

**BUNYORE-.MARANDA JOINT EXAMINATIONS**  
**FORM FOUR 2011 ENROLMENT EXAMINATIONS**  
**MATHEMATICS PAPER 1**

Time 2 ½ **Hours**

**Instructions:**

1. Write your name, class and Admission Number in the spaces provided above.
2. Answer all questions in Section **1** and **ONLY** Five questions in Section II.
3. All answers and working must be written on the question paper in the spaces provided below each question.
4. Non-Programmable silent calculators and KNEC Mathematical tables may be used except where stated otherwise.

**SECTION 1- (50 MARKS)**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total

**SECTION 11 – (50MARKS)**

17	18	19	20	21	22	23	24	TOTAL

SECTION I (50 MKS)

Answer all the questions in this section.

1. Evaluate without using mathematical tables or a calculator.

$$\sqrt{\frac{2.56 \times 0.000625}{0.25 \times 0.08 \times 0.5}}$$

2. Simplify completely

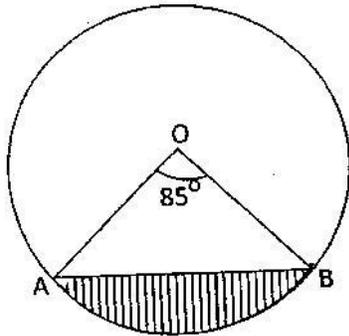
$$\frac{3y^2-1}{y^2-1} - \frac{2y+1}{y+1}$$

$$y^2-1 - y+1$$

(3mks)

3. The figure below represents a circle of diameter 14cm with a sector subtending an angle of  $85^\circ$  at the centre. Find the area of the unshaded region to 4 significant figures.

(4mks)



4. Janepher and Fredrick working together can do a piece of work in 3 days. Janepher working alone takes 8 days longer than Fredrick. How many days does it take Fredrick to do the work alone? (4mks)

5. The sum of interior angles of two regular polygon of side  $n$  and  $n-1$  are in the ratio 3:2 respectively. Calculate the exterior angle of the larger polygon. (3mks)

6. Given that  $\tan 15^\circ = 2 - \sqrt{3}$  find without using tables or a calculator, in the form  $a + b\sqrt{3}$  the value of  $\sin 75^\circ$  (3mks)

7. Fifteen tractors each working 8 hours a day take 8 days to plough a piece of land. How long will it take 24 tractors each working 10 hours a day to plough the same piece of land?

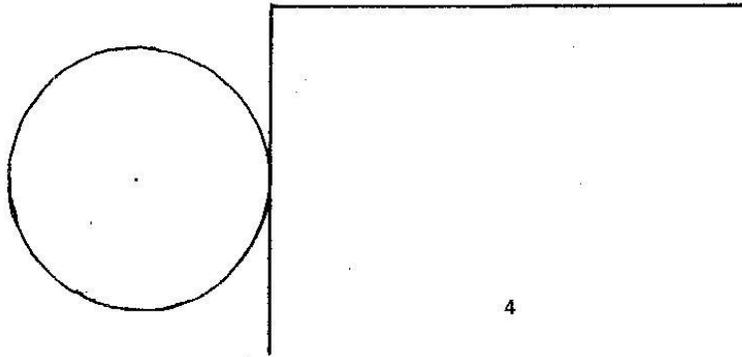
(2mks)

8. If  $a:b = 3:7$ , find the ratio  $(5a-2b):(a+3b)$

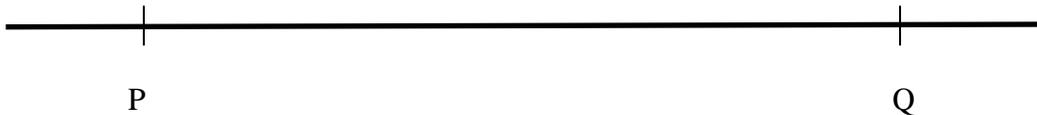
(3mks)

9. The figure below shows part of the net of a solid cylinder. If the diameter and height of the cylinder are 14cm and 20cm respectively, calculate the total surface area of the solid.

