NAME:……..……

SCHOOL:……A.D.M NO:…….

DATE:……CANDIDATE'S SIGNATURE:……

121/1
MATHEMATICS
PAPER 1
TERM TWO
Time $2^1/_2$ Hours
FORM THREE

(KENYA CERTIFICATE OF SECONDARY EDUCATION)
FORM THREE
MATHEMATICS P1

INSTRUCTIONS TO CANDIDATES:

1. *Write **your name**school,**admission number and stream** in the spaces provided above.*
2. *Sign and write the date in the spaces provided above*
3. *This paper contains **two sections**; Section **I** and section **II**.*
4. *Answer **all** the questions in section **I** and any **five** questions from section **II**.*
5. *All workings and answers **must** be written on the question paper in the spaces provided below each question.*
6. *Show all steps in your calculations giving your answers at each stage in the spaces below each question.*
7. *Non-programmable electronic calculator and KNEC mathematical tables may be used, except where stated otherwise*

For Examiner's Use Only;
Section I

Questions	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	**TOTAL**
Marks																	

Section II

Questions	17	18	19	20	21	22	23	24	**TOTAL**
Marks									

GRAND TOTAL

SECTION I (50 MARKS)

1. Use logarithmic tables to evaluate (3mrks)

$$\sqrt[3]{\frac{326.7x0.0589}{30.6x0.2471}}$$

2. Solve the simultaneous linear equations (3mrks)

$3x - 5y = 21$

$7x - 3y = 23$

3. Solve the equation (3mks)

$2x^2 + 4x - 8 = 0$

By completing the square method

4. A Kenyan bank buys and sells foreign currency as shown below: (3mks)

	Buying in (KES)	Selling (in KES)
1 Hong Kong Dollar	9.70	9.78
1 S.A Rand	12.03	12.15

A tourist arrives in Kenya with 280,000 Hong Kong dollars and changed the whole amount to KES. He spent KES 835,210 and exchanged the balance to S.A Rand before leaving. Calculate the amount in S.A Rand that she was left with. (3mrks)

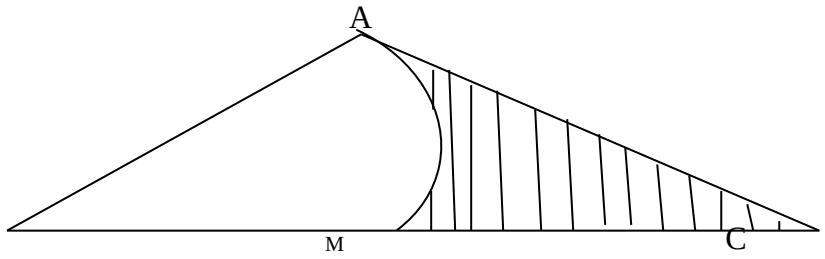
5. P (2,-1) and Q (6, 3) are points on a line. If R is the midpoint of PQ, find the:

a. Coordinates of R (1mk)

b. Equation of the line through R perpendicular to PQ (2mrks)

6. In the triangle ABC below, AB = 6cm, BC = 10cm and angle ABC = $42^{0.}$

AM is an arc of a circle, circle B. Take = 3.142



Calculate the area of:

a) Triangle ABC (1mrk)

b) The shaded portion of the ABC (3mrk)

7. Given that S = 14.6cm and t = 5.68cm determine the percentage error in the product of

S t (3mrk)

8. Solve for x in the logarithmic equation $\log_{10}(3x + 4) = \log_{10}(3 - x) + 1$

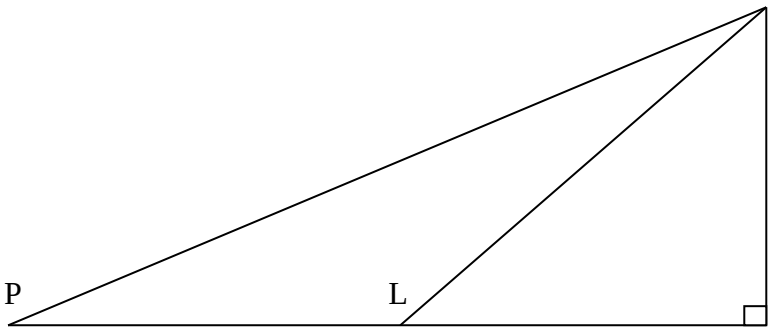
(3mrks)

9. A man left Ksh 1,865, 280 in his will to be shared between his spouse, daughter and son in the ratio 1:2:3. His spouse decided to divide her share equally between her daughter and son. Determine how much finally the son got. (3mks)

10. A boy can dig a piece of land in three and a half hours while a girl can dig the same piece of land in five hours. How long would they take to dig the land if they worked together (3mks)

