Set1 121/1

> MATHEMATICS PAPER 1

TIME: 2 1/2 HOURS

INSTRUCTIONS TO CANDIDATES

- 1. Write your name, index number, class and school in the spaces provided above.
- 2. This paper consists of TWO sections I & II
- 3. Answer ALL the questions in section I and only FIVE questions from section II
- 4. All answers and working must be written on the question paper in the spaces provided below each question.
- 5. Show all the steps in your calculations giving your answers at each stage in the spaces below each question.
- 6. Marks may be given for correct working even if the answer is wrong.
- 7. Non-programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

FOR EXAMINERS USE ONLY

1	2	3	4	5	6	Zils	8	9	10	11	12	13	14	15	16	TOTAL
					ost Par											
17	18	1	9	26	21	22	23	24	Т	OTAL	i (GRAI TOTA	ND AL			

SECTION 1: 50 MARKS

Answer all questions

State the name of the figure sketched
 Without using log tables or a calculator; solve

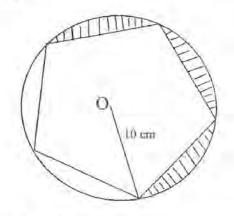
(1 mark) (3 marks)

Log ¼ + log 64

Log 32 - log 1/8

For More Papers and Marking Scheme at a Small Fee: Website: www.freekcsepastpapers.com or Call: 0720502479

- 3. The sum of interior angles of two regular polygons of sides; n and n + 2 are in the ratio 3:4 Calculate the sum of the interior angles of the polygon with n sides. (4 marks)
- 4. A group of 10 soldiers set off with enough food to last 7 days. After 4 soldiers deserted. How many more days will the food last for the remaining soldiers? (3 marks)
- The diagram below, not drawn to scale, is a regular pentagon circumscribed in a circle of radius 10cm at centre O



Find

(a) The length of any side of the pentagon

(2 marks)

(b) The area of the shaded region

(2 marks)

- 6. A line whose gradient is positive is drawn on the Cartesian plane and its equation is $x y\sqrt{3} = -3$. Calculate the angle formed between the lien and x-axis. (3 marks)
- 7. Find all the integral values of x which satisfy the inequality 3(1+x)<5x-11< x+45

(3 marks)

- 8. An arc subtends an angle of 0.9 radians at the centre of a circle whose radius is 13cm. Find the length of the arc. (2 marks)
- 9. The scale of a map is given as 1:50,000. Find the actual area in hectares of a region represented by a triangle of sides 6cm by 7cm (Give your answer to the nearest whole number). (3 marks)
- 10. Two passenger trains A and B, 240m apart are travelling at 164kmh and 88km/h respectively towards each other on a straight railway line. Train A is 150 metres long, while B is 100

metres long. Determine the time in seconds that elapses before the two trains completely pass each other.

(4 marks)

- 11. Given that cos A = 5/13 and angle A is acute, find the value of (3 marks) 2 tan A + 3 sin A.
- 12. Given that $4x^2 32x 20 + k$ is a perfect square, find k. (3 marks)
- 13. A watch which looses a half-minute every hour was set to read the correct time at 0545h on Monday. Determine the time, in the 12 hour system, the watch will show on the following Friday at 1945h. (3 marks)
- Use the exchange rates below to answer this question.

Buying

Selling

1 US dollar 63.00 63.20 1 UK £ 125.30 125.95

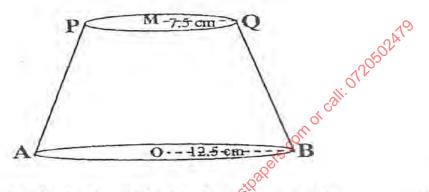
15. A tourist arriving in Kenya from Britain had 9600 UK Sterling pounds (£). He converted the pounds to Kenya shillings at a commission of 5%. While in Kenya, he spent ¾ of this money. He changed the balance to US dollars after his stay. If he was not charged any commission for this last transaction, calculate to the nearest US dollars, the amount he received.

(3 marks)

SECTION II (50 MARKS)

Answer only Five questions from this Section

 PQCB shows a frustum of a cone. The radius of the top and bottom circular parts of the frustum are 7.5cm and 12.5cm respectively, centres M and O are 10cm part.



- a) Calculate the slant length QB of the frustum correct to d.p.
- (1 mark)

b) Calculate the volume of frustum

(5 marks)

- c) If the frustum is of solid metal and is melted down and recast into a solid cylinder having a radius of 10.5cm, calculate.
- (i) The height of cylinder correct to 3 d.p.

(3 marks)

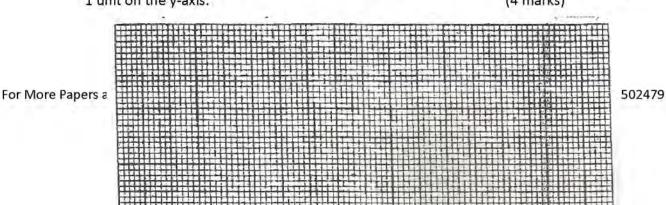
(ii) The surface area of the cylinder

(2 marks)

17. a) Complete the table below giving your values correct to 2 decimal places. (2 marks)

x ⁰	- 90º	-75°	-0°	-45º	-30°	- 15 ⁰	00	15º	300	45°	60°	75°	900
3cos 2x ⁰	-3	2.60		0	1.50		3	2,60		0	1.50		-3
sin (2x+30°)	- 0.5		-1	- 0.87		0	0.5		1	0.87		0	-0.5

b) On the grid provided draw, on the same axes the graph of $y = 3 \cos 2x0$ and $y = \sin (2x + 30^0)$ for interval $-90^0 \le x \le 90^0$. Take the scale: 1cm represent 15° on x-axis and 2cm to represent 1 unit on the y-axis. (4 marks)



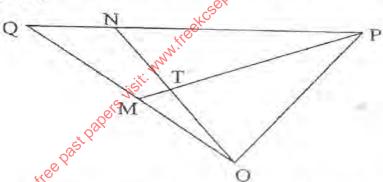
(c) Use the graph in (b) above to solve the equation.

 $3\cos 2x = \sin (2x + 30)$ (2 marks)

(i) $3\cos 2x = \sin (2x)$ (ii) $6\cos 2x + 5 = 0$

(2 marks)

18. The diagram below shows a triangle OPQ in which QN:NP = 1:2, OT:TN = 3:2 and M is the midpoint of OQ.



a) Given that OP = p and OP = q, Express the following vectors in terms of p and q

i) PQ

(1 mark)

ii) ON iii) PT (2 marks) (2 marks)

iv) PM

(1 mark)

b) (i) Show that point P, T and M are collinear

(3 marks)

(ii) Determine the ratio MT: TP

(1 mark)

19. The displacement's meters of a particle moving a long a straight line after 1 second is given by $S = 6t - t^3 - t^2$

3 2 (3 marks) (b) Calculate: (3 marks) The time when particle was momentarily at rest Its displacement by the time it comes to rest momentarily (2 marks)

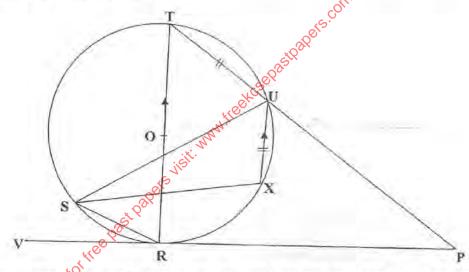
(2 marks)

- 20. Three ports A, B and C are situated in such a way that port A is 140km on a compass bearing of N65°E from port B. Port C is 200km on a compass bearing of S32°E from A. A ship S is docked in the sea, 86km on a bearing of 1900 from port B.
 - Using a scale of 1cm to represent 20km, draw a diagram to show the position of ports A, B, C and ship S. (4 marks)
 - (b) Using your diagram find

(d) Calculate the maximum speed attained

(ii)

- (1 mark) (i) The distance between the ship and the port A (ii) The bearing of the ship from port C (1 mark) The distance from B to C (1 mark) (iii) (iv) Find how far C is south of A (2 marks) (v) Compass bearing of S from A (1 mark)
- 21. In the figure below, O is the centre of the circle TOR is the diameter and PRV is tangent to the circle at R.



Given that <SUR = 25°, <URP = 60°, TU = UX is parallel to the diameter; giving reasons calculate;

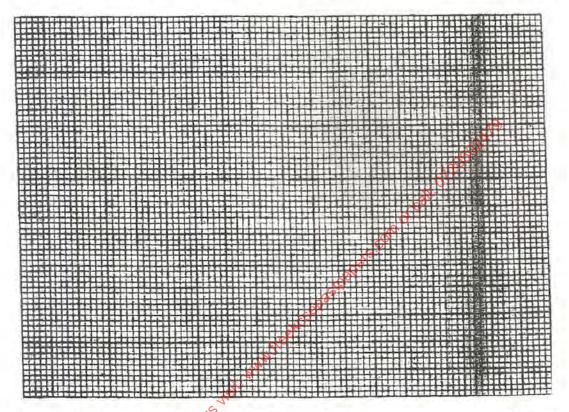
a) <TOU (2 marks) b) <XUP (2 marks) c) <STR (2 marks) d) Reflex <SXU (2 marks) e) <RPU (2 marks)

23. At an agricultural Research Centre, the length of a sample of 50 maize cobs were measured and recorded as shown in the frequency distribution table below.

Length	10-11	12-13	14-15	16-19	20-26
No. of Labs	6	8	11	18	7

a) Calculate the mean (3 marks)

b) Draw a histogram to represent the above information (5 marks)



c) (i) State the class in which the median length lies

(1 mark)

- (ii) Draw a vertical line, in the histogram, showing where the median length lies (1 mark)
- 24. A youth group decided to raise Ksh.480,000 to buy a piece of land costing Kshs.80,000 per hectare. Before the actual payment was made, four of the members pulled out and each of those remaining had to pay an additional Kshs.20,000.
 - a) If the original number of the group members was x, write down;
 - (i) An expression of how much each was to contribute originally. (1 mark)
 - (ii) An expression of how the remaining members were to contribute after the four pulled out. (1 mark)
 - b) Determine the numbers who actually contributed towards the purchase of the land. (5 marks)

- c) Calculate the ration of the supposed original contribution to the new contribution. (1 mark)
- d) If the land was sub-divided equally, find the size of land each member got.

(2 marks)

Set1

Paper 2

SECTION I (50 MARKS)

Answer ALL Questions in this section.

- 1. Find the percentage error in estimating the volume of a cone whose radius is 3.4cm and height is 8cm. (3 marks)
- Make n the subject of the formula $P = ar^2 s)^{1/n}$ 2.

(3 marks)

3. Solve the equation $2\cos^2 x - \sin x = 1$ for $-180^0 \le x \le 180^0$. (4 marks)

- When N = 1 and M = 5 when $N = \frac{1}{2}$ 4.

(2 marks)

(1 mark)

- Solve for x in the equation $\frac{1}{2} \log_2 81 + \log^2 (x^2 x/3) = 1$ Use logarithms to evaluate 5.
- (3 marks)

6.

(4 marks)

7. Table below is part of tax table for annual income for the year 2010.

Taxable income in K£4 p.a.	Rate in Kshs. Per K£
Under K£4201	
From K£4201 but under K£8401	
From K£8401 but under K£1261	

In the year 2010, the tax on Oyugi's annual income was Ksh.12,000. Calculate Oyugi's annual income in K£. (3 marks)

8. (a) Expand $(1-2x)^6$ upto the term in x^3 . (1 mark)

Use the expansion to evaluate (1.02)⁶ to 4 decimal places.

(2 marks)

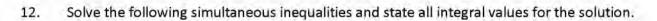
- 9. Given that OA = 2i + 5k and OB = 7i - 5j. A point T is on B such that 2AT = 3TB. Calculate the magnitude of OT to 4 significant figures. (3 marks)
- 10. Find the quartile deviation for the set of data below.

(2 marks)

16, 18, 10, 8, 5, 11, 4 and 7

In the figure below, line AB = 4cm, BE = 8cm and DE = 4cm. Find the value of y. (2 marks)

For More Papers 0720502479 C D 4cm 8cm В 4cm



$$\frac{x-3}{3} < 1$$

$$3x + 1 \ge -17$$
(2 marks)

- 13. The curve $y = ax^3 3x^2 2x + 1$ has the gradient 7 when x = 1. Find the:
 - (i) Value of a
 - (ii) Equation of the tangent to the curve at x = -1 (3 marks)
- 14. Without using a calculator $\sqrt{252 + \sqrt{72}}$ eaving the answer in the form $\sqrt{32} + \sqrt{28}$

a
$$\sqrt{b}$$
 + c where a, b and c are integers. (4 marks)

- 15. A mixture contains two powders P and Q with masses in the ration 3: 11. If the mixture costs sh.670 per kg and powder P costs sh.560 per kg, find the cost of a kg of powder Q. (3 marks)
- 16. Find the radius and the centre of a circle whose equation is

$$3x^2 + 3y^2 + 18y = 12x - 9 = 0$$
 (3 marks)

SECTION 11 (50 Marks)

Answer any five questions from this Section.

- 17. In driving to work, Buma has to pass through three sets of traffic lights. The probability that he will have to stop at any of the lights is ¾
 - (a) Draw a tree diagram to represent the above information. (2 marks)
 - (b) Using the diagram, determine the probability that on any one journey, he will have to stop at:
 - (i) All the three sets. (2 marks) (ii) Only one of the sets (2 marks)

For More Papers and Marking Scheme at a Small Fee: Website: www.freekcsepastpapers.com or Call: 0720502479

(iii) Only two of the sets (2 marks) (iv) None of the sets. (2 marks) 18. Using a ruler and pair of compasses only, construct triangle ABC in which AB = (a) 9cm, AC = 8cm and angle $BAC = 60^{\circ}$. (2 marks) On the same side of AB as C, draw the locus of a point such that angle APB = 60° (b) (3 marks) (c) A region T is within the triangle ABC such that AT > 4cm and angle ACT ≥ angle BCT. Show the region T by shading it. (5 marks) Three consecutive terms in a geometric progression are 3 2x1, 9x and 81 respectively. 19. (a) Calculate the value of x. (3 marks) (b) Find the common ratio of the series. (2 marks) (c) Calculate the sum of the first 10 terms of the series. (2 marks) (d) Given that the fifth and the seventh terms of this G.P form the first two consecutive terms of an arithmetic sequence, Calculate the sum of the first 20 terms of the arithmetic sequence. (3 marks) (a) Sketch the curve of $y = x^2 - 4$ (2 marks) (b) Calculate the area bounded by the curve $y = x^2 - 4x$ the x – axis, the lines x = 1 and x = 4 by using the trapexoidal rule with 6 equal strips. (3 marks) (c) Calculate the exact area in (6) above using the method of integration. (4 marks) (d) Find the percentage error in the area in (b) above. (1 mark) A and B are two points on the latitude 40°N. The two points lie on the longitudes 20° W and 100° E respectively. (a) Calculate: (i) The distance from A to B along a parallel of latitude. (3 marks) The shortest distance from A to B along a great circle. (4 marks) (b) Two planes P and Q left A for B at 400 knots and 600 knots respectively. If P flew along the great circle and B along parallel latitude, which one arrived earlier and by how long. Give your answer to the nearest minute (Take R = 6370 km and π = 22/7). (3 marks) (a) Complete the table below for the equation $y = x^3 - 2x^2 - 4x + 7$. 22. (2 marks) -3 X -2 -1 3 4

For More Paper: III: 0720502479

y - axis, draw the graph of $y = x^3 - 2x^2 - 4x + 7$.

