

SECTION A (50 Marks)

Answer all the questions

1. Without using a calculator, evaluate in its simplest form.

$$\frac{4 \text{ of } 20 + 10 \div 5 + 6}{6 \times 9 - 4 \div 2 - 12 \text{ of } 6}$$

2. The lines $4ax = 5y + 12$ and $6bx = 2 + 3y$ are parallel. Find the ratio $a:b$
3. A certain two digit number is equivalent to five times the sum of the digits. It is found to be 9 less than the number formed when the digits are interchanged. Find the number
4. Two cylindrical containers are similar. The larger one has internal cross-section area of 45cm^2 and can hold 0.945 litres of liquid when full. The smaller container has internal cross- section area of 20cm^2 .
- a) Calculate the capacity of the smaller container.
- b) The larger container is filled with juice to a height of 13cm. Juice is then drawn from it and emptied into the smaller container until the depths of the juice in both containers are equal. Calculate the depth of juice in each container.
5. Solve for x in the equation $2^{2x} - 2^{x+2} + 3 = 0$
6. The sum of interior angles of a regular polygon is 1800° . The number of sides of the polygon is 4 sides less than that of another polygon. Find the ratio of their number of sides.
7. Suchi bought 144 oranges at sh 100 for every six oranges. He sold some of them at sh 72 for every three and the rest at sh 60 for every two oranges. If he made a profit of 40%, calculate the number of oranges sold at sh 72 for every three.
8. A square brass plate is 2mm thick and has a mass of 1.05kg. The density of the brass is 8.4g/cm^3 . Calculate the length of the plate in centimeters.
9. Find the value of a in the figure shown below



10. Simplify the expression

$$\frac{f^4 - n^4}{f^3 - fn^2}$$

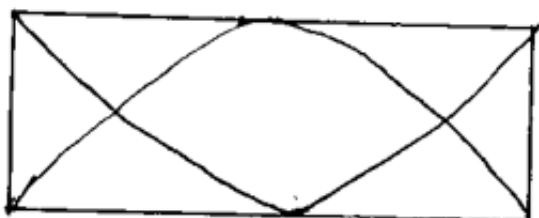
11. Given that

$$\cos(90^\circ - e) = \frac{\sqrt{3}}{2}$$

, determine without using trigonometry tables or calculator, the

value of $\cos e$.

12. The image of the point A(4,-7) under the enlargement of scale factor -2 is $A^1(1,2)$. Determine the co-ordinates of the centre of enlargement
13. Amidah bought 4 pencils and biro pens for sh 100. Eddah bought 2 pencils and 5 biro for sh 80. Find the sum of money spend on buying 3 pencils and 2 biro pens.
14. If $2^{2x} = 51 \times 3^{3x}$, prove that $x \log \frac{4}{27} = \log 51$ and hence find the value of x correct to 2.d.p.
15. A design is to be worked out from a wire consisting of two intersecting semi-circles inside a rectangle of perimeter 26m as shown below. If the total length of the wire used, neglecting wastage, is 28m. Find the width of the rectangle.



