FORM THREE HOLIDAYS KEYNOTE MATHEMATICS PP1 10 QUESTION PAPERS



FORM 3 HOLIDAYS KEYNOTE MATHEMATICS PP1 TEN QUESTION PAPERS

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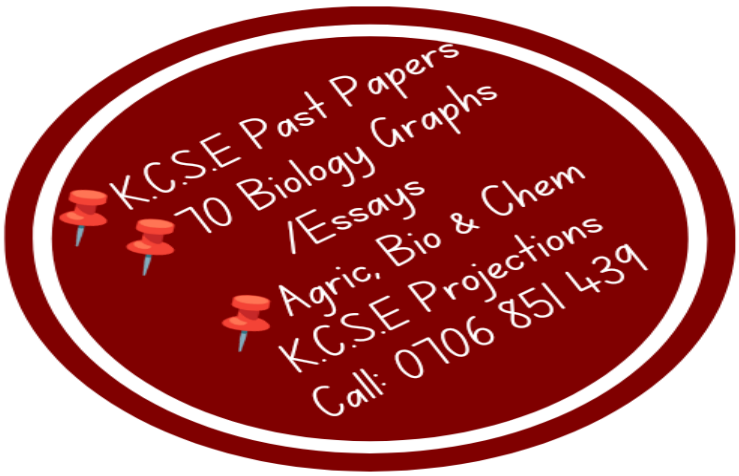
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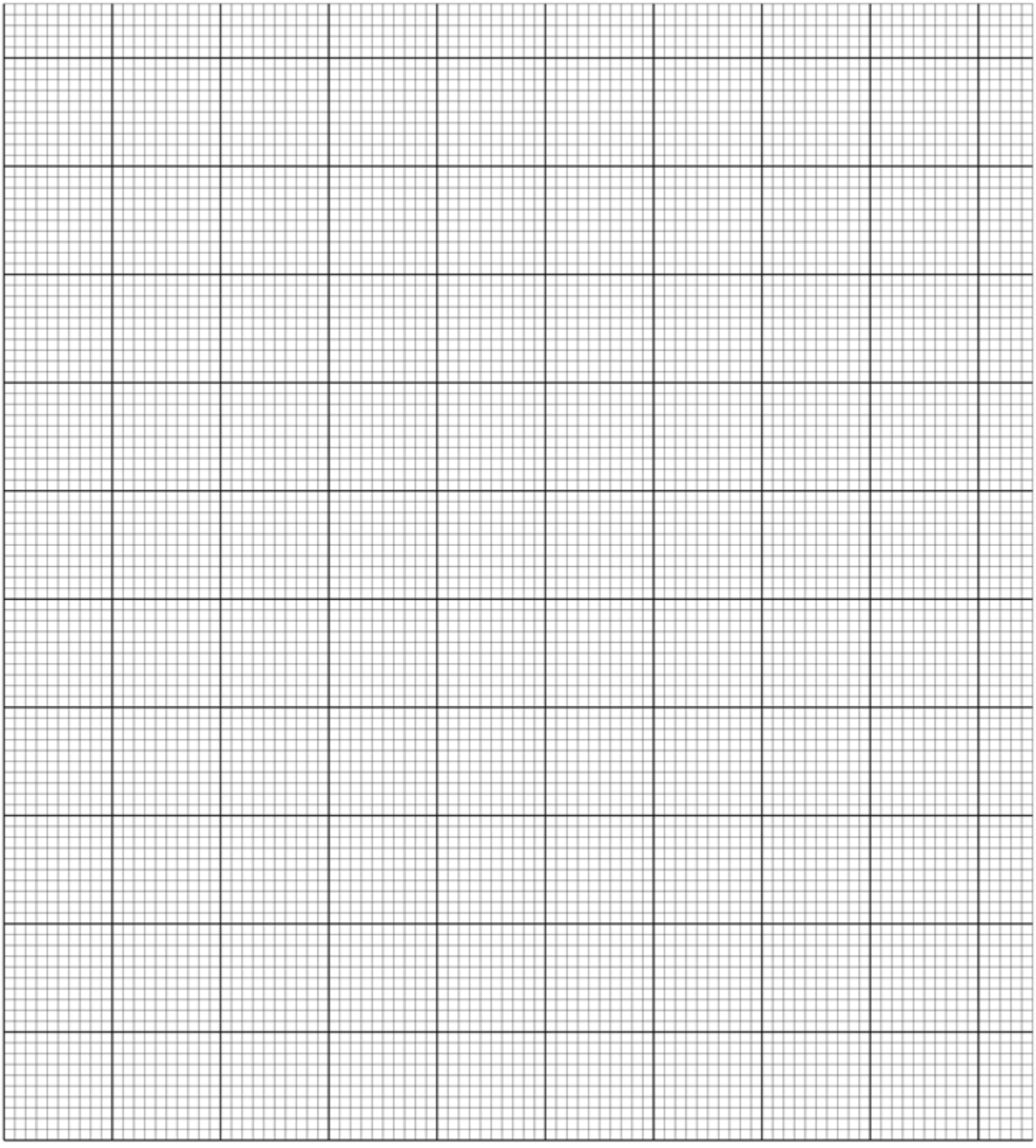








MATHEMATICAL GRAPH PAPER



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FORM THREE HOLIDAYS KEYNOTE
MATHEMATICS PP1 QUESTION PAPER NO: 01

SECTION 1 (50 MARKS)

1. Use logarithms to evaluate to 4s.f. **(4 mks)**

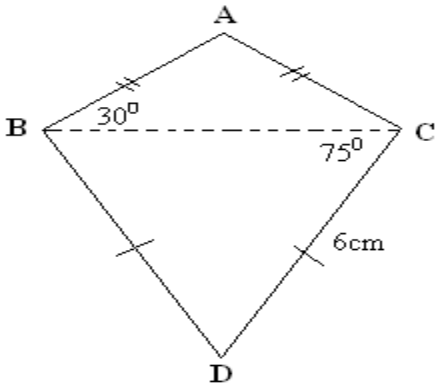
$$\frac{(0.6845)^2 \times (0.08416)^{1/3}}{0.995937}$$

2. A line passes through the points A(2, 6) and B(4, -8). Find the equation of the perpendicular bisector of line AB. **(3 mks)**

3. Find the integral values that satisfy the inequality. $2x + 3 \geq 5x - 3 \geq -8$ **(3 mks)**

4. Solve the equation $2x^2 + 3x = 5$ by completing the square method. **(4 mks)**

5. Find the area of the following figure. **(3 mks)**



6. Solve the simultaneous equations below **(3 mks)**

$\log_x y = 2$

$\log xy = 8$

7. The angles of elevation from two points A and B to the top of a storey building are 48^0 and 57^0 respectively. If AB = 50m and the point A and B are opposite each other;

Calculate

a) The distance of point A to the building. **(2 mks)**

b) The height of the building. **(2 mks)**

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8. Simplify as simple as possible. **(3 mks)**

$$\frac{(4x + 2y)^2 - (2y - 4x)^2}{(2x + y)^2 - (y - 2x)^2}$$

9. The cost of a van outside Kenya is US$10000. Wanda intends to buy one van through an agent who deals in Japanese Yen. The agent charges him a commission of 5% on the price of the van and further 1260 Yen as importation tax. How many Kshs. will he need to send to the agent to obtain the van, given that:- **(3 mks)**

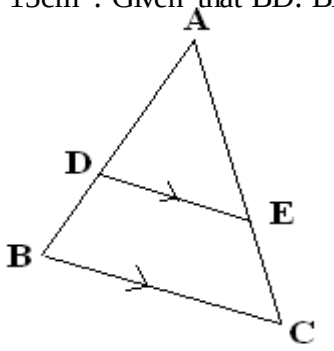
1 US$ = 105.00 Yen

1 US$ = Kshs. 63.00

10. Simplify without using calculators and tables. **(3 mks)**

$$\frac{5^{-1/2} \times 20^{1/2}}{64^{1/2} \times 3^0 \times 5^2}$$

11. The area of triangle ADE is 15cm^2. Given that BD: BA = 1:3, and DE is parallel to BC. Find the area of triangle ABC in the figure. **(3 mks)**



12. Oilibya filling station in Machakos makes a profit of Ksh. 520 for every 1000 litres of petrol sold and Ksh. 480 for every 1000 litres of diesel sold. In a certain month the dealer sold twice as much diesel as petrol. If the total fuel sold that month was 900,000 litres, find the dealer's profit for the month. **(3 mks)**

13. Solve for a in Sin(30 - 2a) = Cos(150 - 3a). **(2 mks)**

14. Show that the points P(3,4), Q(4,3) and R(1,6) are collinear. **(3 mks)**

15. Given that $\frac{3}{2-\sqrt{8}} - \frac{2}{2+\sqrt{8}} = a + b\sqrt{c}$. Find the values of a, b and c. **(3 mks)**

16. A rectangular room was measured and its measurement was found to be 40m by 80m to the nearest metre. Calculate the percentage error in working out its area. **(3 mks)**

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SECTION II (50 MARKS)

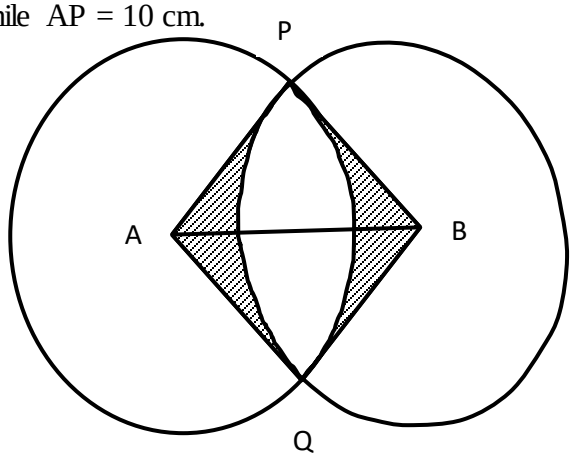
17. Senjeni and Mkimwa entered into a business partnership in which they contributed Kshs. 120,000 and Ksh. 150,000 every year respectively. After one year, Kuku joined the business and contributed Kshs. 90,000.

a) Calculate the ratio of their investment after 3 years of business. **(3 mks)**

b) It was agreed that 30% of the profits after 3 years be used to cater for the cost of running the business, while the remaining would be shared proportionally. Calculate each person's share, if the profit made after three years was Kshs. 187,000. **(4 mks)**

c) If each of them invested their shares back in the business, find their new individual investments at the beginning of the fourth year. **(3 mks)**

18. In the figure below A and B are centres of the circle intersecting at point P and Q. Angle PBQ = 97.2^0 while PAQ = 52^0. PB = 4cm while AP = 10 cm.



Determine;

a) The length of AB **(3 mks)**

b) The area of the sector APQ **(2 mks)**

c) The area of the quadrilateral APBQ **(3 mks)**

d) Area of the shaded region **(2 mks)**

19. Given that equation of a curve $y = x^2 + 5x - 3$

a) **i)** Complete the table below for the function $y = x^2 + 5x - 3$ for $-6 \leq x \leq 1$ **(2 mks)**

x	-6	-5	-4	-3	-2	-1	0	1
Y								

ii) Draw the graph of $y = x^2 + 5x - 3$ for $-6 < x < 1$ **(3 mks)**

b) **i)** State the equation of the line of symmetry for the graph. **(1 mk)**

ii) Use the graph you have drawn to solve the equations:

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A. $x^2 + 5x - 3 = 0$ **(1 mk)**

B. $x^2 + 4x - 2 = 0$ **(2 mks)**

C. $x^2 + 5x - 3 = -3$ **(1 mks)**

20. The table below shows how income tax was charged in a certain year.

(Kenya pounds)	(Ksh. Per Kenya pound)
1 – 3630	2
3631 – 7260	3
7261 – 10890	4
10891 – 14520	5
14521 – 18150	6
18151 – 21780	7
21781 and above	7.5

During the year Mwadime earned a basic salary of Ksh. 25,200 and a house allowance of Ksh. 12,600 per month. He was entitled to a personal tax relief of Ksh. 1,162 per month.

(a) Calculate:

(i) Mwadime's taxable income in Kenya pounds per annum **(2 mks)**

(ii) The net tax he pays per month **(6 mks)**

(b) Apart from income tax he also contributes monthly NHIF Ksh. 1600, WCPS Ksh. 1000. Calculate his net monthly pay **(2 mks)**

21. (a) Draw the graph of $y = \tan x$ and $y = \sin (2x + 30)^0$ for $0^0 \leq x \leq 90^0$ on the same axes.

Take the scale: x - axis 2cm represent 10^0

y - axis 4cm represents 1 unit **(8 mks)**

b) Use your graph to solve the equation.

