

Name.....Adm No.....Class.....
Index No..... Signature.....

121/2

Mathematics Paper 2

June Exams

Form 4

2 ½ Hours

Term 2, 2017

MOI HIGH SCHOOL KABARAK

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 **ALL** questions from section I and **ANY FIVE** 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

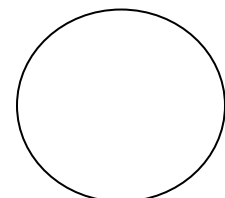
SECTION I

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



SECTION I

(Answer all the questions in the spaces provided)

1. Use tables of logarithms to evaluate

(3marks)

$$\frac{4.28 \times 0.01677}{\tan 20^\circ}$$

2. All prime numbers between ten and twenty are arranged in descending order to form a number.

(i) Write down the number.

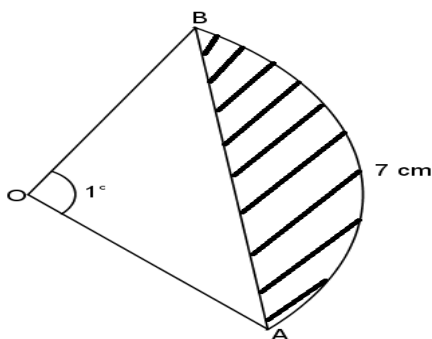
(1mark)

(ii) State the total value of the third digit of the number formed in (i) above.

(1mark)

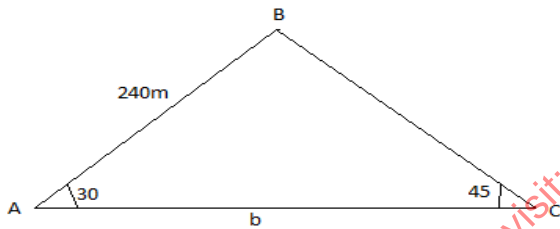
3. The diagram below shows a sector of a circle centre O with arc AB=7 cm and subtends an angle of 1° at the centre. Calculate the shaded area to 4 s.f. (Take $\pi = \frac{22}{7}$).

(3marks)



4. Expand $\left(1 + \frac{1}{x}\right)^9$ up to the term x^3 hence use your expansion to find the estimate value of $100(1.05)^9$ correct to 4 significant figures. (4marks)

5. In the figure below it shows a triangle ABC not drawn to scale. Calculate the value of b given that $AB = 240\text{m}$, $\angle BAC = 30^\circ$ and $\angle ACB = 45^\circ$ (3marks)



6. Kipkemboi running at 10m/s starts 5 m ahead of Mutola who is running at 12m/s. How far from Kipkemboi's starting point does Mutola overtake him? (3marks)

7. Make L the subject given that $H = \sqrt{\left(\frac{3d(L-d)}{10L}\right)}$ (3marks)
8. Without using a mathematical tables or calculators, simplify $\frac{3}{\sqrt{7}-\sqrt{2}} - \frac{2}{\sqrt{2}+\sqrt{7}}$ (3marks)
9. The volume of cuboid A is 64 cm^3 while that of a similar cuboid B is 8 cm^3 . If the width of cuboid A is 2 cm, find the width of cuboid B. (3marks)
10. Show that $4y^2 + 4x^2 = 12x - 12y + 7$ is the equation of a circle, hence find the co-ordinates of the centre and the radius. (3marks)

11. The dimensions of a rectangle are given as 4.1cm by 2.8cm. Calculate the relative error in the area. (3marks)

12. If $2.\dot{5} \times 0.\dot{4}\dot{5} = \frac{a}{b}$ where a and b are in their simplest forms. Find the values of a and b . (3marks)

13. The seventh term of an arithmetic sequence is 17, three times the third term is 3. Calculate the first term and the common difference of the sequence. (3marks)

14. At the start of the 1st year, Mr Chepyator, deposited Ksh. 180,000 in a bank which gives an interest of 12% p.a, compounded quarterly. Find the interest earned by Mr. Chepyator at the start of the 4th year. (3marks)

15. A quantity P varies partly as n and partly as the square of n. When P= -3, n= -1 and when P= 18, n=2. Find P when n =1 (3marks)

16. Find the inverse of $\begin{pmatrix} 5 & -2 \\ 2 & -1 \end{pmatrix}$ hence find the point of intersection of the lines whose equations are (4marks)

