002055101

Name .... Index Number .... /..................

121/1
MATHEMATICS ALT. A
Paper 1
Oct./Nov. 2014
2½ hours

Candidate's Signature ....

Date ....

THE KENYA NATIONAL EXAMINATIONS COUNCIL
Kenya Certificate of Secondary Education
MATHEMATICS ALT A
Paper 1
2½ hours

Instructions to candidates

(a) Write your name and index number in the spaces provided above.
(b) Sign and write the date of the examination in the spaces provided above.
(c) This paper consists of ***two*** *sections:* ***Section I*** *and* ***Section II****.*
(d) Answer ***all*** *the questions in* ***Section I*** *and only* ***five*** *questions from* ***Section II****.*
(e) Show all the steps in your calculations, giving your answers at each stage in the spaces provided below each question.
(f) Marks may be given for correct working even if the answer is wrong.
(g) ***Non-programmable*** *silent electronic calculators* ***and*** *KNEC Mathematical tables may be used, except where stated otherwise.*
(h) This paper consists of 20 printed pages.
(i) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.
(j) Candidates should answer the questions in English.

For Examiner's Use Only

Section I

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

Section II

17	18	19	20	21	22	23	24	Total

Grand Total	

SECTION I (50 marks)

Answer ***all*** *the questions in this section in the spaces provided,*

1. Ntutu had cows, sheep and goats in his farm. The number of cows was 32 and number of sheep
was twelve times the number of cows. The number of goats was 1344 more than the

number of sheep. If he sold $^{1}/_{3}$ of the goats, find the number of goats that remained. (4 marks)

2. Use the prime factors of 1764 and 2744 to evaluate

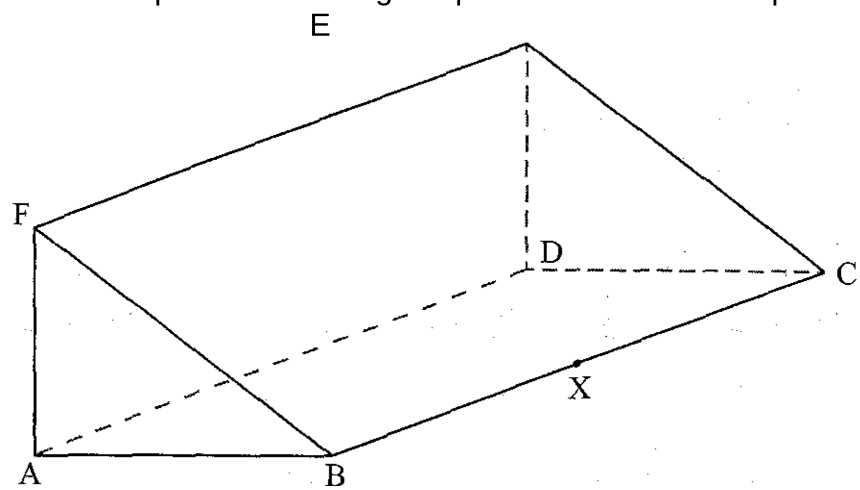
$$\frac{\sqrt{1764}}{\sqrt[3]{2744}}$$

(3 marks)

3. The mass of a solid cone of radius 14cm and height 18cm is 4.62 kg. Find its density in g/cm^3.

(3 marks)

4. The figure below represents a triangular prism ABCDEK X is a point on BC.



(a) Draw a net of the prism. (2 marks)

(b) Find the distance DX. (1 **mark)**

5. A businessman makes a profit of 20% when he sells a carpet for Ksh 36 000. In a trade fair he sold one such carpet for Ksh 33 600. Calculate the percentage profit made on the sale of the carpet during the trade fair. (3 marks)

6. Simplify

$$\frac{243^{\frac{-2}{5}} \times 125^{\frac{2}{3}}}{9^{\frac{-3}{2}}}$$

7. The area of a sector of a circle, radius 2.1 cm, is 2.31 cm^2. The arc of the sector subtends an angle 0, at the centre of the circle. Find the value of 6 in radians correct to 2 decimal places. (2 marks)

8. Expand and simplify $(x + 2y)^2 - (2y - 3)^2$. (2 marks)

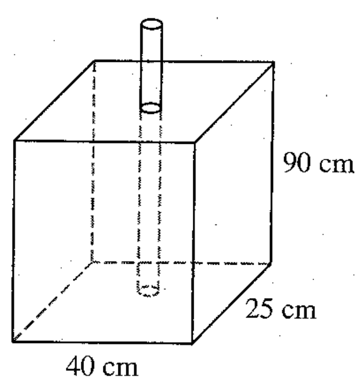
9. A plane leaves an airstrip L and flies on a bearing of 040° to airstrip M 500m away, The plane then flies on a bearing of 316^0 to airstrip N The bearing of N from L is 350^0 .By Scale drawing, determine the distance between airstrips M and N
(4 marks)

10. The sum of interior angles of a regular polygon is 1800°. Find the size of each exterior angle. (3 marks)

11. A cow is 4 years 8 months older than a heifer. The product of their ages is 8 years. Determine the age of the cow and that of the heifer. (4 marks)

12. Solve $4 \leq 3x - 2 < 9 + x$ hence list the integral values that satisfies the inequality. (3 marks)

13. The figure below shows a rectangular container of dimensions 40cm by 25cm by 90cm. A cylindrical pipe of radius 7.5 cm is fitted in the container as shown.



Water is poured into the container in the space outside the pipe such that the water level is 80% the height of the container. Calculate the amount of water, in litres, in the container correct to 3 significant figures. (4 marks)

14. A minor arc of a circle subtends an angle of 105° at the centre of the circle. If the radius of the circle is 8.4cm, find the length of the major arc. (Take TT = $^{22}/_{7}$) (3 marks)

15. Twenty five machines working at a rate of 9 hours per day can complete a job in 16 days.
A contractor intends to complete the job in 10 days using similar machines working at a rate of 12 hours per day. Find the number of machines the contractor requires to complete the job.
(3 marks)

16. Points A (-2, 2) and B(- 3, 7) are mapped onto A'(4, - 10) and B'(0, 10) by an enlargement. Find the scale factor of the enlargement.
(3 marks)

SECTION II (50 marks)

Answer only five questions in this section in the spaces provided

17. A line L passes through points (- 2, 3) and (- I, 6) and is perpendicular to a line P at (— 1, 6).

(a) Find the equation of L. (2 marks)

(b) Find the equation of P in the form $ax + by = c$, where a, b and c are constants. (2 marks)

(c) Given that another line Q is parallel to L and passes through point (1,2), find the x and y intercepts of Q. (3 marks)

(d) Find the point of intersection of lines P and Q. (3 marks)

18 The lengths, in cm, of pencils used by pupils in a standard one class on a certain day woe recorded as follows.

3	7	9	9	20	14	10	6	8	13
14	3	17	13	8	12	5	15	14	15
7	12	11	6	10	19	9	14	6	9
10	16	13	9	12	11	10	7	10	11

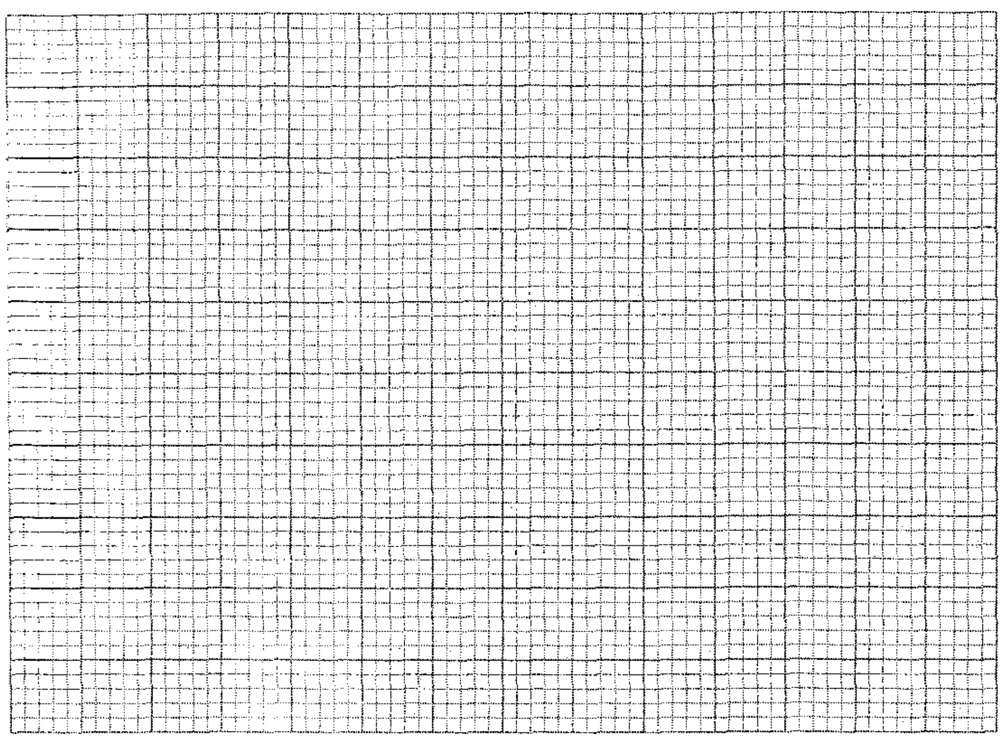
(a) Using a class width of 3, and starting with the shortest length of the pencils, make a frequency distribution table for the data. (2 marks)

(b) Calculate:

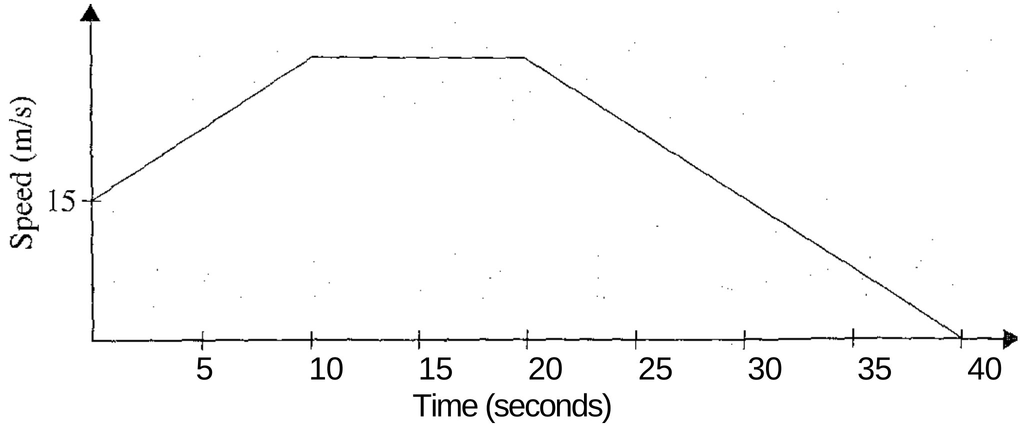
(i) the mean length of the pencils; (3 marks)

