

NAME:

INDEX NO:.....

SCHOOL.....

Date:

Candidate's signature:

121/2

MATHEMATICS

Paper 2

July/August 2017

Time: 2 ½ Hours

SCHOOL BASED FORM 4 EXAM JULY-AUGUST 2017

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

MATHEMATICS

Paper 2

July/August 2017

Time :2 ½ Hours

INSTRUCTIONS TO CANDIDATES

- (a) Write your **NAME** and **INDEX** number in the spaces provided above.
- (b) 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) All answers and working must be written on the question paper in the spaces provided below each question.
- (f) Show **ALL** the steps in your calculations, giving your answers at each stage in the spaces below each question.
- (g) Marks may be given for correct working even if the answer is wrong.
- (h) Non- programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.
- (i) Candidates should check the question paper to ascertain that all the papers are printed as indicated and that no questions are missing.

FOR EXAMINER'S USE ONLY

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 of 16 printed pages.

SECTION A (50 MARKS)

ALL QUESTIONS IN THIS SECTION

1. If $A = 2.3$, $B = 8.7$ and $C = 2.0$. Find the percentage error in $\frac{A+B}{C}$ (3 mks)

2. Simplify $\frac{2\sqrt{5}}{\sqrt{3-\sqrt{5}}}$ leaving the answer in the form $a + b\sqrt{c}$, where a , b and c are rational numbers. (2 mks)

3. Starting from seven minutes to noon the minutes hands of a clock moved so that the clock is showing 27 minutes to one.

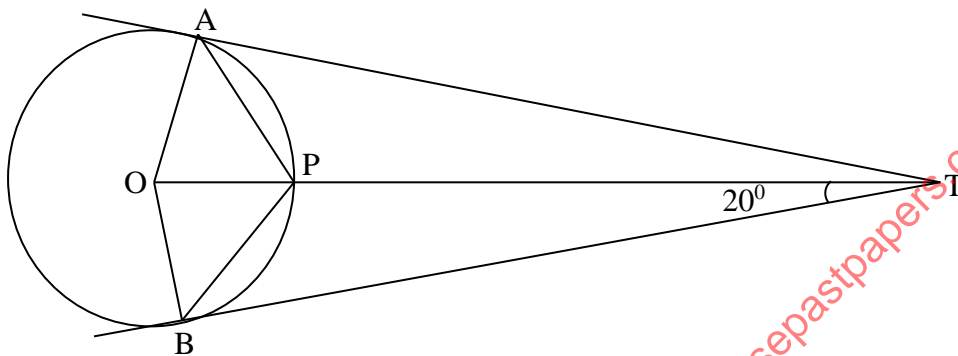
(a) Find the angle through which the minute hand moved. (2 mks)

(b) Given that the minute hand is 6.37cm long. Find the length of the arc it describes in that time.

(2 mks)

4. In the figure below TA and TB are tangents to the circle centre O. Given that $\angle ATB = 20^\circ$. Find $\angle PAT$.

(3 mks)



5. In a school the form three students are 90. The ratio of boys to girls is 7:2. Find the number of girls required to join the existing class so that the ratio of boys to girls is 5:4.

(3 mks)

6. A wire 180cm long was used to make a model of a triangular-based prism. The cross-section has side of length 10cm each. Calculate the volume of the resulting prism. (4 mks)

7. Find the value of x given that $\text{Log}_2(x^2 - 2) - \text{Log}_2(\frac{1}{2}x + 5) - 1 = 0$ (3 mks)

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8. Write down the first four terms of the expression of $(2 - \frac{1}{4}x)^9$ in ascending powers of x giving your answer in simplest forms. Hence find the value of $(1.975)^8$ to the nearest 3 d.p. (3 mks)

9. Determine the centre and the radius of the circle given by equation. (3 mks)
 $x^2 + y^2 - 6x + 4y - 12 = 0$

10. (a) Draw line $MN = 7\text{cm}$ and show the locus of a point P which is such that $\angle MPN = 90^\circ$. (1 mk)

(b) On the locus of P in the diagram in (a) above, construct the locus of T which is such that it is equidistant from M and N. (2 mks)

11. A box contains 3 red balls, 7 blue balls and 2 green balls. A ball is taken at random. What is the probability of it being neither red nor green. (2 mks)

12. In an examination there are two papers each with total marks of 50. To pass the examination a candidate must score at least 20 marks on each paper and at least 50 marks on the two papers combined. If x and y represent marks on paper I and paper II respectively. Write down three inequalities representing the above information. (3 marks)