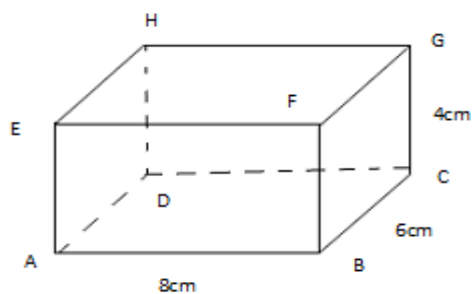
$$5x - 2y = 5$$

$$y = 2x - 3$$

SECTION II

(Answer ANY FIVE questions in the spaces provided)

17. In the cuboid below, $AB = 8\text{cm}$, $BC = 6\text{cm}$, $AE = 4\text{cm}$



Calculate,

- a) The length BD (2marks)
- b) The angle which BH makes with the plane ABCD. (2marks)
- c) The angle between EC and the plane ADHE (2marks)
- d) The angle between EA and AG (2marks)
- e) The angle between planes ABCD and EBCH (2marks)

18. There are 2 bags A and B. Bag A has 4 white balls and 6 red balls. Bag B has 2 white balls and 3 red balls. Each bag has an equal chance of being picked. If a bag is selected randomly and 2 balls picked with replacement in bag A and without replacement in bag B. Find the probability that:

(a) They are both white. (2marks)

(b) They are of different colours. (3marks)

(c) At least one ball is red. (2marks)

(d) None of the balls is white. (3marks)

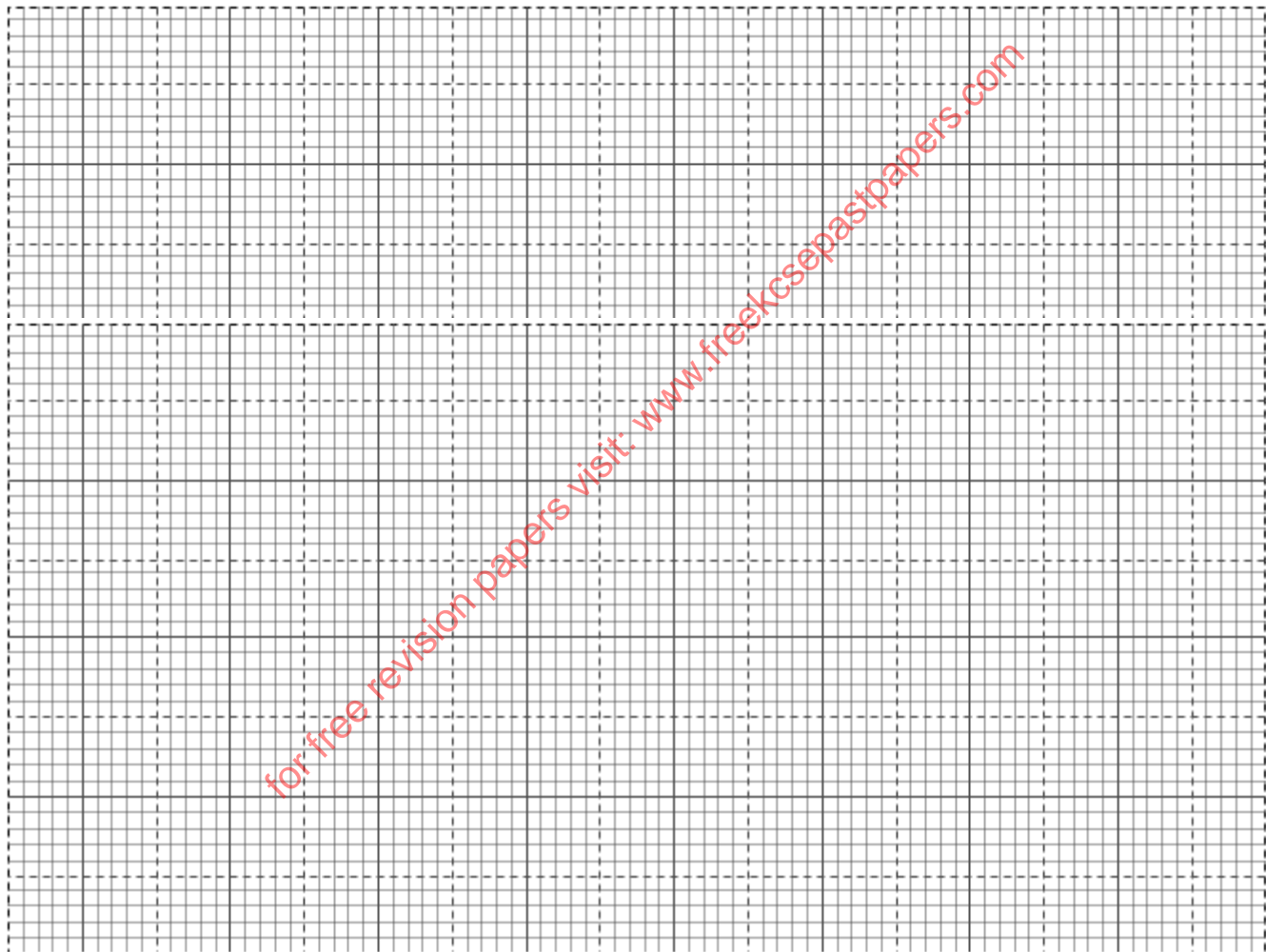
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19. The table below shows marks obtained by form three students in Kiswahili third term exam.