$\tan x - \sin (2x + 30^0) = 0$ **(2 mks)**

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22. The heights of some trees in a nursery were measured to the nearest centimetre and recorded as shown below

23	**33**	**29**	**34**	**25**	**25**	**31**	**31**	**37**	**23**
28	**16**	**23**	**21**	**31**	**36**	**36**	**40**	**42**	**32**
22	**21**	**27**	**30**	**35**	**19**	**27**	**22**	**38**	**34**
31	**28**	**29**	**24**	**32**	**20**	**35**	**15**	**17**	**29**
40	**32**	**27**	**26**	**28**	**23**	**32**	**28**	**26**	**20**

(a) Use the above data to complete the table below **(3 mks)**

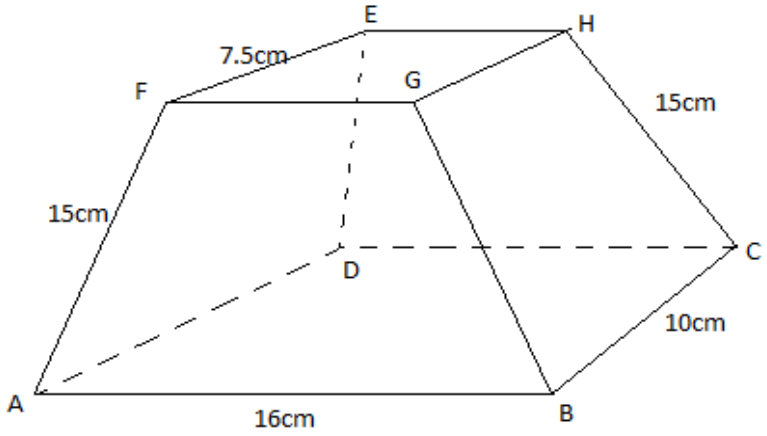
Height in cm	Mid-point (x)	Frequency(f)	(fx)
15 – 19			
20 – 24			
25 – 29			
30 – 34			
35 – 39			
40 – 44			

(b) Calculate (i) the mean height **(2 mks)**

(ii) to 2 decimal places the median height **(2 mks)**

(c) State the modal class. **(1 mk)**

23. The figure below shows a frustrum made from a right pyramid, such that AB=DC=16cm, BC=AD=10cm, FG=EH=12cm, GH=FE=7.5cm, CH=BG=AF=DE=15cm. If the altitude of the frustrum is 14.6cm, find:



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(a) The altitude of the pyramid from which the frustrum was made. **(2 mks)**

(b) The surface area of the frustrum. **(5 mks)**

(c) The volume of the frustrum. **(3 mks)**

24. A bus left Nairobi at 7.00am and travelled towards Eldoret at an average speed of 80km/hr. At 7.45a.m a car left Eldoret towards Nairobi at an average speed of 120km/hr. The distance between Nairobi and Eldoret is 300km. Calculate ;

a) The time the bus arrived at Eldoret. **(2 mks)**

b) The time of the day the two met. **(4 mks)**

c) The distance of the bus from Eldoret when the car arrived in Nairobi. **(2 mks)**

d) The distance from Nairobi when the two met. **(2 mks)**

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FORM THREE HOLIDAYS KEYNOTE
MATHEMATICS PP1 QUESTION PAPER NO: 02

1. Evaluate and simplify without using a calculator.

$$\frac{3\frac{1}{5} + \frac{1}{4} \text{ of } 3\frac{1}{2} - 5\frac{1}{6}}{2\frac{2}{3} - 1\frac{2}{5} \div 1\frac{1}{3} + 3\frac{3}{4}}$$ **(3mks)**

2. The sum of interior angles of a polygon is 1980^0. Find the number of sides the polygon has. **(2mks)**

3. Simplify as far as possible by rationalizing the denominator. **(3mks)**

$$\frac{1+\sqrt{2}}{2+\sqrt{3}} - \frac{1-\sqrt{2}}{2-\sqrt{3}}$$

4. Use table of reciprocal only to work out **(3mks)**

$$\frac{3}{0.6735} + \frac{13}{0.156}$$

5. Solve $3x - 2 \leq 5x - 6 < 2x + 12$ and represent your solution on a number line .
Hence state the integral values. **(4mks)**

6. Evaluate without using mathematical tables. **(3mks)**
$2 \log 5 - \frac{1}{2} \log 16 + 2 \log 40$

7. Given that P=2.6 cm, Q=4.0 cm and R=7.8 cm. Find the percentage error in the expression. **(3mks)**

$$\frac{P+Q}{R}$$

8. From a point 20m away on a level ground the angle of elevation to the lower window line is 29^0 and the angle of elevation to the top line of the window is 32^0. Calculate the height of the window. **(3mks)**

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9. The size of an interior angle of a regular polygon is 156^0. Find the number of sides of the polygon. **(2mks)**

10. The number 5.81 contains an integral part and a recurring decimal. Convert the number into an improper fraction and hence a mixed fraction. **(3mks)**

11. Simplify. **(3mks)**

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

12. Given that Sin A= $\frac{4}{5}$, Cos B= $\frac{5}{12}$ A and B are acute angles. Without using tables calculate
Sin B Cos A + Sin A tan B **(3mks)**

13. A two digit number is such that the sum of the digits is 11 where the digits are reversed the number exceed the original number by 9. Calculate the original number. **(3mks)**

14. Two boys and a girl shared some money. The elder boy got $\frac{4}{5}$ of it, the younger boy got $\frac{2}{5}$ of the remainder and the girl got the rest. Find the percentage share of the younger boy to the girls share. **(4mks)**

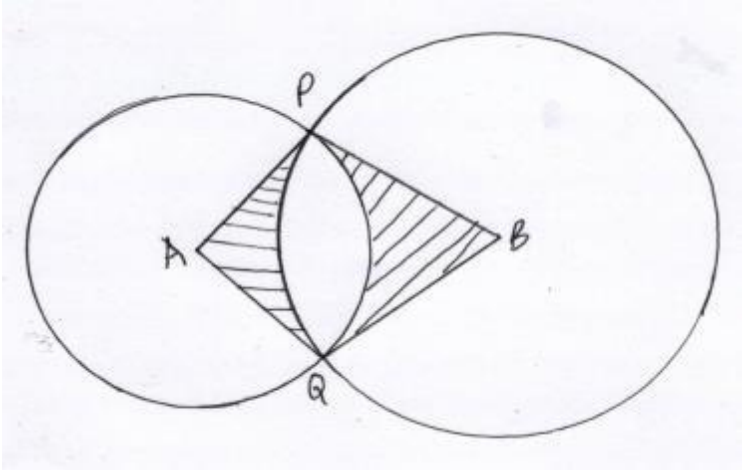
15. Solve the following simultaneous equations. **(4mks)**
$x^2 - xy = 2$
$x + y = 3$

16. Use the table of squares, square roots and reciprocals to evaluate to 3 decimal places the question below. **(4mks)**

$$\frac{10}{\sqrt{0.625}} + (1.64)^2$$

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17. The diagram below shows two circles centre A and B which intersect a point P and Q. Angle PAQ=70^0 and <PRQ=40^0 and PA=AQ=8 cm.



Use the diagram to calculate to 2 d.p

(a) the length PQ **(2mks)**

(b) The length PB **(2mks)**

(c) Area of minor segment circle centre A. **(2mks)**

(d) Area of the shaded region **(4mks)**

18. The following table shows the heights to the nearest centimeter of some maize plants in a research farm.

Height (cm)	80-84	85-89	90-94	95-99	100-105	105-109	110-114	115-119
Frequency	5	14	16	17	24	12	11	4

(a) State the modal class **(1mk)**

(b) Find to 2 d.p

(i) Mean height **(4mks)**

(ii) The difference between the mean height and the median height. **(5mks)**

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19. (a) Three points A(0,4) B(2,3) and C(-2, -1) are vertices of a triangle. Find ;

(i) The gradient of AC **(1mk)**

(ii) The gradient of the perpendicular bisector of line AC **(1mk)**

(iii) The coordinates of the mid-point of line AC. **(1mk)**

(b) (i) the gradient of AB **(1mk)**

(ii) The gradient of the perpendicular bisector of lines AB **(1mk)**

(iii) The coordinates of the mid-point of AB **(1mk)**

(c) (i) Find the equation of the perpendicular bisector of AC **(1mk)**

(ii) The equation of perpendicular bisector of AB **(1mk)**

(iii) Hence find the coordinates of the circumcentre of the triangle. **(2mks)**

20. The position vectors of points A and B with respect to the origin O, are $\binom{-8}{5}$ and $\binom{12}{-5}$ respectively. Points M and N are the mid points of AB and OA respectively.

(a) Find

(i) The coordinates of N and M **(3mks)**

(ii) The magnitude of NM. **(3mks)**

(b) Express vector $\overrightarrow{NM}$ in terms of $\overrightarrow{OB}$ **(1mk)**

(c) Point P maps onto P^1 by a translation $\binom{-5}{8}$ given that OP=OM +2 MN, find the coordinates of P^1 **(3mks)**

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21. The information of a piece of land was entered in a field book as shown below.

	180	F
E 50	120	
	90	74 D
C 35	55	
	30	40 B
A	0	

(a) Sketch the map of the land **(3mks)**

(b) Find the area of the land in hectors. **(7mks)**

22. (a) Draw the graph of the function $y=2x^2 + 4x - 3$ on the graph paper provided for $-4 \leq x \leq 2.5$ **(5mks)**

(b) Use your graph to solve the equations

(i) $2x^2+4x-3=0$ **(2mks)**

(ii) $x^2+x-5=0$ **(3mks)**

23. The base of an open rectangular tank is 3m by 2.5 m and its height is 4m.

(a) Calculate

(i) The capacity of the tank in litres. **(3mks)**

(ii) The total surface area in m^2 of the tank. **(2mks)**

(b) An open cylindrical tank has an equal capacity and same height as the rectangular tank in (a) above. Calculate ;
(correct to one decimal places)

(i) The radius of the cylindrical tank. **(3mks)**

(ii) The total surface area, in m^2, of the tank. **(2mks)**

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24. Transline bus left Nairobi at 8.00 and travelled Kisii at an average speed of 80km/h. Given that the distance between Nairobi and Kisii is 400km, calculate;

(a) The time the car arrived in Nairobi. **(3mks)**

(b) The time the two vehicles met. **(3mks)**

(c) The distance from Nairobi to the meeting point. **(2mks)**

(d) The distance of the bus from Kisii when the car arrived in Nairobi. **(2mks)**

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FORM THREE HOLIDAYS KEYNOTE
MATHEMATICS PP1 QUESTION PAPER NO: 03

SECTION 1

1. Find without using tables or a calculator the value of **(3mk)**

$$\frac{1.33 \times 0.51}{0.19 \times 0.0017}$$

2. The ratio of the size of the exterior angle to the interior angle of a regular polygon is 1:3. Determine the number of sides of the polygon and name it. **(3mk)**

3. Given that $2x^2-kx+18$ is a perfect square, find k and hence solve the equation $2x^2-kx+18=0$ by factorization.
. **(4mk)**

4. Work out using logarithms to 4 s.f

$$\frac{\sqrt{(6.225\log 1.001)}}{(56.7\times 0.031)^3}$$

(4mk)

5. Mr. Kanja,Miss Kanene and Mrs Nyaga have to mark a form three math contest for 160 students. They take 5mins, 4mins, and 12mins respectively to mark a script. If they all start to mark at 9.00 am non-stop, what is the shortest time they can take to complete the marking? **(3mk)**

6. Jackie takes 5minutes to run a distance of 1km in a race. Express her speed in

a) km/hr

b) m/s **(2mk)**

7. Use reciprocal tables to find the value of f given that $\frac{1}{f}=\frac{1}{11}+\frac{2}{13}$ **(3mk)**

8. A man left $\frac{1}{5}$ of his estate in Kerugoya to his wife and $\frac{1}{3}$ to each of his two sons .The remainder was to be shared equally among his six brothers. If the estate was worth sh 3 456 000, how much did each of those people get? **(3mk)**

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9. A distance of 12km is represented by a length of 4cm on a map. Given that the scale of the map is 1:n, find the

a) value of n

b) actual area in hectares of a field on the map with an area of $32cm^2$ **(3mk)**

10. Solve the equation $\frac{1}{3}(x+4)-\frac{1}{2}(2x-4) = 2$ **(2mk)**

11. The sides of a right angled triangle measured to the nearest cm are 5cm, 12cm and 13cm

Determine the

a) limits within which the measured dimensions lie **(1mk)**

b) percentage error in the area of the triangle. **(3mk)**

12. Form a quadratic equation in the form $ax^2+bx+c=0$ whose roots are b and twice the negative reciprocal of b.

. **(3mk)**

13. The coordinates of points A and B are A (2, 3).B (4,–5). M is the midpoint of vector AB.

Determine the coordinates of point M and the magnitude of vector BM. **(3mk)**

14. The equation of line L is y=3x–4 and is perpendicular to line H. They cross each other at the y-intercept of line L. Find the equation of line H. **(3mk)**

15. In a circle radius 10cm, an arc PQ subtends an angle of $\frac{5}{12}\pi$ radians at the centre of the circle. Calculate the radius of another circle whose circumference is equal to the length of arc PQ **(4mk)**

16. Solve for a in $3^{2a+3} = 2187$ **(3mk)**

SECTION 2

17. Four towns are situated in such a way that town Q is 500km on a bearing of 120° from P. Town R is 240km on a bearing of 210° from town P, while town S is due north of town Q and due east of town P.

a) Draw a sketch diagram showing the relative positions of P, Q, R and S. **(2mk)**

b) Find by calculation

i) the distance QR **(2mk)**

ii) the distance QS **(2mk)**

iii) the angle PRQ **(2mk)**

iv) area of triangle PQS **(2mk)**

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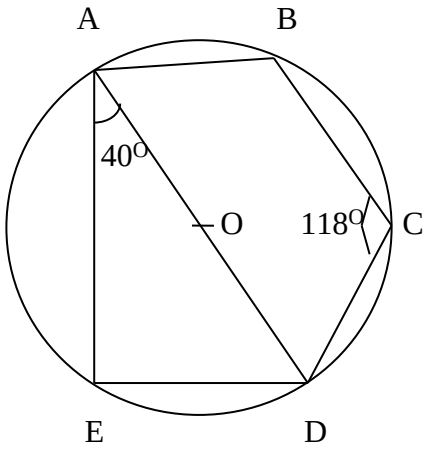
18. a) Represent the following inequalities graphically by shading the unwanted region
$x \geq 0$, $y \geq 0$, $x+y \geq 5$, $x+y \leq 10$, $y \leq 7$, $x \leq 7$ **(6mk)**

b) write down the coordinates of one point that is inside the wanted region **(1mk)**

c) Name the figure formed by the unshaded region **(1mk)**

d) measure and find the sum of all the angles in the figure formed in c) above. **(2mk)**

