

FORM FOUR TERM ONE EXAM 2017

MATHEMATICS
Paper 1
Time: 2¹/₂ Hours

SCHOOLS NET KENYA
Osiligi House, Opposite KCB, Ground Floor
Off Magadi Road, Ongata Rongai | Tel: 0711 88 22 27
E-mail: infosnkenya@gmail.com | Website: www.schoolsnetkenya.com

This paper consists of 15 printed pages. Candidates should check carefully to ascertain that all the pages are printed as indicated and no questions are missing.

1. Evaluate $\frac{0.4 \div 0.5 \text{ of } 0.44 - 1.10}{0.125 + (0.67 \times 0.375)}$, giving your answer to 4 significant figures (3mks)

2. Express the numbers 5148 and 6084 each as product of its prime factors (2mks)

$$\frac{(5148)^2}{6084}$$

Leaving your answer as a product of its prime factors

3. John gets a commission of 3% on sales up Sh. 150,000. He gets an additional commission of 1.5% on sales above this. If he sells goods worth Sh.385,000 and allows a discount of 2.5%, calculate the amount of commission he received. (4mks)

4. A line L passes points A(2x,4) and B(-1,x) and its gradient is $\frac{1}{7}$. Find the equation of a line perpendicular to L and passes through point B (4mks)

5. Find the value of x in the following equation $25^{x-1} + 5^{2x} = 130$ (3mks)
6. A train 100m long travelling at 72km/h overtakes another train travelling in the same direction at 54 seconds. Find the length of the second train (3mks)
7. Given that θ is an acute angle and $\sin \theta = \frac{2\sqrt{3}}{5}$, without using mathematical tables or calculator, find $\tan(90^\circ - \theta)$, leave your answer in surd form (2mks)
8. In a certain school, 45 students are chosen to participate in a mathematics contest and the ratio of girls to boys is 2:7. Find the number of girls required to join the group so that the ratio of girls to boys is changed to 4:5 (3mks)

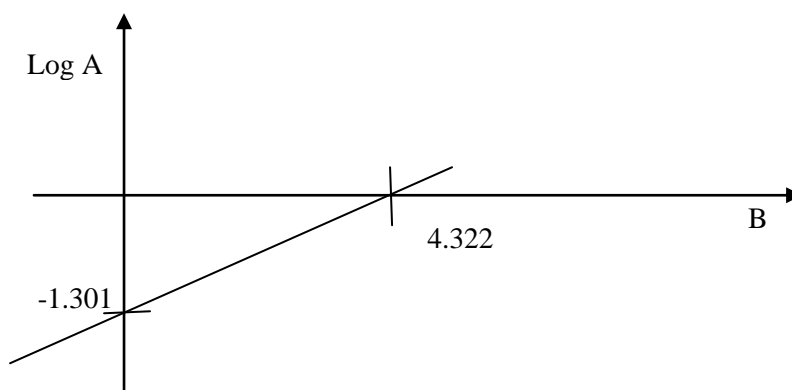
9. Express $\frac{2}{x-2} - \frac{1}{(x+5)} = \frac{2}{x+1}$ in the surd form $ax^2 + bx + c = 0$, where a, b and c are constants hence solve for x (4mks)

10. The area of a trapezium 99cm. if the longer side of the parallel sides is equal to the perpendicular distance between them and the shorter parallel side is 4cm less than the longer side. Find the length of the parallel sides (3mks)

11. Simplify

$$\frac{2x^2 - 3xy - 2y^2}{9x^2 - x^2} \div \frac{2x + y}{3x + y}$$

12. Two variables **A** and **B** are believed to be connected by the law $A = kh^B$ where k and h are constants. Below is a graph obtained from values of **A** and **B**



Find the values of k and h

(3mks)

13. Given the inequalities $\frac{1}{3}x + 2 < x + 5 < 3x - 1$

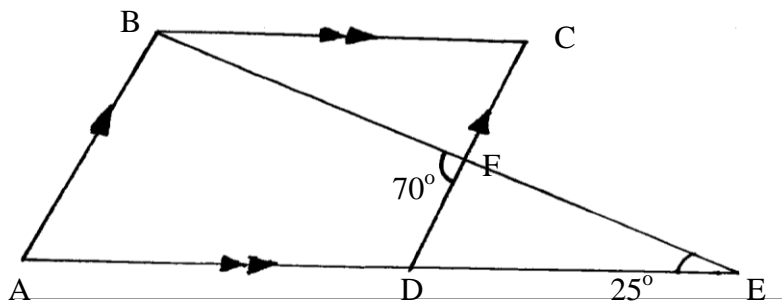
(a) Solve the inequalities

(2mks)

(b) Represent the solution on a number line

(1mk)

14. In the figure below, ABCD is a parallelogram. AD is produced to E, BE and CD meet at F



If angle DEF = 25° and angle BFD = 70° , find the size of angle ABF

(2mks)

15. Solve for x if $\log_2 x + \log_x 2 = 2$

(4mks)

16. The point $A_1(-2,5)$ and $B_2(4,-1)$ are the images of A and B respectively under a translation. Given that the coordinates of A are $(0,1)$ find the coordinates of B. (2mks)

SECTION II

Answer only five questions from this section

17. A newly built classroom measuring 6m long 4.5m wide and 3.2m high is to be cemented on the floor and all inside walls. The classroom has one door measuring 1.85m by 70cm and four windows measuring 1.5m by 70cm each. Cementing materials each cost Sh. 500 per square meter while labour costs 20% of the cost of cementing materials.