Marks	20-25	26-30	31-39	40-45	46-51	52-59	60-68	69-75	76-80
Frequency	2	8	14	24	30	20	10	8	4

(a) Calculate the mean (2marks)

(b) Draw an ogive (3marks)



(c) From the ogive curve in (b) above

(i) estimate the median. (1mk)

(ii) estimate the quartile deviation. (2mark)

(iii) if 40% of the students are to pass, determine the pass mark (2marks)

20. (a) Integrate the function $y = (x - 1)(x - 3)$

(2marks)

(b) Find the exact area bounded by the curve $y = (x - 1)(x - 3)$, y-axis, x-axis and the line $x = 3$

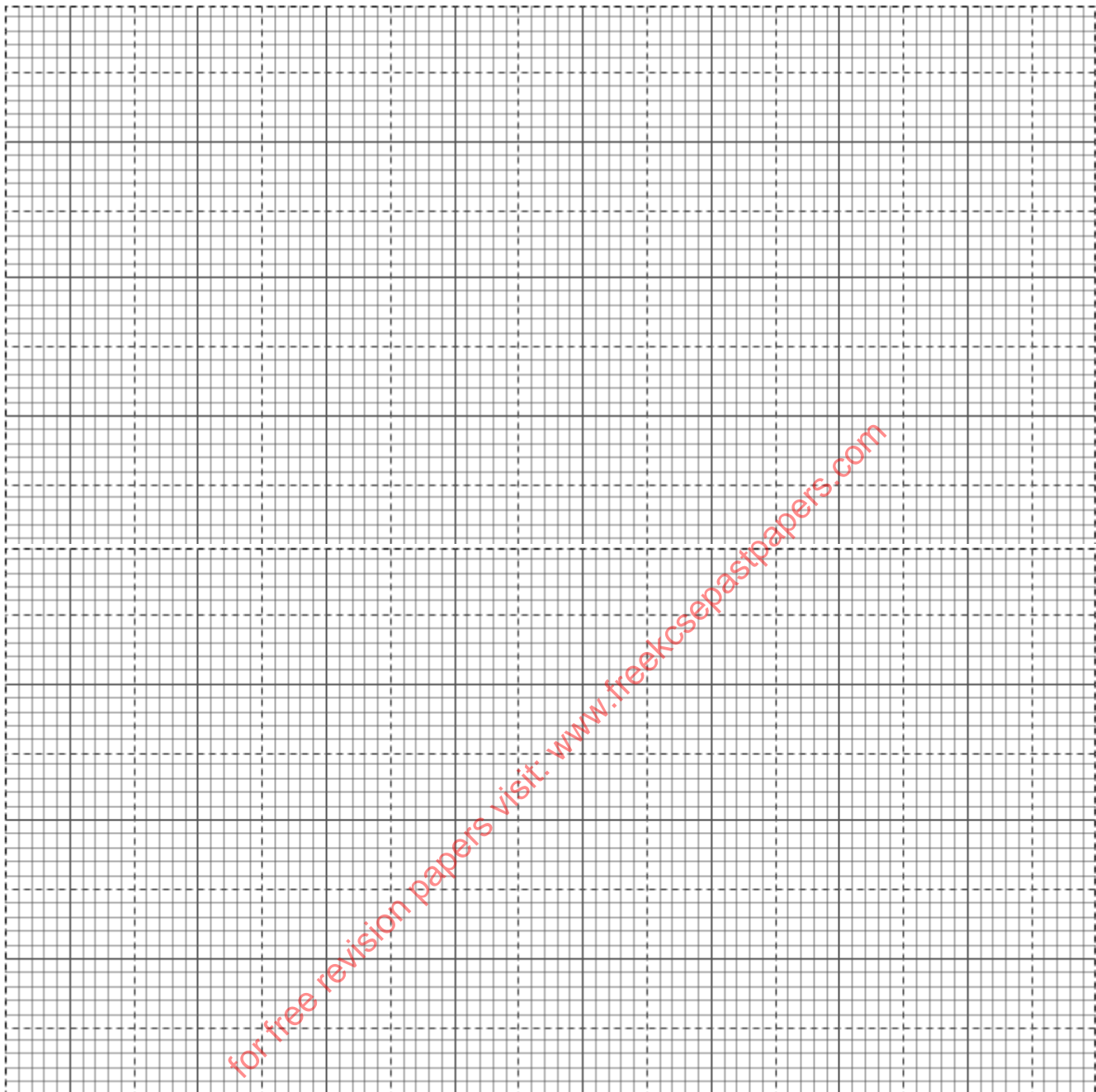
(3marks)