19. In the figure below, O is the centre of the circle and $\angle EAD = 40^o, \angle BCD = 118^o$



Find giving reasons

a) $\angle ADE$ **(2mk)**

b) reflex $\angle EOD$ **(2mk)**

c) $\angle EBD$ **(2mk)**

d) $\angle EAB$ **(2mk)**

e) $\angle DAB$ **(2mk)**

20. The marks scored in a form three maths exam were recorded as follows

69 70 72 40 52 60 22 31 78 53 28 67 63 54 57 48 47 56 55 62

75 38 37 44 62 64 58 39 45 48 65 50 85 46 47 57 35 34 58 64

62 37 41 42 36 54 82 48 53 57 56 72 56 48 44 55 78 59 50 45

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a) Make a grouped frequency table with classes 20—29,30—39,40—49,etc **(2mk)**

b) What is the modal distribution of the test **(1mk)**

c) Calculate the mean of the data **(4mk)**

d) Calculate the median mark **(3mk)**

21. The velocity(v)of a vehicle measured at intervals of time(t) were recorded as follows

t(s)	0	2	4	6	8	10	12
v(m/s)	0	20	40	40	30	8	0

a) Represent this motion on a graph **(3mk)**

b) Calculate the acceleration **(2mk)**

c) Calculate the total distance travelled by the vehicle **(3mk)**

d) Calculate the average velocity of the vehicle **(2mk)**

22. A wooden stool is in the form of a frustum of a cone with slant edge 40cm,top diameter 30cm and bottom diameter 50cm.

a) calculate the perpendicular height of the stool **(3mk)**

b) calculate the total surface area of the stool in terms of π **(3mk)**

c) calculate the volume of wood used to make the stool in terms of π **(3mk)**

d) given that the density of the wood used to make the stool is $0.8g/cm^3$, calculate the mass of the stool in kg **(1mk)**

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23. Using ruler and compasses only,

a) construct triangle ABC in which AB=5cm,BC=6cm and angle ABC=120º. **(3mk)**

b) measure angle ACB **(1mk)**

c) drop a perpendicular from C to cut AB produced at P. Measure CP. **(2mk)**

d) hence calculate area of triangle ABC to 1dp **(2mk)**

e) calculate the radius of a circle that passes through the vertices of triangle ABC **(2mk)**

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24. The distance between two towns A and B is360km.A minibus left town A at 8.15a.m and travelled towards B at an average speed of 90km/hr. A matatu left town B at 10.35a.m on the same day and travelled towards A at an average speed of 110km/hr.

a)i) how far from A did they meet? **(4mk)**

ii) at what time did the two vehicles meet? **(2mk)**

b) A motorist left his home at 10.30a.m on the same day and travelled at an average speed of 100km/hr. He arrived at B at the same time as minibus. Calculate the distance from B to his home. **(4mk)**

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FORM THREE HOLIDAYS KEYNOTE
MATHEMATICS PP1 QUESTION PAPER NO: 04

SECTION I

1. Evaluate without using a calculator. **[1 Mrk]**

$$\frac{(2\frac{3}{7}-1\frac{5}{6})\div\frac{5}{6}}{\frac{2}{3}of\,2\frac{1}{4}-1\frac{1}{7}}$$

2. The equation of a straight line L_1 is $\boldsymbol{3y+4x=12}$

i. Find the gradient of L_1 **[1 Mrk]**

ii. The equation of another line L_2 which is perpendicular to L_1 and passes through $(1,2)$ **[2 Mks]**

3. Evaluate using mathematical tables only expressing your answer to 4 significant figures. **[3 Mks]**

$$\frac{3}{0.2311}+(\boldsymbol{0.7918})^2$$

4. Given that:

$\sin(3x-35)=\cos(x+20)$. Find x **[2 Mks]**

5. The size of an interior angle of a regular polygon is $(3x)°$ while the exterior angle is $(x-20)°$. Find the number sides of the polygon **[3 Mks]**

6. Three bells ring at intervals of 9 minutes, 15 minutes and 21 minutes. The bells will next ring together at 11.00pm. Find the time the bells had last rung together. **[3 Mks]**

7. Find all the integral values of x which satisfy the following inequalities **[3 Mks]**

$$\boldsymbol{2(2-x)<4x-9<x+11}$$

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8. At a party, every two people shared a plate of Ugali between them. Every 3 people shared a plate of soup and every 4 people shared a plate of meat. If 65 plates were used in total. How many people were there? **[3 Mks]**

9. Find the value of x which satisfies the equation; **[3 Mks]**

$$16^{x^2} = 8^{4x-3}$$

10. Mary and John live 140km apart. Mary starts from her home at 7.00am and drives towards John's home at 80km/hr. John starts at 7.30am and drives towards Mary's home at 100km/hr. at what tome did they meet? **[3 Mks]**

11. Two points P and Q have coordinates (-2, 3) and (1, 3) respectively. A translation maps point P to P^1 (10,10).

a. Find the translation vector **[1 Mk]**

b. Find the coordinates of Q the image of Q under the translation. **[1 Mk]**

c. Find the values of M and N if;

$mP - nQ = \begin{pmatrix} -12 \\ 9 \end{pmatrix}$ **[3 Mks]**

12. A Kenyan company received $100,000 US dollars. The money was converted into Kenya shillings in a bank which buys and sells foreign currencies as follows;

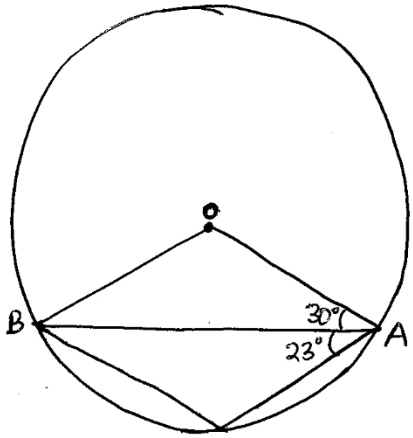
	Buying.	Selling
1 US Dollar ($)	77.23	78.11
1 Sterling Pound (£)	121.04	122.93

a. Calculate the amount of money, in Kenya shillings the company received **[2 Mks]**

b. The company exchanged the Kenya-shilling calculated in (a) above into sterling pounds to buy a car from Britain. Calculate the cost of the car to the nearest sterling pound. **[2 Mks]**

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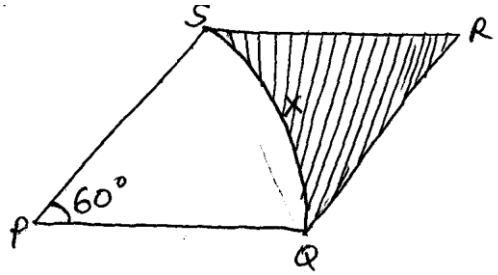
13. In the figure below, O is the centre of the circle. Angle OAB=30^0 and angle BAC = 23^0. Find angle ABC. **[3 Mks]**



14. A number n is such that when it is divided by 27, 30 or 45, the remainder is always 3. Find the smallest value of n. **[2 Mks]**

15. A particle accelerates uniformly from rest and attains a maximum velocity of 30m/s. after 16 seconds. It travels at this constant velocity for 20 seconds before decelerating to rest after another 8 seconds.
Calculate the total distance travelled by the particle. **[4 Mks]**

16. The figure below shows a rhombus PQRS with PQ=9cm and $< SPQ = 60°, S \times Q$ is a circular arc center P.



Calculate the area of the shaded region correct to 2 decimal places. **[3 Mks]**

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SECTION II

Answer any 5 Questions in this Section. (50 Marks)

17. A salesman received a basic salary of sh. 50,000 a year together with a commission of 6% on the value of goods sold and a car allowance of sh. 2.50 per km.

a. Find the total amount he received in a year in which he sells goods worth sh. 625,000 and travels 10,000km. **[4 Mks]**

b. The next year he travels 12,000km and receives a total of sh. 134,000.

i. Calculate the value of goods sold. **[4 Mks]**

ii. Calculate the percentage increases in the value goods sold. **[2 Mks]**

18. The following measurements were recorded in a field book at a farm using XY=400m as the baseline.

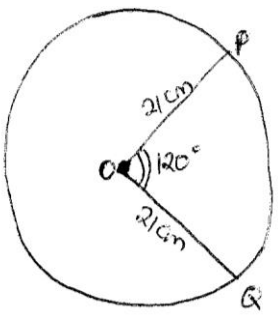
	Y	
C 60	340	
	300	120 D
	240	100 E
	200	160 F
B 100	140	
A 120	80	
	X	

a. Using the scale of 1:4000 (1cm represents 40m) draw accurately the map of the farm. **[4 Mks]**

b. Determine the actual area of the farm in hectares. **[4 Mks]**

c. If the farm is on sale at Ksh. 80,000 per hectare, how much does the farm cost? **[2 Mks]**

19. The minor arc PQ of a circle radius 21cm subtends an angle of 120^0 at the centre of the circle as shown below.



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a. Find the area of the minor sector POQ **[2 Mks]**

b. Find the perimeter of the minor sector POQ **[3 Mks]**

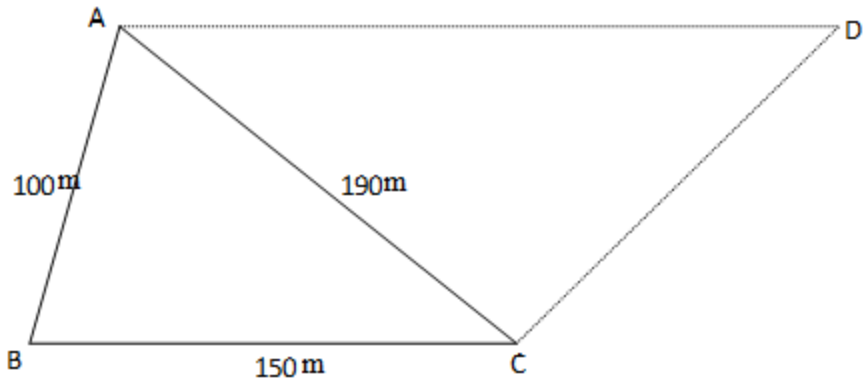
c. The minor sector POQ is folded to form a right circular cone.

Calculate:

i. The radius of the cone. **[3 Mks]**

ii. The height of the cone. **[2 Mks]**

20. A triangular piece of land ABC has sides AB=100m, BC=150m and AC=190m.



a) Calculate the area of the triangular piece of land ABC **[2 Mks]**

b) Calculate the value of angle ACB. **[3 Mks]**

c) A new piece of land ABCD is a trapezium with AD//BC whose area is three times that of triangle ABC, calculate the perimeter of ABCD. **[5 Mks]**

21. Three business partners, Bela, Joan and Trinity contributed Kshs. 112, 000, Kshs. 128, 000 and Kshs. 210, 000 respectively to start a business. They agreed to share their profits as follows:

30% to be shared equally
30% to be shared in the ratio of their contributions
40% to be retained for the running of the business.

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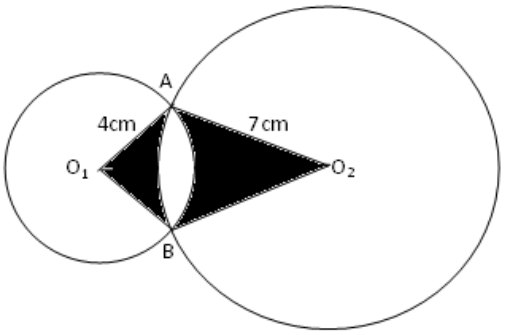
a) If at the end of the year, the business realised a profit of Kshs. 1. 35million Calculate:

b) The amount of money retained for running the business at the end of the year. **[1 Mk]**

c) The difference between the amounts received by Trinity and Bela. **[6 Mks]**

d) Express Joan's share as percentage of the total amount of money shared between the three partners. **[3 Mks]**

22. In the figure below, O_1 and O_2 are the centres of the circles whose radii are 4 cm and 7 cm respectively. The circles intersect at A and B and angle $AO_1O_2 = 60^\circ$



Find by calculation; take $\pi = 3.142$

a. The angle AO_2O_1 **[1 Mk]**

b. The area of the quadrilateral AO_1BO_2 **[4 Mks]**

c. The shaded area **[5 Mks]**

23. Members of a certain group decided to raise sh. 225,000 to buy a plot of land, with each contributing the same amount. Before the due date for collection of the contribution, ten of the members withdrew from the project.