11. In a triangle UVW, (not drawn to scale) VW = 14cm, UW = 10cm and UV = 20cm.
Find the largest angle and hence determine its size. (3mks)

12. The angle elevation of the top of a tower is $35^0$from a point P and is 54^0 from another point L, 3metres nearer the foot of the tower which lies on the line PL and at the same level with P and L. Calculate the height of the tower. (4mks)

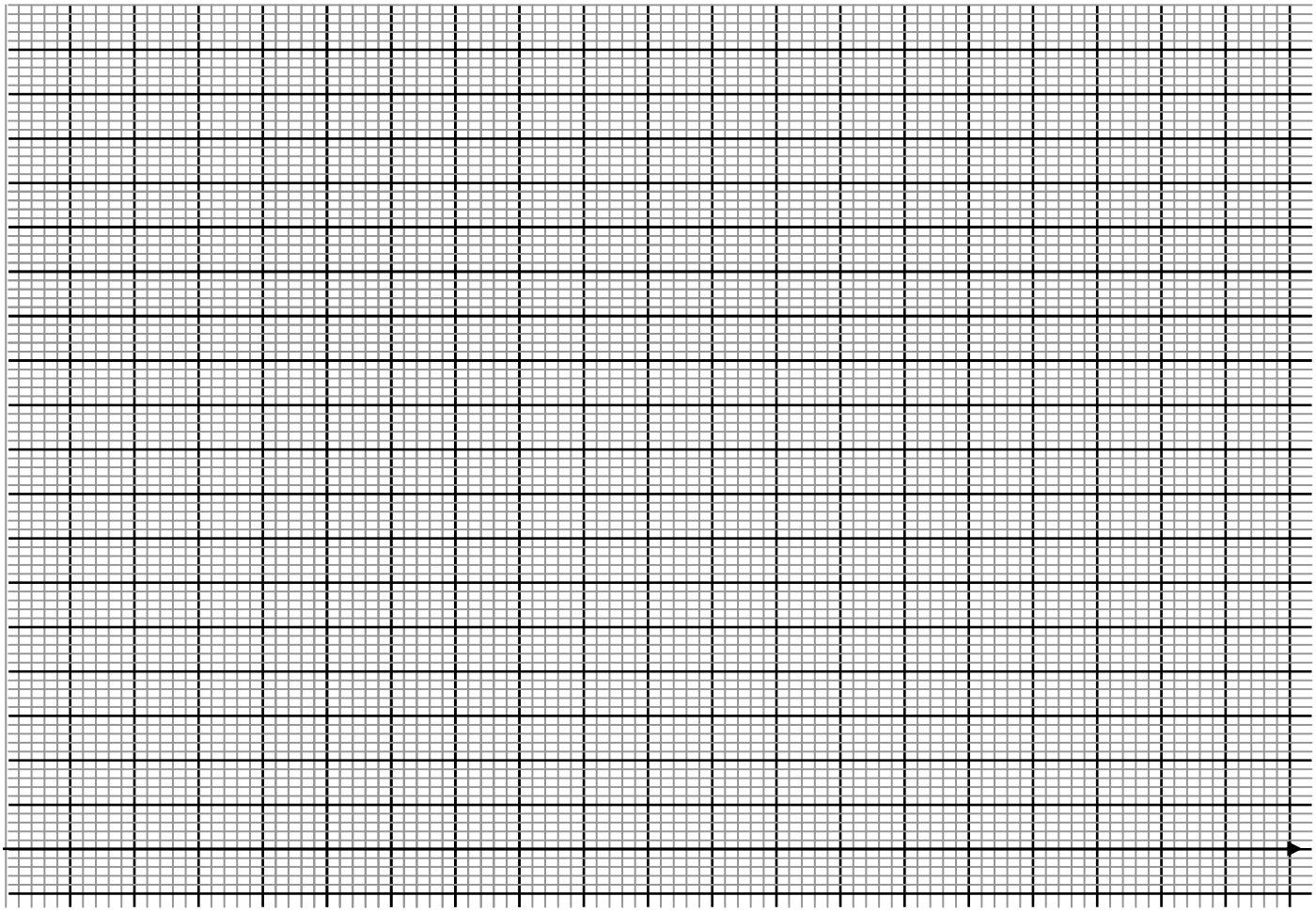


13. On the grid below, identify the region that satisfies the linear equalities and calculate its area.

X + 2y = 10

4x + 3y = 24

y



14. Express $\frac{7+2}{5-\sqrt{2}}$ in the form of $a + b\sqrt{2}$ .where a and b are integers (3mks)

15. Given that the position vectors of points A and B are $\underset{\sim}{a} = \begin{pmatrix}4\\5\end{pmatrix}$ and $\underset{\sim}{b} = \begin{pmatrix}5\\-4\end{pmatrix}$ respectively find:

a) $\underset{\sim}{BA}$ (1mks)

b) $\overline{BA}$ (2mrks)

16. Without using a calculator, evaluate: (3mks)

$\frac{3}{4} + 1\frac{5}{7} \div \frac{4}{7}$ of $2\frac{1}{3}$

$(1\frac{3}{7} - \frac{5}{8}) \times \frac{2}{3}$

SECTION II (50 MARKS)

ANSWER ONLY FIVE QUESTIONS.