13. The gradient of a curve at the point (x,y) is $5x + \frac{3}{x^2}$ if it passes through (1,2). Find its equation. (4 mks)

14. A ship sails due North from latitude 20°S for a distance 1440nm. Find the latitude of the point it reaches. (3 mks)

15. Find x if $\cos x = \frac{\sqrt{3}}{2}$ for $-180^{\circ} \leq x \leq 180^{\circ}$. (3 mks)

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16. Given that $\underline{x} = 3\hat{i} + 2\hat{j} - 4\hat{k}$, $\underline{y} = 3\hat{i} + 5\hat{j} - 2\hat{k}$ and $\underline{z} = -4\hat{i} + 3\hat{j} + 5\hat{k}$ and that $\underline{p} = 4\underline{x} - 2\underline{y} + 3\underline{z}$. Find the magnitude of \underline{p} to 4 S.F. (4 mks)

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SECTION II (50 Marks)

Answer any Five Questions in this section

17. An amount of money was shared among five businessmen. Njoroge, Mwanzia, Ahamed, Wanyama and Kiprotich. Njoroge got $\frac{3}{8}$ of the total while Mwanzia got $\frac{2}{5}$ of the remainder. The remaining amount was shared equally among the other three of which each received KSh. 600.

(a) How much was shared among the five. (3 mks)

(b) Determine how much Mwanzia got. (2 mks)

(c) Njoroge, Mwanzia and Kiprotich invested their money and earned a profit of KSh. 1200. A third of the profit was left to maintain the business and the rest was shared according to their investment. Calculate how much each got. (5 mks)

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18. Three consecutive term of a geometric progression are 3^{2x+1} , 9^x and 81 respectively.

(a) Calculate the value of x .

(3 mks)

(b) Find the common ratio.

(1 mk)

(c) Calculate the sum of the first 4 terms of this series.

(3 mks)

(d) Given that the fifth and the seventh terms of the G.P form the first two consecutive terms of an arithmetic sequence, calculate the sum of the first 20 terms of the sequence.

(3 mks)

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19. The equation of a curve is given by $y = 3 \cos x - 4 \sin x$.

(a) Complete the table below correct to 1 d.p

(2 mks)

x	0	30	60	90	120	150	180	210	240	270	300	330	360
y	3			-4			-3			4			3

(b) On the grid provided, draw the graph of $y = 3 \cos x - 4 \sin x$ for $0 \leq x \leq 360$

(4 mks)

(c) Use your graph to solve. $3 \cos x = 4 \sin x - 1$

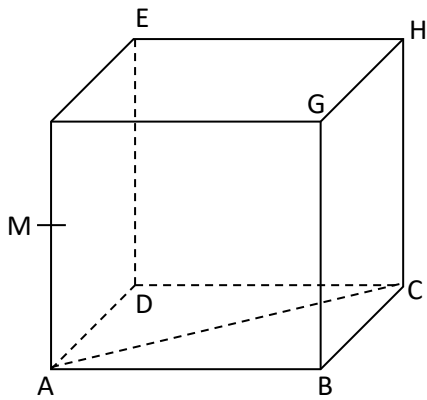
(2 mks)

(d) Find the range of values of x for which $3 \cos x - 4 \sin x + 4 < 0$

(2 mks)

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20. The figure below shows a cube of side 10cm. M is the midpoint of AF.



Find

(i) length HM

(2 mks)

(ii) the angle HM and ABCD.

(4 mks)

(iii) angle between HM and MC

(4 mks)

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21. P varies directly as the square of Q and inversely as R.

(a) (i) Given that $P = 2$ when $R = 5$ and $Q = 4$, find the equation connecting P Q and R. (2 mks)

(ii) If $P = 4.5$ and $R = 5$. Find the positive value of Q. (3 mks)

(b) If Q increases by 5% and R decreases by 10%. Find the percentage change in P. (5 mks)

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22. A particle moves such that its displacement S metres after t seconds from a fixed point is given by

$$S = 3t^3 - 6t^2 + 4t + 5. \text{ Determine}$$

(a) The displacement of the particle at $t = 2$. (1 mk)

(b) The velocity of the particle when $t = 3$. (3 mks)

(c) The displacement of the particle when the particle was momentarily at rest. (3 mks)

(d) The acceleration of the particle when $t = 1.5$ seconds. (3 mks)

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23. A number of students were asked to cut 30cm length of binding wire without measuring. Later 100 pieces are collected and measured correct to the nearest 0.1cm and the data filled on the table below.