Using the scale 1cm to represent 1 unit on the x – axis and 1 unit to represent 5 units on the

(3 marks)

y -26

(b)

castpapars.com or call. OT20502AT9

(c) Use your graph to estimate the roots of the equation

$$x^3 - 2x^2 - 4x + 7 = 0$$

(1 mark)

(d) By drawing appropriate straight lines use your graph to solve the equations.

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

(2 marks)

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

(2 marks)

23. The cash price of a laptop was Kshs.60,500. On hire purchase terms, a deposit of Ksh.8,000 paid followed by 11 monthly installments of Kshs.6000 each.

(a) Calculate:

(i) The cost of a laptop on hire purchase terms.

(2 marks)

(iii) The percentage increase of hire purchase price compared to the cash price.

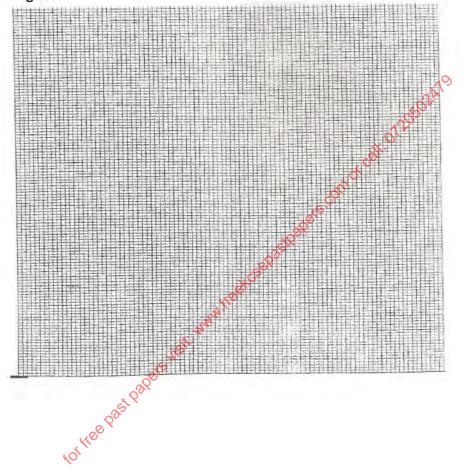
(2 marks)

- (b) An institution was offered a 5% discount when purchasing 25 such laptops on cash terms. Calculate the amount of money paid by the institution. (2 marks)
- (c) Two other institutions X and Y, bought 25 such laptops each. Institution Y bought the laptops on cash terms with no discount by securing a loan form a bank. The bank charged 12% p.a compound interest for two years. Calculate how much more money institution Y paid than institution X. (4 marks)
- 24. A manager wishes to hire two types of machine. He considers the following facts.

Machine type	Number of men operators	Floors space	Hourly profit
Α	4	2	4
В	3	3	8

He has a maximum of $24m^2$ of floor space and a maximum of 36 men available. In addition he is not allowed to hire more machines of type B than of type A.

- (a) If he hires x machines of type A and y machines of type B, write down all the inequalities that satisfy the above conditions. (3 marks)
- (b) On the grid provided, draw the inequalities in part (a), above and shade the unwanted region. (3 marks)



Set2 121/1 MATHEMATICS PAPER 1

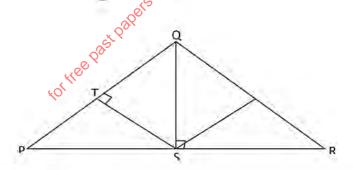
TIME: 2 1/2 HOURS

SECTION I:(50 MARKS)

Answer ALL questions in this section:

- 1. Evaluate: $\frac{-12 \div (-3) \times 4 (-20)}{-6 \times 6 \div 3 + (-6)}$ (3 marks)
- 2. An airbus left Nairobi at 1945hrs and arrived in London at 0320hrs. It stayed for $1\frac{1}{2}$ hrs for rest and refreshment of passengers and crew. It then headed for Washington D.C and took $10\frac{1}{4}$ hrs.
 - (a) How long did the journey from Nairobi to London take in hours and minutes?
 - (b) At what time did it arrive in Washington D.C. (2 marks)
- 3. Evaluate: $\frac{\frac{3}{4} + 15 \frac{4}{7} + \frac{4}{7} of 2\frac{1}{3}}{\left(1\frac{3}{7} \frac{5}{8}\right) \times \frac{2}{3}}$ (3 marks)
- 4. In the Kapsabet station church choir, the ratio of male to female is 2:3. On one Sunday service, 10 male members were absent and six new female members joined the choir as guests for that day. If on this day the ratio of males to females was 1:3, how many regular members does the choir have?

5. The figure **below** represents a roof truss symmetrical about QS. Beam PQ is 5m long and strut TS is 2.4m long. The distance TQ is 1.8m.



Calculate:-

(i) the height QS.

(2 marks)

(ii) hence, find the span PR of the roof.

(2 marks)

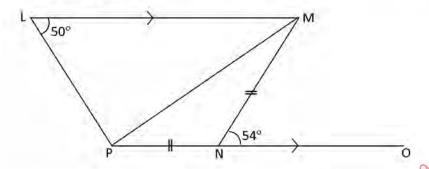
- 6. An article was bought at Ksh.2250 then later sold for Ksh.2520. Calculate:-
 - (i) the percentage profit.

(2 marks)

(ii) the price at which it should be sold to make a profit of 20%.

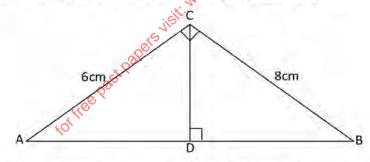
(2 marks)

- 7. In a rectangle ABCD, the side AB has equation 3χ + 2y = 6 and vertex D has coordinates (-2, 4). Find the equation of side AD in the form aχ + by = C. Where a, b and C are integers.
 (3 marks)
 - 8. In the figure **below** \angle MNO = 54° and \angle PLM = 50°, PN = NM and PO is parallel to LM. Find the value of \angle LPM. (3 marks)



- 9. Using ruler and pair of compass only, construct triangle ABC in which AB = 6cm, BC = 8cm and angle ABC = 45°. Drop a perpendicular from A to meet BC at M. Measure AM and AC.

 (3 marks)
- 10. A plane leaves town P to town Q on a bearing of 130° and distance of 350km. it then flies 500km on a bearing of 060° to town R. Find, by scale drawing the distance between town R and town P. (3 marks)
- 11. Use tables of reciprocal and squares to evaluate, to 4 significant figures, the expression: $0.4346^2 + \frac{1}{2746}$ (3 marks)
- 12. The figure **below** shows a triangle ABC which is right-angled at C. CB = 8cm and AC = 6cm. Find the length of CD given that CD is perpendicular to AB. (3 marks)



- 13. Solve for t in the equation: $32^{(t-3)} \div 8^{(t-4)} = 64 \div 2^t$. (3 marks)
- 14. A is a reflex angle and $\tan A = \frac{7}{24}$. Determine the value of Cos A without using the Mathematical table or calculator. (2 marks)
- 15. Translation T is represented by the column vector $\binom{5}{4}$ and another translation U by the column Vector (-3). A point P is mapped to a point Q by T and point Q is mapped to a point R by U. 2

 If point R is at (7, -4), determine the coordinates of point P. (3 marks)

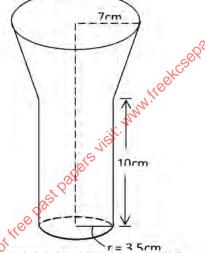
- 16. On the grid provided,
 - (i) Plot the points P (4, -1), Q (5, -3), R (4, -4) and S (3, -3) and join the points to form a polygon PQRS. State the name of the polygon formed.
- (2 marks)
- Write down the equation of the line of symmetry of the polygon.

(1 mark)

SECTION II: (50 MARKS)

Answer any FIVE questions in this section.

- 17. The capacity of two similar rectangular tanks are 1,000,000 litres and 512,000 litres respectively.
 - (a) Determine the length of the larger tank if the smaller one is 240cm long. (4 marks)
 - Calculate the surface area of the smaller tank if the larger tank's surface area is (b) 1875m² (3 marks)
 - Estimate the mass of the smaller tank if the mass of the larger one is 800kg.(3 marks) (c)
- The diagram below represents a model of a pillar. The radii of the top and the base are 7cm 18. and 3.5cm respectively. The height of the cylindrical part is 10cm while the height of the whole pillar is 15cm.



Calculate the volume of the model in cm3. (a)

(6 marks)

- Calculate the mass of the material used to construct the pillar given that the actual height of (b) the whole pillar is 60m and the density of the material used is 0.832g/cm3. (Give your answer in tones). (4 marks)
- 19. Use the quadratic formula to solve the equation.

 $2\chi^2$ - 9χ + 3 = 0 giving your answer to 4 significant figures. Simplify the expression completely: $\frac{\left(3-5\chi+2\chi^2\right)\left(1+\chi\right)}{16\chi^4-18}$

(3 marks)

(b)

(4 marks)

If the expression $25y^2 - 70y + (16 + K)$ is a perfect square; where K is a constant; (c) find the value of K. (3 marks)

20. Christians who attended a church service on a Sunday were grouped by age as shown in the table below.

Age in χ years	0 ≤ × < 5	5≤×<15	15 ≤ × < 25	25 ≤ × < 45	45 ≤ × < 75
No. of members	14	41	.59	70	15

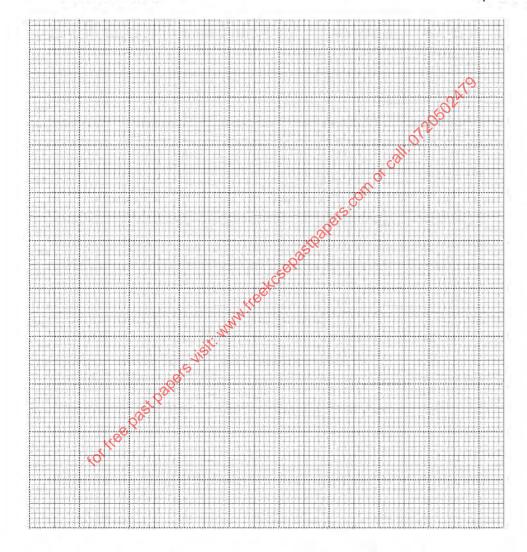
(a) Estimate the mean age

(4 marks)

- (b) On the grid provided, draw a histogram to represent the distribution.

 Use the scale: 1cm to represent 5 units on the horizontal axis.

 2cm to represent 5 units on the vertical axis. (4 marks)
- (c) On the same axes in (b) above, construct a frequency polygon and use it to determine the modal class. (2 marks)



- 21. Nairobi and Eldoret are each 250km from Nakuru. At 8.15a.m, a lorry leaves Nakuru for Nairobi. At 9.30am, a car leaves Eldoret for Nairobi via Nakuru at a speed of 100km/h. Both vehicles arrived Nairobi at the same time.
 - (a) Calculate their time of arrival in Nairobi.

(2 marks)

(b) Find the cars speed relative to that of the lorry.

(4 marks)

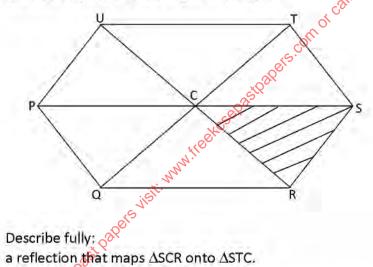
(c) How far apart are the vehicles at 12.45pm.

(4 marks)

22. (a) Complete the table **below**, for the function $y = -\chi^2 + 2\chi + 6$. (2 marks)

						9.2-2-2-4-2-V			
χ	-2	-1	0	1	2	3	4	5	6
-χ²			0						
2χ + 6			6						
у			6						

- On the grid provided, draw the graph of the function $y = -\chi^2 + 2\chi + 6$ for the range -2 (b) $\leq x \leq 6$ and use your graph to estimate the roots of the equation $-\chi^2 + 2\chi + 6 = 0$ to 1 decimal place (4 marks)
- To solve graphically the equation $\chi^2 + 2\chi = 0$; a straight line must be drawn to (c) intersect the curve $y=-\chi^2+2\chi+6$. Determine the equation of this straight line; draw the straight line on the same axes and hence obtain the roots of the equation $\chi^2 = 0$ to 1 (4 marks) decimal place
- 23. In the figure below, PQRSTU is a regular hexagon.



- (a)
- a reflection that maps Δ SCR onto Δ STC. (1 mark) (i)
- (ii) an enlargement that maps Δ SCR on Δ PCU. (2 marks)
- (iii) a rotation that maps \triangle SCR to \triangle TCU. (3 marks)
- The $\triangle PQC$ is reflected on the line RU. The image of $\triangle PQC$ under the reflection is then (b) rotated through an angle -120º about point C. Determine the images of P and Q:
- (i) under the reflection. (2 marks)
- after the two successive transformations. (2 marks) (ii)
- 24. The figure below shows a wedge in which PQR and UXY are congruent right angled triangles. PQ = 8cm, QR = 5cm and RY = 12cm.

For More Papers and Marking Schem kcsepastpapers.com or Call: 0720502479 (a) Calculate:
(i) the length of RU.

(2 marks)

- (ii) the angle the line RU makes with the plane PQVU. (2 marks)
- (b) Find the angle between:-
- (i) line PY and the plane QRYV.

(3 marks)

(ii) the planes PQVU and PRYU.

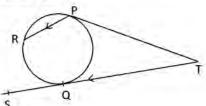
(3 marks)

Set2 Paper 2

SECTION I: (50 MARKS

Answer all questions in this section:

- A pyramid block has a square base whose side is exactly 7.5cm. Its height measured to the
 nearest millimeter is 3.5cm. Find the percentage error in calculating its volume correct to 3
 decimal places. (3 marks)
- A blend of juice is made from pineapple and passion. The cost of two limes of pineapple is 120/= and three limes of passion is 270/=. In what ratio should the juice be mixed such that by selling the mixture at 84/= per lime a profit of 20% is realized? (3 marks)
- 3. Solve for χ in $(\log_2 \chi)^2 + \log_2 8 = \log_2 \chi^4$. (3 marks)
- 4. In the figure shown **below**, angle PTS = 54° and PT and ST are tangents to the circle and that PR is parallel to TS.



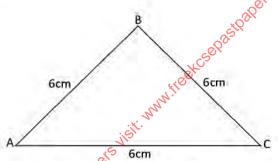
For More Papers and Marking Scheme at a Small Fee: Website: www.freekcsepastpapers.com or Call: 0720502479

Giving reasons; find the values of angles:

- (i) PRQ. (2 marks)
- (ii) RQS. (2 marks)
- 5. Given that $\tan 15^\circ = 2 + \sqrt{3}$, find without using tables or a calculator, in the form $a + 2\sqrt{c}$, the value of $\tan 75^\circ$. (3 marks)
- 6. Make P the subject of the formula:

$$\chi = \left[\frac{1}{mp^3} - A^2 \right] B \tag{3 marks}$$

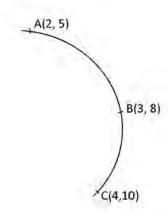
- 7. Expand $\left(3 \frac{1}{2}\chi\right)^5$ up to the 5th team. Hence use the expansion to evaluate (3.25)⁵ correct to 4 decimal places. (4 marks)
- 8. A commercial plot is valued at shs.500,000. The plot depreciates at a rate of 10% per six months for a period of 2 years. It then appreciates at a rate of 4% per quarter yearly for three years. Find the value of the plot after 5 years to nearest shillings. (3 marks)
- 9. The equation of a curve is $y = \chi^3 3\chi^2 + K\chi + 2$ and a normal is $9\sqrt{\chi} + \chi = 18$. If they intersect at $\chi = 0$; Find the value of K. (3 marks)
- 10. The figure **below** drawn to scale represents a field in the shape of an equilateral triangle of sides 120m. (4 marks)



Mr. Mutai wants to plant some tea seedlings in the field. The seedling must be at most 90m from A and nearer to B than to C. If no seedling is to be more than 60m from BC, show by shading, the exact region where the seedling may be planted within the triangle.