17. (a)Without using a protractor, construct triangle ABC, such that BC = 10cm, angle ABC = 60^0 and angle BCA = 45^0 (let BC be the base) (4mks)

(b)Construct the perpendicular bisector of lines BC on the above diagram. Draw the circumference of triangle ABC. (3mks)

c) Find the radius of the circumference hence determine the area of the circle drawn. (3mks)

18. The speeds of a number of vehicles passing a 50kph limit sign were found to be as follows:

Speed in kph	40 - 44	45 - 49	50 - 54	55 - 54	55 - 59	60 - 64	65 -69
No. of vehicle	28	40	65	47	38	38	32

(a) Calculate the mean speed in kph of the above distribution (4mks)

(b) Calculate the medium speed of the distribution (2mks)

(c) Draw a histogram to illustrate the information.

1cm to represent 5 units on the x- axis

1cm to represent 10 units on the y - axis (4mks)

19.Mesurements of a maize field using a base line XY were recorded as shown below in a field book as follows: (take XY = 400cm)

			Y			
			360	80	to	Q
To	R	80	280			
To	S	160	200			
			80	200	to	P
			x			

(a) Use a scale of 1cm to 40m to draw the map of the maize field. (5mks)

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

20.The table below shows some values of fractions y = 2sin x and y = 1 + cos x for the domain $0^0 \leq x \leq 240^0$

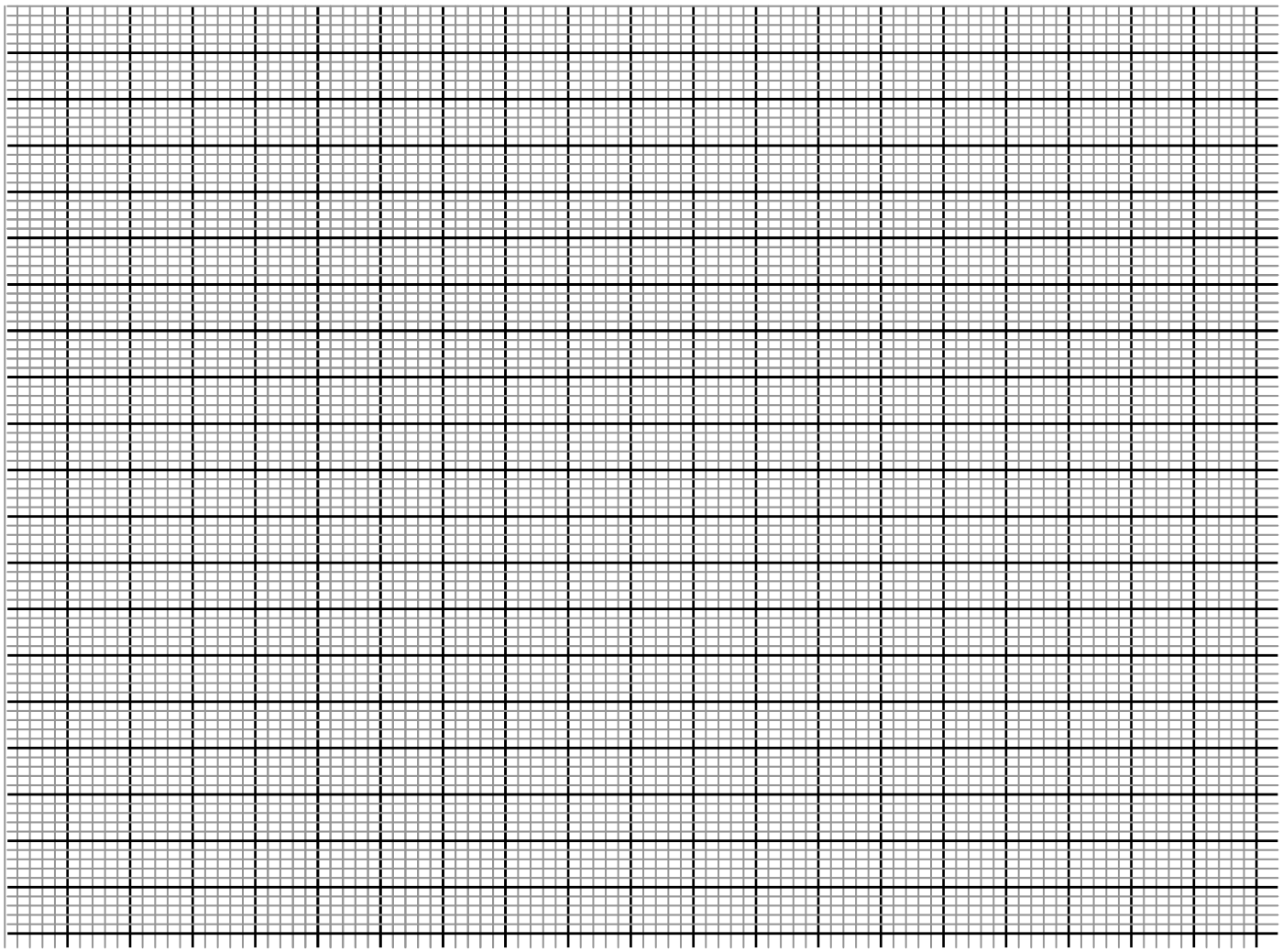
X0	00	300	600	900	1200	1500	1800	210	240
2sinx0	0		0.87	0		-0.84	0		
	2		1.5	1		0.13	0		