(ii) the percentage of pencils that were longer than 8 cm but shorter than 15 cm. (2 marks)

(c) On the grid provided, draw a frequency polygon for the data. (3 marks)



19 The figure below represents a speed time graph for a cheetah which covered 825 m in 40 seconds.



(a) State the speed of the cheetah when recording of its motion started. (1 mark)

(b) Calculate the maximum speed attained by the cheetah. (3 marks)

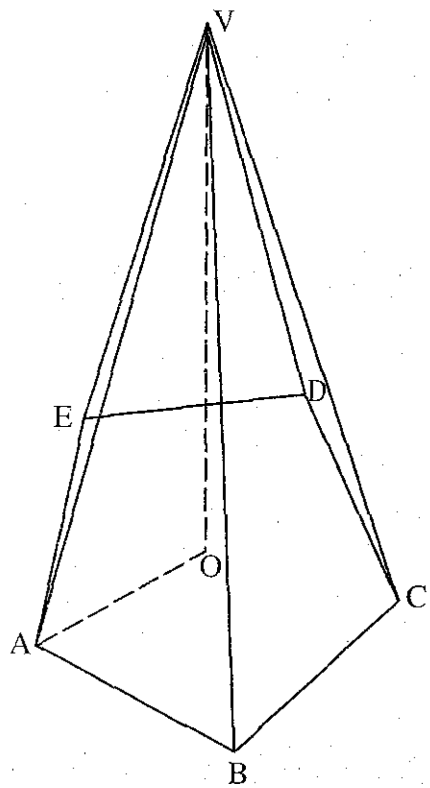
(c) Calculate the acceleration of the cheetah in:

(i) the first 10 seconds; (2 marks)

(ii) the last 20 seconds. (1 mark)

(d) Calculate the average speed of the cheetah in the first 20 seconds. (3 marks)

20 . The figure below shows a right pyramid VABCDE. The base ABCDE is a regular pentagon, AO = 15 cm and VO = 36cm.



Calculate:

(a) the area of the base correct to 2 decimal places; (3 marks)

(b) the length AV; (1 mark)

(c) the surface area of the pyramid correct to 2 decimal places; (4 marks)

(d) the volume of the pyramid correct to 4 significant figures. (2 marks)

21. (a) Complete the table below for the function $y= x^2 — 3x + 6$ in the range $-2 \leq x \leq 8$. (2 marks)

X	-2	- 1	0	1	2	3	4	5	6	7	8
v											

(b) Use the trapezium rule with 10 strips to estimate the area bounded by the curve, $y = x^2 — 3x + 6$, the lines $x= -2$, $x =8$, and the x-axis. (3 marks)

(c) Use the mid-ordinate rule with 5 strips to estimate the area bounded by the curve,
$y = x^2 - 3x + 6$, the lines $x = -2$, $x = 8$ and the x-axis.
(2.marks)

(d) By integration, determine the actual area bounded by the curve $y = x^2 - 3x + 6$,
the lines $x = -2$, ,$x = 8$, and the x-axis. (3 mark)

22. Using a pair of compasses and ruler only, construct:

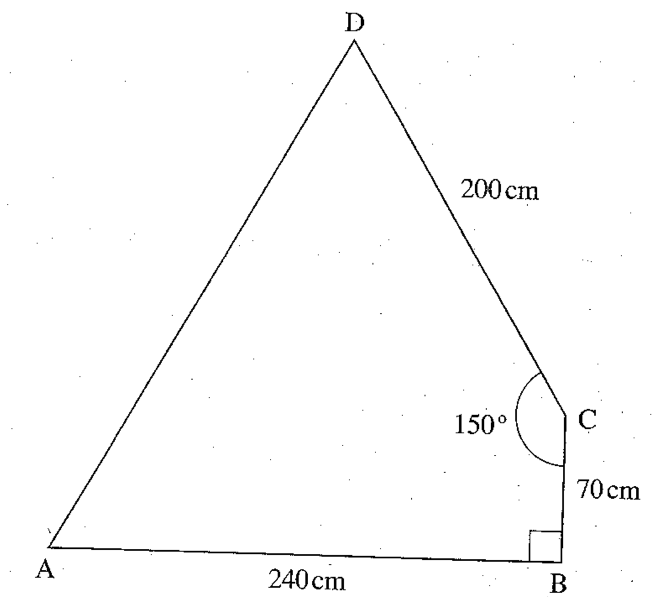
(i) triangle ABC in which AB = 5cm, ^BAC - 30°and Z.ABC - 105°; (3 marks)

(ii) a circle that passes through the vertices of the triangle ABC. Measure the radius.
(3 marks)

(iii) the height of triangle ABC with AB as the base. Measure the height. (2 marks)

(b) Determine the area of the circle that lies outside the triangle correct to 2 decimal places. (2 marks)

23. The figure below represents a piece of land in the shape of a quadrilateral in which
AB = 240m, BC = 70 m, CD - 200m, <.BCD = 150° and <LABC = 90°.



Calculate
(a) the size of <BAC correct to 2 decimal places; : (2 marks)

(b) the length AD correct to one decimal place; (4 marks)

(c) the area of the piece of land, in hectares, correct to 2 decimal places. (4 marks)

24 The equation of a curve is given by $y = x^3 - 4x^2 - 3x$.

(a) Find the value of y when $x = -1$ (1 mark)

(b) Determine the stationary points of the curve. (5 marks)

(c) Find the equation of the normal to the curve at $x = 1$. (4 marks)

Name .... Index Number .... / ....

121/2
MATHEMATICS ALT A
Paper 2
Oct./Nov. 2014
2½ hours

Candidate's Signature ....

Date ....

THE KENYA NATIONAL EXAMINATIONS COUNCIL

Kenya Certificate of Secondary Education

MATHEMATICS ALT A

Paper 2

2½ hours

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Grand Total	

SECTION I (50 marks)

*Answer **all** the questions in this section in the spaces provided.*

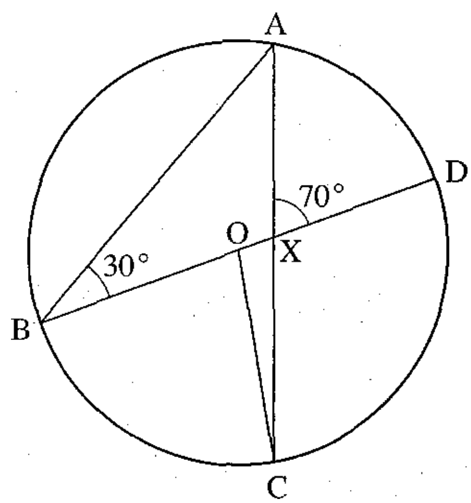
1. The lengths of two similar iron bars were given as 12.5 m and 9.23 m. calculate the maximum possible difference in length between the two bars. (3 marks)

2. The first term of an arithmetic sequence is —7 and the common difference is 3.

   (a) List the first six terms of the sequence; (1 mark)

   (b) Determine the sum of the first 50 terms of the sequence. (2 marks)

3. In the figure below, BOD is the diameter of the circle centre O. Angle ABD = 30° and angle AXD - 70°.



Determine the size of:

(a) reflex angle BOC; (2 marks)

(b) angle AGO. (1 mark)

4. Three quantities L, M and N are such that L varies directly as M and inversely as the square of N. Given that L = 2 when M = 12 and N = 6, determine the equation connecting the three quantities.

   (3 marks)

5. The table below shows the frequency distribution of marks scored by students in a test.

Marks	**Frequency**
1-10	2
11-20	4
21-30	11
31-40	5
41-50	3

Determine the median mark correct to 2 s.f. (4 marks)

6. Determine the amplitude and period of the function y = 2 cos (3x- 45)°. (2 marks)

7. In a transformation, an object with an area of 5 cm^2 is mapped onto an image whose area is
30cm^2. Given that the matrix of the transformation is

$$\begin{pmatrix} x & x-1 \\ 2 & 4 \end{pmatrix},$$

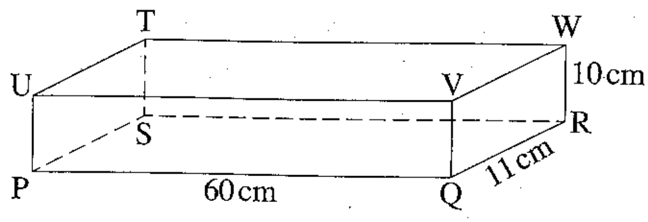
find the value of *x.* (3 marks)

8. Expand $(3 - x)^7$ *up* to the term containing x^4. Hence find the approximate value of $(2.8)^7$.
(3 marks)

9. Solve the equation;
$$2 \log 15 - \log x = \log 5 + \log (x - 4).$$ (4 marks)

10. The figure below represents a cuboid PQRSTUVW.

PQ = 60cm, QR =11 cm and RW =10cm.



Calculate the angle between line PW and plane PQRS, correct to 2 decimal places.

(3 marks)

11.. Solve the simultaneous equations;

3.x - y =9

x^2 -xy =4 (4 marks)

12. Muga bought a plot of land for Ksh 280 000. After 4 years, the value of the plot was
Ksh 495 000. Determine the rate of appreciation, per annum, correct to one decimal place.