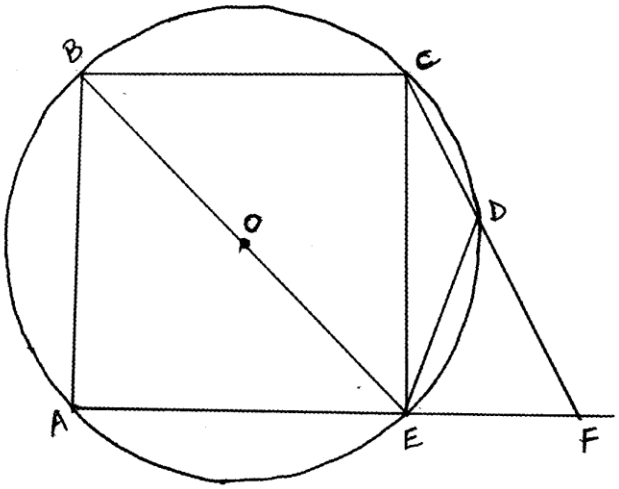
a. Letting n represent the original membership of the group, show that the increase in contribution per member was $\frac{2250000}{n(n-10)}$ **[4 Mks]**

b. If the increase in contribution per person was sh. 1125, what was the original number of members in the group? **[4 Mks]**

c. Calculate the percentage increase in the contribution per person caused by the withdrawal of the members. **[2 Mks]**

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24. In the figure below, O is the center of the circle. $<AEB=50^0$, $<EBC=80^0$ and $<ECD=30^0$



Giving reasons calculate

i. $<CDE$ **[2 Mks]**

ii. $<DFE$ **[2 Mks]**

iii. Obtuse $<COE$ **[2 Mks]**

iv. $<ADE$ **[2 Mks]**

v. $<CAE$ **[2 Mks]**

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FORM THREE HOLIDAYS KEYNOTE
MATHEMATICS PP1 QUESTION PAPER NO: 05

SECTION I (50 marks)

1. Evaluate: **(3mks)**

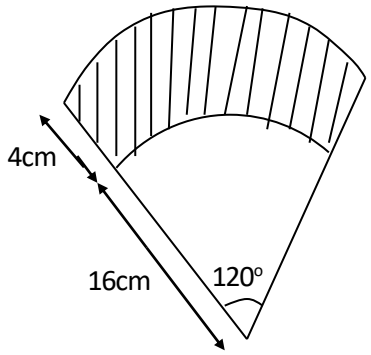
$$1/2\left(3/5 + 1/4\left(\frac{7}{3} - \frac{3}{7}\right) of\ 1\frac{1}{2} \div 5\right)$$

2. A triangle has vertices A(2,5), B(1,-2) and C(-5,1). Determine;

a) The equation of line BC. **(2mks)**

b) The equation of perpendicular line from A to BC. **(2mks)**

3. The shaded region in the figure below shows an area swept out on a flat windscreen by a wiper. Calculate the area of the region. Take π= 3.142. **(3mks)**



4. A piece of metal has a volume of 20cm^3 and a mass of 300g. Calculate the density of the metal in kg/m^3. **(3mks)**

5. List the integral values of x which satisfy the inequalities below. **(3mks)**

$$2x + 21 > 15 - 2x \geq x + 6$$

6. Janet is a saleslady earning a basic salary of Kshs. 20,000 per month and a commission of 8% for the sales in excess of Kshs. 100,000. If in January 2010 she earned a total of Kshs. 48,000 in salaries and commissions. Determine the amount of sales. She made in that month. **(3mks)**

7. The interior angle of a regular polygon is 108° larger than the exterior angle. Find the number of sides of the polygon. **(3mks)**

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8. Given that Cos A=$\frac{5}{13}$ and angle A is acute. Find the value of 2tan A + 3sin A without calculators.

(3mks)

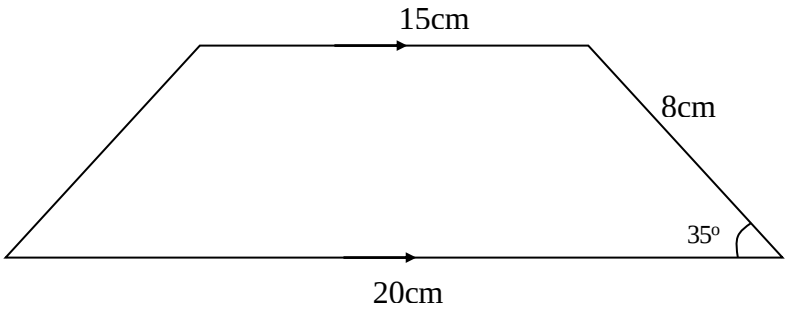
9. Without using a calculator evaluate: **(2mks)**

$$\frac{-9+(-7)\times(-8)-(-5)}{-2+(-6)\div 3\times 6}$$

10. Solve for x in the equation below. **(3mks)**

$$\frac{6x-4}{3}-\frac{2x-1}{2}=\frac{6-5x}{6}$$

11. Calculate the area of the trapezium show below. **(3mks)**



12. Solve the simultaneous equation. **(4mks)**

$\mathbf{x^2 + y^2 = 26}$

$\mathbf{x + y = 4}$

13. Express 72 and 125 as products of their prime factors. **(2mks)**

14. A service vehicle left town P for town Q at 1000hrs had a puncture after travelling for 4 hrs 20 mins. Fixing a new tyre took 33 minutes. The vehicle then travelled for 1 hr 20mins to reach town Q. At what time did it arrive in 12 hour clock system? **(3mks)**

15. A tourist visited Kenya with 2500 US dollars and changed the US dollars into Kenya shillings at a local bank in Kenya when the exchange rates at the time were as follows:

	Buying	*Selling*
1 US dollar	shs.78.45	shs. 78.55
1 Sterling Pound	shs.120.25	shs. 120.45

a) How much did he get in Kenya shillings? **(2mks)**

b) While in Kenya he used shs. 80,000 and after his stay he converted the remaining amount into Sterling pounds. Calculate to 2 decimal places the Sterling pounds that he got. **(2mks)**

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16. Use logarithms tables to evaluate: (4mks)

$$\sqrt[3]{\frac{497 \times 9.84}{5.24 \times 7.65}}$$

SECTION II (50 marks)

17. A motorist left Embu for Nairobi a distance of 240km at 8:00 a.m. and travelled at average speed of 90km/hr. Another motorist left Nairobi for Embu at 8:30a.m and travelled at 100km/hr. Find;

a) The time they met. **(3mks)**

b) How far they met from Nairobi. **(3mks)**

c) The time of the day each motorist arrived at his destination. **(4mks)**

18. A farmer has a rectangular farm which measures 100m by 80m. The farmer intends to fence the plot using post at intervals of 4m apart leaving a gate of 4m. Also he will use four strands of barbed wire. Each post cost shs. 125 and wire is sold at rolls of 60m costing 1,500/=. Calculate;

a) The number of post he will use. **(2mks)**

b) The total length of the barbed wire. **(2mks)**

c) The total cost of fencing the farm if the cost of the gate is 8,000/= and labour is shs. 1,500. **(3mks)**

d) The farmer wishes to subdivide further the farm into square plot. Find the maximum area of each plot. **(2mks)**

19. The parents of a certain mixed school decided to buy a school van worth Kshs 900,000. Each student was to contribute the same amount of money. 50 students were transferred from the school as a result each of the remaining students had to pay kshs.600 more.

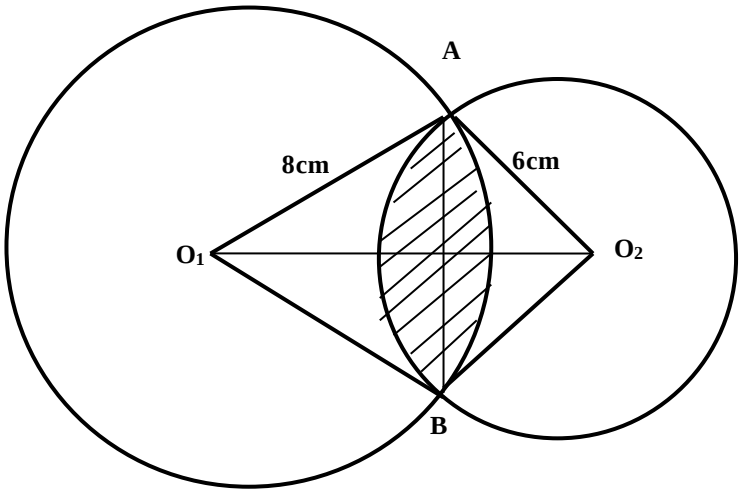
a) Find the original number of the students in the school. **(5mks)**

b) Findthe percentage change in contributions per student. **(3mks)**

c) If the ratio of boys to girls in the school was 11:7, find the amount of money contributed by boys alone. **((2mks)**

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20. The figure below shows two circles of radii 8cm and 6cm with centres O_1 and O_2 respectively. The circles intersect at points A and B. The lines O_1O_2 and AB are perpendicular to each other. If the common chord is 9cm;
(Take π=3.142.



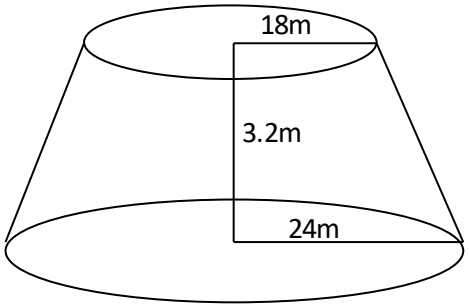
Calculate to 4.s.f.

a) Angle AO_1B **(2mks)**

b) Angle AO_2B **(2mks)**

c) Area of the shaded region. **(6mks)**

21. A village water tank is in the form of a frustum of a cone of height 3.2m. The top and bottom radii of 18m and 24m respectively as shown below.



a. Calculate;

i. The surface area of the tank excluding the bottom. **(4mks)**

ii. The capacity of the tank in litres. **(3mks)**

b. 15 families each having 15 members use the water tank and each person uses 65 litres daily. How long will it take for the full tank to be emptied?

(3mks)

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22. Measurements of a maize field using baseline XY were recorded as shown below in metres

	Y	
	240	
To R 160	190	
	180	75 To Q
	150	50 To P
To S 100	120	
	100	100 To N
To T 30	50	
	20	20 To M
	X	

a) Show the map of the maize field by scale drawing. Take 1cm rep 20m. **(4mks)**

b) Find the area of the field in hectares. **(4mks)**

c) If the cost of one hectare is Kshs. 65,000, find the total cost of the maize field. **(2mks)**

23. Using a ruler and pair of compass only construct the following.

a) Triangle XYZ where XY is 6cm and angle XYZ is 135^{o} and YZ=7cm. Measure XZ. **(3mks)**

b) Drop a perpendicular from Z to meet line XY at K. measure YK. **(3mks)**

c) Bisect line XY and let the bisector meet line XZ at Q. **(2mks)**

d) Join Q to Y and measure angle XQY. **(2mks)**

24. Complete the table for the function.

a) $y=1 - 2x - 3x^2$ in the range $-3 \leq x \leq 3$ **(2mks)**

x	-3	-2	-1	0	1	2	3
-3x2	-27		-3	0		-12	
-2x				0			-6
1	1	1	1	1	1	1	1
y	-20			1		-15	

b) Use the table above to draw a graph of $y=1 - 2x - 3x^2$ on the graph provided. **(4mks)**

c) Use the graph in (b) above to solve;

i. $1 - 2x - 3x^2 = 0$ **(2mks)**

ii. $2 - 5x - 3x^2 = 0$ **(2mks)**

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FORM THREE HOLIDAYS KEYNOTE
MATHEMATICS PP1 QUESTION PAPER NO: 06

SECTION I (50Marks)

1. Evaluate without using tables or a calculator the value of $\frac{1.33\times0.51}{0.19\times0.0017}$ **(3mks)**

2. When a certain number is divided by 48, 72 or 100 the remainder is 3 in each case. Find the number. **(3mks)**

3. Find all the integral values of x which satisfy the inequalities **(3mks)**

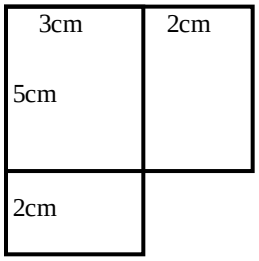
$$\mathbf{20 - x > 5 + 2x \geq x + 5}$$

4.A Kenyan bank buys and sells foreign currency as shown below.