(a)Complete the table above (2mrk)

(b) Draw the Graph of the functions y = 2 sin x and y = 1 + cos x for the values of $0^0 = x = 240$ using the scale

1cm to represent 30 units on the x- axis

2cm to represent 1 unit on the y – axis



(c)

Find the values of x for which

(i) Sin x = 0.5 (2mrks)

(ii) Sin x – ½ cos x = 0.5 (2 mrks)

21.Four towns X, Y, Z and W one such that W is on a bearing of 545^0 W From X. Y is in the direction of 170^0 from W and X is 150km from Y in the direction 035^0, Z is 40km for Y in the direction 125^0

a) Use scale drawing (1cm = 20km) to represent the four towns (3mrks)

(b) Determine the distance of:

(i) (i) W from X (2mks)

(ii) X and Z and the bearing of X from Z (3mks)

(iii)Z from W (2mrks)

22. The table below shows some values of the function $y = 2x^2 - 7x - 1$ for $-1 \leq x \leq 5$

X	-1	0	1	2	3	4	5
Y		-1		-7		3	

(Take $\prod$ =3.142)

a) Complete the table above by filling in the missing values of y (2mks)

b) Draw the graph of the function $y = 2x^2 - 7x - 1$ for $-1 \leq x \leq 5$ by using
the scale 2cm to represent 1 unit on the X-axis.
2cm to represent 5 units on the Y – axis (4mks)

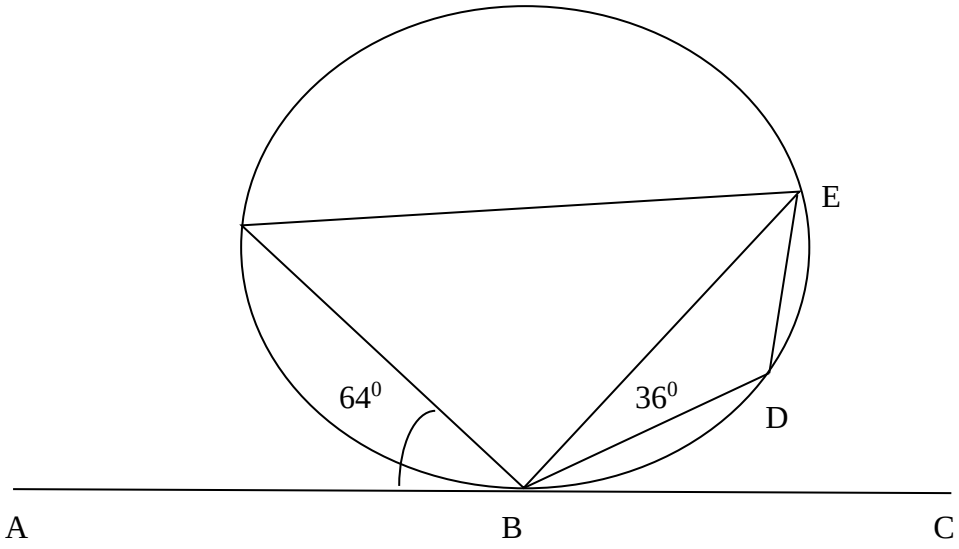
c) By drawing suitable straight lines on the same axes, find the approximate roots of the following equations?