(4mks)



10. Line PQ drawn below is a side of a trapezium PQRS in which  $\angle PQR = 105^\circ$ ,  $QR = 4\text{cm}$ ,  $RS = 6\text{cm}$  and RS is parallel to QP.



Using a ruler and a pair of compasses only;

(i) Complete the trapezium

(2mks)

(ii) Find  $\angle SPQ$

(1mk)

11. Evaluate without using a calculator or mathematical tables leaving the answer as a decimal,

(4mks)

$$\underline{24 \div 4 \text{ of } (-2) \times 2 \div 6}$$

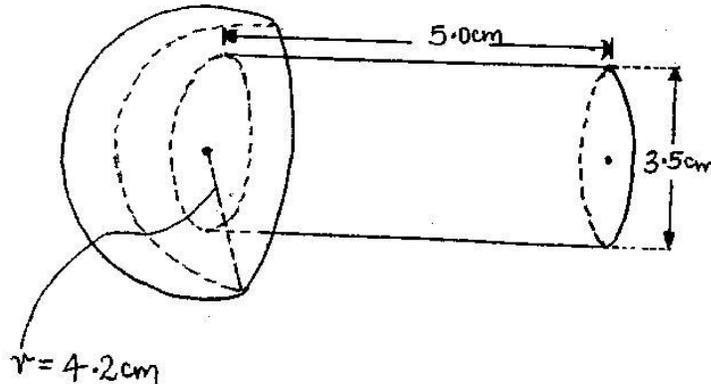
13. The vertices of triangle ABC are  $A(3,6)$ ,  $B(1, -2)$  and  $C(4, -1)$ . The image of point B is  $B'(-2,2)$  under a certain translation. Determine the translation. Hence find the images of A and C

(3mks)

14, A football tube in the form of a sphere is inflated so that its radius increases in the ratio of 32:18. Find the ratio in which the volume is increased (2mk)

$$-8 \div 6 \times 2$$

15, A plug is made up of a hemi-spherical cap of radius 4.2cm and a cylinder of diameter 3.5cm and height 5.0cm as shown in the diagram alongside. Calculate the volume of the plug.



16. A Kenyan businessman owes US\$100,000 to a company in the United States of America. The Kenyan can either pay through his account in Kenya or through his account in the United Kingdom.

Which method is cheaper and by how much? Give your answer in Kenya shillings given that payments through his Kenyan bank attracts a 7.5% exchange commission and his foreign bank transactions are free of charges. Use:

1 US dollar = 78.74 Kenya shillings.

1 Sterling pound 1.5 US dollars

1 Sterling pound = 118.11 Kenya shillings.

## SECTION II (50MKS)

Answer ONLY FIVE questions in this section.

17. Points A and B are on the same side of a hill on a horizontal ground. The angle of elevation of top of the hill from A is  $38.3^\circ$  and the angle of depression of point B from the top of the hill is  $52^\circ$ . Point B is 12m from point A and the height of the hill from the horizontal base is 62m.

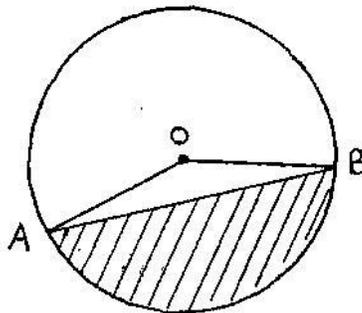
Calculate to 3 s.f.

- (a) The horizontal distance from A to the base of the hill (3mks)
- (b) The horizontal distance between B and the foot of the hill (2mks)
- (c) The shortest distance from the foot of the hill to a line joining the top of the hill and point A. (4mks)

18. (a) A solid cylinder has a radius of 21cm and height of 18cm. A conical hole of radius  $r$  is drilled in the cylinder on one of the end faces. The conical hole is 12cm deep. If the material removed from the hole is  $\frac{22}{3}\%$  of the volume of the cylinder.

Find the surface area of the hole (Take  $\pi = 3.142$ ) (5mks)

- (b) In the diagram below the radius  $OA = 5\text{cm}$  and obtuse angle  $AOB = 150^\circ$ , Calculate the area of the shaded region. (Take  $\pi = 3.142$ ) (3mks)



- (c) The shaded area above represents the cross section of water flowing in a pipe at the rate of 2 litres/second. If the pipe is 10m long calculate how long to the nearest minute it will take the pump to drain all the water from the pipe.

