draw triangle $A''B''C''$ the image of triangle $A'B'C'$ under a reflection in the line $y = x$ (2Marks)
- (c) Draw triangle $A'''B'''C'''$, the image of $A''B''C''$ under a rotation of -90° about (0,0) (2Marks)
- (d) Describe a single transformation that maps triangle ABC onto triangle $A'''B'''C'''$ (2Marks)
- (e) Write down the equations of the lines of symmetry of the quadrilateral $BB''A''A'$ (2Marks)

21. In a KCPE examination the total marks obtained by 200 students is as shown in the following table.

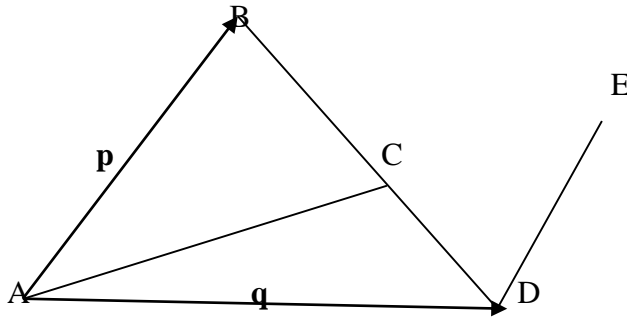
1-50	51-100	101-150	151-200	201-250	251-300	301-350	351-400	401-450	451-500
3	5	20	18	25	50	48	20	8	3

(a) State the frequency of the modal class (1Marks)

(b) Modify the table to calculate the mean Mark (4Marks)

(c) Represent the information on a frequency polygon (5Marks)

22. In figure below $\mathbf{AB}=\mathbf{b}$, $\mathbf{AD}=\mathbf{q}$, $\mathbf{DE}=\frac{1}{2}\mathbf{AB}$ and $\mathbf{BC}=\frac{2}{3}\mathbf{BD}$



(a) Find in terms of \mathbf{p} and \mathbf{q} the vectors

(i) \mathbf{BD} (1Mark)

(ii) \mathbf{BC} (1Mark)

(iii) \mathbf{CD} (1Mark)

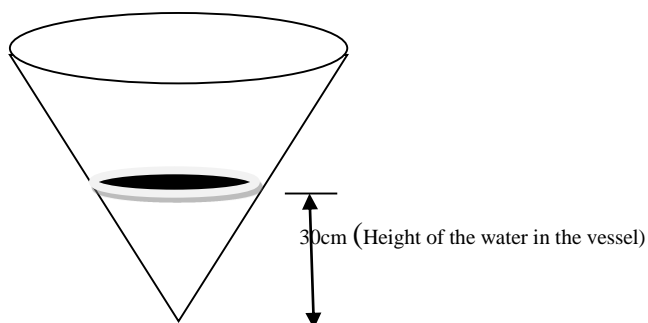
(iv) \mathbf{AC} (2Marks)

(b) Given that $\mathbf{AC}=k\mathbf{CE}$, where k is a scalar, find:

(i) The value of k (4Marks)

(ii) The ratio in which C divides AE (1Mark)

23. The diagram below represents a conical vessel which stands vertically. The vessel contains water to a depth of 30cm. The radius of the water surface in the vessel is 21cm. (Take $\pi = \frac{22}{7}$)



- (a) Calculate the volume of the water in the vessel in cm^3 (2Marks)
- (b) When a metal sphere is completely submerged in the water, the level of the water in the vessel rises by 6 cm. Calculate
- (i) The radius of the new water surface in the vessel; (2Marks)
- (ii) The volume of the metal sphere in cm^3 (3Marks)
- (iii) The radius of the sphere (3Marks)

24. The angle of elevation of the top of the spire from the foot of a building is 60° . The angle of depression of the top of the building from the top of the spire is 47.7° . Given that the height of the building is 15 metres, calculate to one decimal place

(a) The distance between the spire and the building (4Marks)

(b) The difference in height between the spire and the building (2marks)

(c) The height of the spire (2Marks)

(d) The angle of depression of the foot of the spire from the top of the building (2marks)