

# KAPSABET HIGH SCHOOL

(Kenya Certificate of Secondary Education)

Paper 1



## INTERNAL MOCK EXAM MATHEMATICS

ALT A

Dec. 2020– 2 ½ Hours

Name..... Index No. ....

Adm No..... Date:.....

Signature ..... Stream:.....

### Instructions to candidates

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

### 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

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**SECTION I (50 MARKS)**  
**Answer all questions in this section**

1. Evaluate without using a calculator

(3 marks)

$$\frac{32 - -10}{7 \times -2} - \frac{4^2 \times -6 - 12}{36 \div -4 \times 3}$$

2. In Boresha Bank customers may withdraw cash through one of the three tellers at the counter. On average, one teller takes 3 minutes, the others take 5 minutes and 6 minutes respectively to serve a customer. If the three tellers start to serve the customers at the same time, find the shortest time it takes to serve 210 customers. (4 marks)

3. Simplify

(2 marks)

$$\sqrt[3]{2y \times 5^{3y} \div 2^{-2y}}$$

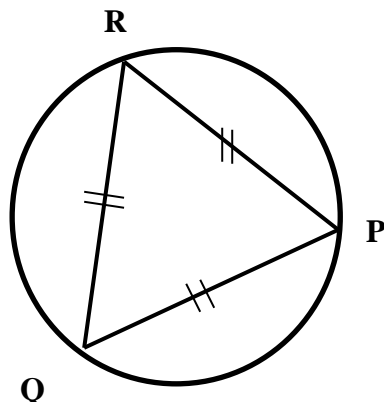
4. Cheluget gets a commission of 2.4% on sales up to sh. 200,000. He gets an additional commission of 1.2% on sales above this. Calculate the commission he gets on sales worth sh. 380,000.

(3 marks)

5. The ratio of the interior angle to that of the exterior angle of a regular polygon is 7:2. Find the number of sides of the polygon. (3 marks)

6. The sum of four consecutive even integers is greater than 248. Determine the first four such integers. (3 marks)

7. The figure below shows an equilateral triangle of radius 8 cm. calculate the length of the side of the triangle. (2 marks)



8. If  $P = \begin{pmatrix} 0 & 1 \\ 2 & x \end{pmatrix}$  and  $Q = \begin{pmatrix} -\frac{3}{2} & -\frac{1}{2} \\ x & x-2 \end{pmatrix}$  Given that PQ is a singular matrix. Find the value of x. (4 marks)

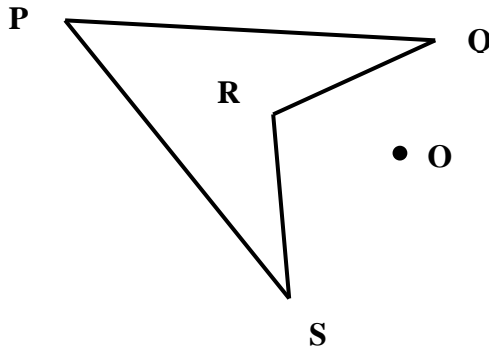
9. The towns X and Y are on the same latitude south of the equator. The longitude of X is  $120^{\circ}\text{W}$  and the longitude of Y is  $143^{\circ}\text{E}$ . the shortest distance between X and Y measured along the parallel of latitude is 5068 nautical miles. Find the latitude on which X and Y lie.  
(4 marks)

10. Joan bought three cups and four spoons for sh. 648. Fridah bought five cups and Halima bought two spoons of the same type as those bought by Joan. Fridah paid sh. 456 more than Halima. Find the price of each cup and each spoon.  
(3 marks)

11. Determine the quartile deviation for the following set of numbers. 6,1,7,6,2,4,5,9,4,8,7  
(3 marks)

12. The sum of 3 133 792, 5 293 476, 7 672 598 and 4 257 348 is rounded off to the nearest 10,000. Find the difference between the actual sum and the rounded figure. (3 marks)