- 11. The product of the digits in a two digit number is 24. Four times the ten digit exceeds the unit digit by 10. Calculate the number. (3 marks)
- 12. Solve for χ in the equation $\sin^2(3\chi + 30^\circ) = \frac{3}{4}$ for $0^\circ \le \chi \le 180^\circ$. (3 marks)
- 13. A Kenya airways plane flies from point P(40°N, 45°W) to a point Q(35°N, 45°W), then to point T(35°N, 135°E). Find the shortest distance between Q and T in nautical miles. (2 marks)
- 14. The position vectors of points A and B are 2i j + 4K and 4i + 3j respectively. If point R is the mid-point of \overrightarrow{AB} . Find the magnitude of \overrightarrow{AR} . (3 mark)
- 15. Water flows through a pipe whose cross sectional radius is 3.5cm at a rate of 3m/min. Calculate how long it will take the pipe to fill a 22000 line Ken tank. (2 marks)
- 16. The figure below shows an arc of a circle through three points A, B and C.

For More Papers and Marking Scheme at a Small Fee: Website: www.freekcsepastpapers.com or Call: 0720502479



Calculate the co-ordinates of the centre of the circle.

(4 marks)

SECTION II

Answer any five questions.

17. (a) Fill the table below using the following function $y = 3^{2} + 4\chi - 2\chi^{2}$ for $-3 \le x \le 5$.

						.6.			
χ	-3	-2	-1	0	1	002	3	4	5
-2χ²	-18			0	S	8-			-50
4χ			-4		(A)		12		
3				0	Co				
У				14100					

(b) On the grid provided, draw the graph of the function $y = 3 + 4\chi - 2\chi^2$ for $-3 \le x \le 5$.

(3 marks)

GRAPH GRAPEIS TO THE PARTY OF T

- (c) Using your graph; estimate the roots of the equations:-
- (i) $3 + 4\chi = 2\chi^2$.

(2 marks)

(ii) $2\chi^2 - 3\chi - 6 = 0$.

(2 marks)

(d) State the y – co-ordinate of the maximum turning point.

(1 mark)

- 18. (a) P, Q and R are three quantities such that P varies directly as the square of Q and inversely as the square root of R.
 - (i) Given that P = 12 when Q = 24 and R = 36, find P when Q = 27 and R = 121.

(3 marks)

(ii) If Q increases by 10% and R decreases by 25%, find the percentage increase in P. (4 marks)

- (b) If Q is inversely proportional to the square root of P and P = 4 when Q = 3. Calculate the value of P when Q = 8. (3 marks)
- 19. Every morning during class time, Brenda either reads a novel or solves Mathematics questions. The probability that she reads a novel is $\frac{4}{5}$. If she reads a novel, there is a probability of $\frac{3}{7}$ that she will fall asleep. If she solves Math's questions there is a probability of $\frac{1}{2}$ that she will fall asleep. Sometimes the teacher on duty enters Brenda's classroom.

Using a tree When Brenda is asked whether she had been a sleep, there is a probability of $\frac{1}{5}$

that she will admit that she had been asleep and a probability of $\frac{3}{5}$ that she will claim to

have been asleep.diagram;

Find the probability that

(i) She sleeps and admits it.

(2 marks)

(ii) She sleeps and does not admit.

(2 marks)

(iii) She does not sheep but claims to have been asleep.

(2 marks)

(iv) She does not sleep and says that she has not been a slept.

(2 marks)

(v) She sleeps and admits and changes her mind.

(2 marks)

20. The table below shows the distribution of marks scored by 50 students of Afraha high.

Marks	11 - 20	21 - 30	31 -40	41 - 50	5 1 - 60	61 - 70	71 - 80	81 - 90	91 - 100
No. of students	2	3	5	6,00	12	10	6	4	2

Calculate:-

(a) interquartile range.

(3 marks)

(b) Mean mark.

(3 marks)

c) Standard deviation

(4 marks)

21. Two quantities P and r are connected by the equation P = Krⁿ. Where k and n are constants. The table of values of P and r is given below.

				00		
Р	1.2	1.5	2.0	2.5	3.5	4.5
r	1.58	2.25	3.39	4.774	7.86	11.5

(a) State the linear equation connecting P and r.

(1mark)

- (b) (i) Using a suitable scale, draw a suitable line graph from the above data on the grid provided. (5 marks)
- (ii) Using your graph, estimate the values of K and n.

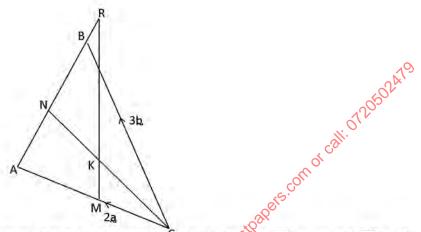
(3 marks)

(c) Find the relation connecting P and r.

(1 mark)

CONTRACTOR STATE		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	14-14-14-14-1	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	1-14-1-1-1-1	
Erik Andalorik (Erik, A. A. Bayon), and					A few board and the few	
H-101-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-			110000111111111111111111111111111111111			
	1101-11-01		14-11-14		1-14-1-1-1	
			1111111111111111			
	1 - 1 - 1 - 1 - 1 - 1 - 1				04-14-14-14-14-14	
	1101-1-11					
11711111111	4-1-1-1-1-1-1-1-1	-p-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-			111111111111111111111111111111111111111	at the state of the state of the state of

For More Papers and Marking Scheme at a Small Fee: Website: www.freekcsepastpapers.com or Call: 0720502479



The diagram **above** shows triangle ABC, such that $\overrightarrow{CA} = 2a$ and $\overrightarrow{CB} = 3b$. M is the midpoint of \overrightarrow{CA} N is a point on AB such that 2 AN = NB and R is a point on AB produced such that 2 AR = 5RB. If K is the point of intersection of MR and CN,

(a) Express in terms of a and by

1>	(i)	AB.	(1 mark)
	(ii)	CN. Jišit.	(2 marks)
	(iii)	BR.	(1 mark)
	(iv)	MR.	(2 marks)
	(v)	CK. AST	(2 marks)
(b)	Find	the ratio CK: KN.	(2 marks)

23. The product of the first three terms of geometric progression is 729. If the first term is a and the common ratio is r.

(a) Express r in terms of a. (2 marks)

(b) Given the sum of the three terms is 39.

(i) Find the values of a and r and hence write down two possible sequences each

For More Papers and Marking Scheme at a Small Fee: Website: www.freekcsepastpapers.com or Call: 0720502479

up to the 4th term. (6 marks)

Find the product of the 10th term of the two sequences. (ii)

(2 marks)

24. The velocity of a particle, Vm/s, moving in a straight line after t seconds is given by:-

 $V = 3t^2 - 3t - 6$ Find:-

the acceleration of the particle after 2 seconds.

(2 marks)

- cicle. of call. or about the second of call. the distance covered by the particle between t = 1 and t = 4 seconds.(3 marks) (ii)
- (iii) the time when the particle is momentarily at rest.

(2 marks)

(iv) The maximum velocity attained by the particle. (3 marks)

Set3 121/1 MATHEMATICS PAPER 1

TIME: 2 1/2 HOURS

SECTION I (50MARKS)

Without using tables or calculators, evaluate.

(3mks)

- Without using a calculator or tables, find the value of y given that $y = (a+b)(x-c)^2$ and a = 5, 2 b = 6, x = -3 and c = 2. (3mks)
- Solve the following inequalities and represent the solution on a single number line. 3

$$3 - 2x < 5$$

$$4 - 3x > -8$$
.

4 Use the reciprocal, square and square-root tables to evaluate to 4 significant figures the expression. (4mks)

$$\sqrt{\frac{1}{24.56} + 4.346^{-2}}$$

5 A Kenyan bank buys and sells foreign currencies at the exchange rates shown below.

BUYING (KSHS)

1Euro

147.56

148.00

SELLING (KSHS)

1U.S Dollar

74.22 74.50

An American arrived in Kenya with 20,000 Euros. He converted all the Euros into Kenyan Shillings at the bank. He spent Kshs.2,510,200 while in Kenya and converted the remaining Kenya shillings into U.S Dollars at the bank. Find the amount in dollars that he received. (3mks)

- Determine the quartile deviation of the following data 4,9,5,4,7,6,2,1,6,7,8,3.(3mks) 6
- Translation Q is represented by the column vector, $\frac{66}{3}$ and another translation R by the 7

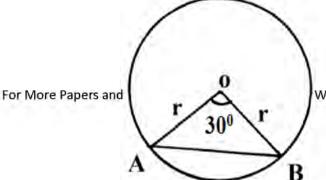
column vector $\begin{pmatrix} -4 \\ 2 \end{pmatrix}$. A point S is mapped onto a point T by Q and a point T is mapped into

a point U by R.If point U is (8, -4), determine the co-ordinates of point S.

- Find the equation of the perpendicular line that passes through the mid point X of C(-7, 8 8) and D (3, -8) (4mks)
- 9 Mbom paid Kshs. 160 for a blowse after getting a discount of 20%. The vendor made a profit of 30% on the sale of this bouse. What percentage profit would the vendor have made if no discount was allowed? (3mks)
- 10 The base of a triangle is 3cm longer than its height. Given that the area of the triangle is 35cm², determine the height of the triangle. (3mks)
- 11 Solve for X in the equation. (2mks)

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

12 The figure below shows a circle centre O. Chord AB subtends 30° at the centre. If the area of the minor segment is 5.25cm², find the radius of the circle.



Website: www.freekcsepastpapers.com or Call: 0720502479

- A certain two digit number is equivalent to five times the sum of the digits. It is found to be 9 less than the number formed when the digits are interchanged. Find the number.(3mks)
- The surface area of two similar bottles are 12cm² and 108cm² respectively. If larger one has a volume of 810cm³. Find the volume of the smaller one. (3mks)
- The exterior angle of a regular polygon is equal to one third of the interior angle. Calculate the number of sides of the polygon and give its name. (3mks)
- King'oo spends one-third of his salary on food, one quarter on rent, three fifth of the remainder on transport and saves the rest. If he spends Kshs. 1800 on transport, find how much money he saves.

 (3mks)

SECTION II (50MARKS) Choose any five questions only

- John bought 3 brands of tea A, B and C.The cost price of the brands were sh.25,sh.30 and sh.45 per kilogram respectively. He mixed the brands in the ratio of 5:2:1 respectively. After selling the mixture, he made a profit of 20%.
 - a) How much profit did he make per kilogram of the mixture. (4mks)
 - b) After one year, the cost price of each brand was increased by 12%.
 - For how much did he sell one kilogram of the mixture to make 20% profit. (3mks)
 - ii) What would have been his percentage profit if he sold one kilogram of the mixture at shs.40.25? (3mks)
- The diagram below represents a solid consisting of a hemispherical bottom and a conical frustrum at the top. Q₄O₂=4cm, O₂B=R=4.9cm



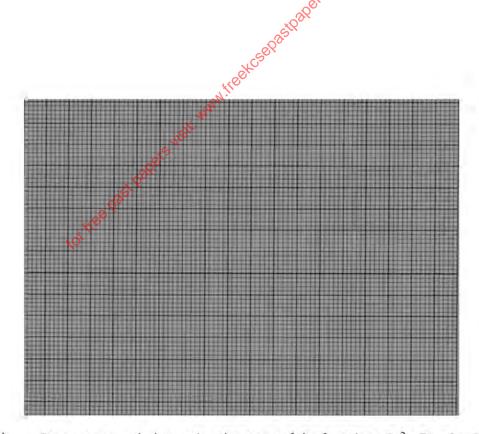
Determine the height of the chopped off cone and hence the height of the bigger cone.

(4mks)

- b) Calculate the surface area of the solid.
- c) Calculate the volume of the solid. (4mks)
- The bill for completely covering the floor of a rectangular room with carpet

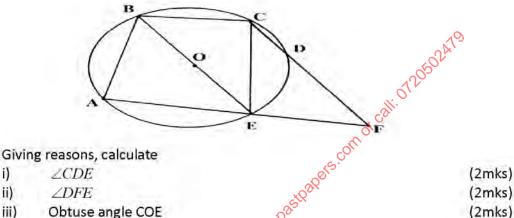
Costing shs.70 per square metre is shs.1960.If one side of the room is X m long; show that the length of the other side is $\frac{28}{x}$ m (3mks)

- b) By leaving a uniform width of $\frac{1}{2}$ m uncovered all round, shs.700 could have been saved. Use this information to form an equation in x and show that it reduces to $X^2 11x + 28 = 0$. (4mks)
- c) Solve the equation and hence find the dimensions of the room. (3mks)
- The angle of elevation of the top of a flagpole from a point A on a level ground is 13°. The angle of elevation of the top of the flagpole from another point B nearer the pole and 12m from A is 30°. Find;
 - a) i) The height of the flagpole (5mks)
 - ii) The distance from point B to the top of the flagpole. (2mks)
 - b) Tan $105^{\circ} = -2 \sqrt{3}$. Determine the value of Tan 15° in surd form. (3mks)
- 21 a) Draw the graph of the function below on the grid provided $y = 2x^2 7x 2$ for the values of $-1 \le X \le 6$ (5mks)



b) From your graph determine the roots of the function. $2x^2 - 7x - 2 = 0.(1mk)$

- c) By drawing a suitable graph of function y = 2x 7 on the same axis, solve the simultaneous equations $y = 2x^2 - 7x - 2$ and y = 2x - 7. (4mks)
- 22 Three people; A, B and C work together to make a certain number of tins. If person C was to work alone he will take 4 4/9 hours to complete the job. If all working together they will take 1hr 40min to complete the job. They all started working together however person B left after first 40min, while person C left 20min later. Person A took a further 1hr 46min.Calculate how long it would take if all the tins were made by;
 - Person A alone? a) (6mks)
 - Person B alone? b) (2mks)
 - c) Person A and C alone? (2mks)
- In the figure below O, is the centre of the circle. \angle AEB = 50°, \angle EBC = 80° and 23 $\angle ECD = 30^{\circ}$.



- ii) Obtuse angle COE
- iv) $\angle ADE$ (2mks) V) $\angle CAE$ (2mks)
- 24 Patients who attended clinic in one week grouped by age as shown in the table below.

X	No. of patients
Age (years)	
0 - 5	14
0 - 5 5 - 15	41
15 - 25	59
25 - 45	70
45 - 75	15

Estimate the mean age. a)

i)

(4mks)

1 Use logarithms only to evaluate,

$$4\sqrt{\frac{72.36 \times 0.69^{2}}{\log 168.4}}$$

Correct to four significant figures.