(i) $2x^2 - 7x - 1 = 0$ (2mrks)

(ii) $2x^2 - 4x + 3 = 0$ (2mrks)

23. in the figure below ABC is a tangent to the circle at B. angle ABF = 640 and angle DBE = 360. Triangle BEF is an isosceles triangle with sides BE = EF

F F



Calculate the size of the following angles giving a reason in each case:

(a) Angle BEF (2mks)

(b) Angle FBE (2mks)

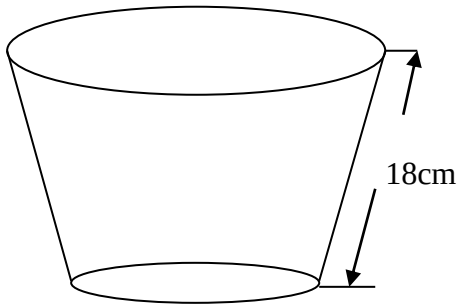
(c) Angle DBC (2mks)

(d) Angle BDE (2mks)

(e) Angle BED (2mks)

24. The diagram below shows a frustum made by cutting off a small cone on a plane parallel to the base of the original one. The frustum represent a bucket with the open end diameter of 36cm and diameter of the bottom 24cm. the bucket is 18cm deep as shown

(Take $\pi = {}^{22}/_{7}$)



Calculate the:

(a) Volume of the small cone cut off. (3mks)

(b) Volume of the original cone (2mks)

(c) The capacity of the bucket in liters (2mk)

NAME:……A.D.M NO:……..

SCHOOL:…….. CLASS……..

DATE:……SIGNATURE:……

121/2

MATHEMATICS

PAPER 2

TERM II

TIME $2^1/_2$ HOURS

FORM THREE

THE DIGITAL PROVE NATIONAL EXAMINATION COUNCIL- 2017

(KENYA CERTIFICATE OF SECONDARY EDUCATION)

FORM THREE

MATHEMATICS P2

INSTRUCTIONS TO CANDIDATES:

1. *Write **your name,admission number, school and class** at the top of thispaper*
2. *The paper contains **two sections**; Section **I** and section **II**.*
3. *Answer **all** the questions in section **I** and only **five** questions from section **II**inthe spaces provided.*
4. *Non programmable Solent electronic calculators and KNEC mathematical tables may be used where necessary.*

For Examiner's Use Only;

Section I

Questions	1	2	3	4	5	6	7	8	9	10	11	12	1	14	15	16	**TOTAL**

													3				
Marks																	

Section II

Questions	17	18	19	20	21	22	23	24	TOTAL	GRAND TOTAL	
Marks											

TEACHERS COMMENT TO;DIGITAL PROVE INVESTMENT CO. TEL 0716052864 NRB KENYA

SECTION I (50 MARKS)

Answer all questions from this section

1. . Without using a calculator or mathematical tables, work out: (4mks)

$$\sqrt[4]{\frac{2(16) \times 2^2 \times 0.05}{6.25}}$$

2. Solve for X and y in:

   $\mathbf{5^{2x-y} = 125}$

   $\mathbf{9^x \div 81^y = 1}$ (3mks)

3. Two similar containers have masses 768kg and 324kg respectively. If the surface of the smaller container has the surface area of 2,430cm^2, what is the area of the corresponding surface of the lager container (3mks)

4. Buluma spend $^3/_8$ of his salary on food and a $^1/_5$ of the remainder on electricity and water bills. He paid fees with $25^0/_0$ of his salary and invested 10% of what is left on business. After making his

payment on a post paid Safaricom on which he spend Ksh1, 800, he saved Ksh 4,500. Calculate his total monthly earnings(4mks)

5. The cost price of 31 inch flat LG TV screen is Ksh 36,500. Mary bought a screen on hire purchase price by paying a deposit of Ksh 12,000 and 15 monthly installments of Ksh 2050 each. Calculate the monthly rate of interest she was charged. Give your answer to 2 decimal places. (4mks)

6. Expand and hence simplify the expression

$$\frac{9y^2 - 16x^2}{16x^2 - 9y^2}$$

(3mks)

7. Express the following in surd form and simplify by rationalizing the denominator.

$$\frac{1}{1 - \cos 45^0}$$

(3mks)