(3 marks)

13. The shortest distance between two points A (40 °N, 20 °W) and B (θ°S, 20 °W) on the surface of the earth is 8008km. Given that the radius of the earth is 6370km, determine the position of B.
(Take $\kappa = {}^{22}/_{7}$). (3 marks)

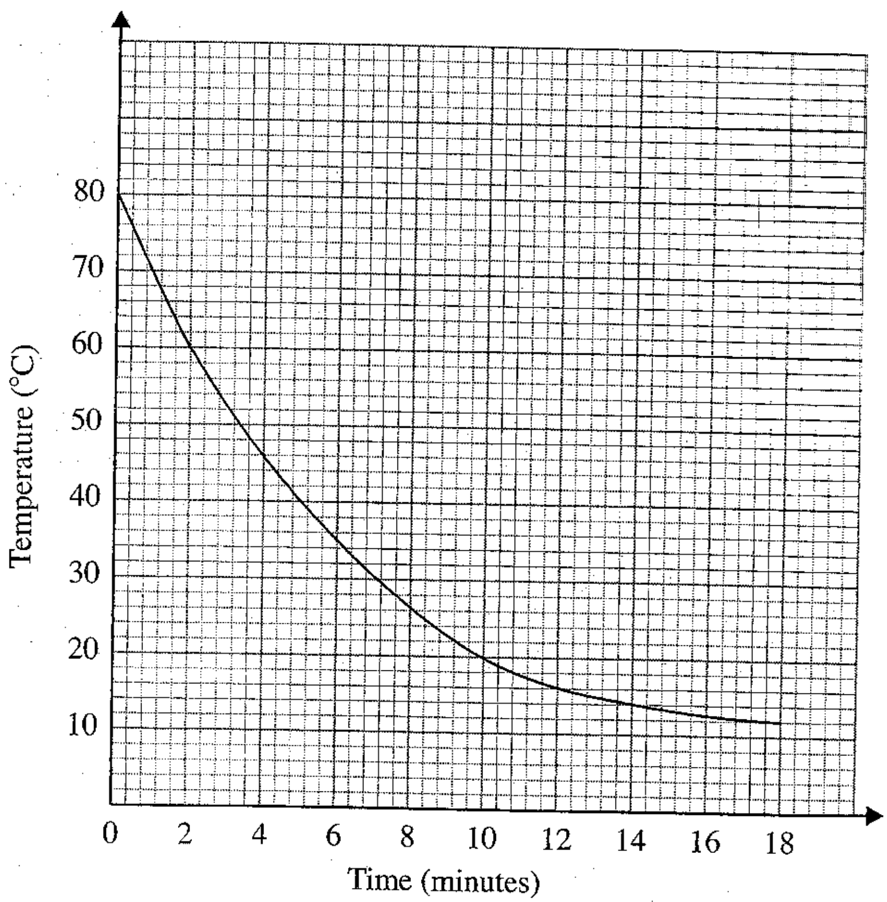
14. Vectors **r** and **s** are such that **r** = 7**i** + 2**j** - **k** and **s** = — **i** + **j** — **k.** Find | **r** + **s** |.
(3 marks)

15. The gradient of a curve is given by ,

$$\frac{dy}{dx} = x^2 - 4x + 3.$$

The curve passes through the point (1,0) Find the equation of the curve.
(3 marks)

16. The graph below shows the rate of cooling of a liquid with respect to time.



Determine the average rate of cooling of the liquid between the second and the eleventh
minutes. (3 marks)

SECTION II (50 marks)

Answer only five questions in this section in the spaces provided.

17. A paint dealer mixes three types of paint A, B and C, in the ratios A:B = 3:4 and B:C = 1:2. The mixture is to contain 168 litres of C.

(a) Find the ratio A:B:C. (2 marks)

(b) Find the required number of litres of B. (2 marks)

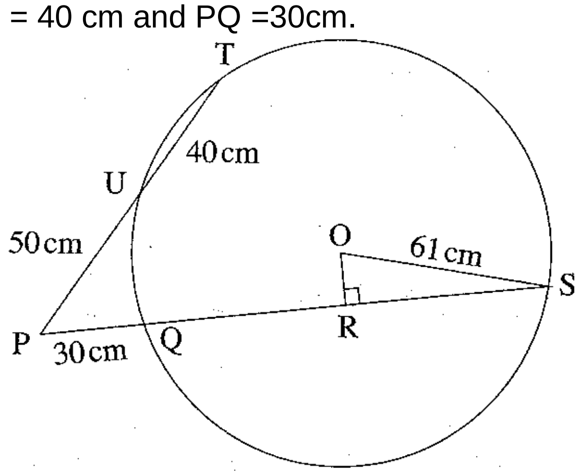
(c) The cost per litre of type A is Ksh 160, type B is Ksh 205 and type C is Ksh 100.

(i) Calculate the cost per litre of the mixture. (2 marks)

(ii) Find the percentage profit if the selling price of the mixture is Ksh 182 per litre. (2 marks)

(iii) Find the selling price of a litre of the mixture if the dealer makes a 25% profit. (2 marks)

18. In the figure below OS is the radius of the circle centre O. Chords SQ and TU are extended to meet at P and OR is perpendicular to QS at R. OS = 61 cm, PU - 50 cm, UT = 40 cm and PQ =30cm.



(a) Calculate the length of:

(i) QS; (2 marks)

(ii) OR. (3 marks)

b) Calculate, correct to 1 decimal place:

(i) the size of angle ROS; (2 marks)

(ii) the length of the minor arc QS. (3 marks)

19. The table below shows income tax rates for a certain year.

Monthly income in Kenya shillings (Ksh)	Tax rate in each shilling
0-10164	10%
10165-19740	15%
19741-29316	20%
29317-38892	25%
over 38892	30%

A tax relief of Ksh 1162 per month was allowed. In a certain month, of that year, an employee's taxable income in the fifth band was Ksh 2108.

(a) Calculate:

(i) the employee's total taxable income in that month; (2marks)

(ii) the tax payable by the employee in that month. (5 marks)

(b) The employee's income included a house allowance of Ksh 15 000 per month. The employee contributed 5% of the basic salary to a co-operative society. Calculate the employees net pay for that month. (3 marks)

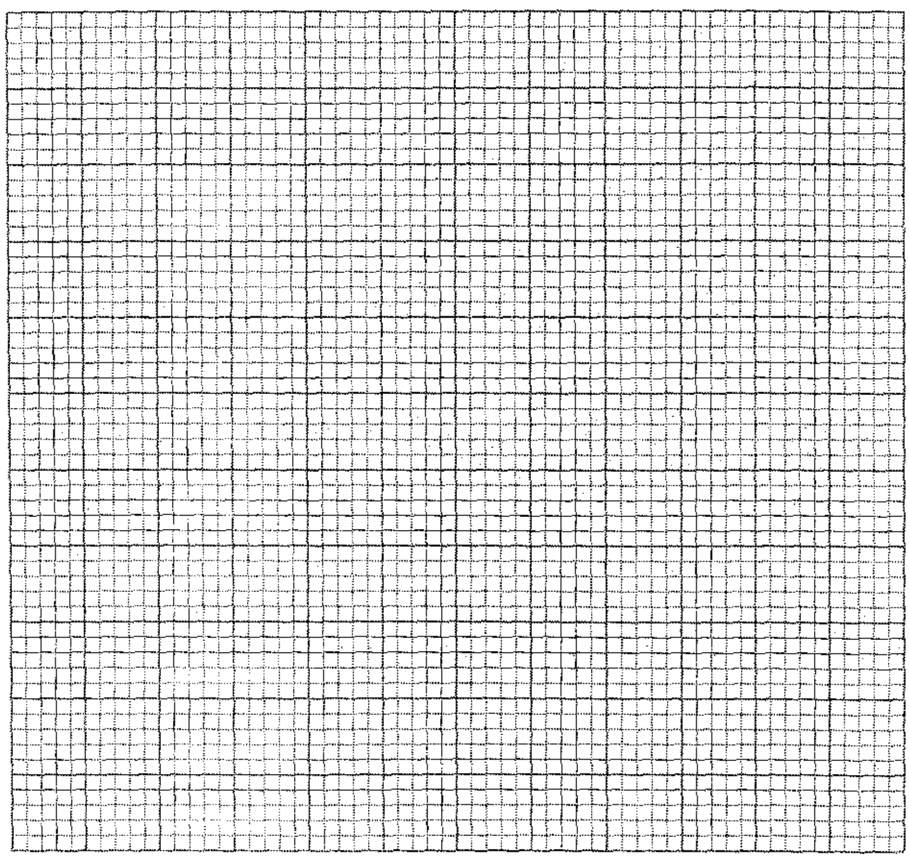
20. The dimensions of a rectangular floor of a proposed building are such that:

- the length is greater than the width but at most twice the width;
- the sum of the width and the length is, more than 8 metres but less than 20 metres.

If *x* represents the width and y the length.

(a) write inequalities to represent the above information. (4 marks)

(b) (i) Represent the inequalities in part (a) above on the grid provided. (4 marks)



(ii) Using the integral values of x and.y, find the maximum possible area of the floor. (2 marks)

21. Each morning Gataro does one of the following exercises: Cycling, jogging or weightlifting.

He chooses the exercise to do by rolling a fair die. The faces of the die are numbered

1, 1,2, 3, 4 and 5.

If the score is 2. 3 or 5, he goes for cycling.

If the score is 1, he goes for jogging.

If the score is 4, he goes for weightlifting.

(a) Find the probability that:

(i) on a given morning, he goes for cycling or weightlifting; (2 marks)

(ii) on two consecutive mornings he goes for jogging. (2 marks)

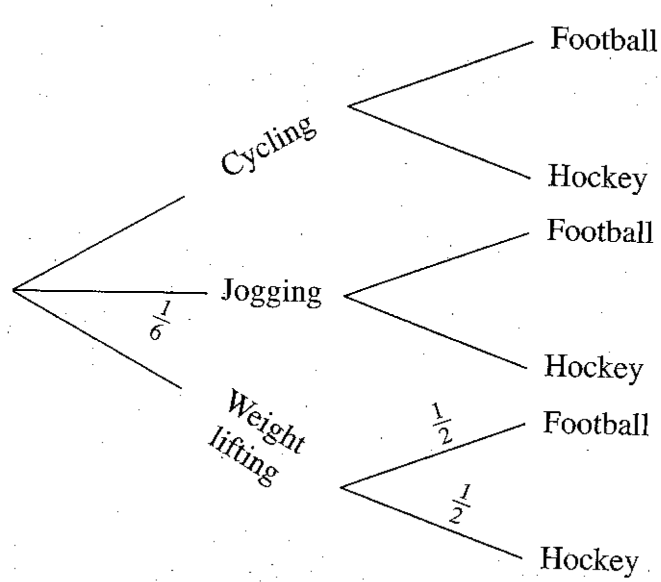
(b) In the afternoon, Gataro plays either football or hockey but never both games. The probability that Gataro plays hockey in the afternoon is:

$^{1}/_{3}$ if he cycled;

$^{2}/_{5}$ if he jogged and

$^{1}/_{2}$ if he did weightlifting in the morning.