(4mks)

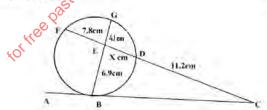
2 Make 4 the subject of the formula.

$$t = \frac{2m}{n} \sqrt{\frac{L - A}{3k}}$$
 (3mks)

- 3 Express the recurring decimal below as a fraction; 4.372 leaving your answer in the form of ^a/_b where a and b are integers. (2mks)
- Determine the amplitude, period and the phase angle of the wave represented by the 4 equation.

$$y = \frac{-2}{3} \sin\left(\frac{2}{5}x + 40^{\,0}\right) \tag{3mks}$$

- $y = \frac{-2}{3} \sin\left(\frac{2}{5}x + 40^{\circ}\right)$ $Given that \frac{3}{3+\sqrt{5}} + \frac{3\sqrt{5}}{3-\sqrt{5}} = a + b\sqrt{5}$. Find the values of a and b 5
- 6 The dimensions of a cuboid are 4.5cm by 3.5cm by 2cm. Find the percentage error in its volume giving your answer to 2 significant figure. (3marks)
- 7 A car was valued at kshs.500,000 in January 2010. Each year its value depreciated at 12% p.a. After how long would the value depreciate to kshs. 250,000? (3mks)
- Given that the matrix $\begin{pmatrix} 5-x & 2 \\ 3x & 4 \end{pmatrix}$ whas no inverse, find x. 8 (2mks)
- 9 In the figure below ABC is a tangent to the circle at point B.Given that BE =6.9cm, FE=7.8cm,GE=4.1cm,DC=41.2cm and ED = xcm.Determine the length BC,give your answer in four significant figures (4mks)



- 10 Find the radius and the co-ordinates of the centre of the circle whose equation is $\frac{1}{2} x^2 + \frac{1}{2} y^2 = 3x - 5y - 9$.
- 11 A quantity P varies partly as t and partly as the square of t. When t = 20, p = 45, and when t = 24, p = 60.
 - a) Express p in terms of t. (2mks)
 - b) Find p when t = 32. (2mks)

- The position vectors of points A and B are a = 2i + j 8k and b = 3i + 2j 2k respectively. Find the magnitude of AB. (3mks)
- Write the expression of $(2 \frac{1}{5}x)^6$ up to the term in x^4 . Hence use the expansion to find the value of $(1.96)^6$ correct to 3 decimal places. (4mks)
- Five men working 8 hours daily complete a piece of work in 3 days. How long will it take 12men working 5hours a day to complete the same work. (2mks)
- Find the integral values of x which satisfy 6 < 2x + 1 and 5x 29 < -4. (3mks)
- In a fund-raising committee of 45 people, the ratio of men to women is 7:2. Find the number of women required to join the existing committee so that the ratio of men to women changes to 5:4. (3mks)

SECTION II (50 MARKS)

Attempt any five questions from this section

17 The table below gives the income tax rates.

Income (k£)	Rate (p.a)
1-1980	10%
1981-3960	15%
3961-5940	25%
3941-7920	35%
7921-8650	45%
Over 8651	50%

- a) Calculate income tax of Wanga's taxable income of kshs.50,400 per month allowing a family relief of kshs. 520 per month. (8mks)
- b) Calculate the total tax as a percentage of taxable income (2mks)
- a) Draw ΔPQR whose vertices are P(1,1)Q(-3,2) and R(0,3) on the grid provided
 - b) Find and draw the image of ΔPQR under the transformation whose matrix is

$$\begin{pmatrix} 3 & 0 \\ 1 & 1 \end{pmatrix}$$
 and label the image P'Q'R' (2mks)

 $P^{\prime}Q^{\prime}R^{\prime}$ is then transformed into $P^{11}\,Q^{11}\,R^{11}$ by the transformation with the

$$\begin{pmatrix} -1 & 0 \\ 1 & 3 \end{pmatrix}$$
 matrix (2mks)

18

- c) Find the co-ordinates of P¹¹ Q¹¹ R¹¹ and draw P¹¹ Q¹¹ R¹¹ (3mks)
- d) describe fully the single transformation which maps PQR onto P¹¹ Q¹¹ R¹¹ find the matrix of this transformation (3mks)
- 19) The probability of passing K.C.P.E depends on performance in the school mock examination. If the candidate passes in mock, the probability of passing K.C.P.E is 4/5. If the candidate fails

in mock, the probability of passing K.C.P.E is $^3/_5$. If the candidate passes K.C.P.E, the probability of getting employed is $^1/_3$, the probability of passing mock is $^2/_3$,

a). Draw a well label tree diagram to represent the above information

(2mks)

b) Use your tree diagram in (a) above to find the probability that she

i) Passes KCPE exams (2mks) ii) Gets employed (2mks)

iii) Passes KCPE and gets employed (2mks)

v) Passes mock and gets employed

20. The diagram below shows triangle O.A.B in which N is the mid point of AB.Mis a point on OA such that OM: MA=2:1.Lines ON and BN meet at X such that vector OX=h vector ON and ,MX= kMB

Given that vector OA =a and vector OB=b

Express the following interms of a and b

a) Vector AB (1mk)
b) Vector ON (2mks)
c) Vector BM (1mk)

a. By expressing vector OX in two different ways, determine the values of h and k

(6mks)

(2mks)

21). Using a ruler and a compass only

a) Construct a parallelogram ABCD such that AB = 10cm BC=7cm and < ABC 105° (5mks)

b) Construct the loci of P and Q within the parallelogram such that AP < 4cm and BQ < 6cm (2mks)

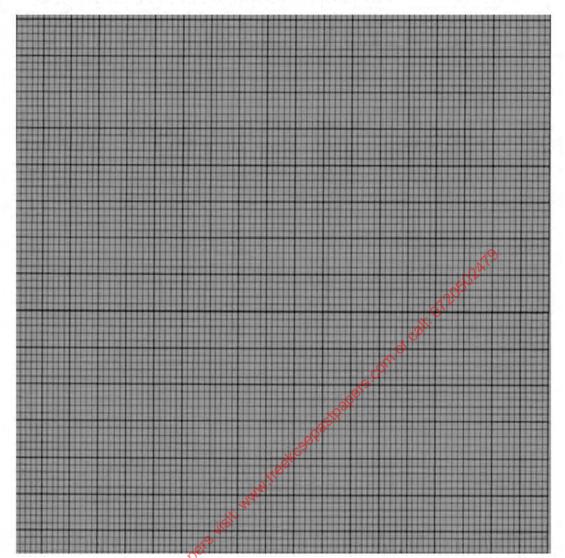
c) Calculate the area within the parallelogram and outside the region bounded by the two loci (3mks)

22. a) Complete the table below

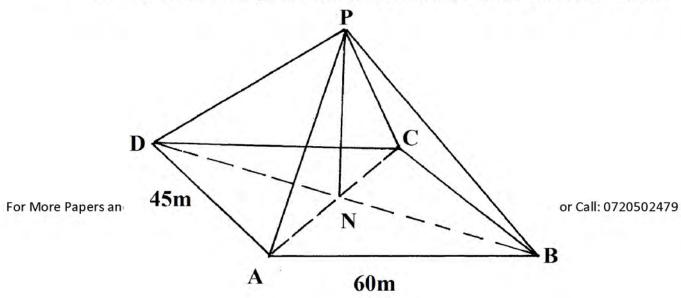
x	-30	0	30	60	90	120	150	180	210	240	270
Sin (x+30)	0	0.50		1.00	0.87			-0.50			-0.87
Cos (x-15)	0.71	O HE	0.97		0.26				-0.97	-0.71	-0.26

- b) Draw the graph of $y = \sin(x+30)$ and $y=\cos(x-15)$ for $-30 \le X \le 270^{\circ}$ on the same grid. Take 1cm to represent 30° on x-axis and 1cm to represent 0.2units on y-axis.
- a) Using your graph drawn (b) above

i) Find the values of x for which $\cos (x-15) - \sin (x+30) = 0$ (2mks)



- a. State the co-ordinates of the turning point of the curvefor the function y =cos (x-15) on the negative section of y-axis (1mk)
- b. Estimate the angle corresponding to $\cos(x-15) = 0.6$
- 23. The figure below shows rectangular plot ABCD with AB =60m and BC=45m.
 PN is a vertical pole of length 30m to which four taut wire PB₁, PC1,PD and PA are attached



Calculate

a) length of the projection of PCon the plane ABCD

(2mrks)

b) the angle PC made with the base ABCD

(3mks)

c) The angle between the planes PBC and ABCD

(3Mrks)

- If point A is to be the North of point C. calculate the bearing of B from A (2mks)
- 24. a) The first term of an arithmetic progression (AP) is 2.The sum of the first 8 terms of AP is 256.
 - i) Find the common difference of AP

(2mks)

ii) Given that the sum of the first n terms of the AP 416 Find n

(2mks)

- b) The 3rd, 5th, and 8th terms of another AP forms the first three terms of a geometric progression (GP). If the common difference of the AP is 3. Find
 - i) The first term of GP

(4mks)

ii) The sum of the first 9 terms of the Geto 4 s.f

(2mks)

(3mks)

Set4 121/1

MATHEMATICS

PAPER 1

TIME: 2 1/2 HOURS

SECTION 1 (50 MARKS)

Answer all questions in the spaces provided.

- 1. Evaluate without using a calculator $\frac{\left(2\frac{3}{7} 1\frac{5}{6}\right) \div \frac{5}{6}}{\frac{2}{3}of 2\frac{1}{4} 1\frac{1}{7}}$ (3mks)
- 2. Calculate the standard deviation for the data below 5,8,13,12,7,10,8,15,3,14

- 3. A straight line L_1 is perpendicular to another line L_2 whose equation is 3y+4x=12. If the two lines meet at point P which lines on the x-axis, find:
 - (i) The co-ordinate of point P

(1mk)

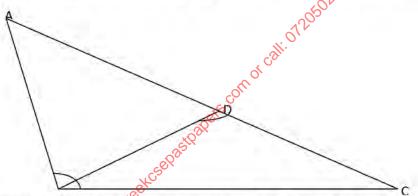
(ii) The equation of line L1 in the form y=mx+c

(3mks)

- 4. Mr. Ochuodho who deals in electronics sells a radio to a customer at Kshs. 1,440 after giving him a discount of 10% but finds that he still makes a 20% profit. Find the profit Mr. Ochuodho would make if he does not give a discount. (3mks)
- 5. A solid block in the shape of a cylinder has a height of 14cm and weighs 22kg. If it is made of material of density 5g/cm³, find the radius of the cylinder. Take $\pi = \frac{22}{3}$ (3mks)
- 6. Simplify completely by factorization $\frac{20-45x^2}{6x^2-x-2}$

(3mks)

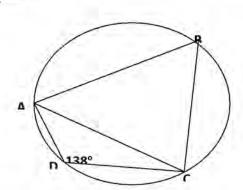
7. The figure below shows a triangle ABC not drawn to scale, D is a point on line AC. Given that BC=14cm, DC=7cm and ∠ABC=∠BDC. Find the length of AD (3mks)



8. Solve the simultaneous inequalities given below and list all the integral values of x (3mks)

$$\frac{3 - x}{2} \ge \frac{x+1}{3} \ge \frac{2x+1}{-3}$$

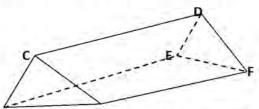
9. In the circle drawn to scale below A,B,C and D are points on its circumference, Chord BC=AC and angle ADC=138°



Giving reasons calculate the angle ACB

(3mks)

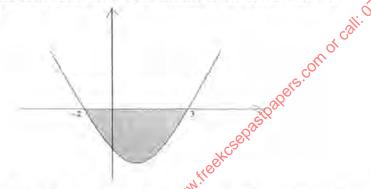
The figure below shows a triangular prism ABCDEF. AF=CD=BE=18cm, The ends ABC and EDF are equilateral triangles of side 8cm. calculate the angle plane ABD makes with the lie CD (3mks)



- 11. Patricia a student at Ongeti mixed Secondary bought 5 pens and 3 exercise books from Solving supermarket at Kshs. 135, at the same time Jane her class mate also bought 4 pens and 5 exercise books and spent Ksh. 25 more than Patricia. Find the cost of each pen and exercise book (4mks)
- 12. Evaluate using mathematical tables only expressing your answer to 4 significant figures

$$\frac{4}{0.2356} + (0.9873)^3$$
 (3mks)

13. The diagram below shows the sketch of the curve y=x²-x-6



Using the mid-ordinate rule with rive rectangles, calculate the area of the shaded region (4mks)

- 14. Given that sin (3x-35)° cos (x+20)°= 0 and x is an acute angle, find its value (2 mks)
- 15. A train of length 80m crosses a bridge 20 m long in 5 seconds. Calculate the average speed of the train in km/h (3mks)
- 16. Mr. Ombogo the principal of Chiga secondary would wish to cover the floor of the new administration block using the square tiles. The floor is a rectangle of sides 12.8m by 8.4m. Find the area of each of the largest tiles which can be used to fit exactly without breaking (3mks)

SECTION B (50 MARKS)

Answer ONLY FIVE questions in this section in the spaces provided

- 17. Four schools Wiobiero, Asumbi, Nyawita and Angiro are such that Wiobiero is 15km from Asumbi on a bearing of 158°, Nyawita is to the west of Asumbi and 20km away while An'giro is to the South of Nyawita and on a bearing of 240° from Wiobiero.
 - (a) Using a scale of 1:400,000 draw a scale diagram showing the relative positions of the four schools. (5mks)
 - (b) Using your diagram determine the distance and bearing of Ang'iro from Asumbi (2mks)

- (c) A mast is to be erected so that its equidistant from Asumbi and Nyawita and 20km from Ang'iro on the same diagram show the position of the mast and find its distance from Wiobiero (3mks)
- 18. The table shows the marks obtained by 40 candidates in an examination

Marks	5-14	15-29	30-34	35-44	45-49
Frequency	2	12	7	15	x

- (a) Find the value of x (2mks)
- (b) On the grid provided below draw a histogram to represent the data(5mks)



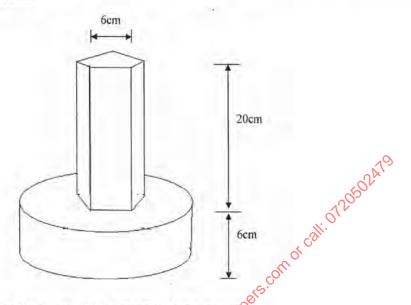
drawing a straight line on the graph above determine the median mark (3mks)

- 19. A matatu left Oyugis for Homabay town 51km away at an average speed of 48km/h at 7.00am. At 7.30am a Boda boda left Homabay for Oyugis travelling along the same route at an average speed of 60km/h
 - (a) The time when Boda boda meet the matatu (3mks)
 - (b) How far from Oyugis did the Boda boda meet the matatu (3mks)
 - (c) After meeting the Boda boda the matatu stopped for fifteen minutes before resuming the journey. At what speed should it travel then to reach Homabay at the same time when the Boda boda reached Oyugis (4mks)

By

- 20. A group of people planned to contribute equally towards a water project which needed Ksh.2,000,000 to complete. However 40 members of the group withdrew from the project. As a result each of the remaining members were to contribute Kshs.2,500 more
 - (a) Find the original number of members in the group (5mks)
 - (b) Forty five percent of the value of the project was funded by constituency development fund(CDF). Calculate the amount of contribution that would be made by each of the remaining members. (3mks)

- (c) Members contribution were in terms of labour provided and money contributed. If the ratio of the value of labour to the money contribution was 6:9. Calculate the total amount of money contributed by the members (2mks)
- 21. The figure below shows a prism whose cross section is a regular pentagon of side 6cm and whose length is 20cm joined to a cylinder of radius 14cm and height 6cm to form a the model of a solid



(a) Calculate the cross section area of the pentagon

(3mks)

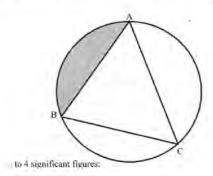
(b) Calculate the total volume of the solid

- (4mks)
- (c) The model represents a pillar of total height 5.2m, calculate the volume of the actual solid in m³ (3mks)
- 22. The displacement of a particle S metres, t seconds after passing a fixed point O is given by S=3+2t-5t²

Calculate:

(a) The displacement of the particle 2 seconds later	(2mks)
(b) The time taken for the particle to return to O	(2mks)
(c) The maximum displacement of the particle	(3mks)
d) The initial velocity of the particle	(2mks)
(e) The acceleration of the particle after t seconds	(1mk)

23. The diagram below shows a circle ABC with AB=12cm, BC=15cm, and AC=14cm



Calculate to 4 significance figures:

(a) The angle ACB	(3mks)
(b) The radius of the circle	(3mks)

(c) The area of the shaded region (4mks)

24. OABC is a trapezium such that the coordinates of O,A,B and C are (0,0),(2,-1) (4,3) and (0,y)

(a) Find the value of y (2mks)

(b) M is the mid-point of AB and N is the mid point of OM. Find in column form

(i) The vector AN (3mks)
(ii) The vector NC (2mks)

(ii) The vector NC (2mks)
(iii) Vector AC (1mk)

(c) Hence show that A, N and C are collinear (2mks)

Set4 Paper 2

SECTION I (50 MARKS).