13. Construct the image of quadrilateral PQRS under an enlargement scale factor -2 center of enlargement O.  
(3 marks)



14. Kemosi cycled from town A to town B at 10km/h and he returned at 12km/h. the total time taken was 1hr 50min. find the distance between the two towns.  
(3 marks)

15. A line  $y+6x+p=0$  passes through  $(4,-2)$  and is perpendicular to the line  $qy+4x-10=0$ . Determine the values of p and q.  
(4 marks)

16. The sides of a triangle are the ratio 3:5:6 and its perimeter is 56m. Calculate the angle between the shortest and longest sides.  
(3 marks)

**SECTION II**

**Answer only five questions in this section**

17. A rectangular plot of land measures  $(3x+9)$  m by  $(x-3)$ m and has an area of  $648\text{m}^2$ .

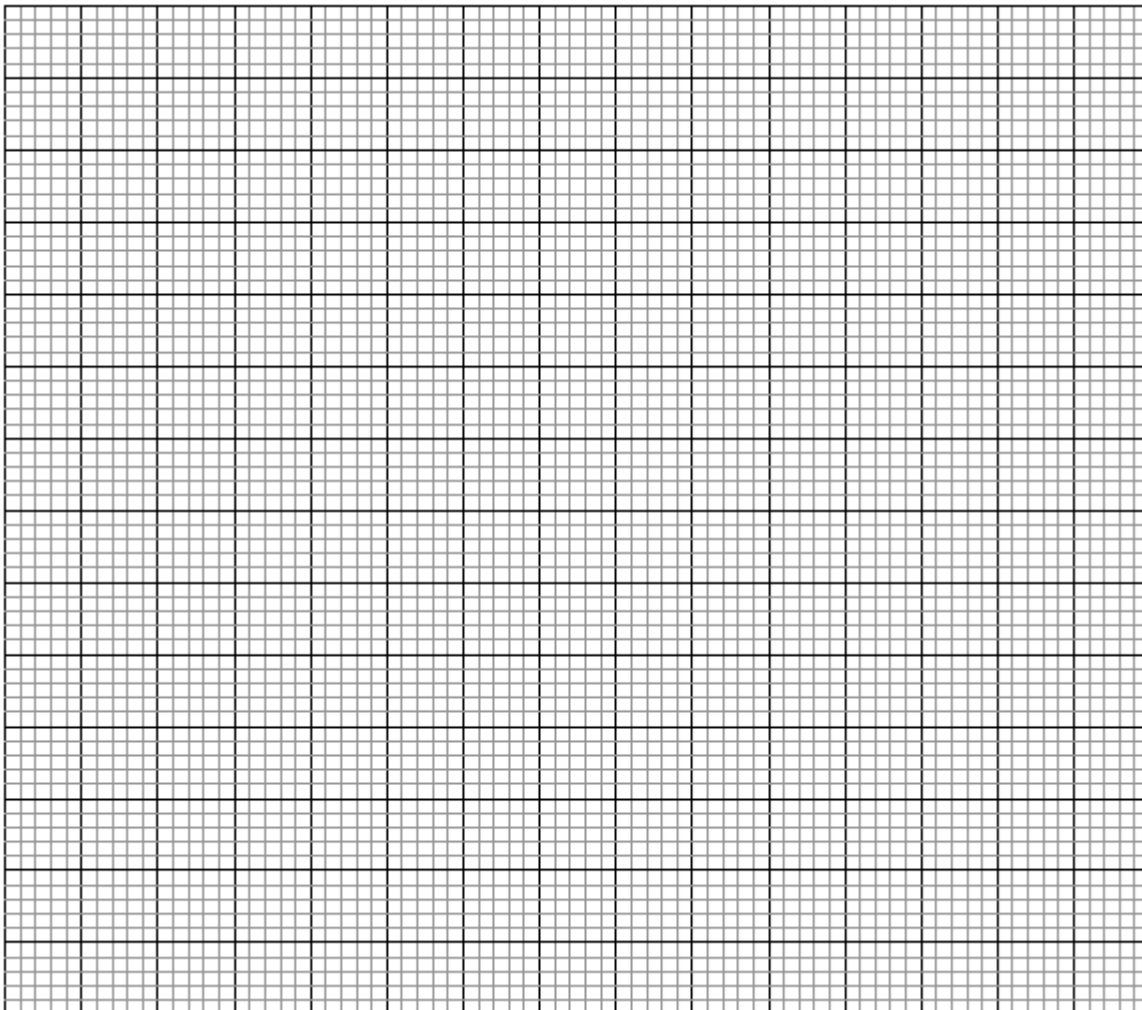
a) Write an equation for the area of the plot in the form  $ax^2+bx+c=0$  (2 marks)