Complete the tree diagram below by writing the appropriate probability on each branch. (2 marks)

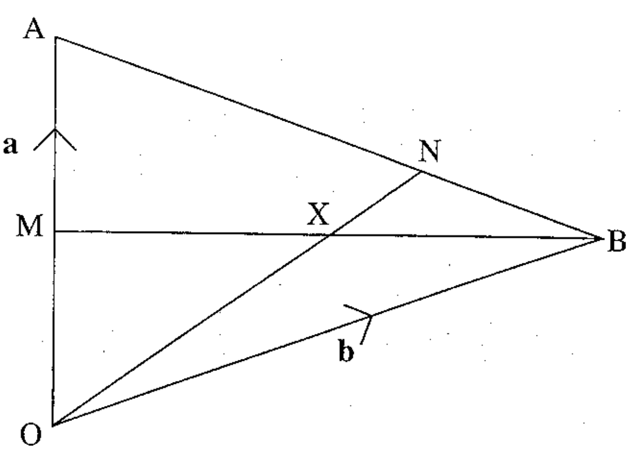


(c) Find the probability that on any given

(i) Gataro plays football; (2 marks)

(ii) Gataro neither jogs nor plays football. (2 marks)

22. In the figure below **OA** = **a** and **OB** = **b**. M is the mid-point of OA and AN:NB = 2:1.



(a) Express in terms of **a** and **b**:

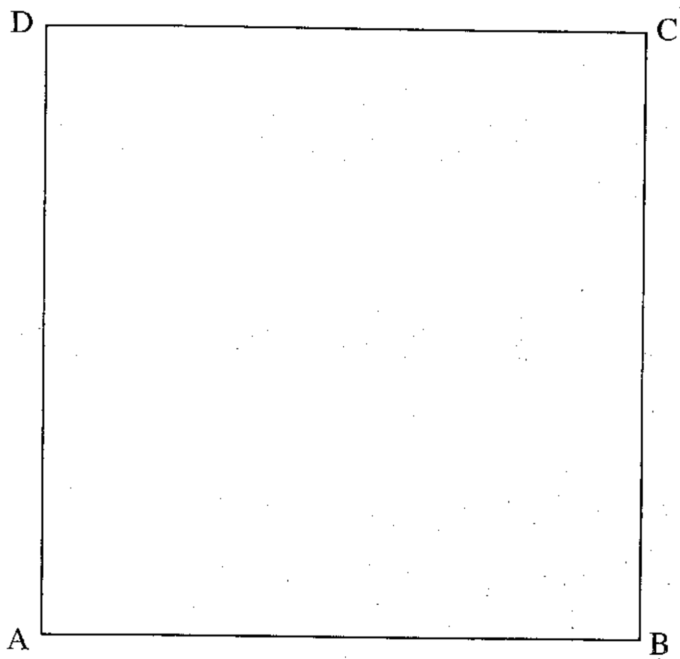
(i) BA; (1 mark)

(ii) BN; (1 mark)

(iii) ON. (2 marks)

b) Given that BX = hBM and OX = kON determine the values of h and k. (6 marks)

23. Figure ABCD below is a scale drawing representing a square plot of side 80 metres.



On the drawing, construct:

(i) the locus of a point P, such that it is equidistant from AD and BC. (2 marks)

(ii) the locus of a point Q such that $\angle AQB = 60°$ (3 marks)

b)

(i) Mark on the drawing the point Q_1 the intersection of the locus of Q and line AD. Determine the length of BQ_1, in metres. (1 mark)

(ii) Calculate, correct to the nearest m^2, the area of the region bounded by the locus of P, the locus of Q and the line BQ_1 (4 marks)

24. In an experiment involving two variables t and r, the following results were obtained.

t	1.0	1.5	2.0	2.5	3.0	3.5
r	1.50	1.45	1.30	1.25	1.05	1.00

(a) On the grid provided, draw the line of best fit for the data. (4 marks)

(b) The variables r and t are connected by the equation $r = at + k$ where a and k are constants. Determine:

(i) the values of a and k;

(3 marks)

(ii) the equation of the line of best fit. (1 mark)

(iii) the value of t when $r = 0$. (2 marks)

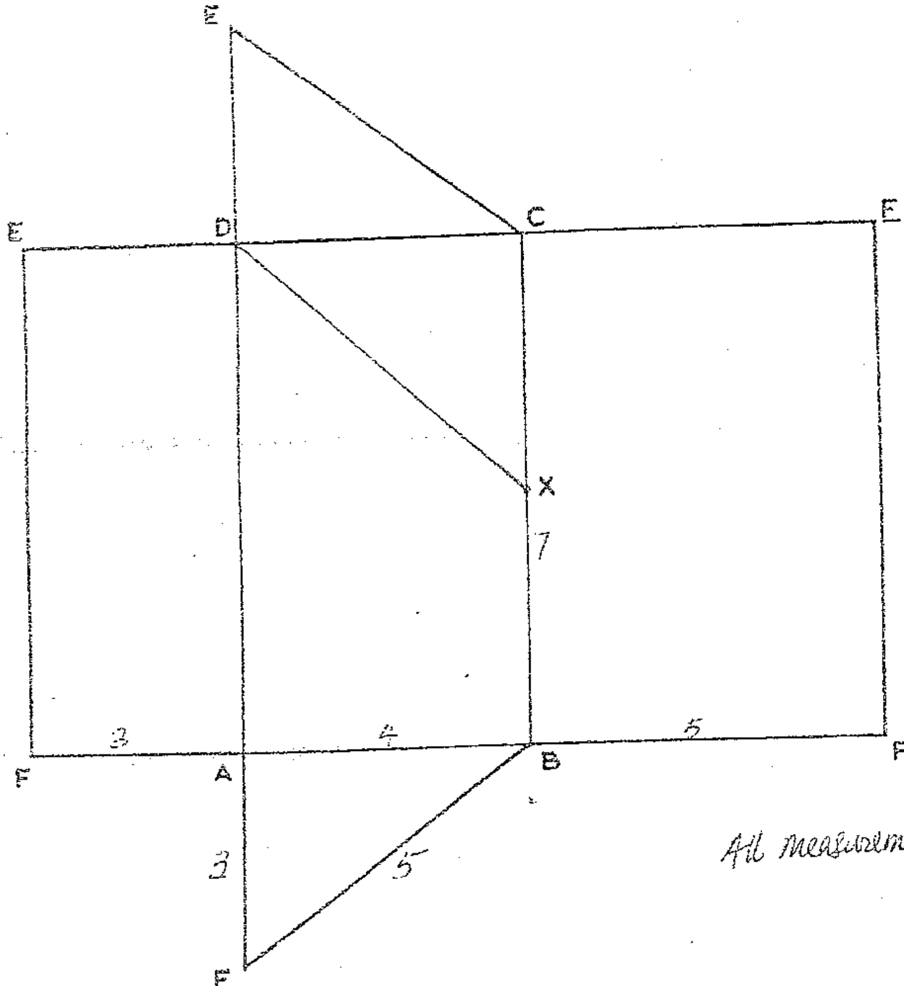
PAPER 1
MARKING SCHEME
OCT/NOV 2014

KENYA NATIONAL EXAMINATION COUNCIL
Kenya certificate of secondary education

MATHEMATICS

Paper 1
MARKING SCHEME
(CONFIDENTIAL)

1.	Cows $= 32$		
	Sheep $= 32 \times 12$		
	$= 384$		
	Goats $= 384 + 1344$		
	$= 1728$		
	Number of goats that remained		
	$= \frac{1}{4} \times 1728$	M1	Allow $1728 - \frac{3}{4} \times 1728$ M1
	$= 432$	A1	
		4	
2.	$\frac{\sqrt{1764}}{\sqrt[3]{2744}} = \frac{\sqrt{2^2 \times 3^2 \times 7^2}}{\sqrt[3]{2^3 \times 7^3}}$	M1	For prime factors of both (Allow in at least one expressed fully and the other partially)
	$= \frac{2 \times 3 \times 7}{2 \times 7}$	M1	$\sqrt{\ }$ and $\sqrt[3]{\ }$
	$= 3$	A1	
		3	
3.	Volume $= \frac{1}{3} \times \frac{22}{7} \times (14)^2 \times 18$	M1	Allow 3694.51, 3694.99 (π use) (3.142)
	$= 3696\ \text{cm}^3$		
	Density $= \frac{4.62 \times 1000}{3696}$	M1	
	$= 1.25\ \text{g/cm}^3$	A1	Allow 1.251, 1.25 (π) (3.142)
		3	

4.	 All measurement ± 0.1 DX $= 5.3 \pm 0.1$	B1 B1 B1 3	√ measurements and angles √ complete net {labelled} Allow 5.315 (By Calculation)
5.	C.P. for carpet $= \frac{36000 \times 100}{120}$ $= 30000$ % profit made during trade fair $= \frac{33600 - 30000}{30000} \times 100$ $= 12\%$	M1	Look out for misreads $\frac{120}{100} x = 36000$ $x = 30,000$

our mandate
To understand the Marking Scheme.

6.	$=\dfrac{243^{\frac{-2}{5}}\times 125^{\frac{2}{3}}}{9^{\frac{-3}{2}}}$ $\qquad \dfrac{3^{-2}\times 5^{2}}{3^{-3}}$ M1 $=\dfrac{27\times 25}{9}$ $=75$	M1 M1 A1 3	If this: Allow $\cancel{\dfrac{1}{9}\times 25 \over {}^{1}\!/_{27}}$ M1 or If this: $\cancel{\frac{1}{9}\times 25\times 27}$ M1 m1 then √ manipulation of all indices or equivalent (Removal of fraction Indices) simplification (Where powers are reversed)
7.	$=\dfrac{\theta}{2\pi}\times\pi\times 2.1\times 2.1 = 2.31$ $\theta=\dfrac{2.31\times 2}{2.1\times 2.1}$ $=1.05^{c}$	M1 A1 2	Allow M1 where 360° is Used and the Kid is Converting Degrees to radians. eg $\dfrac{60^{\circ}}{57.29}$, $\dfrac{60}{180}\pi^{c}$
8.	$(x+2y)^2-(2y-3)^2$ $=(x^2+4xy+4y^2)-(4y^2-12y+9)$ (expansion of both and a Subtraction Sign) $=x^2+4xy+12y-9$	M1 A1 2	Allow if difference of two Squares $x^2+3x+4xy+12y-3x-9$ M1 $x^2+4xy+12y-9$ A1