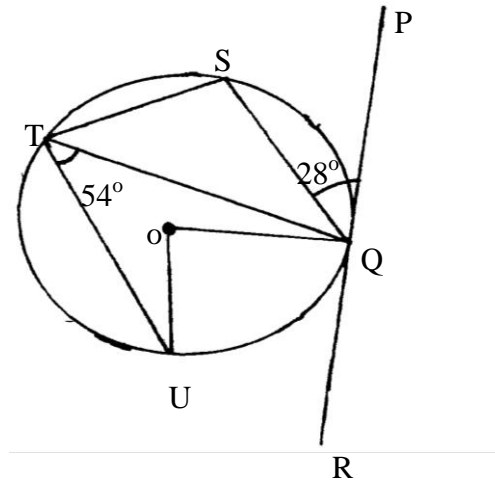
Calculate:

- (a) The total surface area to be cemented, giving your answer to one decimal place (5mks)

- (b) The cost of cementing materials (2mks)

- (c) The total cost of cementing the classroom (3mks)

18. In the figure below, **O** is the centre of the circle. **PQR** is a tangent to the circle at **Q**. angle **PQS** = 28° , angle **UTR** = 54° and **UT** = **TQ**



Giving reasons, determine the size of

(a) Angle **STQ** (2mks)

(b) Angle **TQU** (2mks)

(c) Angle **TQS** (2mks)

(d) Reflex angle **UOQ** (2mks)

(e) Angle **TQR** (2mks)

19. The equation of motion of a butterfly is given by $y = b + ax - x^3$ and has a turning point at (2,9)

(a) Given b and a are constants, determine the value of a and b

(b) Determine the nature of the turning point

(c) The equation of the tangent to this motion curve at the point where it cuts the y axis

20. Given that $y = 7 - 3x - 2x^2$ for $-4 \leq x \leq 3$

(a) Complete the table below

(2mks)

x	-4	-3	-2	-1	0	1	2	3
7	7	7	-	7	7	7		7
$-3x$	12	9		3	0	-3		-9
$-2x^2$	-32	-18		-2	0	-2		-18
y	-13	-2		8	7	2		20

(b) Draw the graph $y = 7 - 3x - 2x^2$ for $-4 \leq x \leq 3$

(3mks)

(c) Use the graph to find the roots of the equation

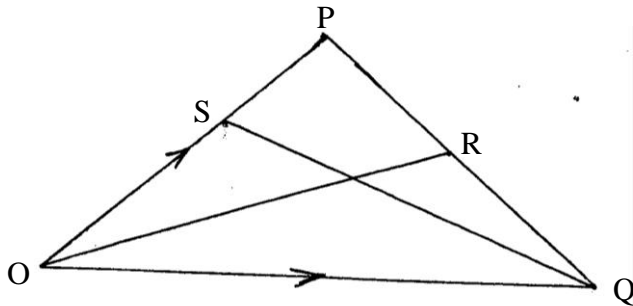
$$(i) -2x^2 - 3x + 7 = 0$$

(2mks)

$$(ii) 2x^2 - 4x - 9 = 0$$

(3mks)

21. In the figure **OPQ** is a triangle in which $\vec{QS} = \frac{3}{4} \vec{QP}$ and $PR:RQ=2:1$. Lines OR and SQ meet at T



(a) Given that $\vec{OP} = \mathbf{p}$ and $\vec{OQ} = \mathbf{q}$, express the following vectors in terms of \mathbf{p} and \mathbf{q}

(i) \vec{PQ}

(1mk)

(ii) \vec{OR}

(1mk)

(iii) \vec{SQ}

(1mk)

(b) Given that $\vec{ST} = m\vec{SQ}$ and $\vec{OT} = n\vec{OR}$. Determine the values m and n

(5mks)

(c) Hence show that **S, T** and **Q** are collinear

(2mks)

22. **P, Q** and **R** are three villages such that **PQ=8km**, **QR=6km** and **PR=4km** are connecting roads

(a) Using a scale of 1cm rep 1km, locate the relative positions of three villages

(2mks)

(b) A water tank **T** is to be located at a point equidistant from the three villages. By constructing locate water tank **T** and measure its distance from **R**

(3mks)

(c) Determine the shortest distance from **T** to the road **PQ** by construction

(d) Determine the area enclosed by the roads **PQ, QR** and **PR** by construction

23. The height of seedlings in a nursery were measured and recorded in the table below

Height (cm)	1.0-1.4	1.5-1.9	2.0-2.4	2.5-2.9	3.0-3.4	3.5-3.9
No of seedlings	6	10	11	14	6	3

(a) Calculate the mean height of the seedlings in the nursery (4mks)

(b) Estimate the median height of the seedlings in the nursery (3mks)

(c) On the grid provided, draw a histogram to represent the above information (3mks)

24. A surveyor recorded the measurements of a field book using lines AB 260m as shown below

	B	
	130	R40
	70	Q10
	50	P20
S 50	10	
	A	

(a) Sketch the map of the field

(b) Find the area of the field in hectares

(c) Find the length of the wire that can go around the field only once