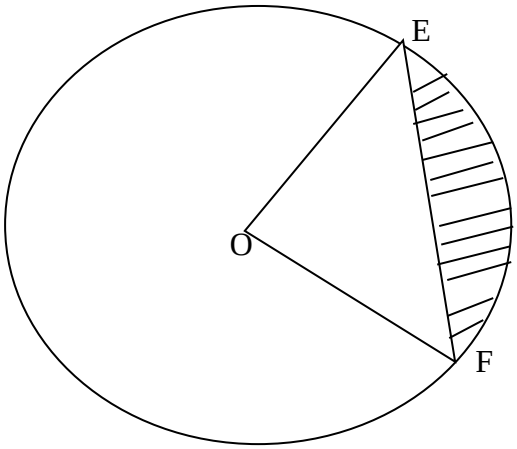
8. Solve the simultaneous equalities and state the integral values of :

   $5x - 4 \leq 5 + 2x$

   $-9 - 3x < x + 3$ (3mks)

9. The volume (v) of an inflated balloon varies as the cube of the diameter (d). The volume is $14.23cm^3$ when its diameter is 3.5 cm. what is the volume of the balloon when its diameter is 4.5cm? (3mrks)

10. The figure below shows a circle centre O, radius 8.4cm. The chord EF = 12.5cm. calculate the area of the unshaded region. (3mrks)



11. In June 2009, a cleaner salary was Ksh 15,300. Given that the company increases the cleaner's money by ksh 800 every month of May since. What was the cleaner's salary in May 2014? (3mks)

12. Make **g** the subject of the formular: (3mrks)

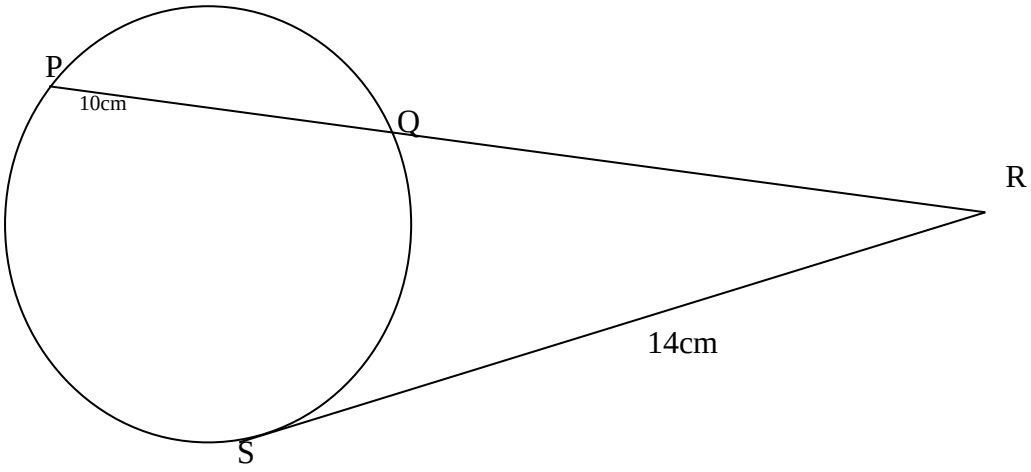
$P = \frac{fh^2}{2} + fge$

13. Use the matrix method to solve the simultaneous equations:

$5 = y - 3x$

$4y + 2x = 7$ (3mrks)

14. In the diagram below ; PQ = 10cm and RS = 14cm. find the length of QR (3mrks)



15. Use table of square roots and reciprocals only to evaluate.

(3mrks)

$$\frac{\frac{2}{\sqrt{0.3746}} + \frac{3}{5085}}{}$$

16. Solve for x in the equation

$\text{Log}_3 128 = X$ (3mrks)

SECTION II (50 marks)

Answer only five question from this section in the spaces provided.

17. The table below shows income tax rates in Kenya in a certain year

Total income per month	Rate in shillings per Kenyan pound
1– 325	2
326 – 650	3
651 – 975	4
976 - 1300	5
1301 – 1625	7
Over 1625	7.5

Mr. King'ori earned a basic salary of ksh13, 120 and a house allowance of ksh3, 000 per month. He claimed a tax relief from a married person of ksh455 per month

a) Calculate :

(i) The tax payable without relief (4mrks)

(ii) The tax paid after relief (2mrks)

b) A part from the income tax, the following month deductions are made; a service charge of ksh 100, a health Insurance fund of ksh and 2% of his basic salary as widow and children pension scheme.