Allow $A=\dfrac{l}{2}\times r$

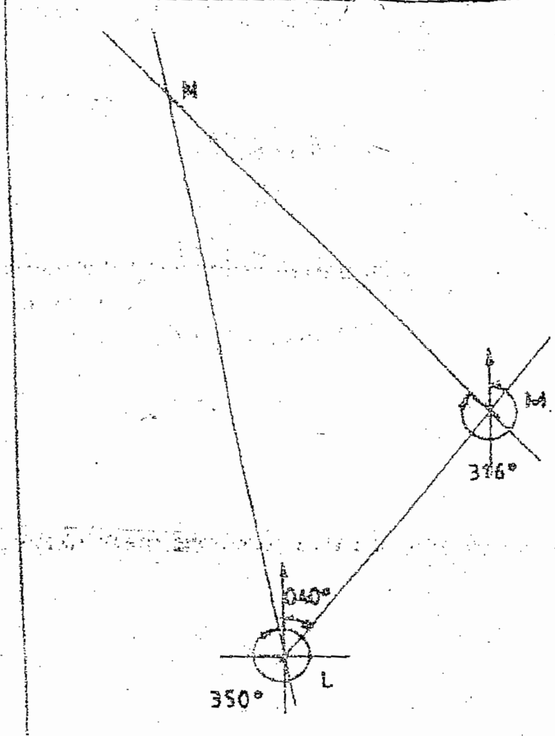
$\dfrac{l}{2}=\dfrac{2.31}{2.1}$

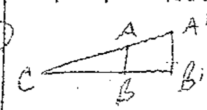
$l=2.2$

$2.1\text{ cm}=1^{c}$

$2.2\text{ cm}=1.05^{c}$ M1

$\dfrac{A}{\pi r^2}=\dfrac{\theta}{360}=\dfrac{l}{2\pi r}$

	 Distance MN = 6.8×100 $= 680$ km	B1 B1 M1 A1 4	√ location of M √ location of N Check this $\angle LMN = 76°$ MN = 6.8 ± 0.1 cm
10.	$(2n-4)\times 90 = 1800$ $180n = 2160$ $n = 12$ size of each exterior angle $= \frac{360}{12} = 30°$	M1 ~~A1~~ m1 B1 3	$150 = \frac{2160}{12}$ $\frac{1800}{12}$ accept $180° - 150°$
11.	let age of cow be x years $\therefore x\left(x - 4\frac{2}{3}\right) = 8$ $3x^2 - 14x - 24 = 0$ $(3x+4)(x-6) = 0$ $x = 6$ or $-\frac{4}{3}$ Age of cow = 6 years Age of heifer = $1\frac{1}{3}$ years (1 year 4 months)	M1 M1 A1 B1 4	Whichever comes first earns A1

12.	$4 \leq 3x - 2 < 9 + x$ $4 \leq 3x - 2 \quad 3x - 2 < 9 + x$ $6 \leq 3x \quad 2x < 11$ $x \geq 2 \quad x < 5\frac{1}{2}$ $\therefore 2 \leq x < 5\frac{1}{2}$ Integral values 2, 3, 4, 5	M1 A1 B1 3	for separation of both if $11/2$ used then A_1 B_1 recovery
13.	Volume of water in container $= \frac{80}{100} \times 90(40 \times 25 - \pi \times 7.5^2)$ $= 59276.54975$ $= \frac{59276.5475}{1000}$ $= 59.3$	M1 M1 M1 A1 4	for $\frac{80}{100} \times 90$ difference in volumes conversion into litres
14.	Angle for major arc $= 360 - 105$ $= 255°$ Length of arc $= \frac{255}{360} \times 2 \times 8.4 \times \frac{22}{7}$ $= 37.4$ cm	B1 M1 A1 4	Accept $2\pi r - \frac{105}{360} \times 2\pi r$ B1 M1 or $52.8 - 15.4$ B1 M1
15.	Amount of work $= 25 \times 16 \times 9$ Machines required $= \frac{25 \times 16 \times 9}{12 \times 10}$ $= 30$	M1 M1 A1 3	÷ by 12×10
16.	$\lvert AB \rvert = \sqrt{(-3+2)^2 + (7-2)^2} = \sqrt{26}$ $\lvert A'B' \rvert = \sqrt{4^2 + (-20)^2} = \sqrt{416}$ Scale factor $= \frac{\lvert A'B' \rvert}{\lvert AB \rvert} = \frac{\sqrt{416}}{\sqrt{26}}$ $= 4$	M1 M1 A1 3	Accept for $\lvert AB \rvert$ and $\lvert A'B' \rvert$ (1)  $C(-4, 6)$ $\frac{\lvert CA' \rvert}{\lvert CA \rvert}$ M1 $= \frac{\sqrt{320}}{\sqrt{20}}$ M1

(2) $AB = \begin{pmatrix} -1 \\ 5 \end{pmatrix}$ M1
$A'B' = \begin{pmatrix} -4 \\ 20 \end{pmatrix}$

17.	(a)	Equation of L		
		gradient $= \frac{6-3}{-1-^-2}$		
		$= 3$		
		equation $= \frac{y-6}{x+1} = 3$		
		$\Rightarrow y - 3x = 9$	A1	Accept other forms eg $y = 3x+9$, $y-3x-9=0$
	(b)	equation of P		
		$= \frac{y-6}{x+1} = -\frac{1}{3}$	M1	
		$3y + x = 17$ (Condone)	A1	Accept $x+3y=17$ (addition is Commutative) $\frac{1}{3}x+y=\frac{17}{3}$ and its equivalents.
	(c)	equation of Q		
		$= \frac{y-2}{x-1} = 3$		
		$y = 3x - 1$	B1	
		x intercept when $y = 0 \Rightarrow x = +\frac{1}{3}$	B1	Do not accept Coordinates
		y intercept when $x = 0 \Rightarrow y = -1$	B1	
	(d)	Intersection of lines P and Q		
		$3y + x = 17..(i)$ $y - 3x = -1..(ii)$ $3y + x = 17$ $3y - 9x = -3$	M1	for elimination of one unknown.
		$10x = 20 \Rightarrow x = 2$	A1	for both $x = 2$ and $y = 5$
		subset $3y + 2 = 17 \Rightarrow y = 5$ $\therefore$ point of intersection $(2,5)$	B1	
			10	

18. (a)

Class	3-5	6-8	9-11	12-14	15-17	18-20
Frequency	3	8	13	10	4	2

B1
B1

Accept use of frequency Currenty e.g 1, 2.7, 4.3, 3.3, 1.3 ...

(b) (i) mean length $= \dfrac{\sum fx}{\sum f}$

$= \dfrac{4\times 3 + 7\times 8 + 10\times 13 + 13\times 10 + 16\times 4 + 19\times 2}{40}$ B1 for all √ mid points - i.e 4, 7, 10, 13, 16, and 19

M1 → $\frac{430}{40}$

$= 10.75$ A1

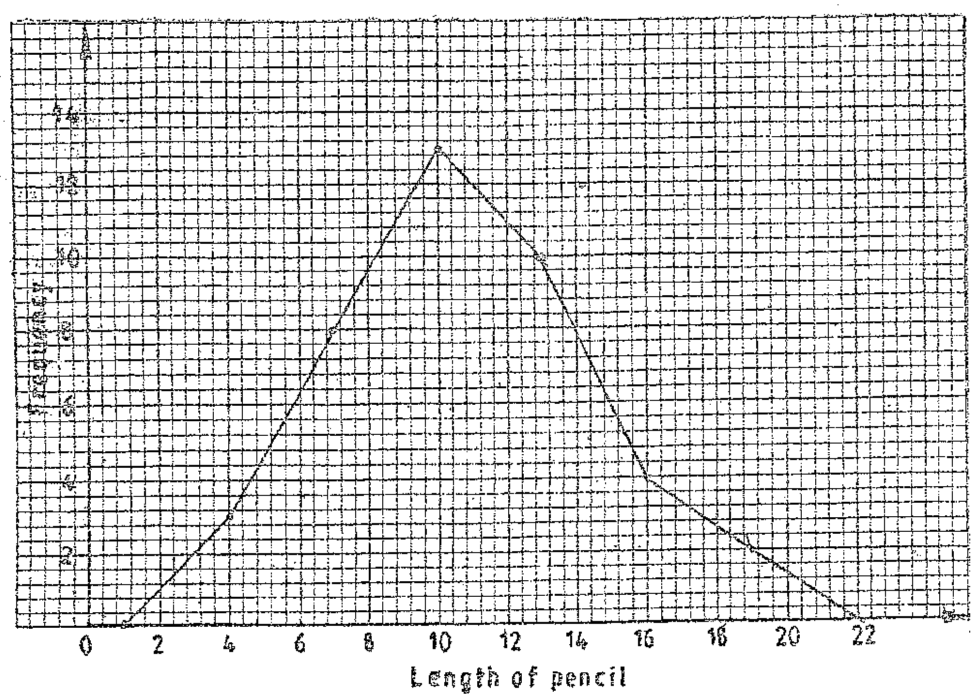
B1
M1 $\frac{427}{40} = 10.675$
A1

(ii)

$= \dfrac{23}{40}\times 100$ B1 for 23

$= 57.5\%$ B1

(c)



S1 — linear/accommodating all values
P1 — ~~Scale~~ Vertical Scale May be given in frequency density
C1

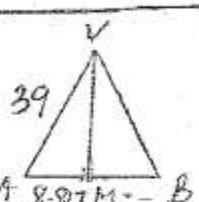
10

The first and last pair should be (1,0) and (22,0) respectively

19.	(a)	15 m/s		
	(b)	maximum speed		
		$\frac{1}{2}(15+h)\times 10+\frac{1}{2}(10+30)h=825$		correct expression of area (accept other forms)
		$75+5h+20h=825$	M1	Removal of brackets.
		$25h=750$		
		$h=30$ m/s	A1	
	(c)	(i) $=\frac{30-15}{10}$	M1	
		$=1.5$ m/s²	A1	
		(ii) $=\frac{0-30}{20}=-1.5$ m/s²	B1	Accept 1.5 m/s² retardation or deceleration
	(d)	$\left[\frac{1}{2}(15+30)\times 10+10\times 30\right]\div 20$	M1	for distance covered in first 20 seconds
		$=(225+300)\div 20$	M1	For div by 20
		$=26.25$ m/s	A1	
			10	

20.	(a)	base area $=\frac{1}{2}\times 15\times 15\sin 72\times 5$ $=534.97$	B1 M1 A1	use 72° Seen or Implied
	(b)	Length AV $=\sqrt{36^2+15^2}=39$	B1	
	(c)	Area of triangular faces: $\frac{AB}{\sin 72}=\frac{15}{\sin 54}$ $AB=\frac{15\sin 72}{\sin 54}$ $=17.63$	 M1	Accept $AX = 15\sin 36°$ for Sine rule $AB = 15\sin 36\times 2$ M1 app. Dont wait for AB $=8.817\times 2$ $=17.63$
		$\therefore$ area $=\sqrt{\left\{\frac{1}{2}(39+39+17.63)(30.185)(8.815^2)\right\}}$ $=334.89$	M1	√ application of Herons formula Follow through.
		Total area $=334.89\times 5+534.97$ $=2209.42$	M1 A1	for process of getting area of 5 2209.97 2209.38
	(d)	volume of pyramid $=\frac{1}{3}\times 534.97\times 36$ $=6419.63\text{ cm}^2$ $\simeq 6420$ (4 s.f.)	M1 A1	
			10	