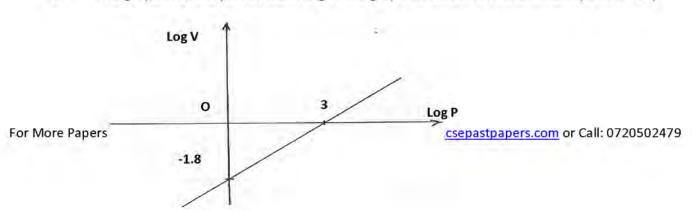
Answer All Questions from this section in the spaces provided

Evaluate using logarithms

(4mks)

$$\sqrt[5]{\frac{41.9x \log 1.159}{2.3x 10^3}}$$

- 2. A business lady bought 180 mangoes at Shs.60 for every five mangoes. She sold some of them at Shs.30 for every three and 33 ½% the rest at Sh.30 for every four. If she made a 33 ½% loss, calculate the number of mangoes sold at Shs.30 for every four (3mks)
- 3. Write an equation of a circle that has a diameter whose end points are at (2,7) and (-6, 15) in the form $x^2+y^2+ax+by+c=0$ where a,b and c are integers (3mks)
- 4. Miss Jaber bought a motor cycle at Shs.160,000. The depreciation rate was 6% per annum determined semi annually. How long will it take the motor cycle to be valued at a quarter of its original cost (3mks)
- 5. Given that d = 3 express y in terms of d (3mks)
- 6. An arithmetic progression of 41 terms in such that the sum of the first five terms in 560 and sum of the last five terms is -250. Find the first term (3mks)
- (a) Expand and simplify the binomial expression (2x-y)⁵ (1mk)
 (b) Use the first four terms of the expansion above to approximate the value of (3.8)⁵ (2mks)
- The graph below is part of the straight line graph obtained from the initial equation V=apⁿ



(a) Write down the equation of the straight line in the form y=mx+c

(1mk)

(b) Use the graph to calculate the values of a and n

(2mks)

9. In the figure below kite ABCD represents a part of a county government logo. The logo has symmetry order 4 about O. Complete the figure to show the logo (2mks)



- 10. The velocity V of a body moving in a straight line at any time t is given by V=3t-2. Its distance S at time t=0 is equal to 4m. Calculate the distance when t=4 seconds (3mks)
- 11. The sides of a triangle were measured and recorded as 4cm, 6.2cm and 9.50cm. Calculate the percentage error in its perimeter, correct to 2 decimal places (3mks)
- 12. The size of an interior angle of a regular polygon is x² while its exterior angle is 3x. Find the number of sides of the polygon (4mks)
- 13. Without using logarithms table, solve the equation

(3mks)

(2mks)

(2mks)

$$\log(5x - 4) = \log(x - 2) + \frac{1}{2}\log 27$$

- 14. A rectangle ABCD is such that AB=6cm, and BC=5cm. A variable point P moves inside the rectangle such that AP ≤ PB and AP >2.5cm. Show the region where P lies (3mks)
- 15. Without using a calculator or mathematical table, express $\frac{\sin 60^{\circ\prime}}{1-\cos 30^{\circ}}$ (3mks)
- In surd form and simplify

 16. An angles of 0.9 radians at the centre of the circle subtends an arc of length 28.8cm. Find
 - (a) The radius of the circle
 (b) The area of the sector enclosed by the arc and radii

SECTION B (50 MARKS)

Answer any five questions from the section in the spaces provided .

17. Mr. Alvin George, a civil servant gets a monthly salary of Shs. 48,000. He lives in a government house where he pays nominal rent of Shs.2500. Besides this he gets an automatic house allowance of Shs.12000 and medical allowance of shs.8000 per month. He gets a gamily relief of sh.1065 per month. The rates of income tax are shown below

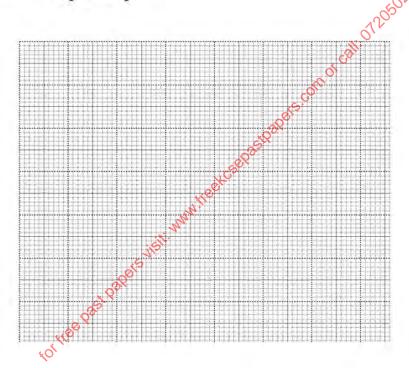
Income tax in K£ per month rates in shs. Per K£

1-400 10%
401-1200 15%
1201-2400 25%
2401-3600 35%
3601 and above 45%
Calculate:
(a) His taxable income per month in Kenya pounds
(b) Net tax per month in Kshs.

- 18. The vertices of a rectangle are A(-1,-1) B(-4,-1) C)-4,-3) and D(-1,-3)
 - (a) On the grid provided, draw the rectangle and its image A_IB_IC_ID under a transformation

whose matrix is $\begin{bmatrix} -2 & 0 \\ 0 & -2 \end{bmatrix}$

(c) Net salary



- (b) A_2, B_2, C_2, D_2 is the image of A_1, B_1, C_1, D_1 under a transformation matrix $P = \begin{bmatrix} \frac{1}{2} & 1\\ 1 & \frac{1}{2} \end{bmatrix}$
- (i) Determine the co-ordinates of A₂B₂C₂D₂

(2mks)

(ii) On the same grid draw the quadrilateral A₂B₂C₂D₂

(1mk)

(2mks)

(6mks)

(2mks)

(c) Find the area of A₂B₂C₂D₂

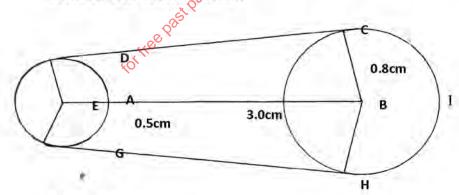
(3mks)

- 19. A solution whose volume is 120 litres is made up of 35% water and the rest alcohol. When y litres of alcohol is added the percentage of water drops to 15%
 - (a) Find the value of y

(4mks)

- (b) The new solution is diluted further by addition of seventy litres of water. Calculate the percentage of alcohol in the resulting solution (2mks)
- (c) A blend is made by mixing 10 litres of the solution in (b) above with 20 liters of the original solution. Calculate in the simplest form, the ratio of water to that of alcohol in the blend (4mks)
- 20. A passenger plane takes off from airport A(60°N,5°E) and flies directly to another airport B(60°N,17°E) and then flies due North for 600 nautical miles (nm) another airport C
 - (a) Find the position of airport C (3mks)
 - (b) Find the distance between airport A and B in nautical miles (3mks)
 - (c) If the plane at an average speed of 300knots, find total flight time (2mks)
 - (d)Given that the plane left air port A at 9.20am. Find the local time of arrival at airport C

 √○ (2mks)
- 21. In a certain country, the probability of a school A topping in county exams is 1/3. If it tops the probability of it topping in KCSE is 5/7 otherwise the probability of it topping in KCSE is 2/9. If the school tops in KCSE the probability of its appearing in the newspaper is 2/5, otherwise the probability of its appearing in newspaper is 4/11
 - (a) Draw a tree diagram to represent the above information (2mks)
 - (b) Use the tree diagram to find the probability that:
 - (i) The school tops in the two exams and appears in the newspaper (2mks)
 - (ii) The school did not appear in the newspaper (2mks)
 - (iii) The school topped in atleast one exam and did not appear in the newspaper (2mks)
 - (iv) The school appeared in the newspaper (2mks)
- 22. The diagram below shows a design model of a race course drawn to scale of 1:5000,000. It consists of two circles centre A and B radii 0.5cm and 0.8cm respectively and the distance between their centres is 3.0cm



Calculate in km:

(i) The length of leg CD (2mks)

(ii) The length of the leg DEG (π =3.142) (2mks)

(iii) The length of the leg HIC (π =3.142) (2mks)

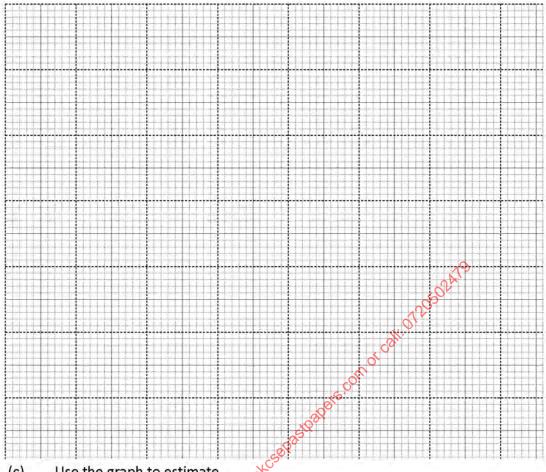
- (iv) During a race, the course is manned by race officials placed 500m apart and each is paid Kshs.2300/= per day. How much is needed to pay race officials for one day event (4mks)
- 23. A relief organization has to transport atleast 80 people and atleast 18 tonnes of supplies to a site. There are two types of vehicles available type A and B. type A can carry 900kg of supplies and 6 people while type B can carry 1350kg of supplies and 5 people. There are at most 12 vehicles of each type available. By putting X to represent the number of vehicles of type A and y to represent the number of vehicles of type B
 - (a) Write down all the four inequalities to represent the above information (4mks)
 - (b) On the grid provided, draw all the inequalities in (a) above
 - (c) Use the graph in (b) above the determine the least number of vehicles required at the site

(4mks

24. Given that y=2x°+ cos ½ x°, complete the table below for the missing values of y, correct to 1 decimal place

Xo	00	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°	360°
Y=sin 2x+ cos ½ x	1	1.8			-0.4	-0.6		at paper	0.4	-0.7			-1

(b) On the grid provide below, draw the graph of y=sin $2x^{\circ}$ +cos ½ x° for $0 \le x \le 360^{\circ}$ Take the scale 1cm for 30° on the x-axis. 2 cm for 0.5 units on the y -axis. (4mks)



(c) Use the graph to estimate

(i) The minimum value of y

(ii) The value of X for which $\frac{1}{2} \sin 2x + \frac{1}{2} \cos \frac{1}{2} x \ge 0.25$

On the graph provided, draw a histogram to represent the distribution. torfiee Past padr

(6mks)

Set5

121/1 **MATHEMATICS** PAPER 1

TIME: 2 1/2 HOURS

SECTION A: Answer all questions

Evaluate without using a calculator or Mathematical tables leaving your answer in the simplest form. (3mks)

$$\frac{\frac{4}{11} \ of \left(\frac{3}{4} - \frac{1}{20}\right)}{\left(3 + \frac{1}{3}\right) \div \left(1 + \frac{1}{10}\right)}$$
 For More Papers and Ma

2: Website: www.freekcsepastpapers.com or Call: 0720502479

2. A Kenya bank buys and sells foreign currencies as shown.

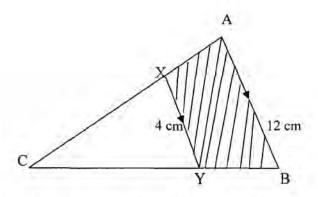
	Buying (Ksh)	Selling (Ksh)
1 Euro	84.15	84.26
100 Japanese Yen	65.37	65.45

A Japanese travelling from France to Kenya had 5000 Euros. He converted all the 5000 Euros to Kenya shilling at the bank. While in Kenya, he spent a total of Ksh.289850 and then converted the remaining Kenya shilling to Japanese Yens at the bank. Calculate the amount in Japanese Yen that he received. (3mks)

- 3. Line L1 passes through the points A (1, -2) and B (3, -4). Find the equation of line L2 passing through the mid-point of AB and perpendicular to L1, leaving your answer in the form ax+by+c=0. (4mks)
- 4. The curved surface area of a cylindrical container is 1980cm2. If the radius of the container is 21cm, calculate to one decimal place the capacity of the container in litres (3 mks) $(\text{Take } \pi = \frac{22}{7}).$
- 5. State all the integral values of a which satisfy the inequality. (4mks) $\frac{3a+2}{4} \le \frac{2a+3}{5} \le \frac{4a+15}{6}$
- 6. Using a pair of compasses and a ruler only construct a triangle ABC such that AB= 4cm, BC = 6cm and ZABC = 135°. (2mks)
 - (b) Construct the height of triangle ABC in (a) above taking AB as the base, hence calculate the area of triangle ABC. (2 mks)
- 7. One interior angle of a polygon is equal to 800 and each of the other interior angles are 128°. Find the number of sides of the polygon. (3 mks)
- 8. Given that tan c = 0.75, without using tables or a calculator find cos (180— ct) (3mks)
- 9. Simplify: (3 marks)

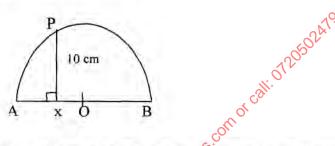
$$\left[\frac{X^3-XY^2}{X^4-Y^4}\right]^{-1}$$

10. In the figure below, lines AB and XY are parallel.



If the area of the shaded region is 36 cm2, find the area of triangle CXY. (3 marks)

11. In the figure below 0 is the centre of the circle diameter AB. <AXP = 900, AX 4cm and PX 10 cm. Calculate the radius of the semi-circle. (3 mks)



12. All prime numbers between ten and twenty are arranged in descending order to form a number.

(i) Write down the number.