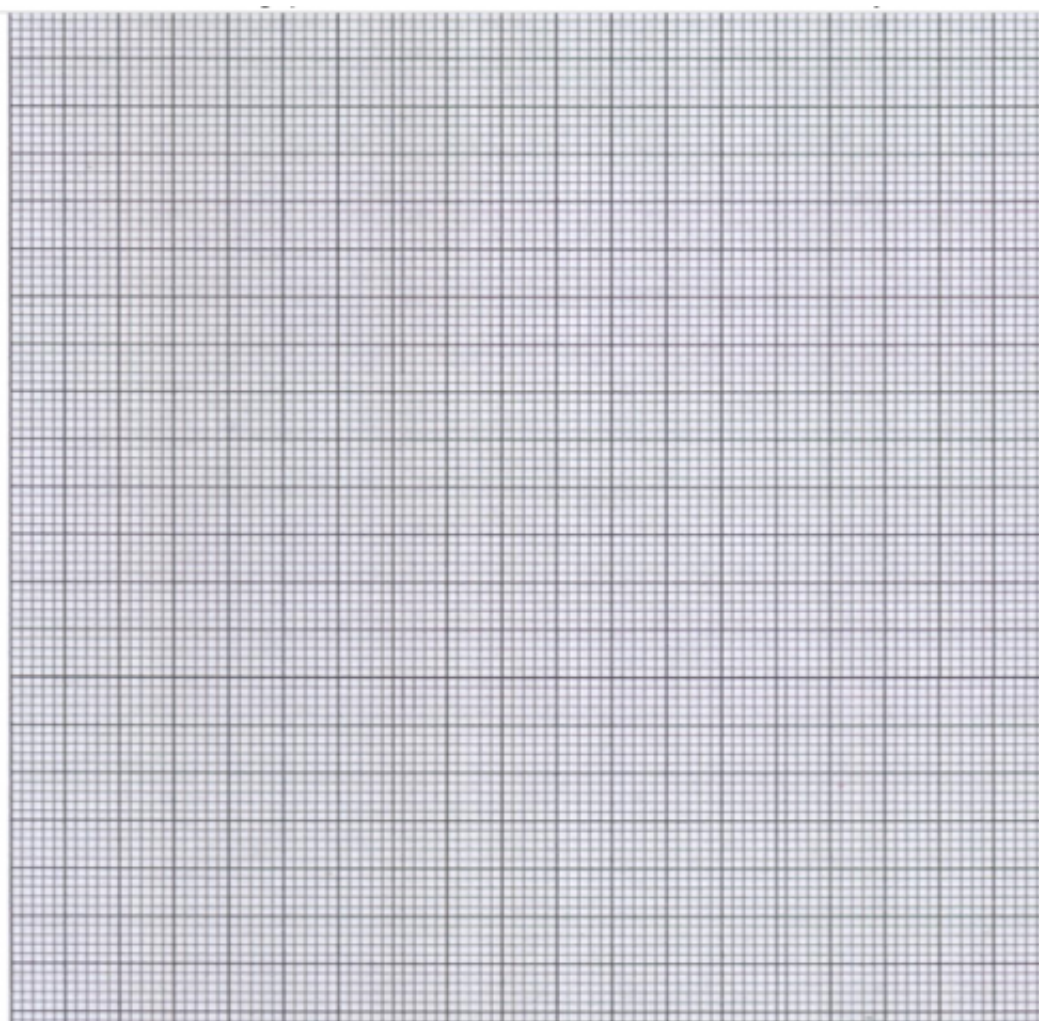
16. A two digit number is formed from the prime numbers below 10. Determine the probability that the number formed is an even number

SECTION B (50 Marks)

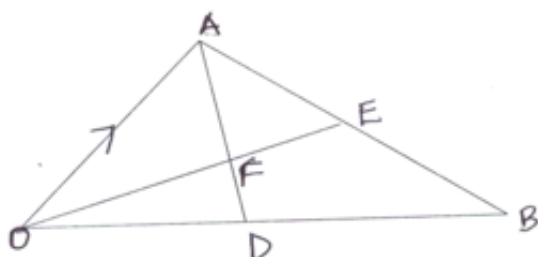
Answer Any FIVE questions

17. Mumias town hall has 200 seats. During the District Drama festivals the tickets were sold at Ksh.150 for adults and sh. 75 for students.
- a) On day one of the festival 80% of the seats in the hall were occupied and twenty of the seats were occupied by the students. Calculate the total money collected from the sale of the tickets this day.
- b) On the last day of the festivals, x students occupied the seats and all seats were occupied. The money collected from the tickets sales was Sh.25,350 i) Write down an equation of x
- ii) Calculate the value of x
- c) The money collected from the sale of the tickets during the festival was divided among costs of hosting, allowance for adjudicators and electricity bill in the ratio of 7:3:2. If the allowances totaled to Ksh.126, 000. Calculate i) Amount collected during the festivals.
- ii) The cost of electricity bill during the festival.
18. Triangle PQR has vertices P(3,2), Q(-1,1) and R(-3,-1)
- a) Draw PQR on the grid provided.

