EDUCATOR EXAM SERIES

Mathematics **Paper 2**

TIME: 2 ½ Hours

Instructions to Candidates

(a) Write your name and Index Number in the spaces provided.
(b) Sign and write the date of examination in the spaces provided above.
(c) Answer **ALL** the questions in the spaces provided in the question paper.
(d) All working **MUST** be clearly shown where necessary.
(e) Mathematical tables and electronic calculators may be used.
(f) This paper consists of seven (18) Printed pages.
(g) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no question(s) are missing.

For Examiners use only

Question	Maximum Score	Score
TOTAL		

SECTION 1-50 MARKS

1. Use logarithms correct to 4 significant figures to calculate (4mrks)

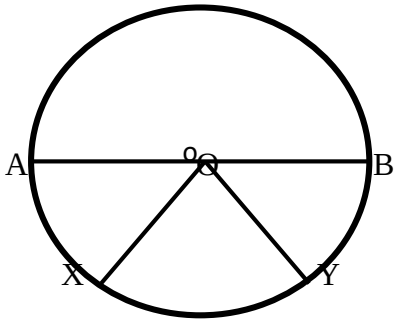
$$\frac{(93.4)^2 x \sqrt{0.00435}}{\log \quad 6.56}$$

2. Simplify the expression

(3mrks)

$$\frac{(-36 + 9x^2)(-6y + 3xy)}{3x - 6}$$

3. In the figure below xy = 8cm and O is the centre of a circle



Determine the area of a circle if $<AOX=15^0$ to 2 d.p (3mrk)

4. Object P of area $10cm^2$ is mapped on to its image Q of area $60cm^2$ by a transformation whose matrix is given by $T = \begin{bmatrix} x & 4 \\ 3 & x+3 \end{bmatrix}$

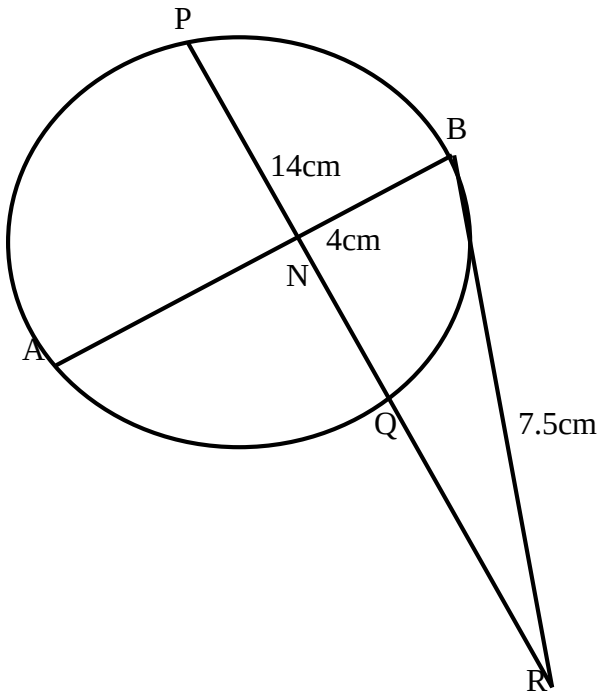
Find the possible value of x (3mks)

5. Evaluate $\int_1^4 \left(x - \frac{1}{x^2}\right) dx$ (3mks)

6. If $4x^2 + 32x - 20 + k$ is a perfect square. Find the value of k (3mks)

7. The masses in kg of eight boys are 56, 62, 58,65,50,49, 57, 59. Find the interquatile deviation of the data (3mrks)

8. In the figure below AB is a diameter of the circle. Chord PQ intersects AB at N. A tangent to the circle at B meets PQ produced at R.