19. A bus left town A for town B at 7:00am traveling at an average speed of 80km/h. After  $\frac{3}{4}$  hours saloon car left town B towards town A at an average speed of 120km/h. Given that town A and B are 300km apart, calculate;

- (a) The time the bus arrived at town B. (2mks)
- (b) The time of day the two vehicles met (4mks)
- (c) The distance from town A to where the two vehicles met (4mks)

(d) The distance of the pickup from town B when the saloon car arrived at town A.  
(2mks)

20. (a) Complete the table below giving your values correct to 2 decimal places.

$X^{\circ}$	$0^{\circ}$	$15^{\circ}$	$30^{\circ}$	$45^{\circ}$	$60^{\circ}$	$75^{\circ}$	$90^{\circ}$	$105^{\circ}$	$120^{\circ}$	$135^{\circ}$	$150^{\circ}$	$165^{\circ}$	$180^{\circ}$
COS	1	0.87					-1				0.50		-
2X													
	0.50	0.71		0.97			0.87				0		-0.50

(b) Using the grid provided, draw on the same axes, the graph of  $y = \cos 2x$  and  $y = \sin(x+30^{\circ})$  for  $0^{\circ} \leq x \leq 180^{\circ}$ . Take the scale 1cm for 15 on x-axis, 4cm for 1 unit on y-axis. (5mks)

(c) Use the graph in part (b) above to estimate the solutions to the equation

$$\sin(x+30^{\circ}) = \cos 2x \quad \text{2mks}$$

(d) Find the period of the curve  $y = \cos 2x$  (1mk)

21. Four schools P, Q, R and S are situated in such a way that Q is 240km due east of school P. School R is 100km due south of school Q and on a bearing of  $112^{\circ}$  from P. The fourth school S is 225km on a bearing of  $202^{\circ}$  from P.

(a) Use a scale of 1cm to represent 25km to show the relative position of the four schools (4mks)

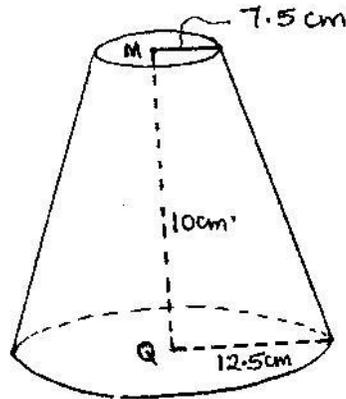
(b) Use the scale drawing in (a) above to determine

(i) The distance of school R from school P (2mk)

(ii) The bearing of P from R (2mk)

(iii) The distance of S from R (2mk)

22. The fig. below shows a solid frustum of a right circular cone. The radii of the top and bottom circular parts of the frustum are 7.5cm and 12.5cm respectively. The centres M and Q are 10cm apart. (3mks)



(a) Calculate the vertical height of the original cone.

(b) Calculate the volume of the frustum giving the answer correct to 3 significant figures. (4mks)

(c) The frustum is melted down and recast into a solid cylinder with base radius 12.5cm. Calculate to 2 decimal places the height of the cylinder. (3mk)

23. The vertices of a quadrilateral are A(2,2), B(8,2), C(8,6) and D(6,4). Under a rotation the in A and D are A'(0,8) and D'(-2, 12) respectively.

(a) Draw the object ABCD on the grid provided.

(b) Determine the centre of rotation and angle of rotation.

(c) Draw the images of B and C and write down their co-ordinates.

(d) Under another transformation the images A and D are A<sub>2</sub>(2,-2) and D<sub>2</sub>(6,4).

Describe this transformation fully and determine the coordinates of the images of B and C under this transformation. (3mk)

24. The marks obtained by 10 candidates in an English test were 15, 14, 12, 13, 16, 11, 13, 12 and 17. The sum of the squares of the marks was 1794.

- (a) Calculate the value of P (3mks)
- (b) The standard deviation (5mb)
- (c) If the teacher increased each mark by 3, find
  - (i) The new mean (1mk)
  - (ii) The standard deviation (1 mk)