Calculate:

(i) The total monthly deductions made from King'ori's income (2mrks)

(ii) Mr. King'ori's net income from his employment (2mrks)

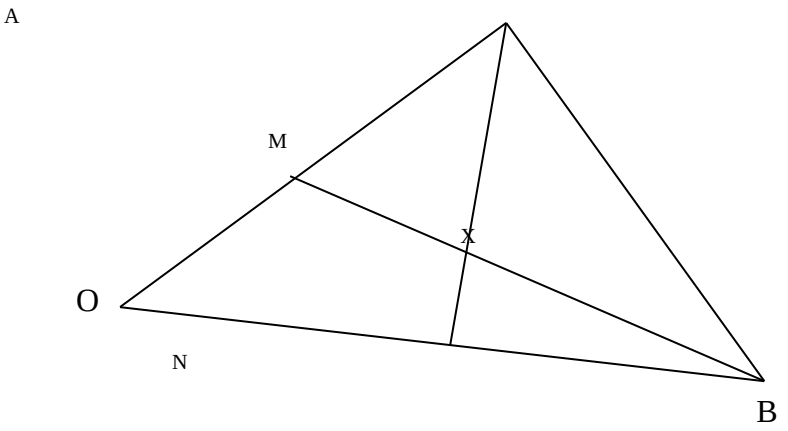
18. A trailer 30m long moving at an average speed of 60km/hr started from station A towards station B at 4.00am ,a bus moving at an average speed of 90km/hr and 20m long started also travelling from A towards B . find:

a) The time the bus caught up with the trailer (4mrks)

b) The time in seconds the bus took to pass the trailer completely (4mrk)

c) How far from A did the bus completely overtake the trailer (4mrk)

19. The figure below shows triangle OAB in which M divides OA in the ratio 2:3 and N divides OB in the ratio 4:1, AN and BM intersect at X



a) Given that $\overrightarrow{OA} = \underset{\sim}{\mathbf{a}}$ and $OB = \underset{\sim}{b}$, express in terms of $\underset{\sim}{\mathbf{a}}$ and $\underset{\sim}{\mathbf{b}}$:

(i) $\overrightarrow{AN}$ (1mrk)

(ii) $\overrightarrow{BM}$ (1mrk)

b) If $\overrightarrow{AX} = s\overrightarrow{AN}$ and $\overrightarrow{BX} = t\overrightarrow{BM}$, where **s** and **t** are constants, write an expression for OX in terms of $\underset{\sim}{\mathbf{a}}, \underset{\sim}{\mathbf{b}}$, **s** and t (2mrks)

c) Find the values of **s** (2mrks)

d) Hence write $\overrightarrow{OX}$ in terms of $\underset{\sim}{\mathbf{a}}$ and $\underset{\sim}{\mathbf{b}}$ (2mrks)

20. Using a ruler and a pair of compasses only, construct a triangle QRS in which angle QRS = $37^{1}/_{2}^{0}$, RS = 7cm and RQ = 6cm. Drop a perpendicular from Q to RS = to meet RS at T. measure QT, hence calculate the area of the triangle QRS. (10mrks)

21.

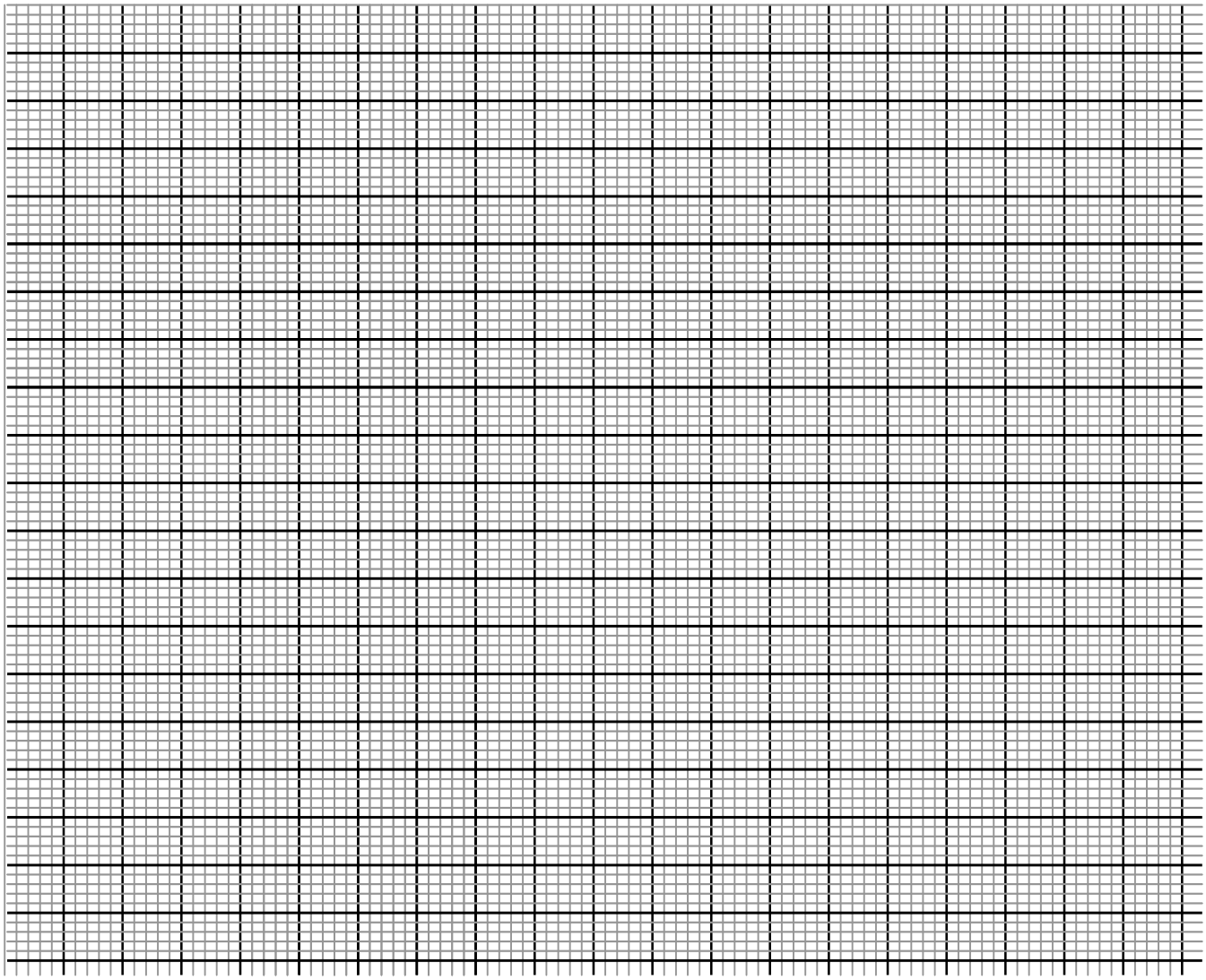
a) Complete the table below by filling in the blank spaces for the function