b) Determine the dimensions of the plot. (4marks)

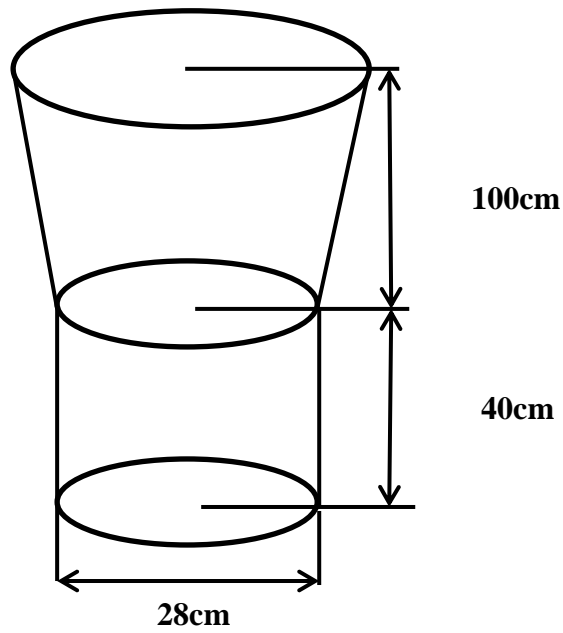
c) Another similar plot has an area of  $2592\text{m}^2$ . Find the dimensions of the plot.  
(4 marks)

18. The vertices of a triangle PQR are P(-3,2), Q(-1,2) and R(-1,4)

- a) On the grid provided draw triangle PQR. (1 mark)
- b) Triangle PQR is reflected on line  $y=x+1$ 
  - i. Draw line  $y = x+1$  (2 marks)
  - ii. Draw triangle P'Q'R' the image of triangle PQR under reflection in the line  $y = x+1$  (2 marks)
- c) Draw triangle P''Q''R'' the image of the triangle P'Q'R' under a rotation of  $(-90^\circ)$  about (0, 0). (2 marks)
- d) Under translation  $\begin{pmatrix} 2 \\ 3 \end{pmatrix}$ , triangle P''Q''R'' is mapped onto triangle P'''Q'''R'''.
  - i. Find the coordinate of P'''Q'''R''' (2 marks)
  - ii. Draw triangle P'''Q'''R''' (1 mark)



19. The figure below represents a wooden model. The model consists of a frustum part and a cylindrical part. The diameter of the cylindrical part is 28cm and the height is 40cm. the height of the frustum is 100cm.