Given that PN = 14cm, NB = 4cm and BR = 7.5cm. Calculate the length of

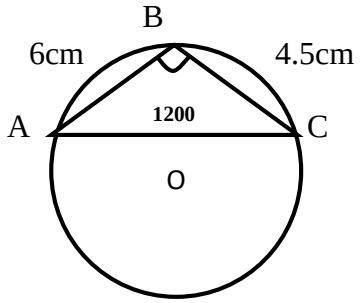
a) NR (Imk)

b) AN (1mk)

9. Calculate the time taken for sh. 40,000 to accumulate to Sh 47,840 at compound interest rate of 12% p.a. If compounding is done monthly. (Give your answer correct to the nearest whole number) (3mks)

10). A rectangular piece of paper has a length of 8.792 cm and 0.00265 cm width. If each of the numbers are corrected to one significant figure, calculate the percentage error in area arising from this approximation (3mrks)

11) In the figure below, O is the centre of the circle .<ABC=120^0
AB = 6cm and BC = 4.5 cm



Calculate

a) length AC (2mks)

b) Radius of the circle (2mks)

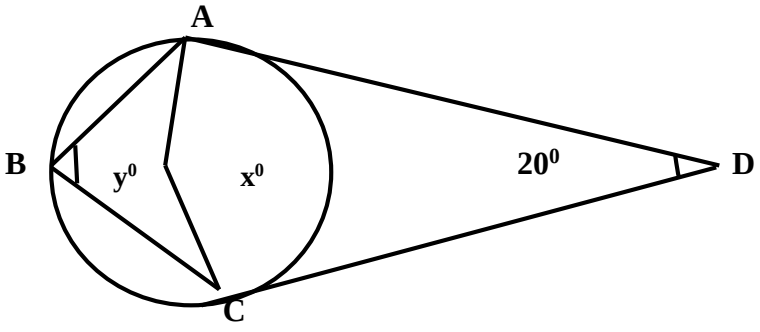
12. The cost C of operating a hardware is partly constant and partly varies as the square of labour input L. If C = 25000 when L = 5 and C = 100,000 when L = 20. Find C when L = 8 (4mrks)

13) A merchant blends 350 kg of tea costing Shs. 84 per kg with 140 kg of tea costing Shs. 105 per kg. At what price must he sell the mixture to gain 25% per kg (3mrks)

14. Solve the equation

$\sin\frac{5}{2}\theta = -\frac{1}{2} for\ 0 \leq 0 \leq 180^0$ (2mrks)

15. The lines AD and CD are tangents to the circle ABC with center O and <ADC=20^0. Calculate the values of x and y (2mrks)



16) Find the centre and the radius of a circle given the equation
$x^2 + y^2 - 16x + 24y + 127 = 0$

(3mks)

17 The table below shows a monthly income tax rate for the year 2005

Monthly taxable income in Ksh	**Tax rate percentage**
1 - 9860	10%
9681 - 18800	15%
18801 - 27920	20%
27921 - 37040	25%
37041 and above	30%

Peters monthly earning in 2005 were as follows;

Basic salary Ksh 35,600, house allowance Kshs 12,000, Medical allowance Kshs. 2,800, transport allowance Kshs. 3,400, Peter was entitled to monthly tax relief of Kshs 1056.

Calculate:

a) His monthly taxable income (3mrks)

b)The monthly tax paid by peter (5mrks)

c) In addition to tax the following deductions were made to Peters monthly income

- Service charge of Ksh 100
- Health insurance fund 320

2% of his basic salary as widow and child pension .calculate peters net pay that month

(3mrks)

18. a) Fill in the table for the function

$y = x^3 - 2x^2 - x + 2$

x	-4	-3	-2	-1	0	1	2	3	4
y		- 40			2				30

(2mrks

b) Draw the graph $y = x^3 - 2x^2 - x + 2$ on the graph paper (3mrks)

c) Use the graph to solve

i. $x^3 - 2x^2 - x + 2 = 0$ (1mrk)

ii. $x^3 - 2x^2 - 5x + 6 = 0$ (4mk)

19. The cost C of producing n items partly varies as n and partly as the inverse of n. To produce three items it cost Ksh.140 and to produce five items it costs sh 180. Find

a) the constants of proportionality and hence write the equation connecting c and n (5mks)

b) The cost of producing 15 items (2mks)

c) The number of items produced at a cost of Ksh 756 (3mks)

20. During a price giving day, the probability that the programme is not adjusted is 0.3. For two guest speakers, the probability of the second getting a chance is 0.4, if the programme is adjusted and 0.8 if the programme remains the same.