$8.817 \times 2 = 17.634$



$VM = \sqrt{39^2 - 8.817^2}$
$= 37.99$ cm

$A = \frac{1}{2}\times 17.63\times 37.99$

Total $A = 334.88\times 5 + 534.97$
$= 2209.38\text{ cm}^2$

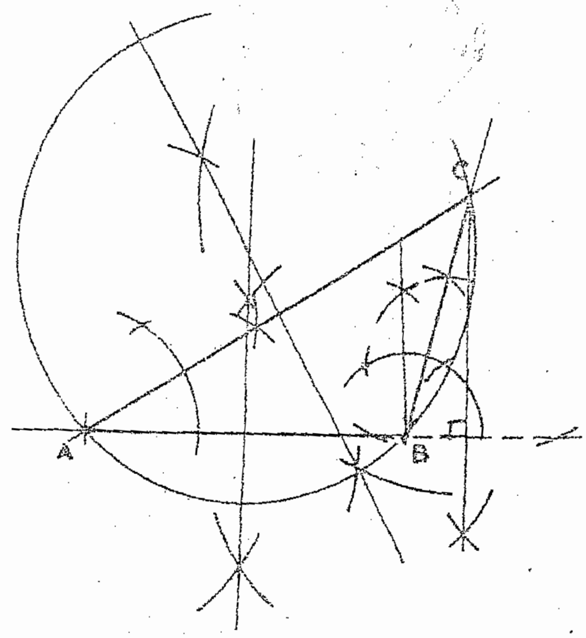
21. (a)

x	-2	-1	0	1	2	3	4	5	6	7	8
y	16	10	6	4	4	6	10	16	24	34	46

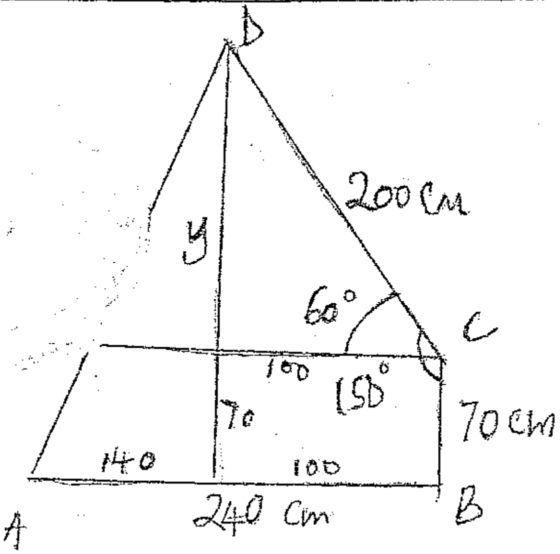
Possibility

	Marks	Remarks
	B2	y values B1 (B1 for at least 6 correct)
(b) Area using trapezium rule		
$= \frac{1}{2} \times 1[16 + 46 + 2(10 + 6 + 4 + 4 + 6 + 10 + 16 + 24 + 34)]$	M1	m1
$= \frac{1}{2}[62 + 2(114)]$	M1	simplification m1
$= 145$	A1	A0
(c) Area using mid-ordinate rule		
$= 2 \times (10 + 4 + 6 + 16 + 34)$	M1	
$= 140$	A1	
(d) Area using integration method		
$\int_{-2}^{8} x^2 - 3x + 6 = \frac{x^3}{3} - \frac{3x^2}{2} + 6x \Big]_{-2}^{8}$	M1	√ integration
$= \left[\frac{512}{3} - \frac{192}{2} + 48\right] - \left[\frac{-8}{3} - \frac{3 \times 4}{2} - 12\right]$	M1	
$= 122\frac{2}{3} + 20\frac{2}{3}$		
$= 143\frac{1}{3}$	A1	Accept $143.\dot{3}$
	10	143.3----

Not 143.3

22.	(a) (i) 	B1 B1 B1	Possibility ✓construction of 30° at A Bc construction of 105° at B Bc completion of ✓△ABC B1
	(ii)	B1	⊥ bisectors (Any 2 bisectors)
		B1	circle
	radius = 3.5 ± 0.1	B1	
	(iii) height construction height = 3.4 ± 0.1	B1 B1	height constructed Follow Through
	(b) area of circle outside triangle $= \pi \times 3.5^2 - \frac{1}{2} \times 3.4 \times 5$	M1	
	~~= 32.21504079~~ 30 ~~≃ 32.22~~ 30.00	A1	Accept 29.98 (if π used) 29.99 (if 3.142 used)
		10	

23.	(a) $\tan\theta = \frac{70}{240}$	M1	
	$= 0.2917$ $\theta = 16.26°$	A1	
	(b) $AC = \sqrt{70^2 + 240^2}$ $= 250$ m	B1	250 seen
	$\angle ACD = 150° - (90° - 16.26°)$ $= 76.26°$	M1	Process - kindly look at work in diagram.
	$AD^2 = 200^2 + 250^2 - 2 \times 200 \times 250 \cos 76.26$ $AD = \sqrt{40000 + 62500 - 100000 \cos 76.26°}$ $= 280.6$	M1 A1	
	(c) Area of plot $= \frac{1}{2} \times 240 \times 70 + \frac{1}{2} \times 250 \times 200 \sin 76.26°$	M1	for Area 1
	$= 8400 + 24284.59$	M1	for Area 2
	$= 32684.59$ m^2		Note: If cm used 0.00 hectares. Division is by 100 000 000
	$= \frac{32684.59}{10000}$	M1	for calculation and conversion
	$= 3.27$ ha	A1	
		10	



$y = 200 \sin 60$
$= 173.21$ cm
$x = 200 \cos 60°$ B1
$= 100$ cm

$DT = 173.21 + 70$ M1
$= 243.21$

$AD = \sqrt{243.21^2 + 140^2}$
$= 280.6$ cm A1

24.	(a)	Value of y when $x=-1$ $y=-1-4+3=-2$	B1	
	(b)	Stationary points $\frac{dy}{dx}=3x^2-8x-3$	M1	
		for stationary points $3x^2-8x-3=0$ $(3x+1)(x-3)=0$	M1	for equating factors to zero
		$x=-\frac{1}{3}$ or $x=3$ when $x=-\frac{1}{3}$, $y=\frac{14}{27}$ when $x=3$, $y=-18$	A1	
		$\therefore$ stationary points $\left(-\frac{1}{3},\frac{14}{27}\right)$	B1	
		and (3, -18)	B1	
	(c)	Equation of normal to curve: gradient of tangent at $x=1$ $\frac{dy}{dx}=3-8-3=-8$	B1	
		gradient of normal $=\frac{1}{8}$	B1	
		$\therefore$ equation of normal at $x=1$ $\frac{y+6}{x-1}=\frac{1}{8}$	M1	
		$y+6=\frac{1}{8}x-\frac{1}{8}$ $y=\frac{1}{8}x-6\frac{1}{8}$	A1	Accept equivalent forms
			10	

OCT/NOV 2014

KENYA NATIONAL EXAMINATION COUNCIL

Kenya certificate of secondary education

MATHEMATICS

Paper 2

MARKING SCHEME

(CONFIDENTIAL)

MATHS P2 2014 KCSE

No.	Working	Marks	Comments
1.	Limits: 12.5 ± 0.05 m and 9.23 ± 0.005 m	B1	Absolute errors need to be associated with
	Maximum difference $= 12.55 - 9.225$ $= 3.325$ m	M1 A1	Substituting values in B mark – Allow when you see the diff.
		3	
2.	a) First 6 terms $-7, -4, -1, 2, 5, 8$	B1	All the 50 terms listed down and being added.
	b) Sum of 1st 50 terms $S_{50} = \frac{50}{2}\{2\times -7 + 49 \times 3\}$ $\frac{50}{2}[2x-7+(50-1)3]$ $= 3325$	M1 A1	Allow listing of terms
		3	
3.	a) $\angle BAC = 70^\circ - 30^\circ = 40^\circ$	B1	Allow $\angle KAD = 50$ — B1 Allow B1 if on diagram
	Reflex $\angle BOC = 360^\circ - 80^\circ$ $= 280^\circ$	B1	Allow if DOC = 100 B1
	b) $\angle ACO = 40^\circ - 30^\circ = 10^\circ$	B1	
		3	
4.	$L = \frac{km}{n^2}$	B1	Allow if small letters are used
	$2 = \frac{k \times 12}{36}$	M1	for M1, if 6x6 or 36 M1 can be implied when k = 6 is found
	$k = 6$ $\therefore$ equation $L = \frac{6m}{n^2}$	A1	Dont give if 6^2 Allow $N^2 = \frac{6M}{L}$ or others
		3	

5.

Marks	Frequency	c.f
1 - 10	2	2
11 - 20	4	6
21 - 30	11	17
31 - 40	5	22
41 - 50	3	25

B1 for c.f – Can be implied.

Median

$= 20.5 + \cancel{\frac{12-6}{11}} \times 10$ $20.5 + \left(\frac{25}{2} - 6\right) \times \frac{10}{11}$ — M1 — M1 → correct subst.