(1 mk)

- (ii) State the total value of the third digit of the number formed in (i) above. (1 mk)
- 13. Find the value of x in the following equations:

(3mks)

$$(4)^{-2x} = (\frac{1}{32})^{3x-4}$$

14. The marked price of a car in a dealer's shop was Kshs 450,000. Wekesa bought the car at 7% discount. The dealer still made a profit of 13%. Calculate the amount of money the dealer had paid for the car. (3 mks)

15. Use tables of cubes, square roots and reciprocals to evaluate.

(3mks)

$$\frac{3}{(0.3375)^3 - \sqrt{337.5}}$$

16. Without using tables or a calculator, evaluate

(3mks)

$$\frac{(-2) x7 + (-4) \div (-3)}{3x(-2) + 5x(-4)}$$

17. (a) A bus traveling at 99km/hr passes a checkpoint at 10.00am and a matatu travelingati32kmihr in the same direction passes through the check point at 10.15am. If the bus and the matatu continue at their uniform speeds, find the time the matatu will overtake the bus. (6 mks)

b) Two passenger trains A and B which are 240m apart and travelling in opposite directions at 164km/h and 88km/h respectively approach one another on a straight railway line.

Train A is 150 metres long and train B is 100m long. Determine the time in seconds that elapses before the two trains completely pass each other. (4 mks)

18. The vertices of triangle PQR are P(O,O), Q(6, 0) and R(2, 4)

(a) Draw triangle PQR on the grid provided.

(lmk)

- b). Triangle P1Q1R' is the image of a triangle PQR under an enlargement scale factor, ¼ and centre (2, 2). Write down the coordinates of triangle P¹Q¹R¹ and plot on the same grid. (2 mks)
- c). Draw triangle P¹¹Q¹¹R¹¹ the image of triangle P¹Q¹R¹ under a positive quarter turn about points (1, 1). (3 mks)
- d). Draw a triangle P¹¹¹Q¹¹¹R¹¹¹ the image of triangle P¹¹Q¹¹R¹¹ under reflection in the line y=l. (2mks)
- e). Describe fully a single transformation that maps triangle $P^{111}Q^{111}R^{111}$ onto triangle P'Q'R' (2 mks)
- 19. 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 m
- 20. The velocity of a particle t seconds after passing a fixed point 0, is given by $V = at^2 + bt$ m/s, where a and b are constants. Given that its velocity is 2 m/s when t = 1 sec and it returns to 0 when t = 4.5 secs, calculate;
 - (a) The values of a and b.

(4 mks)

(b) Hence find;

i) The values oft when the particle is instantaneously at rest.

(2 mks)

- The total distance travelled by the particle during the first 4 seconds. (2 mks)
- iii) The maximum velocity attained by the particle.

(2mks)

21. The table below shows marks obtained by 120 candidates. Frequencies for all the groups and also the area and height of the rectangle for the group 30 — 60 marks are shown.

Marks	0 10	10 - 30	30 - 60	60 - 70	70 - 100
Frequency	12	40	36	8	24
Area of rectangle			36		1
Height of rectangle			1.2		

(a) (i) Complete the table.

(2mks)

- (ii) On the grid provided below, draw he histogram to represent the distribution (4mks)
- iii) State the group in which the median mark lies.

(1 mk)

(iv) A vertical line drawn through the median mark divides the total area of the histogram into two equal parts. Using this information, estimate the median mark.

(2 mks)

22. A frustum of a cone is such that one of its ends is hemispherical with a radius of2lcm and the other top end is circular with a radius of 10.5cm. The perpendicular distance between the centres of the circular parts is 20cm. Find;

1	a	The slant	length	of the	original	cone
٧	a	THE SIGHT	icing til	OI LITE	Original	cone.

(3 mks)

(b) The slant length of the frustum.

(2mks)

(c) The surface area of the frustum.

(5 mks)

23. Four towns P, R, T and S are such that R is 80km directly to the north of P and T is on a bearing of 290° from P at a distance of 65km. S is on a bearing of 330° from T and a distance of 30 km. Using a scale of 1cm to represent 10km, make an accurate scale drawing to show the relative position of the towns. (4mks)

Find:

(a) The distance and the bearing of R from T

(3mks)

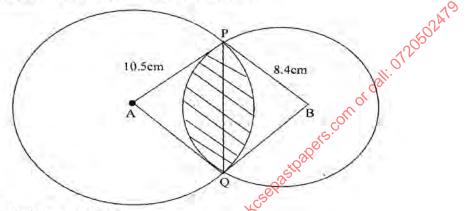
(b) The distance and the bearing of S from R

(2mks)

(c) The bearing of P from S

(lmk)

24. The figure below shows two circles of radii 10.5 and 8.4cm and with centres A and B respectively. The common chord PQ 9cm.



(a) Calculate angle PAQ.

(2 mks)

(b) Calculate angle PBQ.

(2 mks)

(c) Calculate the area of the shaded part.

(6 mks)

Set5

Paper 2

Evaluate without using Mathematical tables or a calculator.

(3mks)

$$2\log 5 - \frac{1}{2}\log 6 + 2\log 40$$

Solve for x given that the following is a singular matrix

(2mks)

$$\begin{pmatrix} 1 & 2 \\ x & x-3 \end{pmatrix}$$

Make d the subject of the formula.

(3mks)

$$a^2 = \sqrt{\frac{1+d^2}{b^2} - \frac{b}{3}}$$

- 4. Simplify $\frac{3}{\sqrt{7-2}} + \frac{1}{\sqrt{7}}$ leaving your answer in the form $a + b\sqrt{c}$, where a, b and c are rational numbers. (3mks)
- 5. Calculate the percentage error in the volume of a cone whose radius is 9.0cm and slant length 15.0cm. (3mks)
- 6. A quantity A is partly constant and partly varies inversely as a quantity B. Given that A = -10 when B = 2.5 and A = 10 when B = 1.25, find the value of A when B = 1.5. (4mks)
- 7. The table below shows corresponding values of x and y for a certain curve.

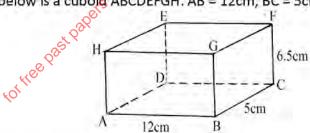
У	1.0	1.2	1.4	1.6	1.8	2.0	2.2
X	6.5	6.2	5.2	4.3	4.0	2.6	2.4

Using 3 strips and mid-ordinate rule, estimate the area between the curve x axis, the line x = 1 and x = 2.2. (2mks)

- 8. 14 people can build 10 huts in 30 days. Find the number of people working at the same rate that will build 18 similar huts in 27 days. (3mks)
- The coordinates of two airports M and N are (60°N, 35°W) and (60°N, 15°E) respectively.
 - The longitude difference.

- (1mk)
- (ii) the shortest time an aeroplane whose speed is 250 knots will take to fly from M to N along a circle of latitude. (2mks)
- 10. (a) Expand $(x-0.2)^5$ in ascending powers of x

- (2mks)
- (b) Use your expansion up to the fourth term to evaluate 9.85.
- (2mks)
- 11. The figure below is a cuboid ABCDEFGH. AB = 12cm, BC = 5cm and CF = 6.5cm.



(a) State the projection of AF on the plane ABCD.

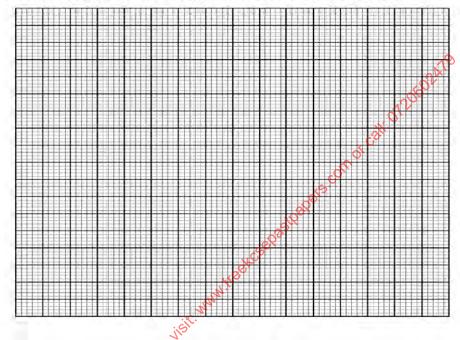
(1mk)

- (b) Calculate the angle between AF and the plane ABCD correct to 2 decimal planes.
 (3mks)
- 12. Show that $\frac{\sin x(\cos x + 1)}{\cos x} = \sin x + \tan x$ (3mks)

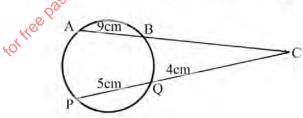
- 13. The mid-point of AB is (1,-1.5,2) and the position vector of a point A is -1+j. Find the magnitude of \overrightarrow{AB} where O is the origin. (3mks)
- 14. Draw a line of best fit for the graph of y against x using the values in the table below. Hence determine the equation connecting y and x.

х	0.4	1.0	1.4	2.0	2.5
у	0.5	1.0	1.2	1.5	2.0

15. A coffee dealer mixes two brands of coffee, x and y to obtain 40kg of the mixture worth Ksh. 2,600. If brand x is valued at Ksh. 70 per kg and brand y is valued at Ksh. 55 per kg. Calculate the ratio in its simplest form in which brands x and y are mixed. (4mks)



16. The figure below shows a circle centre O. AB and PQ are chords intersecting externally at a point C. AB = 9cm, PQ=5cm and QC = 4cm. Find the length of BC. (3mks)



SECTION II: (50 MARKS)

Answer only five questions in this section

- 17. (a) Salome invested Ksh. 250,000 for 2 ½ years in an account which paid 16% compound interest p.a. The interest is compounded quarterly. At the end of 2 ½ years she withdrew all the amount and spent it to the nearest thousands to buy four similar motor cycles. She earned an average of Ksh. 10,000 from each motorcycle per month.
 - (i) the amount she withdrew at the end of 2 ½ years.

(2mks)

(ii) the cost of each motorcycle.

(2mks)

- (iii) the total earnings from the motorcycles for 3 years. (2mks)
- (b) She decided to sell the motorcycles after depreciating at an average rate of 20% p.a for the 3 years.

Find:-

the new value of each motorcycle after depreciation.

(2mks)

(ii) the profit earned from her initial investment to the nearest shilling.

(2mks)

18. The table below shows the distribution of ages in years of 50 adults who attended a clinic:-

Age	21-30	31-40	41-50	51-60	61-70	71-80
Frequency	15	11	17	4	2	1

(a) State the medium class

(1mk)

- (b) Using a working mean of 45.5, calculate:-
 - (i) the mean age

(3mks)

(ii) the standard deviation

(3mks)

(iii) Calculate the 6th docile.

(3mks)

- An arithmetic progression (AP) has the first term a and the common difference d.
 - (a) Write down the third, ninth and twenty fifth terms of the AP in terms of a and
 - (b) The AP above is increasing and the third, ninth and twenty fifth terms form the first three consecutive terms of a Geometric Progression (G.P) The sum of the seventh and twice the sixth terms of the AP is 78. Calculate:-
 - the first term and common difference of the AP.

(5mks)

(ii) the sum of the first nine terms of the AR

(2mks)

(iii) The difference between the fourth and the seventh terms of an increasing AP.

(2mks)

- 20. The probability that three candidates; Anthony, Beatrice and Caleb will pass an examination are $\frac{3}{4}$, $\frac{2}{3}$ and $\frac{4}{5}$ respectfully. Find the probability that:-
 - (a) all the three candidates will pass

(2mks)

(b) all the three candidates will not pass.

(2mks)

(c) only one of them will pass

(2mks) (2mks)

(d) only two of them will pass.

12-1-

(e) at most two of them will pass.

(2mks)

21. (a) Complete the table below for the function y = (3 - x)(x + 1)

х	-3 40	-2	-1	0	1	2	3	4
x+1	-2	-1		1		3	4	
3-x	6	5	4		2	1		-1
У	-12	-5		3	4		0	-5

2mks)

(b) Use the values in the table to draw the graph of y = (3 - x)(x + 1). Use the following scale.

Horizontal axis 2cm for 1 unit

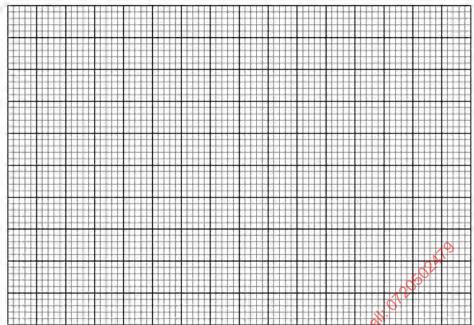
Vertical axis 1cm for 1 unit.

(3mks)

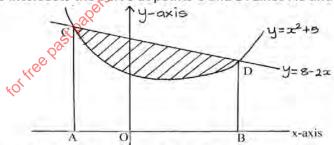
(c) Use your graph in part (b) above to solve the following quadratic equations

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

(2mks)



- 22. Use a ruler and a pair of compasses only all constructions in this question.
 - (a) Construct the rectangle ABCD such that AB = 7.2cm and BC = 5.6cm. (3mks)
 - (b) Constructs on the same diagram the locus Left points equidistant from A and B to meet with another locus L2 of points equidistant from AB and BC at M. measure the acute angle formed at M by L1 and L2. (3mks)
 - (c) Construct on the same diagram the locus of point K inside the rectangle such that K is less than 3.5cm from point M. Given that point K is nearer to B than A and also nearer to BA than BC, shade the possible region where K lies. Hence calculate the area of this region. Correct to one decimal place. (4mks)
- 23. The diagram below, not drawn to scale shows part of the curve $y = x^2 + 5$ and the line y = 8-2x. The line intersects the curve at points C and D. Lines AC and BD are parallel to the y-axis.



(a) Determine the coordinates of C and D.

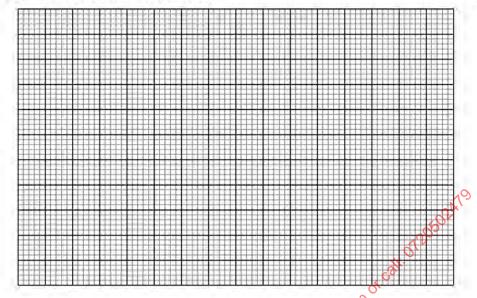
(4mks)

- (b) Use integration to calculate the area bounded by the curve and the x-axis between the points C and D. (3mks)
- (c) Calculate the area enclosed by the lines CD, CA, BD and the x-axis. (3mks)
- (d) Hence determine the area of the shaded region. (1mk)
- 24. A tailoring business makes two types of garments A and B. Garment A requires 3 metres of material while garment B requires 2 ½ metres of material. The business uses not more than 600 metres of material daily in making both garments. It must make not more than 100 garments of type A and nor less than 80 of type B each day.

(a) Write down three inequalities from this information other than $x \ge 0$ and $x \ge y$, where x is the number of garments of type A and y the number of garments of type B.

(3mks)

(b) Graph these inequalities. (3mks)



If the business makes a profit of sh 80 on garment A and a profit of sh. 60 on garment B, how many garments of each type must it make in order to maximize the profit and what is the zers visit: www.freekcs total profit? (4mks)

Set6 121/1 MATHEMATICS PAPER 1

TIME: 2 1/2 HOURS

SECTION I: (50 MARKS)

Answer all the question in this section in the spaces provided:

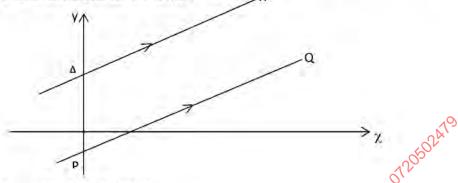
 $\frac{\sqrt{\frac{1}{4}} \text{ of } 3\frac{1}{2} + \frac{3}{2}\left(\frac{5}{2} - \frac{2}{3}\right)}{\frac{3}{4} \text{ of } 2\frac{1}{2} \div \frac{1}{4}}$ (3mks)

2. The average lap time for 3 athletes in a long distance race is 36 seconds, 40 seconds and 48 seconds respectively. If they all start the race at the same time, find the number of times the slowest runner will have been overlapped by the fastest at the time they all cross the starting point together again (3mks)

- 3. Kamau toured Switerland from Germany. In Switzerland he bought his wife a present worth 72 Deutsche marks. Find the value of the present in
 - (a) Swiss Francs.
 - (b) Kenya shillings correct to the nearest sh, if
 - 1 Swiss Franc = 1.25 Deutsche marks
 - 1 Swiss Franc = 48.2 Kenya shillings

(3mks)

4. The equation of line AB in the figure below is $y = 3\chi + 5$ and A is the point (0, a). Line PQ is parallel to AB and AP = 7 units.