The first guest has a probability of 0.9 whether the programme is adjusted or not.

a) Draw a tree diagram to represent the events (3mks)

b) Using the tree diagram in (a) above determine the probability that:

i) Only one guest talks (3mks)

ii) Both talk whether the programme is adjusted or not (2mks)

iii) The programme is adjusted and at least one talks (2mks)

21. Seedpods are collected and weighed to the nearest gram as shown in the frequency distribution below

Mass (gram)	10 - 13	14 - 17	18 - 21	22 - 25	26 - 29	30 - 33	34 - 37
Frequency	20	25	32	48	35	27	23

Using an assumed mean of 23.5 calculate

a) The mean mass (3mks)

b) The median (3mks)

c) The standard deviation (4mks)

22. Complete the table below for the function of y = sin $(x + 30)$and y = 2cos $(x + 30)$ for the range $-180 \leq x \leq 180$

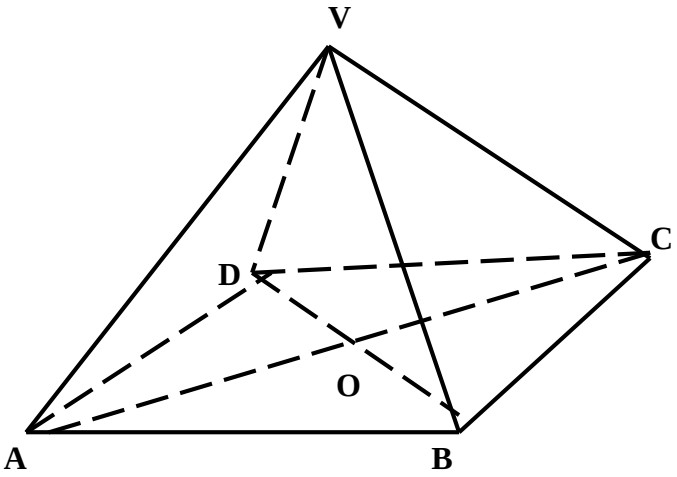
x	-180^0	-150^0	-120^0	-90^0	-60^0	-30^0	0^0	30^0	60^0	90^0	120^0	150^0	180^0
$y = \sin(x + 30)$			-1				0.5				0.5		
$y = 2\cos(x + 30)$			0				1.73				-1.73		

a) On the same axes draw the graphs of y = $\sin(x + 30)^0$ and y = 2cos $(x + 30)^0$ (5mks)

b) Use your graph to solve the equation $2\cos(x + 30) - \sin(x + 30) = 0$ (2mks)

c) State the amplitude of $y = 2\cos(x + 30)^0$ (1mk)

23. The figure below show a right pyramid on a square base ABCD and vertex Vo is the centre of the base AB = 14cm, VA = 20cm and V is the midpoint of BC.



Find

a) i) The height of the pyramid VO (2mks)

ii) The length VN (2mks)

b) The angle between (2mks)

(i) BV and the plane ABCD (2mks)

ii) VO and the plane BVC (2mks)

c). The volume of the pyramid (2mks)

24. Mumbua makes two types of cakes A and B. She takes 3 hours to make a type A cake and 4hours to make a type B cake. She works for a maximum of 120hours to make x type A cake and y type B cake. It cost her sh400 to make a type A cake and shs. 150 to make a type B cake. Her total cost does not exceed sh 9,000. She must make atleast 8 type A cakes and more than 12 type B cakes.

a) Write down four inequalities representing the information above (4mks

b) On the grid provided draw the inequalities and shade the unwanted regions. (4mks)

c) Mumbua makes a profit of sh 40 on each type A cake and Sh70 on each type B cake determine the maximum profit she makes. (2mks)