	Buying	Selling
	Kenya shillings	Kenya shillings
1 Euro	84.15	84.26
1 US Dollar	80.12	80.43

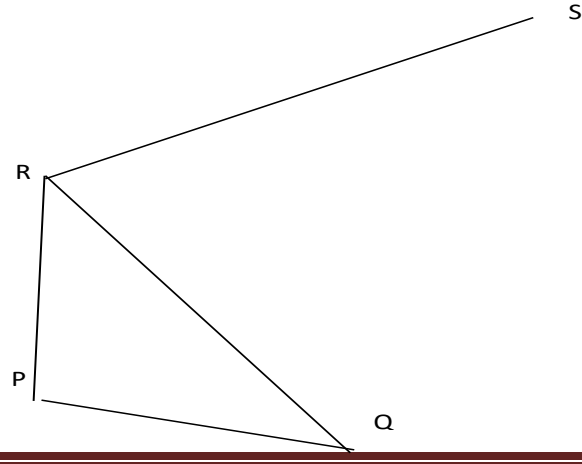
A tourist travelling from Britain arrives in Kenya with 5000 Euros. He converts all the Euros to Kenya Shillings at the bank. While in Kenya he spends a total of KSh. 289,850 and then converts the remaining Kenya shillings to US dollars at the bank. Calculate (to nearest dollar) the amount he receives? **(3mks)**

5. Complete the figure below so as to make the net of a cuboid. Hence determine the surface area of the cuboid. **(4 Mks)**



6.Find the value of x given that $\begin{pmatrix} 2x-1 & 1 \\ x^2 & 1 \end{pmatrix}$ is a singular matrix **(3 mks)**

7.The figure below shows a solid wedge PQRSTU. Complete the solid showing all the hidden edges with dotted lines. ***(3marks)***



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8.During an annual general meeting at Patel Mixed Day, goats and chicken were slaughtered. The number of heads for both chicken and goats were 45. The total number of legs were 100. Determine the exact number of goats and chicken slaughtered. **(3mks)**

8. In a mixed school there are 900 students, out of these 600 are girls.

(a) Find the ratio of boys to girls. **(2mks)**

(b) What is the percentage of boys in this school? **(1mk)**

9. Find the value of t in the equation $\frac{t-1}{3} - \frac{4+t}{4} = 0$ **(3mks)**

10. Using tables, find the reciprocal of 0.432 and hence evaluate $\frac{\sqrt{0.1225}}{0.432}$ **(3mks)**

11. Find the equation of the line perpendicular to 3x – 7y – 20 = 0, and passes through the point (5, 2). **(3 Mks)**

12. The angle of elevation of the top of a building from a point P is 45°. From another point T, 15 meters nearer the foot of the building, the angle of elevation of the top of the building is 52°. Calculate the height of the building. **(3mks)**

13. Given A = $\begin{pmatrix} 10 & 7 & 5 \\ 9 & 11 & 12 \end{pmatrix}$ and B= $\begin{pmatrix} 3 & 4 \\ 1 & 6 \\ 0 & 3 \end{pmatrix}$, find AB **(4mks)**

14. The travel timetable below shows the departure and arrival time for a bus plying between two towns M and R, 300 kilometres apart.

TOWN	ARRIVAL	DEPARTURE
M		0830h
N	1000h	1020h
P	1310h	1340h
Q	1510h	1520h
R	1600h	

Calculate the average speed for the whole journey. **(3mks)**

15. Evaluate the value of *x* in $81^{x+1} + 3^{4x} = 243$ **(3mks)**

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SECTION B (50 Marks

16. A group of choir members decided to raise 3600/= to buy a guitar. Each member was to contribute equal amount. In the preparation process five members transferred to another church which meant the remaining contributors had to pay more to achieve the target.

a) Show that the increase in the contribution per member was:
Sh. $\frac{18,000}{n(n-5)}$ if n is the initial number of members. **(4 mks)**

b) If the increase in the contribution per member was sh. 24, what was the original contribution before the other members left? **(4 mks)**

c) Calculate the percentage increase in the contribution after the others left. **(2 mks)**

17. The table below shows the age groups and number of people who are HIV/ AIDS positive in a certain Sub-county in Kenya.

Age group	10 – 19	20 – 29	30 – 39	40 – 49	50 – 59	60 – 69	70 – 79
No. of people	12	15	16	25	18	10	4

a) State the modal age group. **(1mk)**

b) Calculate the mean age of the people who are HIV/AIDS Positive. **(3mks)**

c) Calculate the median of the age group. **(3mks)**

18. Using a pair of compass and ruler only construct.

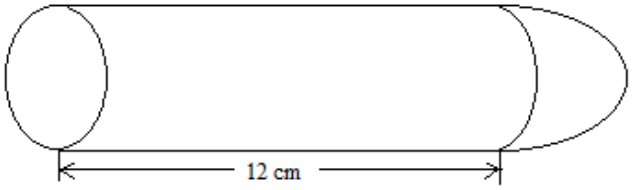
(a) Triangle PQR in which PQ =5cm, $\angle QPR = 30^0$ and $\angle PQR=105^0$. **(3mks)**

(b) A circle that passes through the vertices of the triangle PQR. Measure its radius. **(3mks)**

(c) The height of triangles PQR with PQ as the base. Measure the height. **(2mks)**

(d) Determine the area of the circle that has outsides the triangle correct to 2 decimal places **(2mks)**

19. The diagram below shows a solid made of a hemisphere and a cylinder. The radius of both the cylinder and the hemisphere is 3cm. The length of the cylinder is 12cm.



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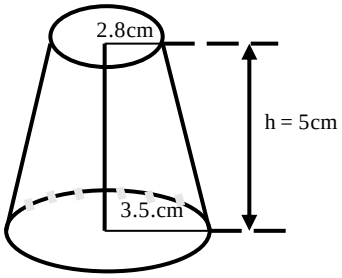
a) i) Calculate the volume of the solid. **(3mks)**

ii) The solid fits in a box in the shape of a cuboid 15 cm by 6cmby 6cm. Calculate the volume of the box not occupied by the solid correct to four significant figures. **(2mks)**

b) i) Calculate the total surface area of the solid correct to four significant figures. **(3mks)**

ii) The surface of the solid is to be painted. One millilitre of paint covers an area of $8cm^2$.The cost of paint is Ksh 900 per litre. Calculate the cost of the paint required. **(2mks)**

21. Find



(a) The surface area of the frustrum **(5 Mks)**

(b) The volume of frustrum shown. **(5 Mks)**

22. A pirate boat sails from port A on a bearing of 050° at a speed of 112km/h, for 2½ hours to port B. From port B it changes its course and travelled on a bearing of 170° at a speed of 75km/h for $2^2/_3$ hours toward part C. From C it travelled to port D. D is on a bearing of 130° and 160km from A.

a) Using a scale of 1cm to represent 40km, Draw a diagram showing the positions of the ports A, B, C and D. **(4 mks)**

b) Use your drawing to find.

i) The distance CD **(1 mk)**

ii) The bearing of C from D **(1 mk)**

c) A marine police patrol leaves port A to intercept the pirate boat at M as it moves from B to C in the shortest time possible.

i) How far from A will the two boats meet at M? **(2 mks)**

i) If the boats meets after 2 hours, what is the speed of the marine police patrol boat? **(2 mks)**

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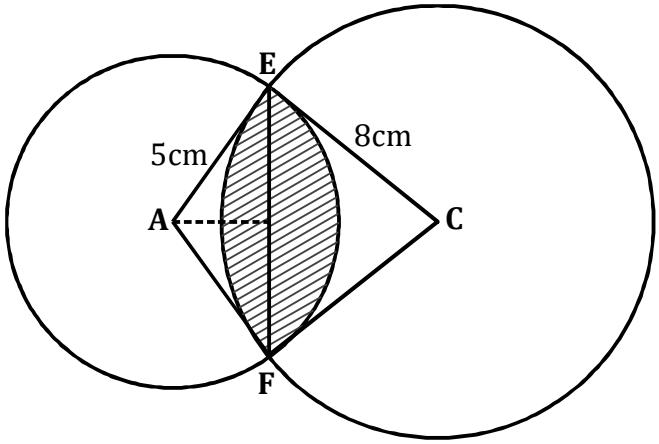
23. Helena left town A at 8:00 am and travelled towards town B at an average speed of 64 km/h. half an hour later, Joan left town B and travelled towards A at the same speed if the two towns are 384km apart:

a. At what time of the day did they meet? **(5mks)**

b. How far from town B was their meeting point? **(2mks)**

c. How far apart were they at 10:30am **(3mks)**

24. The figure below shows two intersecting circles with centres A and C, of radius 5cm and 8cm respectively. The common chord EF = 6cm



Calculate

a) Angle EAF **(2 mks)**

b) Angle ECF **(2 mks)**

c) Calculate the common area between the two intersecting circles. **(6 mks)**

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FORM THREE HOLIDAYS KEYNOTE
MATHEMATICS PP1 QUESTION PAPER NO: 07

SECTION I (50 Marks)

Answer ***all*** the questions in this section

1. Anthony spent one-quarter of his net January salary on school fees. He spent 25% of the remainder on bills and one-ninth of what was left on transport. If he finally had Kshs. 15,800, calculate Anthony's net January salary. **(3 mks)**

2. Find the values of x and y **in** $2^{\frac{3}{2}x} \times 3^{2y} = 5184$ **(3 mks)**

3. A straight line is such that P(4, −3) and Q (2, 5), find the equation of the perpendicular bisector of PQ in the form $ax + by = c$, where a, b and c are integral values. **(3 mks)**

4. Without using a calculator or mathematical tables, simplify **(3 mks)**

$$\frac{\frac{1}{2}\log 625 + \frac{1}{2}\log 100}{\log 100 - \frac{1}{2}\log 16}$$

5. Simplify the algebraic expression **(3 mks)**

$$\frac{9p^2 - q^2}{3p^2 - 4pq + q^2}$$

6. Determine all the integral values of x that satisfy the inequalities **(3 mks)**

$$3x - 5 < 7 - x \leq x + 13$$

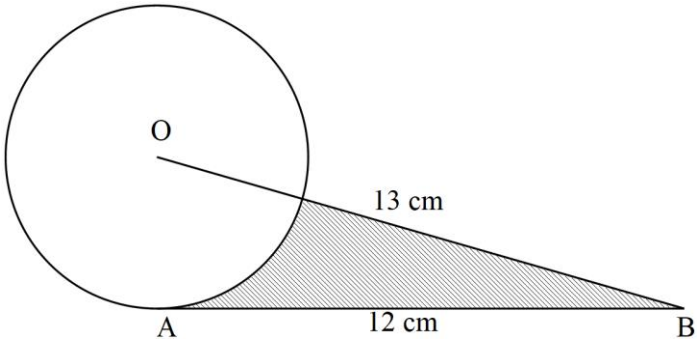
7. Simplify the expression below without using a mathematical table or a calculator, giving the answer as $p + q\sqrt{r}$, where p, q and r are constants. **(3 mks)**

$$\frac{\sqrt{7} + 3}{\sqrt{7} - 2}$$

8. Solve for x in the equation below for $0^0 \leq x \leq 90^0$ **(3 mks)**

$$\sin(2x - 30^0) = \frac{\sqrt{3}}{2}$$

9. In the figure below, O is the centre of the circle, OA=13 cm, AB=12 cm and AB is a tangent to the circle at A. Use π=3.142 to calculate the shaded area correct to 2 decimal places



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10. A Kenyan company received US dollars that it converted into Kenya Shillings in Bureau de Change that buys and sells foreign currencies at the rates shown below.

	Buying (Kshs)	Selling (Kshs)
1 Sterling Pound	125.78	126.64
1 US Dollar	75.66	75.86

(a) If the company received Kshs. 15,132,000, calculate the amount it received in US dollars. **(1 mk)**

(b) The company exchanged the amount in (a) into Sterling pounds and bought a car. Calculate the cost of the car to the nearest sterling pound. **(2 mks)**

11. 5men can erect 2 cottages in 21 days, how many more men, working at the same rate, will be needed to construct 6 cottages in the same period. **(2 mks)**

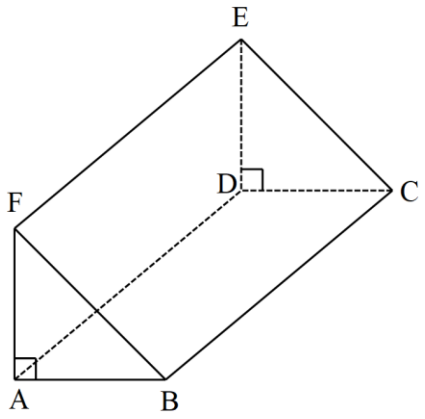
12. Two trains M and N are travelling in opposite directions along parallel railway lines. Train M is moving at a speed of 72 km/h and is 20 m long. Train N travels at a speed of 54 km/h. Find the length of train N if it took the two trains 9 seconds to completely pass each other **(3 mks)**

13. Find the values of c and d if $0.4\dot{9}\dot{7}$ is equivalent to $\frac{c}{d}$, where c and d are integers. **(3 mks)**

14. A mother is 42 years old and her daughter is 25 years younger than her. After how many years will the daughter's age be half the mother's? **(2 mks)**

15. The exterior angle of a regular polygon equals one-third of its interior angle. Calculate the number of sides of the polygon. **(3 mks)**

16. The figure below shows a solid triangular prism ABCDEF. Sketch the net of the solid. **(2 mks)**



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SECTION II (50 Marks)

Answer ***any*** five questions in this section

17. (a) Complete the table below for the function $\boldsymbol{y = 2x^2 - 3x - 5 \text{ for } -2 \leq x \leq 3}$ **(2 mks)**

x	-2	-1.5	-1	-0.5	0	0.5	1	1.5	2	2.5	3
y					-5						

(b) On the grid provided, draw the graph of $\boldsymbol{y = 2x^2 - 3x - 5 \text{ for } -2 \leq x \leq 3}$ **(3 mks)**

(c) Use your graph to find the roots of the equation $\boldsymbol{2x^2 - 3x - 5 = 0}$ **(1 mk)**

(d) (i) On the same axes, draw the graph of $\boldsymbol{y = -2x - 2}$ **(1 mk)**

(ii) From your graphs, find the values of x that satisfy the simultaneous equations $\mathbf{y = 2x^2 - 3x - 5}$ and $\mathbf{y = -2x - 2}$ **(1 mk)**

(iii) Hence write the quadratic equation in the form $ax^2 + bx + c = 0$ satisfied by the values of x where the two graphs intersect, where a, b and c are integers. **(2 mks)**

18. Leakey, a salesman, earns a basic salary of Kshs. 20,000 per month and a commission of 8% on sales up to Kshs. 100,000 and a further commission of $2\frac{1}{2}\%$ on sales above Kshs. 100,000. In January 2021, he earned a total of Kshs. 48,000 in salaries and commissions.