- b) Under a rotation the vertices of $P^1Q^1R^1$ are $P^1(1,4)$, $Q^1(2,0)$ and $R^1(4,-2)$. Find the centre and angle of rotation using points P and Q.
- c) Triangle PQR is enlarged with scale factor 2, centre (0,0) to give $P^2Q^2R^2$. Draw triangle $P^2Q^2R^2$ and state its co-ordinates.
- d) Triangle $P^1Q^1R^1$ undergoes reflection in the line $y=-x$ to give $P^3Q^3R^3$. Draw $P^3Q^3R^3$ and state its coordinates.



19. In the figure below E is the midpoint of AB. $OD:DB=2:3$ and F is the point of intersection of OE and AD.



- a) Given that $OA = a$ and $OB = b$, express in terms of a and b
- i) OE

ii) AD

b) Given that $AF=tAD$ and $OF = sOE$, find the values of s and t

c) Hence show that O , F and E are collinear.

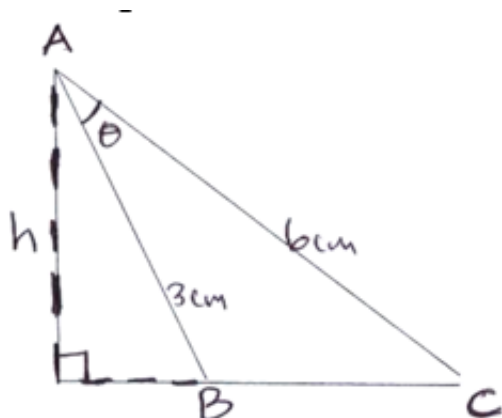
20. a) Solve the equation

$$\frac{1}{x+3} + \frac{1}{x} = \frac{3}{x-5}$$

b) There were 240 exercise books to be given to form 2 students. Thirty -four students in the class did not receive the books for various reasons. If the books were then shared equally among the remaining members of the class, the number obtained by each student was equal to the number of students in class. Find the number of students in the class.

c) What must be added to $4x^2 - 12x + \underline{\hspace{1cm}}$ to make it a perfect square?

21. In the triangle $ABC=120^\circ$, sides AB and AC are 3cm and 6cm respectively.



Calculate

a) The value of θ° to the nearest degree.

b) The value of side BC to four significant figures.

c) The value of h , hence the area of the triangle to two decimal place

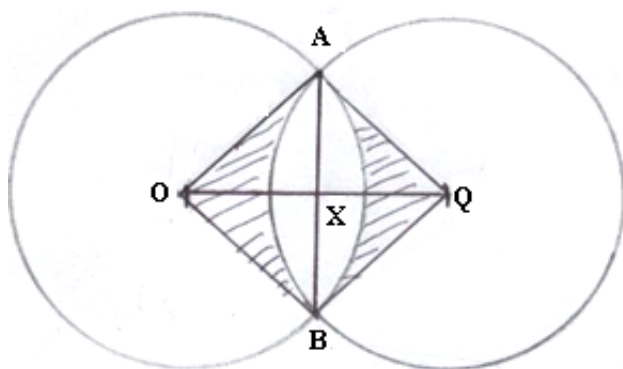
22. A ship leaves port K for port M , through port L . L is 200km on a bearing of 230° from K . M is 400km on a bearing of 150° from L .

a) Using a scale of 1:4000000, draw a diagram to show the relative position of the three ports K , L and M .

b) By further drawing on the same diagram, determine

i) How far M is to the South of K .

- ii) The shortest distance from L direct to path KM
- c) If the ship had sailed directly from K to M at an average speed of 40 knots, find how long it would have taken to arrive at M. (1nm=1.853km).
- d) What is the bearing of K from M?
23. Use a ruler and a pair of compasses only in this question, Construct
- Triangle ABC in which $AB=10\text{cm}$, $AC=9\text{cm}$ and $\angle ABC=60^\circ$. Measure BC
 - L_1 the locus of points perpendicular to AB and passing through B
 - L_2 the locus of points equidistant from line AB and AC to meet L_1 at E
 - A circle with the centre at B and AE as its tangent. Measure its radius
 - Locate the locus L_3 of a point P which lies within triangle ABE but outside the circle centre B. Hence find the area defined by locus L_3 .
24. Two equal circles with centres O and Q with radius 8cm intersect at points A and B as shown below. Given that the distance between O and Q is 12cm and that line AB meets OQ at X. Find:



- The length of the chord AB
- The reflex angle AOB
- The area of the shaded region.