$y = -x + x^2 - 6$. (2mrk)

x	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
y	24	14			-4	-6			0	6	14	24

b) On the grid provided draw a graph of $\mathbf{y = -x + x^2 - 6}$ with the domain

$-5 = x = 6$. (3mrks)



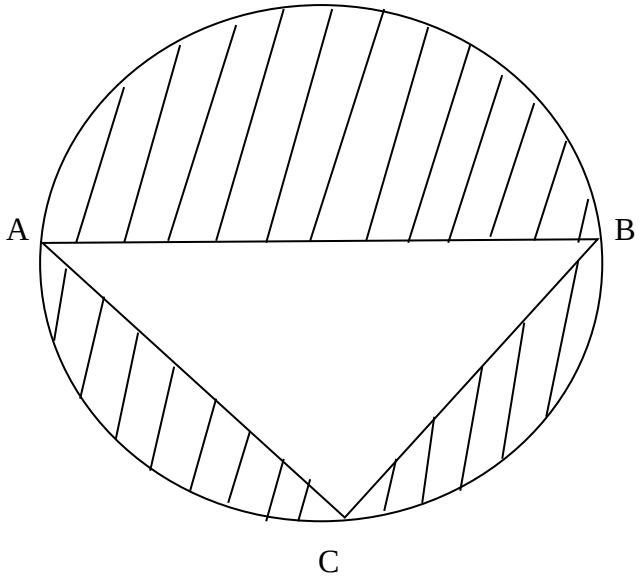
c) From the graph find the values of x which satisfies the expressions

(i) $-x + x^2 - 6 = 0$ (2mrks)

(ii) $-x + x^2 - 6 = 5$ (3mrks)

22. The figure below shows triangle ABC inscribed in a circle. AB = 6 cm, BC = 9cm

and AC = 10cm.



Calculate:

a) The radius of the circle (6mrks)

b) The area of the shaded parts (4mrks)

23.

a) Express as single fraction in its simplest form $\frac{200}{x} - \frac{200}{x-4}$ (2mrks)

b) When driven into a town a car travels **x** km on each litter of petrol.

i)Find in terms of x, the number of litters of petrol used when the car is driven 200km in town. (1mrk)

ii)When driven out of town the car travels (x +4) km on each litre of petrol. It uses 5 litres less petrol to cover 200km out of town to cover same distance in town. Use this information to write down an equation involving x, and show if simplified to

$x^2 + 4x - 160 = 0$ (3mrks)

c) Solve the equation $x^2 + 4x - 160 = 0$ (3mrks)

d) Calculate the volume of petrol when the car is driven 40km in town (1mrk)

24. The 4^{th} , 5^{th}, and 6^{th} terms of a geometrical series are $9x^2$, $27x^3$, $81x^4$ respectively. Determine :

a) The common ratio (2mrks)

b) The first three terms (3mrks)

c) The sum of the first ten terms (3mrks)

d) The ratio of the first term to the fifth term (2mrks)