(a) Determine the amount of sales he made in January. **(4 mks)**

(b) In the month of February, the total sales increased by 18%. Calculate his commission in the month of February. **(3 mks)**

(c) In March, the total sales decreased by 25%, calculate his total earnings in March. **(3 mks)**

19. Using a ruler a pair of compasses only,

(a) Construct triangle ABC in which AB=5.3 cm, BC=7.4 cm and AC=8.5 cm **(3 mks)**

(b) Construct an escribed circle opposite angle ACB **(3 mks)**

(i) Measure the radius of the circle **(1 mk)**

(ii) Measure the acute angle subtended at the centre of the circle by chord AB **(1 mk)**

(c) Calculate the area of triangle OBA with O as the centre of the circle **(2 mks)**

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20. Kisumu Concrete Products owns three lorries A, B and C. Lorry A has a capacity of 7 tonnes and uses one litre of fuel for every 10 km. Lorry B has a capacity of 5 tonnes and uses one litre of fuel for every 12 km, and lorry C has a capacity of 2 tonnes consuming a litre of fuel for every 15 km. the company plans to transport materials with the lorries making 3, 7 and 9 trips respectively.

(a) Calculate the quantity of materials transported by each lorry. **(1 mk)**

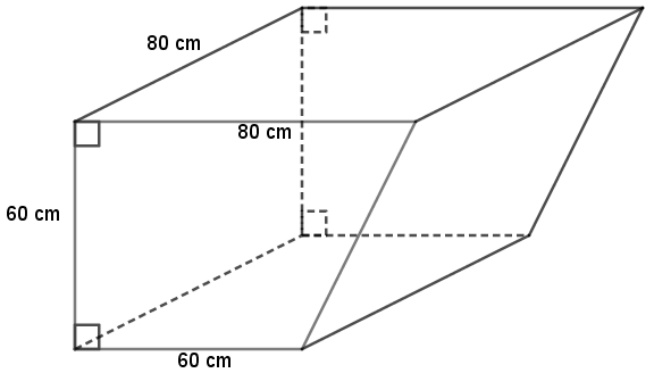
(b) The materials are to be transported to a site 30 km from their yard. Calculate the amount of fuel consumed by each lorry. **(4 mks)**

(c) The company's expenses are as follows; fuel at Kshs 112 per litre, wages Kshs. 20,100 and tear and ware at Kshs. 105,000

(i) Calculate the total fuel cost **(1 mk)**

(ii) If the lorries are hired at Kshs. 25,000, Kshs. 15,000 and Kshs. 10,000 per trip respectively, calculate the company's profit. **(3 mks)**

21. The figure below shows the internal dimensions of a laundry sink whose cross-section is a trapezium



(a) Calculate the capacity of water that the sink can hold when full. **(4 mks)**

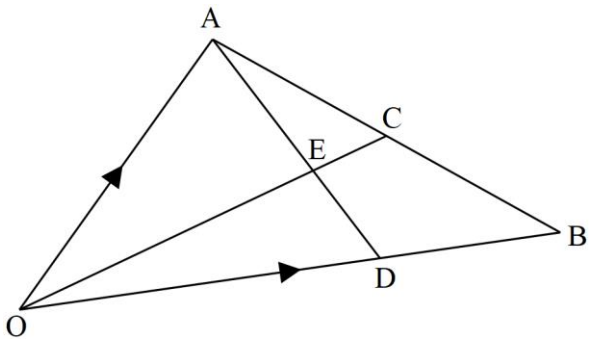
(b) The sink is filled with water using a cylindrical pipe of radius 10.5 cm at a rate of 10 cm per minute.

(i) Calculate the time to the nearest minutes it takes to fill the tank. Use $\pi = \frac{22}{7}$ **(3 mks)**

(ii) Water in the full sink is then drained into cylindrical containers of diameter 28 cm and height 30 cm. How many cylinders are required to completely drain the sink? **(3 mks)**

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22. In the figure below, C is the midpoint of **AB** and D is a point on $\boldsymbol{OB}$ such that $\mathbf{OD}:\mathbf{DB}=3:2$. **OC** and **AD** intersect at E.



Given that $\boldsymbol{OA}=\boldsymbol{a}$ and $\boldsymbol{OB}=\boldsymbol{b}$

(a) Express the following in terms of $\boldsymbol{a}$ and $\boldsymbol{b}$ only:

(i) AD **(1 mk)**

(ii) OC **(2 mks)**

(b) Given further that $\boldsymbol{AE}=s\boldsymbol{AD}$ and $\boldsymbol{OE}=t\boldsymbol{OC}$. Express $\boldsymbol{OE}$ in terms of:

(i) $\boldsymbol{a}$, $\boldsymbol{b}$ and s **(2 mks)**

(ii) $\boldsymbol{a}$, $\boldsymbol{b}$ and t **(1 mk)**

(c) hence find the values of s and t **(3 mks)**

(d) State the ratio in which E divides $\boldsymbol{AD}$ **(1 mk)**

23. The table below shows the age groups and number of people tested of Covid-19 in a health care facility

Age Group	10 – 19	20 – 29	30 – 39	40 – 49	50 – 59	60 – 69	70 - 79
Number of patients	7	12	16	25	15	22	4

(a) Calculate the mean age of the patients tested **(4 mks)**

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

(c) On the histogram in (b) above, draw a straight line to show where the median age lies. **(3 mks)**

24. (a) In 2011, the total cost of manufacturing an article was Kshs.3,750 and this was divided between the cost of material, labour and transport in the ratio 14: 8: 3. In 2014 the cost of the material was doubled, labour cost increased by 30% and transport costs increased by 20%.

Calculate the cost of manufacturing the article in 2014. **(6 mks)**

(b) For the same article in (a) above, the cost of manufacturing in 2015 was Kshs. 6,672 as a result of increase inlabour costs only. Find the percentage increase in labour cost of 2015. **(4 mks)**

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FORM THREE HOLIDAYS KEYNOTE
MATHEMATICS PP1 QUESTION PAPER NO: 08

SECTION A (50 MARKS)

Answer all the questions in this section

1. Without using mathematical tables or calculator, evaluate. **3 mks**

$$\frac{\left(\sqrt[3]{13824}\right) - 4}{3 + 4 \div 2 - 5 \times 7}$$

2. A watch which looses a half a minute every hour was set read the correct time at 0445hr on Monday. Determine in twelve hour system the time the watch will show on Friday at 1845hr the same week. **3mks**

3. Find the least whole number by which $2^5 \times 5^4 \times 7^3$ must be multiplied with to get a perfect cube. What is the cube root of the resulting number. **3mks**

4. A woman went on a journey by walking, bus and matatu. She went by bus $\frac{4}{5}$ of the distance , then by matatu for $\frac{2}{3}$ of the rest of the distance. The distance by bus was 55km more than the distance walked. Find the total distance. **3mks.**

5. Equity bank buys and sells foreign currencies as shown:

Currency	Buying (ksh)	Selling (ksh)
1 US Dollar	77.43	78.10
1 S.A Rand	9.03	9.51

A tourist arrived in Kenya with 5 600 US Dollars and changed the whole amount to Kenya shillings. While in Kenya he spent Sh. 201 376 and changed the balance to S.A Rand before leaving to South Africa. Calculate in SA Rand he received. **3 mks**

6. The size of an interior angle of regular polygon is $3x^o$. While its exterior angle is $(x - 20)^o$. Find the number of sides of the polygon. **3mks**

7. Use reciprocal, cosine and square tables only to evaluate to 4.s.f the expression.

$$\frac{1}{15.79} - (\cos 73.61)^2$$ **4mks**

8. Given that $\sin(x + 20^o) = \cos(2x + 25)$ find the value of x and hence find the value of $\tan x$. **3mks**

9. A rectangular room is 4m longer than it is wide. If its area is 12 m^2,find its dimensions. **3mks.**

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10. The masses of two similar building blocks are 2.7 kg and 800grams respectively.
Find the surface area of the larger block if the surface area of the smaller block is 120 cm^2. **3 mks**

11. By completing the square solve the following quadratic equation **4mks**

$$x^2 + 8x + 9 = 0$$

12. Without using a calculator , evaluate: $\dfrac{\frac{3}{4} + 1\frac{2}{7} \div \frac{3}{7} of\ 2\frac{1}{3}}{\frac{2}{3}\ (1\frac{2}{7} - \frac{3}{8})}$ **3 mks**

13. Simplify the expression: $\dfrac{9t^2 - 25a^2}{6t^2 + 19at + 15a^2}$ **3mks.**

14. A business bought 300 kg of tomatoes at Ksh. 30 per kg. He lost 20% due to waste. If he has to make a profit 20%, at how much per kilogram should he sell the tomatoes. **3mks.**

15. Find the equation of the line through the point (2,3) and parallel to the line x – 8y -2=0. Leave the equation in the form y = mx + c. **3 mks**

16. A rectangular field measures 308m by 228m. Fence posts are placed along its sides at equal distance apart. If the posts are as far as possible, what is the distance between them. **3mks**

SECTION II (50mks)

17. Three points P, Q and R are on a level ground. Q is 240 m from P on a bearing of 230°, R is 120m to the East of P.

(a) Using a scale of 1cm to represent 40m, draw a diagram to show the positions of P, Q and R in the space provided below. **4mks**

(b) Determine:

i. The distance of R from Q. **1mk**

ii. The bearing of R from Q. **1mk**

(c) A vertical post stands at P and another one at Q. A bird takes 18 seconds to fly directly from the top of the post at Q to the top of the post at P. Given that the angle of depression of the top of the post at P from the top of the post at Q is 9°, calculate.

i. The distance to the nearest metre the bird covers. **2mks**

ii. The speed of the bird in Km/h. **2mks**

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18. A and B are two towns. Tom left town A at 8:00 am travelling towards town B at an average speed of 90km/h. At 8:21 am on the same day, John left town A for town B travelling along the same road at an average speed of 97km/h. Determine;

(a) The time John caught up with Tom. **5mks**

(b) The distance from town A to the point where John overtook Tom. **2mks**

(c) On the same day, Paul left town B for A at 8:40am travelling at an average speed of 80km/h. He met Tom after 2hours 30 minutes. Determine the distance between A and B. **3 mks**

19. A surveyor recorded the following information in his field book after taking measurement in metres of a plot.

	To E	
	1000	
	880	320 to D
720 to F	640	
	480	600 to C
240 to G	400	
	200	400 to B
	From A	

(a) Sketch the layout of the plot. **4mks.**

(b) Calculate the area of the plot in hectares. **6mks**

20. Complete the table for the function $y = 1 - 2x - 3x^2$ in the range $-3 \leq x \leq 3$ **(2mks)**

X	-3	-2	-1	0	1	2	3
$-3x^2$	-27		-3	0		-12	
-2x		4		0			-6
1	1	1	1	1	1	1	1
Y	-20			1		-15	

b) Using the table above and the graph paper provided, draw the graph of $\mathbf{y = 1 - 2x - 3x^2}$ **(4mks)**

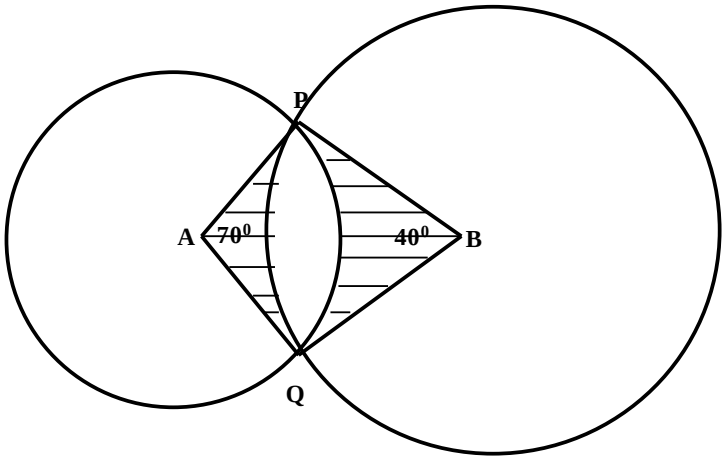
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c) Use the graph in (b) above to solve

i) $1 - 2x - 3x^2 = 0$ **(2mks)**

ii) $2 - 5x - 3x^2 = 0$ **(2mks)**

21. The diagram below shows two circles, centre A and B which intersect at points P and Q. Angle PAQ = 70^0, angle PBQ = 40^0 and PA = AQ = 8cm.



Calculate

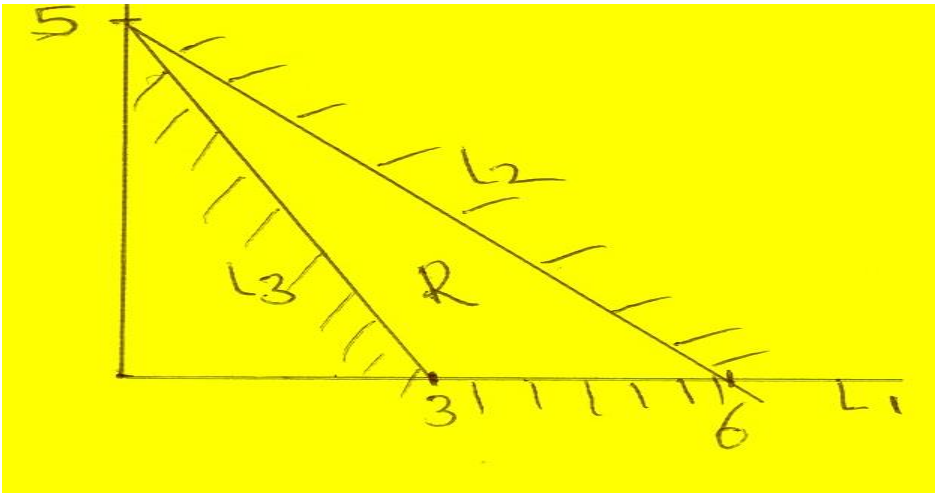
(a) PQ to correct to 2 decimal places **2 Mks**

(b) PB to correct to 2 decimal places **2 Mks**

(c) Area of the minor segment of the circle whose centre is A **2 Mks**

(d) Area of shaded region **4 Mks**

22. The region marked R below is enclosed by three inequalities as shown.



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a) Determine the area of region R **(2mks)**

(b) determine the inequalities that enclose the region

(i) L_1 **(2mks)**

(ii) L_2 **(3mks)**

(iii) L_3 **(3mks)**

23. Three business partners, Bela ,Joan and Trinity contributed Kshs 112,000, Ksh,128,000 and ksh,210,000 respectively to start a business. They agreed to share their profit as follows:

30% to be shared equally
30% to be shared in the ratio of their contributions
40% to be retained for running the business.