$= \cancel{20.5 + 5.45}$ $20.5 + 5.9$ — M1 — M1 Allow 5.909 / 5.91

$\cancel{= 25.95}$

$\cancel{\approx 26}$ $= 26$ — A1 — A1

/4   (If 13 is used M0 M1 A0)

	Amplitude $= 2$ Period $= \frac{360}{3} = 120°$	1 B1	
		2	may be implied in the method ma
7.	Area scale factor $= \frac{30}{5} = \cancel{6}$ $4x - 2x + 2 = 6$ or $4x - 2(x-1) = 6$ $2x = 4$ $x = 2$	B1 M1 A1	$4x - 2(x-1) = -6$ M1 $x = -4$ A1
		3	
8.	$(3-x)^7 = 3^7 - 7(3)^6x + 21(3)^5x^2 - 35(3)^4x^3 + 35(3)^3x^4 + \ldots$ $= 2187 - 5103x + 5103x^2 - 2835x^3 + 945x^4$ $(2.8)^7 = (3-0.2)^7$ $= 2187 - 5103(0.2) + 5103(0.2)^2 - 2835(0.2)^3 + 945(0.2)^4$ $= 1349.352$	B1 M1 A1	— expanded & simplified must be seen upto x^4 If all the terms are substituted then B0 M1 A1 CAO
		3	
9.	$\text{Log}\frac{15^2}{x} = \log 5(x-4)$ M1 — single log — RHS & LHS $\frac{15^2}{x} = 5(x-4)$ M1 $x^2 - 4x - 45 = 0$ $(x-9)(x+5) = 0$ M1 → if formula (substitution stage) (Correct attempt to solve) (— Combine equating to zero) $x = 9$ or -5 $x = 9$ A1 (identifying $x = 9$)	M1 M1 ~~A1~~ M1 ~~B1~~ A1	
		4	
10.	$PR = \sqrt{60^2 + 11^2} = 61$ $\text{Tan}\,\theta = \frac{10}{61}$ or $\cos\theta = \frac{10}{61.81}$ $\sin\theta = \frac{61}{61.8}$ $\theta = 9.31°$ $\theta = 9.29$ $\theta = 9.31$ 9.3 (3sf)	B1 M1 A1	or equivalent | PR = 61.81 B1
		3	

If Cos used 9.33, 9.32, 9.34, 9.35, 9.28

If new $\log$ value is introduced no M1

Q. 6. $3x - 45 = 0$
$x = 15$
$3x - 45 = 360$
$x = 135$

B0 M1 A0 if ASF $= \frac{5}{30}$

M0 M1 A0

11.	$3x - y = 9$ .... $\times x$ $x^2 - xy = 4$		
	$3x^2 - xy = 9x$ $x^2 - xy = 4$ $2x^2 = 9x - 4$	M1	Attempt to ~~solve~~ correct eliminate one value through Sub. or elimination
	$2x^2 - 9x + 4 = 0$ $(2x-1)(x-4) = 0$	M1	Factors Correct attempt to solve using factorisation, formula / Completing Sq.
	$x = \frac{1}{2}$ or $x = 4$	A1	both
	$y = 3\left(\frac{1}{2}\right) - 9$ or $3(4) - 9$		
	$= -7\frac{1}{2}$ or 3	B1	Both
		4	
12.	$\left(1 + \frac{R}{100}\right)^4 = \frac{495000}{280000}$	M1	$280000\left(1+\frac{R}{100}\right)^4 = 495000$ — M1
	$1 + \frac{R}{100} = 1.153$	M1	fourth root
	$R = 15.3$	A1	Condone % ie 15.3%
		3	
13.	$8008 = \frac{40+\theta}{360} \times 2 \times \frac{22}{7} \times 6370$	M1	Allow $\frac{\theta}{360} \times 2 \times \frac{22}{7} \times 6370 = 8008$
	$40 + \theta = \frac{8008 \times 360 \times 7}{2 \times 22 \times 6370} = 72$ $\theta = 72° - 40°$ $= 32°$	M1	or 32° seen | $\theta = 72 - 40$ or ... first M1 must be correct
	Position of B(32° S, 20°W)	A1	
		3	
14.	$\underset{\sim}{r} + \underset{\sim}{s} = (7i + 2j - k) + (-i + j - k)$		
	$6i + 3j - 2k$	B1	Accept $\begin{pmatrix} 6 \\ 3 \\ -2 \end{pmatrix}$, Can also be implied from correct working. Condone $\begin{pmatrix} 6i \\ 3j \\ -2k \end{pmatrix}$
	$\lvert \underset{\sim}{r} + \underset{\sim}{s} \rvert = \sqrt{6^2 + 3^2 + (-2)^2}$	M1	
	$= 7$	A1	No (ow - 1) if vector sign
		3	

If 3.142 used in any but must use accuracy

A1 if $\theta = 0$ then no A1

	$= \int (x^2 - 4x + 3)\ dx$	~~M1~~	
	$= \frac{1}{3}x^3 - 2x^2 + 3x + c$	M_1	Correct integration (don't wait for simplification) $\frac{x^3}{3} - \frac{4x^2}{2} + 3x + c$ (C must be there)
	$0 = \frac{1}{3} - 2 + 3 + c$	M1	Correct substitution. Allow if 2 terms are correctly integrated (M_1) or $\frac{1^3}{3} - \frac{4(1)^2}{2} + 3$
	$\therefore c = -\frac{4}{3}$ allow $-1\frac{1}{3}$		
	$\therefore y = \frac{1}{3}x^3 - 2x^2 + 3x - \frac{4}{3}$	A1	Correct equation. A_0 if no C
		3	
16.	Temperature at the 2nd minute = 60° Temperature at the 11th minute = 18°	B1	for both √
	Average rate of cooling either $(17 \le 18)$ $= \frac{60-18}{2-11}$ $\frac{60-18}{11-2} = \frac{42}{9}$ $= \frac{42}{\lvert 9 \rvert}$	M1	
	$= 4\frac{2}{3}$ °C/min	A1	Accept 4.667 °C/min. Accept $4.\dot{6}$ if no units condone. If -4.667 A_0. If wrong units penalise
		3	
17.	a) $A = \frac{3}{4}B, C = 2B$		
	$\Rightarrow A:B:C = \frac{3}{4}B:B:2B$	M1	A : B : C 3 : 4 $(1 : 2) \times 4$ — M_1
	$= 3:4:8$	A1	3 : 4 : 8 — A_1. M_1 can be implied
	b) $\left(\frac{168}{8} \times 4\right)$ litres	M1	
	$= 84\ l$	A1	
	c) (i) $\frac{3 \times 160 + 4 \times 205 + 8 \times 100}{3+4+8}$	M1	
	$= sh\ 140$	A1	
	(ii) $\frac{182-140}{140} \times 100\%$	M1	
	$= 30\%$	A1	
	(iii) sh $140 \times \frac{125}{100}$	M1	
	$=$ sh 175	A1	
		10	

$182 \times 315 = 57330$
44100
13230

A	B	C
63	84	168
× 160	× 205	× 100
10080	17220	16800

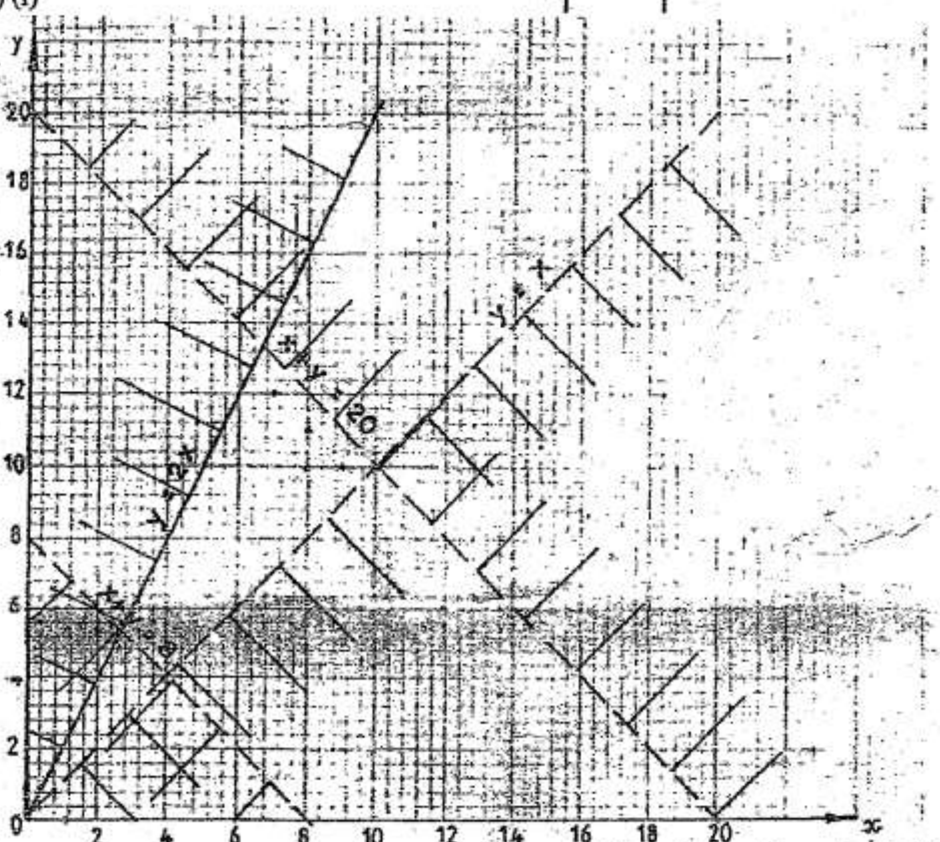
$= \frac{44100}{315} = 140$

Q. 10 analysis step 0

18.	a) (i) $(50+40)(50) = 30(30+x)$	M1	
	$4500 = 900 + 30x$		
	$30x = 3600$		
	$QS = x = 120$ cm	A1	
	(ii) $RS = \frac{1}{2}QS$		
	$= \frac{1}{2}(120) = 60$ cm	B1	– not a double tick
	$OR = \sqrt{61^2 - 60^2}$	M1	
	$= 11$	A1	
	b) (i) $\sin\theta = \frac{60}{61}$	M1	or equivalent $\tan\theta = \frac{60}{11}$ $\cos\theta = \frac{11}{61}$
	$\theta = 79.6°$	A1	
	(ii) Angle at the centre	M1	← doubling the angle
	$= 2 \times 79.6$		
	$= 159.2°$		
	Length of minor arc QS		
	$= \frac{159.2}{360} \times 2\pi \times 61$	M1	
	$= 169.5$ cm or 169.64 if $\pi = \frac{22}{7}$	A1	
		10	
19.	a) (i) $38392 + 2108$	M1	
	$= 41000$	A1	
	(ii) $10164 \times 0.1 + 9576 \times 0.15 + 9576 \times 0.2$ $+ 9576 \times 0.25 + 2108 \times 0.3$	B1 M1 M1	√1st band √3 middle bands √last (5th) band
	$= 1016.4 + 1436.4 + 1915.2 + 2394 + 632.4$		
	$= 7394.4$	A1	
	monthly income tax		
	$= 7394.4 - 1162$	M1	→ Allow 387 ... 1162
	$= 6232.4$	BFA1	
	b) Amount saved in coop society		
	$= \frac{5}{100} \times (41000 - 15000)$	M1	$\frac{5}{100}(45918.70 - 15000) = 1545.90$
	$= 1300$		
	Nett pay		
	41000 - (6232	M1	Can be accessed using his values $45918.70 - (1545.9 + 7308)$
	$= 33467$	A1	
		10	

a) ~~$y \geq x$~~	~~B1~~	
$y \leq 2x$ ✓	B1	
$x+y<20$ ✓	B1	
$x+y>8$	B1	
$y > x$	B1	

b) (i)



- Inequality sign only

B1	line $y = 2x$ and √ shading B1 ✓
B1 ✓	broken line $x + y = 20$ and √ shading
B1 ✓	broken line $x + y = 8$ and √ shading
B1 ✓	broken line $y = x$ and √ shading

(ii) Maximum area:

9×10 ✓ M1

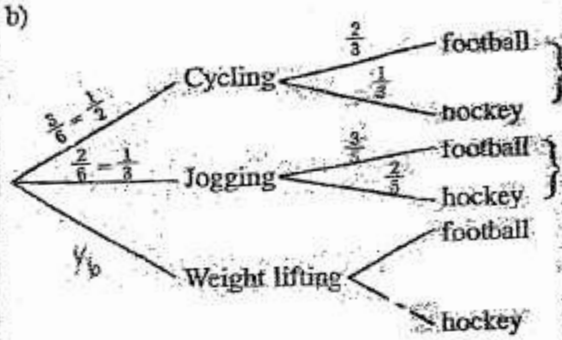
$= 90\,m^2$ ✓ A1

10

- Evidence must be there of inspection if no evidence

B1 ✓ double tick apply if inequality signs are reversed or equals used.