If the vertical height of the cone from which the frustum was cut was 120cm, calculate:-

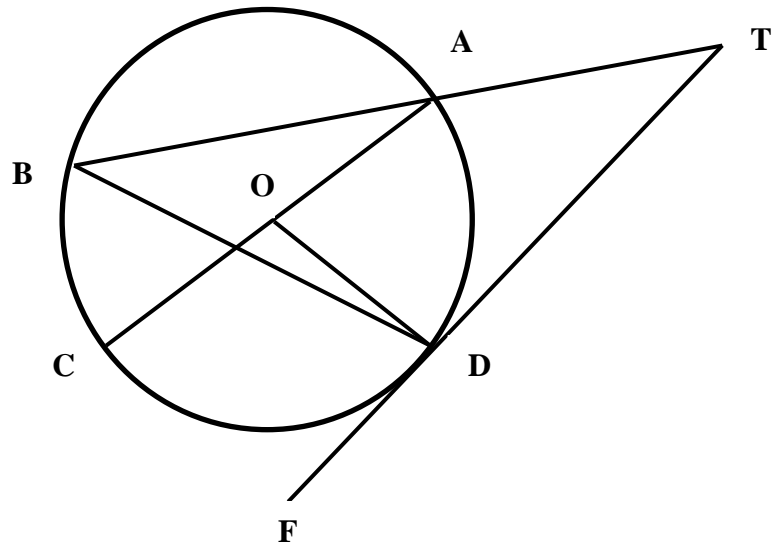
- a) The larger radius of the frustum; (2 marks)

- b) The slant height of the frustum; (4 marks)

- c) The surface area of the model (4 marks)

20. In the figure below





A, B, C and D are points on the circumference of the circle centre O. Line TDF is a tangent to the circle at D and BA produced meets the tangent at T.  $\angle ACD = 38^\circ$  and  $\angle BAC = 28^\circ$

Giving reasons in each case, find the size of

a)  $\angle AOD$

b)  $\angle BDC$

c)  $\angle ACB$

d)  $\angle FDC$

e)  $\angle ATD$

21. From a watch tower M on a hill, N is 5km on a bearing of  $078^\circ$  and a railway station 9km away on a bearing of  $200^\circ$ .

a) Using a scale 1:100000, draw the relative positions of M, N and P. (4 marks)

b) Find;

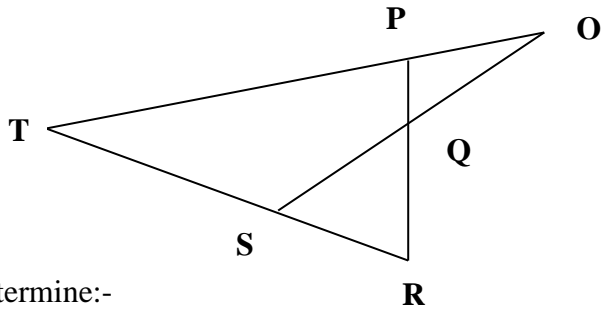
i. The bearing of N from the railway station. (1 mark)

ii. The distance between P and N (2 marks)

iii. The shortest distance between M and the line PN. (3 marks)

22. In the figure below

**OP = p, OQ = q, PQ = QR and OQ: QS = 3:1**



a) Determine:-  
 i. PQ (1 mark)

ii. RS in terms of p and q (2 marks)

b) If  $RS:ST = 1:n$  and  $OP:PT = 1:m$ , determine  
 i. ST in terms of p,q and m (1 mark)

ii. The values of m and n (4 marks)

iii. Show that R,S and T are collinear (2 marks)

23. The table below shows some values of the function  $y=x^2+3$

x	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
y	3			5.25		9.25							39