If at the end of the year, the business realized a profit of ksh 1.35 Million. Calculate:

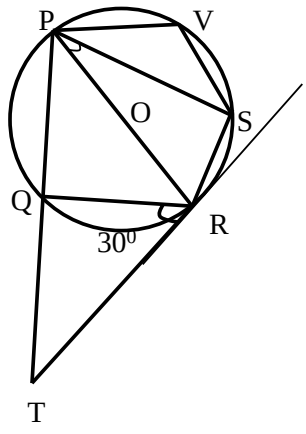
a) The amount of money retained for the running of the business at the end of the year. **(1mk)**

b) The difference between the amounts received by Trinity and Bela **(6mks)**

c) Express Joan's share as a percentage of the total amount of money shared between the three partners. **(3mks)**

24. In the figure below POR is a diameter. PQT is a straight line, and $\angle QRT = 30^0$ and $RPS = \angle 35^0$. O is the centre of the circle.

Calculate



(a) Angle PRQ **(2 Mks)**

(b) Angle RPQ **(2 Mks)**

(c) Acute angle SOR **(2 Mks)**

(d) Angle RTQ **(2 Mks)**

(e) Angle PVS **(2 Mks)**

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FORM THREE HOLIDAYS KEYNOTE
MATHEMATICS PP1 QUESTION PAPER NO: 09

SECTION I (50 MARKS)

Answer all questions in this section in the spaces provided.

1. Without using a calculator ,evaluate

$$\frac{3/4 + 1\,5/7 \div 4/7 \text{ of } 2\,1/3}{(1\,3/7 - 5/8) \times 2/3}$$

Giving your answer as mixed fraction **(3mks)**

2. Two boys and a girl shared some money. The younger boy got $5/18$ of it; the elder boy got $7/12$ of the remainder and the girl got the rest. Find the percentage share of the younger boy to the girl's share. **(4mks)**

3. Three numbers, 1400,1960 and **n** have a G.C.Dand L.C.M of 70 and $2^2 \times 5^2 \times 7^2 \times 11$ respectively.Find the least possible value of **n** **(3mks)**

4. A bus starts off from Kitale at 9. a.m and travels towards Kakamega at a speed of 60km/hr. At 9.50 a.m, a matatu leaves Kakamega and travels towards Kitale at a speed of 60Km/h. How far from Kitale will the two vehicles meet? **(3mks)**

5. Find the equation of a straight line which is equidistant from the points **A**(2,3) and **B** (6,1) (3mks)

6. Simplify the expression completely **(3mks)**

$$\frac{12x^2 - 16x}{20 - 11x - 3x^2}$$

7. Given that $\sin\theta = 2/3$ and θ is an acute angle, find without using tables $tan^2\theta + Cos^2\theta$. Give your answer as a mixed fraction. **(3mks)**

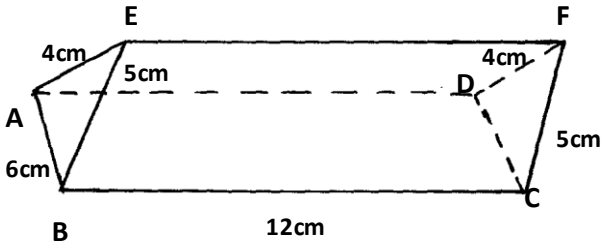
8. Solve for ***y*** in the equation below. **(4mks)**

$$8(2^2)^y = 6\,(2^y) - 1$$

9. Using a ruler, a pair of compasses only and (proportional) a set square, construct on the upper side division of line **BC**, a line **BD** such that $\angle$**DBC** = 37.5°. Use the line **BD** to divide **BC** into 4 equal portions. **(3mks)**

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10. Sketch the net of the solid below. **(2mks)**

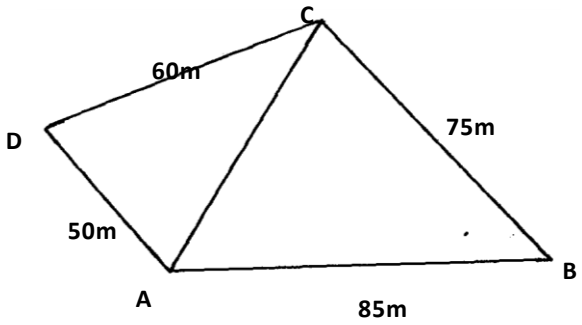


11. In a regular polygon, each interior angle is x^o and each exterior angle is $\left(\frac{x-36}{3}\right)^o$

(i) Find angle X^o **(1mk)**

(ii) Find the number of sides of the polygon **(2mks)**

12. The figure below represents a plot of land **ABCD** such that **AB**= 85m, **BC** 75m **CD**= 60m **DA** = 50m and angle **ACB** = 90°. (not drawn to scale)



Determine the area of the plot, in hectares correct to two decimal places. **(4mks)**

13. An open rectangular box measures externally 32cm long, 27cm wide and 15cm deep. The box is made up of metal 1cm thick. If it has a mass of 1.5kg, what is the density of the box to 4 significant figures? **(3mks)**

14. Find the integral values of x which satisfy the following inequalities;

$2x + 3 > 5x - 3 > -8$ **(3mks)**

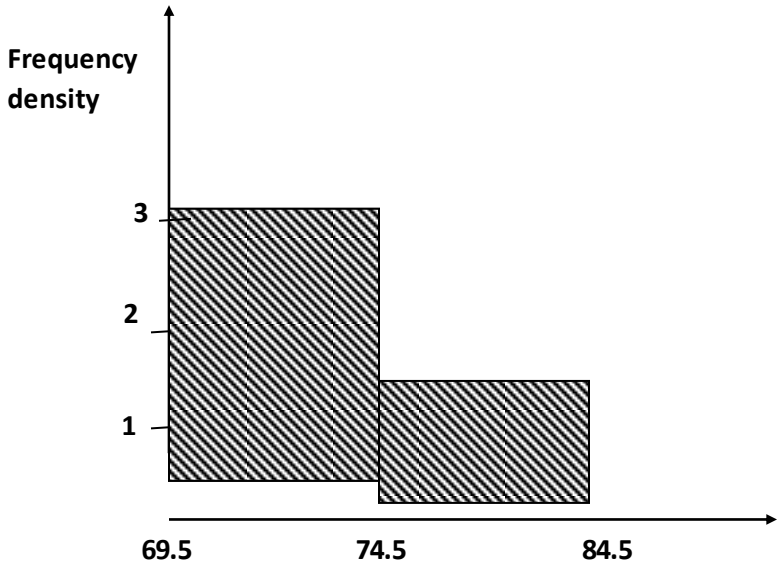
15. A Kenyan bank buys and sells foreign currency as shown below.

	Buying Ksh	Selling Ksh
1 US dollar ($)	63.00	63.20
1 UK pound (£)	125.00	125.95

A tourist arrived in Kenya with £ 9600 which he converted into Kshs at a commission of 5%. He later used ¾ of the money before changing the balance of dollars at no commission calculate ; to the nearest dollar, the amount he received. **(3mks)**

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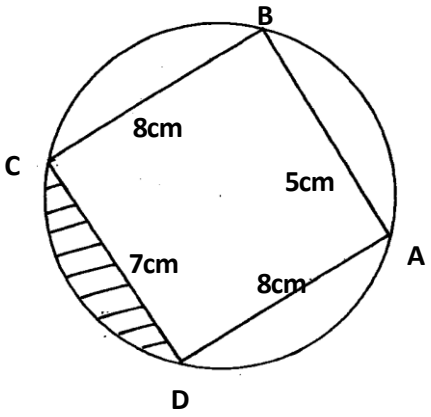
16. The histogram shown below represents the distribution of marks obtained in attest. The bar marked A has a height of 3.2 units while **B** has aheight 1.2 units. If the frequency of the class represented by **B** is 6, find the frequency of the bar represented by **A**. **(3mks)**



SECTION II (50 MARKS)

Answer any five questions in this sections in the spaces provided.

17. The figure below (not drawn to scale) shows a quadrilateral **ABCD** inscribed in a circle. **AB** = 5cm, **BC** = 8cm, **CD** = 7cm and **AD** = 8cm. **AC** is one of the diagonals of length 10cm.



(a) Find the size of angle **ABC**. **(3mks)**

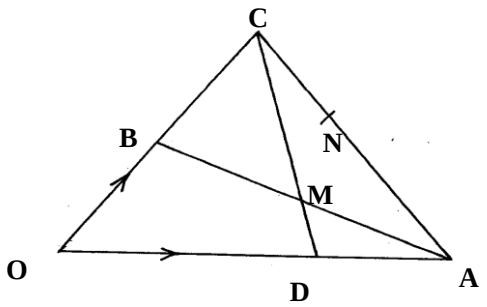
(b) Find the radius of the circle. **(2mks)**

(c) Hence, calculate the area of the shaded region. **(5mks)**

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18. In the figure below $\overrightarrow{OB} = \underset{\sim}{b}$, $\overrightarrow{OC} = 3\overrightarrow{OB}$ and $\overrightarrow{OA} = \underset{\sim}{a}$

(a) Given that $\overrightarrow{OD} = 1/3\ \overrightarrow{OA}$ and $\overrightarrow{AN} = ½\ \overrightarrow{AC}$, $\overrightarrow{CD}$ and $\overrightarrow{AB}$ meet at **M**. Determine in terms of $\underset{\sim}{a}$ and $\underset{\sim}{b}$



(i) $\overrightarrow{AB}$ **(1mk)**

(ii) $\overrightarrow{CD}$ **(1mk)**

(b) Given that $\overrightarrow{CM} = k\overrightarrow{CD}$ and $\overrightarrow{AM} = h\overrightarrow{AB}$ determine the values of the scalars **k** and **h** **(5mks)**

(c) Show that **O**,**M** and **N** are collinear. **(3mks)**

19. Three variables p, q and r are such that p varies directly as q and inversely as the square of r.

a.When p = 18, q = 24 and r = 4.
Find p when q = 30 and r = 10. **(4mks)**

b. Express q in terms of p and r. **(1mk)**

c. If p is increased by 20% and r is decreased by 10% find:

i. A simplified expression for the change in q in terms of p and r. **(3mks)**

ii. The percentage change in q. **(3mks)**

20. A circular lawn is surrounded by a path of uniform width of 7m. The area of the path is 21% that of the lawn.

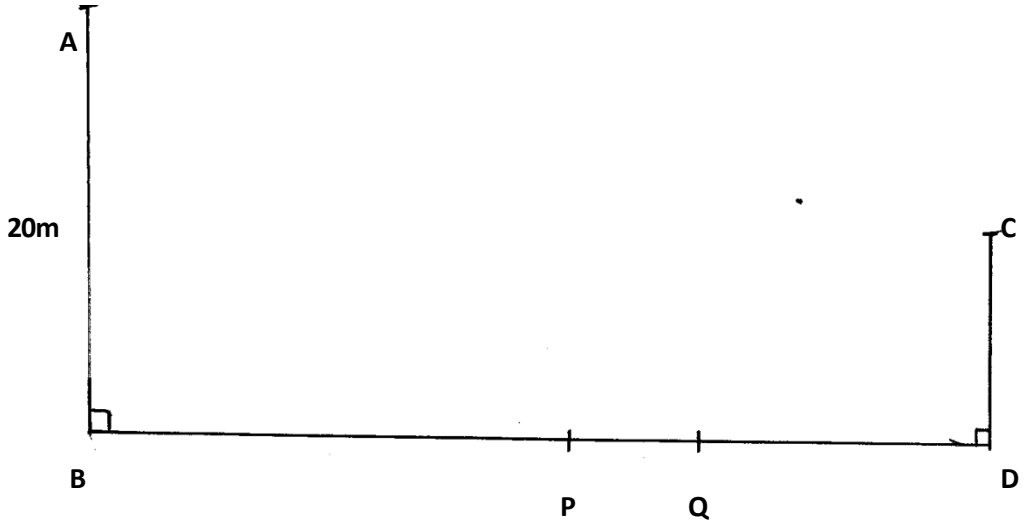
(a) Calculate the radius of the lawn. **(4 mks)**

(b) Given further that the path surrounding the lawn is fenced on both sides by barbed wire on posts at intervals of 10 metres and 11 metres on the inner and outer sides respectively. Calculate the total number of posts required for the fence. **(4 mks)**

(c) Calculate the total cost of the posts if one post costs sh 105. **(2 mks)**

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21. The diagram below represents two vertical watch – towers **AB** and **CD** on a level ground. **P** and **Q**are two points on a straight road **BD**. The height of the tower **AB** is 20m and road **BD** is 200m



(a) A car moves from **B** towards **D**. At point **P,** the angle of depression of the car from points**A** is 11.3°Calculate the distance **BP** to 4 significant figures. **(2mks)**

(b) If the car takes 5 second to move from **P** to **Q** at an average speed of 36km/hr, calculate the angle of depression of **Q** from **A** to 2 decimal places. **(3mks)**

(c) Given that **QC** = 50.9 cm, calculate

(i) The height of **CD** in meters to 2 decimal places; **(2mks)**

(ii) The angle of elevation of **A** from **C** to the nearest degree. **(3mks)**

22. The parents of acertain mixed secondary school decided to buy a school van worth Ksh. 900,000. Each student was to contribute the same amount of money. 50 students were transferred from the school; as a result each f the remaining students had to pay Ksh. 600 more.