Length (cm)	28.0– 28.4	28.5-28.9	29.0-29.4	29.5-29.9	30.0-30.4	30.5-30.9	31.0-31.4	31.5-31.9
	5	8	30	x	10	20	10	4

(a) Calculate the value of x

(1 mk)

(b) State the model class

(1 mk)

(c) Using 29.7 as working mean, calculate

(i) the mean.

(4 mks)

(ii) the standard deviation.

(4 mks)

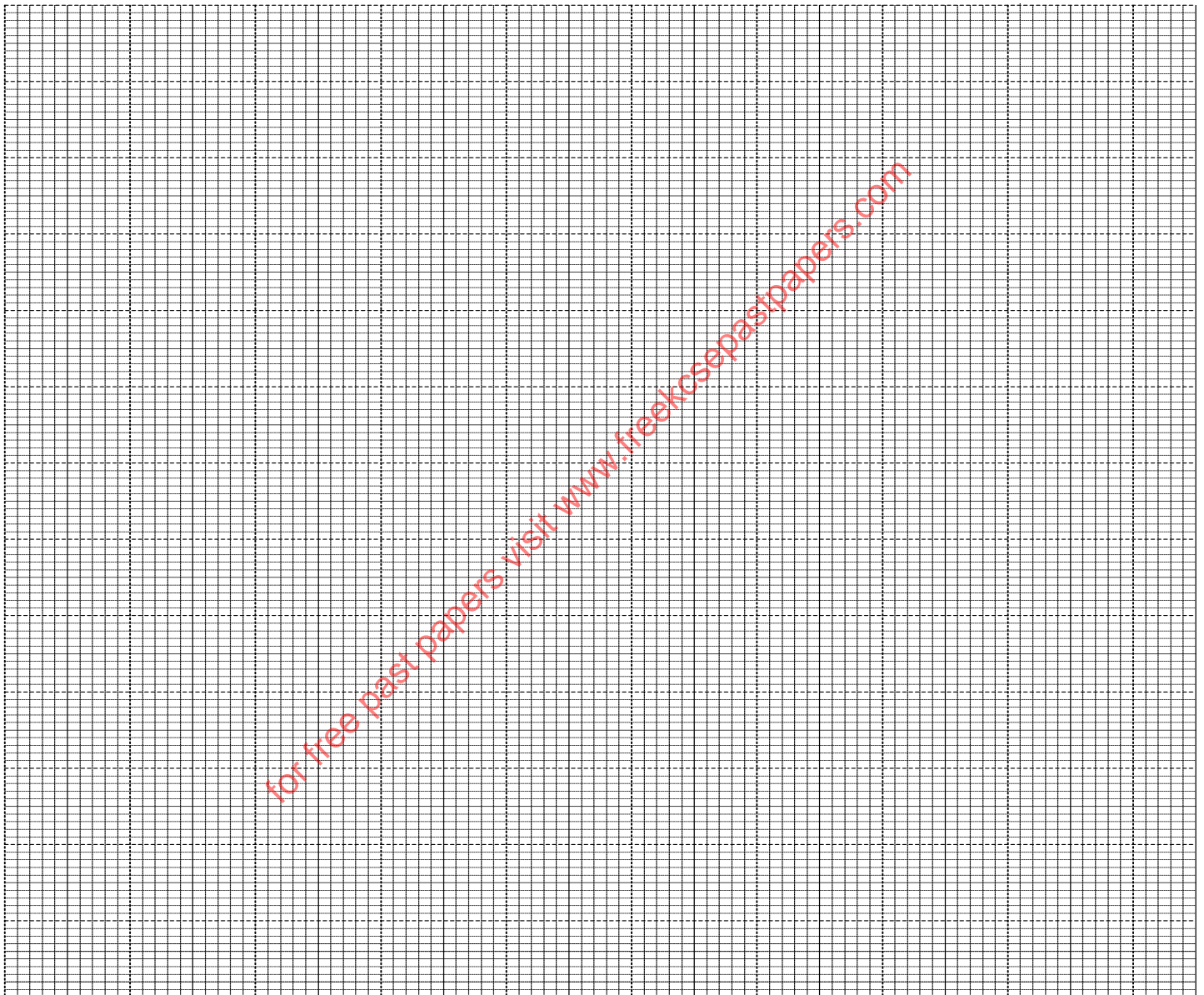
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24. Two quantities p and n are connected by the equation $P = AK^n$, where A and K are constant. The table below shows corresponding values of n and p .

n	2	4	6	8	10
P	9.8	19.4	37.4	74.0	144.4

(a) State the linear equation connecting p and n . (2 mks)

(b) On the grid provided, draw a suitable straight line. (6 mks)



(c) Use your graph to estimate the value of A and K . (2 mks)