(c) Use trapezium rule with three trapezia to estimate the area bounded by the curve $y = (x - 1)(x - 3)$, y-axis, x-axis and the line $x = 3$.

(3marks)

(d) Calculate the percentage error introduced by using the trapezium rule in (c) above.(2marks)

21. Triangle ABC has A(1,4), B(1,1) and C(3,3). Draw $\triangle ABC$ on the grid provided.(1 mark



(a) $\triangle ABC$ is reflected in the line $x = 0$ to give $\triangle A_1 B_1 C_1$. Draw $\triangle A_1 B_1 C_1$ on the same grid and state its coordinates. (3marks)

(b) $\triangle A_2 B_2 C_2$ is the image of $\triangle A_1 B_1 C_1$ under a stretch with x - axis invariant and scale factor 2. Determine the coordinates of $\triangle A_2 B_2 C_2$ and draw it on the same grid. (3 marks)

(c) $A_3(-1,7)$ and $B_3(-1,1)$ are the images of A_2 and B_2 respectively under a shear with y -axis invariant. Determine the coordinates of C_3 and draw $\triangle A_3 B_3 C_3$ on the same grid. (3 marks)

22. Use a pair of compass and ruler only in this question

- a) Construct a parallelogram ABCD in which $AB = 6\text{cm}$, $AD = 4\text{cm}$ and angle $BAD = 60^\circ$ (3marks)
- b) Measure the length AC (1mark)
- c) Show the locus of point P which moves so that it is equidistant from A and C (3marks)
- d) The locus of point Q which moves so that angle $BQD = 90^\circ$ (3marks)

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23. A plane leaves an airport P (10°S , 62°E) and flies due north at 800km/h .

(a) Find its position after 2 hours

(3marks)

(b) The plane turns and flies at the same speed due west. It reaches longitude Q, 12°W .

(i) Find the distance it has traveled in nautical miles.

(3marks)

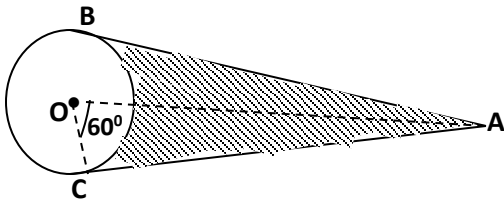
(ii) Find the time it has taken (Take $\pi = \frac{22}{7}$, the radius of the earth to be 6370km and 1 nautical mile to be 1.853km)

(2marks)

(c) If the local time at P was 1300 hours when it reached Q, find the local time at Q when it landed at Q

(2mks)

24 In the figure below AB and AC are tangents to the circle center O at B and C respectively, the angle $\text{AOC} = 60^\circ$, radius of the circle 5cm.



Calculate;

a) The length of AC (2marks)

b) The area of triangle OAC (2marks)

c) The area of minor sector COD (2marks)

d) The area of the shaded region (4marks)