(a) Find the original number of the students in the school. **(5mks)**

(b) Find the percentage change in contributions per student. **(3mks)**

(c) If the ratio of boys to girl in the school was 11: 7 find the amount money contributed by boys alone. **(2mks)**

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23. Five members of 'SILK', a self-supporting enterprise Jane, Jepchoge, Esther, Mama Charo and Chepkoech were given a certain amount of money to share amongst themselves. Jane got 3/8 of the total amount while Jepchoge got 2/5 of the remainder. The remaining amount was shared equally among Esther, Mama Charo and Chepkoech each of which received Kshs. 6,000;

a. How much was shared among the five business women? **(3mks)**

b. How much did Jepchoge get? **(2mks)**

c. Jane, Jepchoge and Chepkoech invested their money and earned a profit of Kshs. 12,000. A third of the profit was left to maintain the business and the rest was shared according to their investments. Find how much each got. **(5mks)**

24. Onyango and Juma live 200km apart. One day, Onyango left his house at 7.00am and travelled towards Juma's house at an average speed of 30km/hr. Juma left his house at 7.30am on the same day and travelled towards Onyango's at an average speed of 40km/hr.

(a) Determine:-

i. The time they met. **(2mks)**

ii. The distance from Onyango's house where the two met. **(2mks)**

iii. How far was Onyango from Juma's house when they met? **(2mks)**

(b) The two took 15 minutes at the meeting point and then travelled to Juma's house at an average speed of 20km/hr. Find the time he arrived at Juma's house. **(4mks)**

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FORM THREE HOLIDAYS KEYNOTE
MATHEMATICS PP1 QUESTION PAPER NO: 10

SECTION I (50 Marks)

Answer all the questions in the spaces provided.

1. Without using tables or a calculator evaluate; **(3 mks)**

$$\frac{-24 \div -8 \times 5 - (-30)}{-16 \times 4 \div 2 + (-8)}$$

2. Factorize completely $3x^2 - 2xy - y^2$ **(2 mks)**

3. A Kenyan bank buys and sells foreign currencies as shown below.

Currency	Buying (Ksh)	Selling (Ksh)
1 Hong Kong dollar	9.84	9.87
100 Japanese yen	76.08	76.12

A tourist arrived in Kenya with 100 500 Hong Kong Dollars and changed the whole amount to Kenyan shillings. While in Kenya he spent Ksh. 430 897 and changed the balance to Japanese yen before leaving for Tokyo. Calculate the amount in Japanese Yen that he received. **(3 mks)**

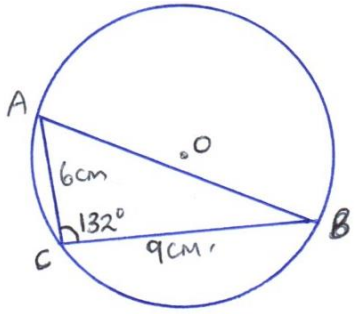
4. Use logarithm tables to evaluate **(4 mks)**

$$\sqrt[3]{\frac{0.7432 \times 80.23}{(4.125)^2}}$$

5. The sides of a triangle were measured to 1 decimal as 6.5cm, 7.4cm and 8.2cm respectively. Calculate the percentage error in its perimeter **(4 mks)**

6. Line L_1 passes through points $A(2,-4)$ and $B(6,-8)$. Find the equation of the line L_2, the perpendicular bisector of AB leaving your answer in the form $ax + by + c = 0$. **(3 mks)**

7. In the figure below, O is the centre of the circle. AC = 6 cm, BC = 9 cm and $\angle ACB = 132°$



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a) Calculate length AB correct to 2 decimal places. **(2 mks)**

b) Calculate the area of the circle. **(2 mks)**

8. Evalute, without using mathematical tables or the calculator, the expression. **(3 mks)**

$$\mathbf{2\log_{10}5-\frac{1}{2}\log_{10}16+2\log_{10}40}$$

9.Rationalize the denominator and leave your answer in surd form. **(3 mks)**

$$\frac{\mathbf{3}}{\mathbf{2\sqrt{5}+\sqrt{2}}}$$

10. Solve the quadratic equation $6a^2 = 5a + 4$ using completing the square method. **(3 mks)**

11. The hire purchase terms of a cupboard is a deposit of Ksh 4,400 and six monthly installments of Ksh 900 each. The hire purchase price is 175% of the cost price while the cash price is 25% more than the cost price Calculate the cash price of the cupboard. **(3 mks)**

12. Construct triangle PQR in which $PQ = QR = 5\ cm$ and $\angle\ PRQ = 35°$. Measure PR. **(3 mks)**

13. **A** and **B** are two matrices. If $\mathbf{A} = \begin{bmatrix}1 & 2\\ 4 & 3\end{bmatrix}$ find B given that $\mathbf{A^2 = A + B}$. **(3 mks)**

14. Make n the subject of the formulae in $A = P\left(1+\frac{r}{100}\right)^n$ **(3 mks)**

15. Solve the following inequality and show your solution on a number line. **(3 mks)**

$4x - 3 \leq \frac{1}{2}(x + 8) < x + 5$

16. The sixth term of an arithmetic progression is 27 and the tenth term is 43. Find the 16^{th} term. **(3 mks)**

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SECTION II (50 Marks)

Answer ONLY five the questions in the spaces provided.

17. Mr. Omwega is employed. His basic salary is Kshs. 21, 750 and is entitled to a house allowance of Kshs 15, 000 and a travelling allowance of Kshs 8, 000 per month. He also claims a family monthly relief of Kshs 1, 056 per month. Other deductions are;

Union dues Kshs 200 and

Co-operative shares Kshs 4, 500 per month.

The table below shows the tax rates for the year.

Income (Kshs per annum)	Tax rates
1 – 116, 600	10%
116, 161 – 225, 600	15%
225, 601 – 335, 040	20%
335, 041 – 444, 480	25%
Over 444, 480	30%

Calculate;

a) Mr. Omwega's annual taxable income. **(2 mks)**

b) The tax paid by Mr. Omwega in the year. **(6 mks)**

c) Mr. Omwega's net income per month. **(2 mks)**

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

$x°$	-90	-75	-60	-45	-30	-15	0	15	30	45	60	75	90
$3\cos 2x°$	-3	-2.6		0	1.5		3	2.6		0	-1.5		-3
$\sin(2x+30°)$	-0.5		-1	-0.87		0	0.5		1		0.5	0	-0.5

b) On the grid provided, draw on the same axes the graph of $y = 3\cos 2x°$ and $y = \mathbf{sin}\ (\mathbf{2}x + \mathbf{30}°)$ for interval $\mathbf{-90° \leq x \leq 90°}$. Take the scale 1 cm represent $15°$ on x – axis and 2 cm represent 1 unit on the y – axis. **(4 mks)**

c) Use the graph in (b) above to solve the equation;

i. $\mathbf{3\cos 2x° = \sin(2x + 30°)}$ **(2 mks)**

ii. $\mathbf{6\cos 2x° + 5 = 0}$ **(2 mks)**

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19. Triangle ABC has coordinates $A\ (-4,1), B\ (-1,2)$ and $C\ (-3,4)$.

a) On the grid provided, draw triangle ABC. **(1 mk)**

b) Triangle $A'B'C'$ is the image of triangle ABC under an enlargement with scale factor -1 about the origin. On the same grid draw triangle $A'B'C'$ and state its coordinates. **(3 mks)**

c) Triangle $A''B''C''$ is the image of triangle $A'B'C'$ under a rotation of $-90°$ about the origin. On the same grid draw triangle $A''B''C''$ and state its coordinates. **(3 mks)**

d) Under a certain translation T, the image of points $A''B''C''$ are mapped onto triangle $A'''B'''C'''$ such that point A'' is mapped onto $A'''(2,3)$.

i. Find the translation T**.** **(1 mk)**

ii. Find the coordinates of the image points B''' and C''' and plot le $A'''B'''C'''$ on the same grid**.** **(2 mks)**

20. A parent has two children whose age difference is 5 years. Twice the sum of the ages of the two children is equal to the age of the parent.

a) Taking x to be the age of the elder child, write an expression for

i. The age of the younger child. **(1 mk)**

ii. The age of the parent **(1 mk)**

b) In twenty years' time, the product of the children's age will be 15 times the age of their parent

i. Form an equation in x and hence determine the present possible ages of the older child**.** **(4 mks)**

ii. Find the present possible ages of the parent**.** **(2 mks)**

iii. Determine the possible ages of the younger child in twenty years' time. **(2 mks)**

21. The masses of 40 students were measured to the nearest kilogram and recorded as shown below.

52	58	54	51	59	53	56	51
43	41	53	58	54	65	58	59
49	63	49	49	47	45	46	52
52	55	52	55	49	57	53	63
42	45	46	48	60	49	48	53

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a) Use this data to complete the table below. **(4 mks)**

Mass in Kg	Class mid point x	Frequency f	fx
$41-45$			
$46-50$	48	10	480
$51-55$			
$56-60$			
$61-65$	63	3	189
		$\sum f = 40$	$\sum fx =$

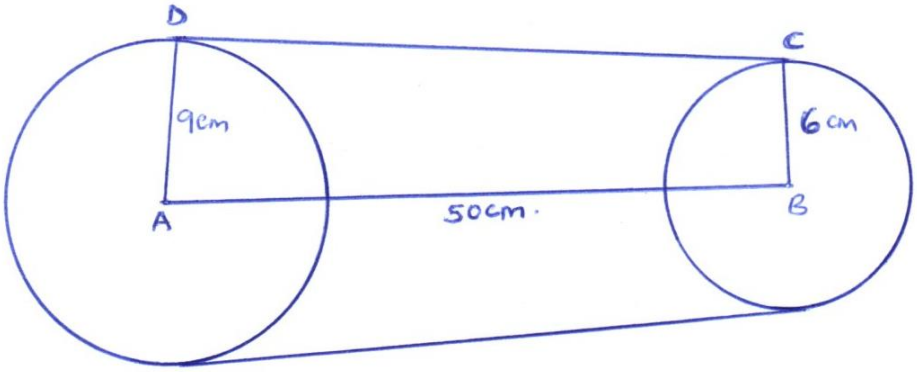
b) Calculate ;

i. The mean mass. **(2 mks)**

ii. The median mass **(2 mks)**

c) Draw a frequency polygon for the distribution. **(2 mks)**

22. The figure below shows two pulleys with centres A and B of radii 9 cm and 6 cm respectively. C and D are contact points of the belt with the pulleys. The distance between the centres of the two pulleys is 50 cm. a belt is tied around the two pulleys as shown.



Calculate,

a) Length DC **(2 mks)**

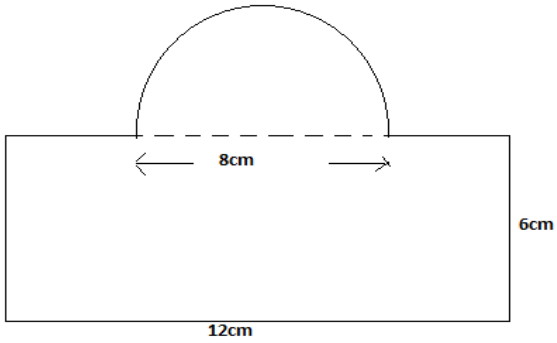
b) The length of arc DE **(3 mks)**

c) The length of arc CF **(3 mks)**

d) The total length of the belt. **(2 mks)**

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23. The figure below shows a rectangle attached to a semi-circle



a) Calculate;

i. the area of the figure **(3mks)**

ii. the perimeter of the figure **(3 mks)**

b) If the figure represents a cross-section of a steel girder of length 9m, determine the volume of the steel girder in cubic centimetres **(2 mks)**

c) If the mass of the steel girder is 306kg, calculate its density in g/cm^3. **(2 mks)**

24. Five towns P,Q, R S and T are situated such that Q is 200 km east of P. R is 300 km from Q on a bearing of 150° from Q. S is 350 km on a bearing of 240° from R. T is 250 km from S and its bearing from P is 160°.

a) Using a scale of 1 cm to represent 50 km, draw a diagram representing the position of the towns. **(5 mks)**

b) From the diagram, determine:

i.The distance in km from P to T**.** **(1 mk)**

ii. The bearing of S from Q. **(1 mk)**

c) A plane heading to town R takes off from town P and flies upward at a constant angle which is less than 90°. After flying a distance of 100 km in the air, it sees a town R at angle of depression of 50°. By scale drawing, find the horizontal distance of the plane from R at this point**.** **(3 mks)**

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