(i) Find the value of a.

9.

(1mk)

(ii) Write down the equation of PQ.

(2mks)

5. Solve the equation $2\chi^2 + 3\chi = 5$ by completing the square method...

(3mks)

- 6. Given that $\frac{3}{2-\sqrt{18}} + \frac{5}{2+\sqrt{18}} = a + b\sqrt{c}$. Find the values of a, b and c.(3mks)
- 7. The mean of five numbers is 20. The mean of the first three numbers is 16. The fifth number is greater than the fourth by 8. Find the fifth number. (3mks)
- 8. Show that the points P(3, 4), Q(4, 3) and R(1, 6) are collinear. (3mks)

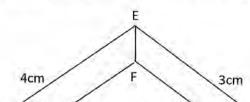
Solve the inequalities $\chi \le 2\chi + \sqrt{2} - \frac{1}{3}\chi + 14$ hence represent the solution on a number

line. (3mks)

10. Use the tables of squares square roots and reciprocals only to find the value of

 $(0.0546)^{\frac{1}{2}} + \left(\frac{1}{4.327}\right)^{\frac{3}{2}}$ (3mks)

- 11. A circle of radius 7 units has it's centre at the point of intersection between the lines $\chi + 2y + 1 = 0$ and $2\chi + 3y 3 = 0$. Find the equation of the circle expressing it in the form $\chi^2 + y^2 + y\chi + fy + c = 0$. (3mk
- 12. The gradient of a curve at any point (χ, y) is given by $3\chi^2 + 2\chi$. If the curve passes through the point (-2, 1). Find its equation. (3mks)
- 13. A solid metal cylinder with radius 7cm and height 5cm is melted down and recast into a spherical ball. Calculate to 1 decimal place the surface area of this ball. (4mks)
- 14. Sketch and label the net of the prism shown below.



- 15. The volume of two similar solid spheres are 4752cm³ and 1408cm³. If the surface area of the small sphere is 352cm², find the surface area of the larger sphere. (3mks)
- 16. A carpenter constructed a closed wooden box with internal measurements 1.5 metres long, 0.8 m metres wide and 0.4 metres high. The wood used in constructing the box was 1.0cm thick and has a density of 0.6g/cm³.

Determine the:

- (i) volume in cm³ of the wood used in constructing the box. (3mks)
- (ii) mass of the box in kilograms correct to 1 decimal place. (1mk)

SECTION II: (50 MARKS)

Answer any five questions from this section in the spaces provided:

- 17. Two aeroplanes, T and S leave an airport A at the same time. S flies on a bearing of 060° at 750km/h while T flies on a bearing of 210° at 900 km/h.
 - (a) Use a suitable scale, to draw a diagram showing the relative position of the aeroplanes after two hours. (3mks) (b)

Use your diagram to determine:

- (i) the distance between the two aeroptanes. (2mks)
- (ii) the bearing of T from S.

(1mk)

(c) Aeroplane T later flew to the East at the same speed for one hour. Show its final position on the diagram in (a) above.

Determine:

- (i) Its final distance from A. (2mks)
- (ii) Its final bearing from S. (1mk)
- 18. The table **below** shows the income tax rates for a certain year.

Taxable pay per month (Ksh)	Tax rates
1 - 9,680	10%
9,681 - 18,800	15%
18,801 - 27,920	20%
27,921 - 37.040	25%
37,040 and above	30%

That year Kazembe paid net tax of Ksh.5,512 per month. His total monthly taxable allowances amounted to Ksh.15,220 and he was entitled to a monthly personal relief of Ksh.1,162. Every month the following deductions were made:

- NHIF Ksh, 320
- Union dues Ksh.200
- Co-operative shares Ksh.7,500
- (a) Calculate Kazembe's monthly basic salary in Ksh. (7mks)

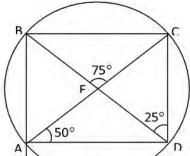
(b) Calculate his monthly net salary.

(3mks)

19. (a) On the grid provided **below**, draw the graph of $y = (\chi + 4)(1 - 2\chi)$ for the range $-5 \le \chi \le 2$. (4mks)



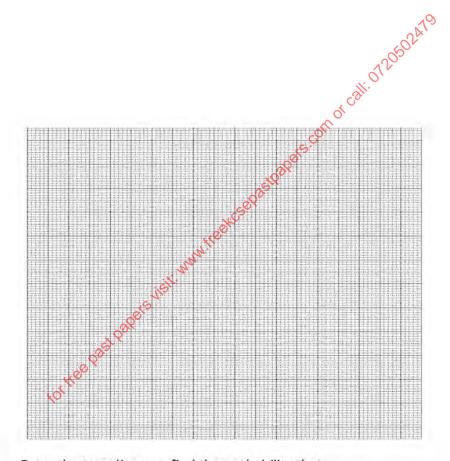
- (b) On the same grid draw the line $y + 3\chi = 2$. (2mks)
- (c) Use your graph to solve the equations:
 - (i) $(\chi + 4)(1 2\chi) = 5$ (2mks)
 - (ii) $-2 4\chi 2\chi^2 = 0$ (2mks)
- 20. A tetrahedron has equilateral triangular base ABC of side 10cm. The vertex V is such that VA = VB = VC = 8cm. Calculate.
 - (a) The angle between the planes ABC and BCV. (5mks)
 - (b) The vertical height of the vertex V above the base ABC. (2mks)
 - (c) Volume of the tetrahedron. (3mks)
- 21. In the given figure, \angle CAD = 50°, \angle BEC = 75° and \angle BDC = 25°. BAF is a straight line.



Giving reasons where necessary, calculate the size of:-

(i)	∠ABC.	(2mks)
(ii)	∠DEC.	(2mks)
(iii)	∠ABD.	(3mks)
(iv)	∠DAF.	(3mks)

- 22. A bag contains 5 red, 4 white and 3 blue beads. Two beads are selected at random one after another without replacement.
 - (a) Draw a tree diagram and show the probability space. (2mks)



- (b) From the tree diagram, find the probability that:
- (i) The last bead selected is red. (3mks)
- (ii) The beads selected were of the same colour. (2mks)
- (iii) At least one of selected beads is blue. (3mks)

- 23. A transformation represented by the matrix $\begin{pmatrix} 2 & 1 \\ 1 & -2 \end{pmatrix}$ maps the points A(0, 0), B(2, 0), C(2,
 - 3) and D(0, 3) of the quad ABCD onto A¹B¹C¹D¹ respectively.
 - (a) Draw the quadrilateral ABCD and its image A¹B¹C¹D¹. (3mks)
 - (b) Hence or otherwise determine the area of A¹B¹C¹D¹. (2mks)
 - (c) Another transformation $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$ maps $A^1B^1C^1D^1$ onto $A^{11}B^{11}C^{11}D^{11}$.

 Draw the image $A^{11}B^{11}C^{11}D^{11}$. (2mks)
 - (d) Determine the single matrix which maps A¹¹B¹¹C¹¹D¹¹ back to ABCD. (3mks)
- 24. The distance from town A to town B is 360km. A bus left town A and traveled towards town B at an average speed of 60km/h. After 1½ hours, a car left town A and traveled along the same road at an average speed of 100km/h.
 - (a) (Determine
 - (i) The distance of the bus from town A when the car took off. (2mks)
 - (ii) The distance the car traveled to catch up with the bus. (4mks)
 - (b) The distance from P to Q is 160km. If an express train was 16km/h slower it would take 20 minutes longer on the journey. Find the average speed of the express train.

 (4mks)

Set6

Paper 2

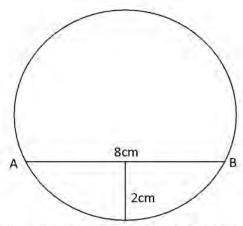
SECTION I: (50 MARKS)

Answer all the question in this section in the spaces provided:

- 1. Use a tables to find the value of χ if $2^{\chi} = 3$. Give your answer correct to 4sf. (3mks)
- Make χ the subject of the formula:

$$A = \sqrt{\frac{3+2\chi}{5-4\chi}} \tag{3mks}$$

- It would take 18 men 12 days to dig a piece of land. If they work for 8 hours a day, how long will it take 24 men if they work 12 hours to cultivate three quarters of the same land. (3mks)
- 4. Kinyua bought soya and millet at sh.65 per kg and sh.40 per kg respectively. He then mixed them and sold the mixture at sh.60 per kg making a profit of 20%. Determine the ratio of soya to millet in mixture. (3mks)
- Chord AB is of length 8cm and the maximum distance between chord and lower part of circle is 2cm. Determine the radius of the circle. (3mks)



6. Use the inverse matrix method rule to solve simultaneous equations.

 $2\chi + y = 10$

(3mks)

$$2\chi + 2y = 14$$

7. Solve $\log_2^{(\chi+7)} - \log_2^{(\chi-7)} = 3$

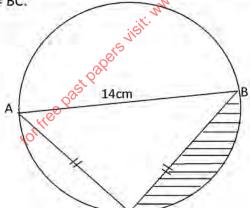
(4mks)

- 8. Construct a circle centre K and radius 2.5cm. Construct a tangent from a point Q which is 6cm from K to touch the circle at M. Measure the length QM: (3mks)
- 9. Given 4.6 ÷ 2.0 find
 - (a) the absolute error in the quotient.

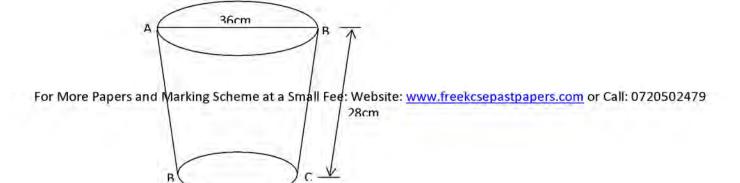
(2mks)

- (b) the percentage error in the quotient correct to four significant figures. (1mk)
- A variable P varies jointly with the square of R and inversely with the square root of Q.
 If R is increased by 10% and Q decreased by 20%, what is the percentage change in the value of P.

 (3mks)
- 11. The figure below shows a circle with segments cut off by a triangle whose longest side AB is the largest possible chord of a circle. Determine the area shaded given that AB = 14cm and AC = BC. (3mks)



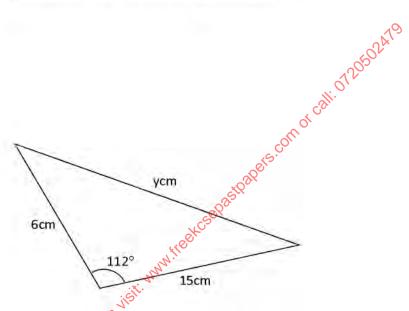
12. A bucket in the shape of a frustrum as shown in the diagram. It has diameters of 36cm and 24cm. Calculate the volume of the bucket. (4mks)



13. Without using a Mathematical tables or a calculator, evaluate.

$$\frac{2.7 \times 2.04}{300 \times 0.054}$$
 (2mks)

14. Find the length represented by y in the figure below. (3mks)



15. (a) Expand $(1 + 2\chi)^8$ in ascending powers of χ up to and including the term χ^3 .(1mk)

(b) Hence evaluate (1.02)8 to 3d.p. (2mks)

16. The difference between the exterior and interior angle of a regular polygon is 100°. Determine the number of sides of the polygon. (3mks)

SECTION II: (50 MARKS)

Answer any five questions from this section in the spaces provided:

17. (a) Fill the table below for the curves given by $y=3 \sin{(2\chi+30^\circ)}$ and $y=\cos{2\chi}$ for χ values in the range $0 \le \chi \le 180^\circ$. (2mks)

χ	0°	15°	30°	45°	60	75°	90°	120°	150°	180°
$y = 3 \sin (2\chi + 30^{\circ})$				17		-	-			
y = Cos 2χ	10.74	0.0	100	11						

(b) Draw the graphs of y = 3 Sin $(2\chi + 30^{\circ})$ = Cos 2χ on same axes. (2mks) com or call. or 20502479 (c) Use your graph to solve the equation $y = 3 \sin(2x^2 + 30^\circ)$ and $y = \cos 2x$. (2mks) (d) Determine the following from your graph: (i) Amplitude of y = 3 Sin $(2\chi + 30^\circ)$, (1mk) (ii) Period of y = 3 Sin $(2\chi + 30^\circ)$ (2mks) Phase difference for $y = 3 \sin (2\chi + 30^{\circ})$. (iii) (1mk) 18. OAB is a triangle in which $QA = \mathcal{X}$ and QB = b. M is a point on OA such that OM: MA = 2:3 and N is another point on AB such that AN: NB = 1: 2. Lines ON and MB intercept at X. Express the following vectors in terms of a and b. (a) (i) AB (1mk) ON (W) (1mk) (ijj) BM (1mk) (b) ~ If OX KON and BX = hBM express OX in two different ways. Hence or otherwise find the values of h and K. (6mks) Determine the ratio OX: XN. (c) (1mk) 19. (a) Using only a ruler and a pair of compasses draw a line AB of length 8cm long. Hence draw the locus of all points P such that angle APB = 52.5° . If the region above represents a map of an estate drawn to a scale of 1cm (b) representing 1km. Show the region to be fenced if AMB \leq 90° by shading the

20. The data **below** is a daily record of sugar sold in one of the supermarkets in Kerugoya town which sells any proportion in kg of sugar.

(3mks)

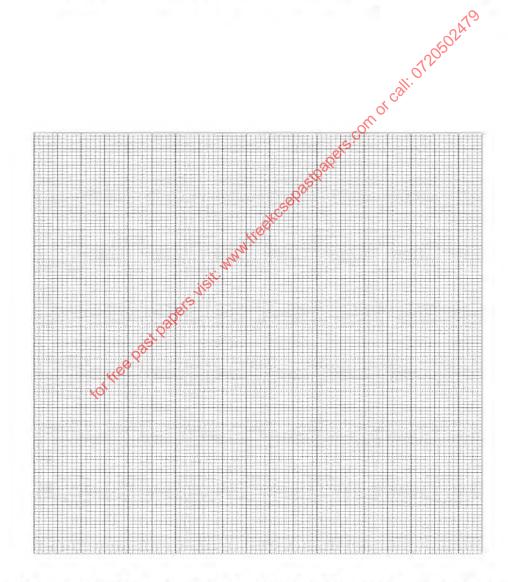
(2mks)

unwanted region.

Find the area of this region.