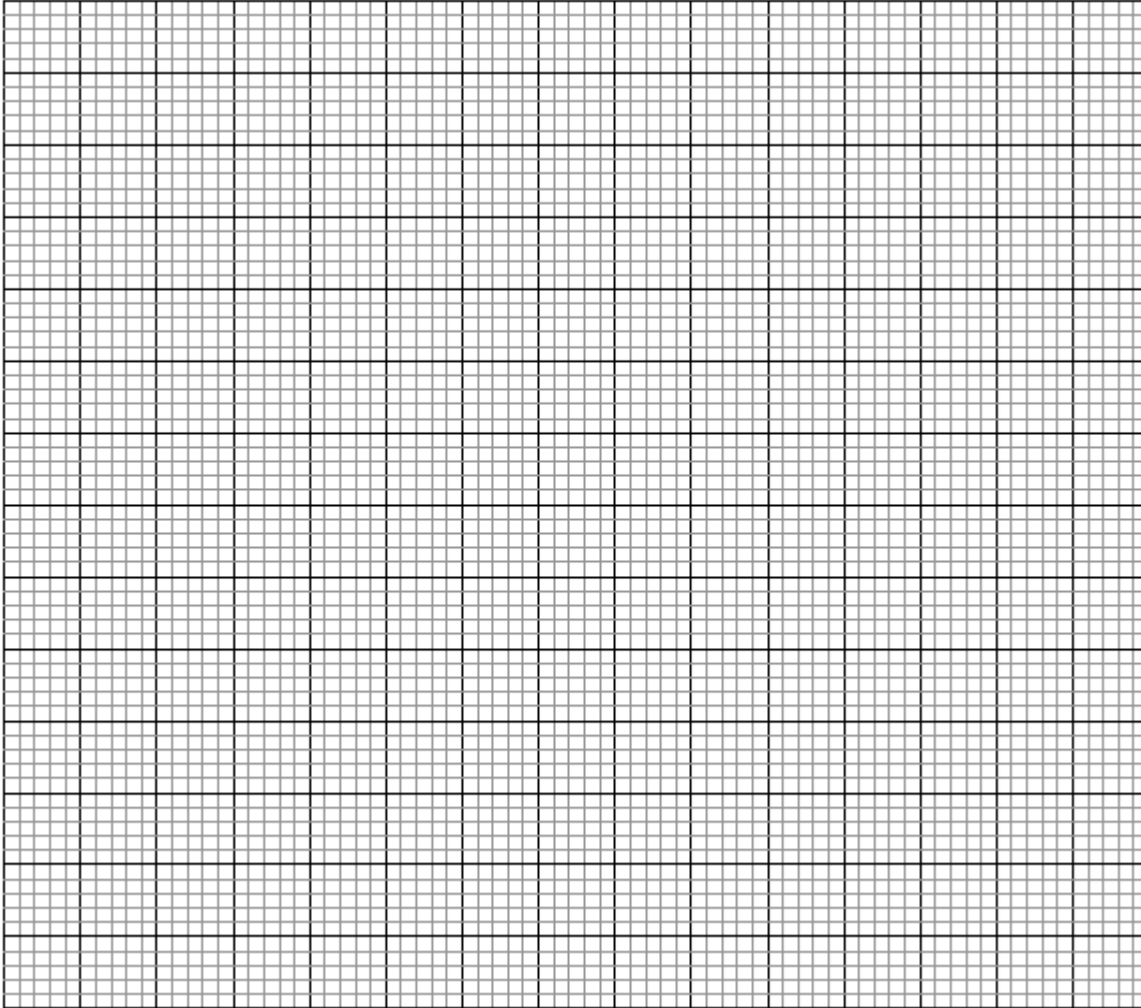
- a) Complete the table above (2 marks)
- b) Use the mid-ordinate rule with six strips to estimate the area bounded by the curve  $y=x^2+3$ , the y-axis, the x-axis and the line  $x=6$  (3 marks)
- c) Find the exact area in (b) above. (3 marks)
- d) Calculate the percentage error in the approximated area from the exact area. (2 marks)

24. Two variables  $x$  and  $y$  are related by the law  $y=-2+bx^n$  where  $b$  and  $n$  are constants. The table below shows the variations between  $x$  and  $y$

x	1	1.5	2	2.5	3	3.5	4
y	3	14.88	38	76.13	133	212.4	318

a) Write down the function  $y = -2 + bx^n$  in the linear form (1 mark)

b) On the grid provided draw a suitable line graph to represent the relation  $y = -2 + bx^n$ . (5 marks)



c) Find the values of b and n (3 marks)

d) Write a relationship connecting y and x (1 mark)