B0 — if no line
B0 ✓ if line is there but wrong.

21.	a) (i) $\frac{3}{6}+\frac{1}{6}$	M1	
	$=\frac{2}{3}$	A1	$\frac{4}{6}$
	(ii) $\frac{2}{6}\times\frac{2}{6}$	M1	
	$=\frac{1}{9}$	A1	$\frac{4}{36}$
	b) 	B1	Accept $\frac{4}{6}$
		B1	$\frac{1}{2}$  B1
	c) (i) P(Gataro plays football)		$\frac{1}{2}\times\frac{2}{3}+\frac{1}{6}\times\frac{3}{5}+\frac{1}{6}\times\frac{1}{2}$
	$=\frac{1}{2}\times\frac{2}{3}+\frac{1}{3}\times\frac{3}{5}+\frac{1}{6}\times\frac{1}{2}$	M1	$\frac{31}{60}$
	$=\frac{37}{60}$	A1	
	(ii) P(neither jogs nor plays football)		
	$=\frac{1}{2}\times\frac{1}{3}+\frac{1}{6}\times\frac{1}{2}$	M1	
	$=\frac{1}{4}$	A1	
		10	

B1 If $\frac{1}{6}$ is attached to Jogging but $\frac{1}{6}$ must be attached to weightlifting.

(i) $\underline{BA} = \underline{a} - \underline{b}$	B1	
(ii) $\underline{BN} = \frac{1}{3}\underline{BA} = \frac{1}{3}(\underline{a} - \underline{b})$	B1	
(iii) $\underline{ON} = \underline{b} + \frac{1}{3}(\underline{a} - \underline{b})$	M1	or equivalent
$= \frac{1}{3}\underline{a} + \frac{2}{3}\underline{b}$	A1	— if ratio theorem is used give the marks M1 A1
b) $\underline{BX} = h\underline{BM} = h\left(\frac{1}{2}\underline{a} - \underline{b}\right)$	~~B1~~	
$\underline{OX} = k\underline{ON} = k\left(\frac{1}{3}\underline{a} + \frac{2}{3}\underline{b}\right)$	B1	
also		
$\underline{OX} = \underline{OB} + \underline{BX}$	~~M1~~	
$= \underline{b} + h\left(\frac{1}{2}\underline{a} - \underline{b}\right)$	B1 ~~A1~~	
$k\left(\frac{1}{3}\underline{a} + \frac{2}{3}\underline{b}\right) = h\left(\frac{1}{2}\underline{a} - \frac{1}{2}\underline{b}\right)$	M1	$k\left(\frac{1}{3}a + \frac{2}{3}b\right) = b + h\left(\frac{1}{2}a - b\right)$ — equating (one must be right)
$\frac{1}{3}k\underline{a} = \frac{1}{2}h\underline{a}$		
$\frac{1}{3}k = \frac{1}{2}h \Longrightarrow k = \frac{3}{2}h$ ....(i)		
$\frac{2}{3}k\underline{b} = \underline{b} - h\underline{b}$	M1	Two Simultaneous eqns.
$\frac{2}{3}k = 1 - h$ ....(ii)		
Substituting $k = \frac{3}{2}h$ in (ii)		
$\frac{2}{3}\left(\frac{3}{2}h\right) = 1 - h \Longrightarrow h = \frac{1}{2}$	M1	Substituting one value
Substituting $h = \frac{1}{2}$ in (i)		
$k = \frac{3}{2}\left(\frac{1}{2}\right) = \frac{3}{4}$	A1	for $h = \frac{1}{2}$ and $k = \frac{3}{4}$ both.
	10	

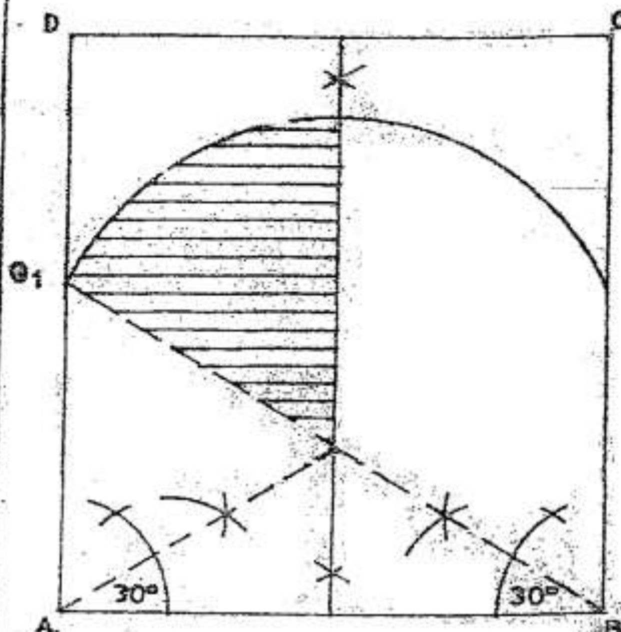
if vector symbols are missing apply (ow−1) once

$BX = h\left(\frac{1}{2}a - b\right)$ B1

$BX = -b + k\left(\frac{2}{3}b + \frac{1}{3}a\right)$ B1

$h\left(\frac{1}{2}a - b\right) = -b + k\left(\frac{2}{3}b + \frac{1}{3}a\right)$ M1

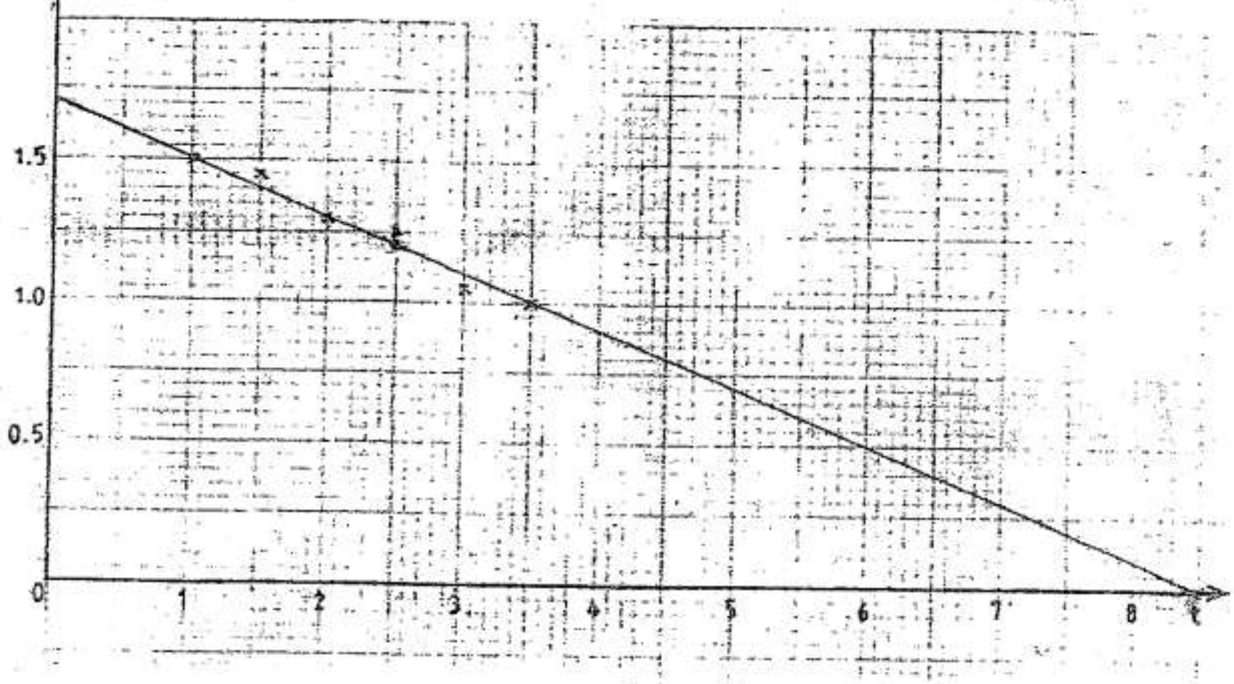
23.



		B1	Construction arcs seen.
(i)		B1	locus of P
(ii)		B1	construction of 30° either at A or B
		B1	identification of correct centre
		B1	drawing of arc – centre O (extended to C and B)
b) (i)	$9.2 \times 10 = 92$ m ± 0.1 91 92 93	B1	Allow BQ_1 from calculation.
	(ii) area of region bounded by locus of P, locus of Q and line BQ_1	B1	Identifying region – can also be implied
	angle $= 60^\circ$ radius $= 46$ m ± 0.1	B1	for radius and angle of sector
	$= \pi \times 46^2 \times \frac{60}{360}$	M1	
	$= 1107.94$ $\simeq 1108\,m^2$ 1061 r=45	A1	$\pi \times 45 \times 45 \times \frac{60}{360} = 1060$
		10	$\pi \times 47 \times 47 \times \frac{60}{360} =$

Locus of P must touch DC & AB & not BO

Equilateral triangle ABX the – two pairs – get lower a)



	S1	scale [illegible] significant
	P2	(P1 for 4 points √ plotted)
	~~S1~~	~~√scale~~
	L1	√line
b) (i) value of a $= \frac{-0.7}{3.5}$	M1	
$= -0.2$	A1	
value of k $= 1.7$	B1	
(ii) equation: $-0.2t + 1.7 = r$	B1	~~[illegible]~~ apply it if M_1 earned
(iii) value of t when $r = 0$		value of t → x-intercept of the graph
$\therefore 0 = -0.2t + 1.7$	M1	
$0.2t = 1.7$		
$t = 1.7$		
$t = \frac{1.7}{0.2} = 8.5$	A1	
	10	

P_2 – Can be scored if S_0 provided the
& L_1 part of the ~~[illegible]~~ line is not on the
'condemned' part.