Kg of sugar	Number of people
0.5 - 0.9	22
1.0 - 1.4	38
1.5 - 1.9	14
2.0 - 2.4	12
2.5 - 2.9	10
3.0 - 3.4	4

- (a) How many people bought sugar from this supermarket on that day. (1mk)
- (b) Calculate mean of sugar bought that day. Calculate also the standard deviation from this data. (4mks)
 - (c) Draw a cumulative frequency curve of the data above and determine the number of people who bought sugar between 1.2 and 1.9kg. (5mks)



21. A plane take of f from airport P at (0°, 40°W) and flies 1800 nautical rules due East to Q then

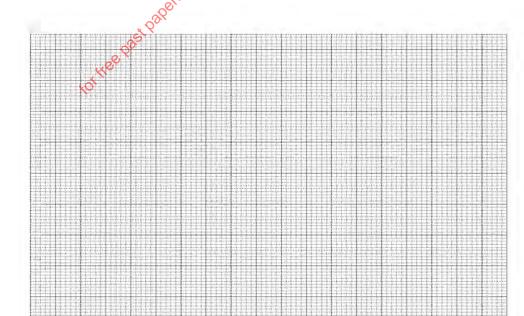
1800 nautical rules due South to R and finally 1800 nautical rules due West before landing at S.

- (a) Find to the nearest degree the latitudes and longitudes of Q, R and S. (4mks)
- (b) If the total flight time is 16 hours, find the average speed in knots for the whole journey.
 (3mks)
- (c) Find the time taken to fly from R to S, given that this was two hours shorter than the time taken from P to Q to R. (2mks)
- 22. The 2nd and 5th terms of an arithmetic progression are 8 and 17 respectively. The 2nd, 10th and 42nd terms of the A.P. form the first three terms of a geometric progression. Find
 - (a) the 1st term and the common difference. (3mks)
 - b) the first three terms of the G.P and the 10th term of the G.P. (4mks)
 - (c) The sum of the first 10 terms of the G.P. (3mks)
- 23. (a) The acceleration of a particle t seconds after passing a fixed point P is given by a = 3t 3. Given that the velocity of the particle when t = 2 is 5 m/s, find
 - (i) its velocity when t = 4 seconds. (3mks)
 - (ii) its displacement at this time. (3mks)
 - (b) Find the exact area bounded by the graph $\chi = 9y y^3$ and the Y-axis. (4mks)
 - 24. A girl's school has a store a far off distance for food. It has 20 sacks of rice and 35 sacks of maize. The weight, volume and number of meal rations for each sack are as follows.

Sack of	Weight in kg	Volume (m³)	No of meals
Rice	25	0.050	800
Maize	10	0.05	160

A delivery van is to carry the largest possible total number of meals. It can carry up to 600kg in weight and 2m³ in volume.

- (a) If a load is made up of χ sacks of rice and y sacks of maize, write four inequalities other than $\chi \ge 0$, $y \ge 0$ which satisfy these conditions. (3mks)
- (b) Illustrated these inequalities graphically by shading unwanted region. (4mks)



(b) Write down an expression for the number of meals that can be provided from χ sacks of rice and y-sacks of maize. Use your graph to find best values to take for χ and y. (3mks)

pars.com or call. or 20502AT9

Set7
121/1
MATHEMATICS
PAPER 1
TIME: 2 ½ HOURS

SECTION 1:(50 Marks). Answers ALL questions in this section

Without using a calculator evaluates

(3 Marks)

$$\frac{\left(3\frac{1}{3}+1\frac{1}{9}\right)\div1\frac{1}{3}}{\left(4\frac{2}{9}-2\frac{5}{9}\right)x\frac{2}{3}}$$

- The number \$.81 contains an integral part and a recurring decimal. Convert the number into an improper fraction and hence a mixed fraction. (3 Marks)
- 3. The gradient of curve at any point is given by 2x 1. Given that the curve passes through point (1, 5), find the equation of the curve. (3 Marks)
- 4. Simplify: $\frac{9x^2-1}{3x^2+2x-1}$ (3 Marks)
- A man invests KSh. 24,000 in an account which pays 16% interest p.a. The interest is compounded quarterly. Find the amount in the account after 1 ½ years. (3 Marks)
- 6. Given that $-\frac{3}{5}x + 3y 6 = 0$ is an equation of a straight line, find:
 - (i) The gradient of the line

(1 Mark)

(ii) Equation of a line passing through point (2,3) and parallel to the given line. (2marks)

- 7. A two digit number is formed from the first four prime numbers.
 - (a) Draw the table to show the possible outcomes.

(1 Mark)

- (b) Calculate the probability that a number chosen from the two digit numbers is an even number. (1 Mark)
- 8. Solve for x given that

$$Log(x-4)+2 = log 5 + log (2x + 10)$$

(3 marks)

9. The position vectors of A and B are given as $\mathbf{a} = 2\mathbf{i} - 3\mathbf{j} + 4\mathbf{k}$ and $\mathbf{b} = -2\mathbf{i} - \mathbf{j} + 2\mathbf{k}$ respectively.

Find to 2 decimal places, the length of vector AB.

(3 Marks)

- orcall. of Call. 10. A regular polygon has internal angle of 150° and side of length 10cm.
 - (a) Find the number of sides of the polygon.

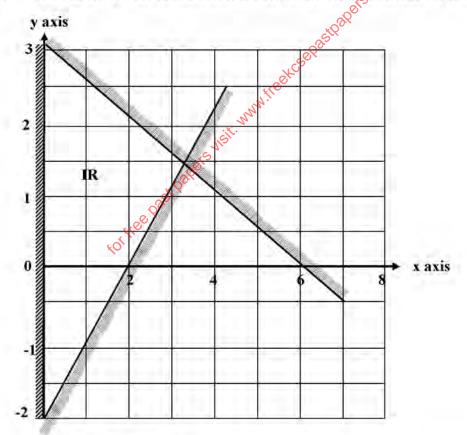
(b) Find the perimeter of the polygon.

(2 Marks)

11. Solve for x in the equation. (3 Marks)

$$9^{(2x-1)} \times 3^{(2x+1)} = 243$$

The region R in the figure below is defined by the inequalities L1, L2 and L3. 12.



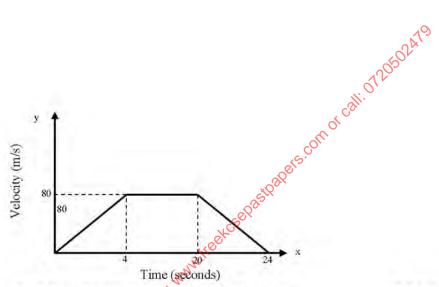
Find the three inequalities

(3 Marks)

- 13. Two boys and a girl shared some money. The elder boy got $\frac{4}{9}$ 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 girl's share. (4 Marks)
- 14. Use tables of reciprocals only to find the value of

$$\frac{5}{0.0829} - \frac{14}{0.581}$$
 (3 marks)

15. The figure below is a velocity – time graph for a car. (not drawn to scale).



- (a) Find the total distance traveled by the car?
- (2 Mks)

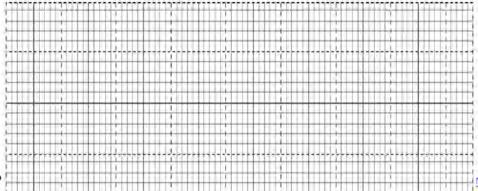
(b) Calculate the deceleration of the car.

- (2 Marks)
- 16. The table below shows marks obtained by a form four class in a certain school.

Marks (x)	8≤X 2 9	9≤X<11	11≤X<13	13≤X<16	16≤X<20	20≤X<21
No. of contents y	2	6	8	3	2	1

Use the table to represent the information on a histogram.

(3 Marks)



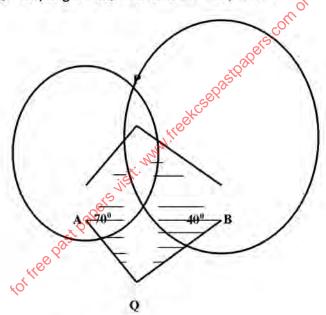
For More P

m or Call: 0720502479

SECTION II: (50 MARKS): Answer any five questions in this section

17. The diagram below shows two circles, centre A and B which intersect at points P and Q.

Angle PAQ = 70° , angle PBQ = 40° and PA = AQ = 8cm.



Use the diagram to calculate

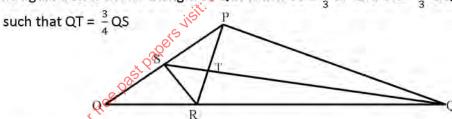
- (a) PQ to correct to 2 decimal places (2 Marks)
- (b) PB to correct to 2 decimal places (2 Marks)
- (c) Area of the minor segment of the circle whose centre is A (2 Marks)
- (d) Area of shaded region (4 Marks)
- 18. income tax rates in a certain year are as shown below.

Income (k£ – p.a	Rate (KSh. per £)

1 -4200	2
4201 -8000	3
8001 -12600	5
12601 - 16800	6
16801 and above	7

Omar pays Sh. 4000 as P.A.Y.E per month. He has a monthly house allowance of KSh.10800 and is entitled to a personal relief of KSh. 1,100 per month. Determine:

- (i) his gross tax per annum in Kshs (2 Marks) (ii) his taxable income in K£ per annum
- (2 marks) (iii) his basic salary in Ksh. per month (2marks) (iv) his net salary per month (2 marks)
- 19. A straight line passes through the points (8, -2) and (4,-4).
 - (a) Write its equation in the form ax + by +c = 0, where a, b and c are integers. (3 Marks)
 - (b) If the line in (a) above cuts the x-axis at point P, determine the 60 ordinates of P. (2 Marks)
 - (c) Another line, which is perpendicular to the line in (a) above passes through point P and cuts the y axis at the point Q. Determine the coordinates of point Q. (3 Marks)
 - (d) Find the length of QP (2 Marks)
- 20. A bus and a Nissan left Nairobi for Eldoret, a distance of 340 km at 7.00 a.m. The bus travelled at 100km/h while the Nissan travelled 120km/h. After 30 minutes, the Nissan had a puncture which took 30 minutes to mend.
 - (a) Find how far from Nairobi the Nissan caught up with the bus (5 Minutes)
 - (b) At what time of the day did the Nissan catch up with the bus? (2 Marks)
 - (c) Find the time at which the bus reached Eldoret (3 Marks)
- The figure below shows triangle OPQ in which OS = $\frac{1}{3}$ OP and OR = $\frac{1}{3}$ OQ. T is a point on QS



- (a) Given that OP = p and OQ = q, express the following vectors in terms of p and q.
- (1 Mark) (i) SR
- (ii) QS (2 Marks) (iii) PT (2 Marks)
- (iv) TR (2 Marks)
- (b) Hence or otherwise show that the points P, T and R are collinear. (3 Marks)
- On the grid provided below: 22.
 - (a) Draw triangle ABC whose coordinates are A (8,6), B(6,10) and C(10,12) and its image A'B'C' after undergoing a reflection in the line y = x. Write the co - ordinates of A' B' C' (4 Marks)

(b) Triangle A'B'C' undergoes an enlargement centre (0,0) scale factor ½ to form triangle A''B''C''. Draw triangle A''B''C''. (3 Marks)

(c) Triangle ABC is stretched with y – axis invariant and stretch factor of ½ to obtain triangle A"B"C". Draw triangle A"B"C". (3 Marks)

23. Three Kenyan warships A, B and C are at sea such that ship B is 450km on a bearing of 030° from ship A. Ship C is 700km from ship B on a bearing of 120°. An enemy ship D is sighted 1000km due south of ship B.

(a) Taking a scale of 1cm to represent 100km locate the position of the ships A, B, C and D.

(4 Marks)

(b) Find the compass bearing of:

(i) Ship A from ship D

(1 Mark)

(ii) Ship D from ship C

(1 Mark)

(c) Use the scale drawing to determine

(i) The distance of D from A

(1 Mark)

(ii) The distance of C from O

(1 Mark)

(d) Find the bearing of:

(i) B from C

(1 Mark)

(ii) A from C

(1 Mark)

24. (a) Fill the table below for the function $y = 2x^2 + 6x - 5$, for $-4 \le x \le 3$ (2 Marks)

X	-4	-3	-2	-1	0	1	2	3
Υ				4				
1/11	Draw tha	aumia Farii	- 242 1 64	E for A	2 on avid a	ivan		11 Marks

(b) (i) Draw the curve for $y = 2x^2 + 6x - 5$, for $-4 \le x \le 3$ on grid given

(1 Mark)

Set7 Paper 2

SECTION 1 (50 MARKS): ANSWER ALL QUESTIONS IN THE SECTION.

1. Use logarithms to evaluate

(4 Marks)

$$\sqrt[3]{\frac{45.3 \times 0.00697}{0.534}}$$

- 2. Form the quadratic equation whose roots are $x = -\frac{5}{3}$ and x = 1 (2 Marks)
- W varies directly as the cube of x and inversely as γ. Find W in terms of x and y given that W = 80 when x = 2 and y = 5.
 (2 Marks)
- 4. A cold water tap can fill a bath in 10 minutes while a hot water tap can fill it in 8 minutes. The drainage pipe can empty it in 5 minutes. The cold water and hot water taps are opened for 4 minutes. After four minutes all the three taps are opened. Find how long it takes to fill the bath.
 (3 Marks)
- 5. Object A of area 10cm^2 is mapped onto its image B of area 60cm^2 by a transformation. Whose matrix is given by $p = \begin{pmatrix} x & 4 \\ 3 & x+3 \end{pmatrix}$. Find the positive values of x
- 6. Make P the subject of the formula in $L = \frac{2}{3} \sqrt{\frac{x^2 PT}{y}}$

(3 Marks)

- 7. (a) Expand the expression $\left(1 + \frac{1}{2}x\right)^5$ in ascending order powers of x, leaving the coefficients as fractions in their simplest form. (2 Marks)
 - (b) Use the first three terms of the expansion in (a) above to estimate the value of $(1.05)^5$

(2 Marks)

- 8. By rounding each number to the hearest tens, approximate the value of $\frac{2454 \times 396}{66}$ Hence, calculate the percentage error arising from this approximation to 4 significant figures.

 (3 Marks)
- 9. Without using a calculator or mathematical tables, express $\frac{\sqrt{3}}{1-\cos 30^0}$ in surd form and simplify

(3 Marks)

- 10. Kasyoka and Kyalo working together can do a piece of work in 6 days. Kasyoka, working alone takes 5 days longer than Kyalo. How many days does it take Kyalo to do the work alone? (3Marks
- The second and fifth terms of a geometric progression are 16 and 2 respectively. Determine the common ratio and the first term. (3 Marks)
- 12. A particle moves along a straight line AB. Its velocity V metres per second after t seconds is given by $v = t^2 3t + 5$ Its distance from A at the time t = 1 is 6 metres.

 Determine its distance from A when t = 3 (3 marks)
- 13. On the triangle PQR, draw a circle touching PR, QP produced and QR produced. (3 Marks)

R

14. Two containers have base area of 750cm² and 120cm² respectively. Calculate the volume of the larger container in litres given that the volume of the smaller container is 400cm³.

(3 Marks)

Solve for x in the equation

$$2 \sin^2 x - 1 = \cos^2 x + \sin x$$
, where $0^0 \le x \le 360^0$.

(4 Marks)

16. Find the radius and the coordinate of the centre of the circle whose equation is

$$2x^2 + 2y^2 - 3x + 2y + \frac{1}{2} = 0$$

(4 marks)

SECTION II: (50 MARKS): ANSWER FIVE QUESTIONS IN THIS SECTION.

17. A bag contains 5 red, 4 white and 3 blue beads. Two beads are selected at random.

(a) Draw a tree diagram and list the probability space.

(3 Marks)

(b) Find the probability that

(i) The last bead selected is red.

(2 Marks)

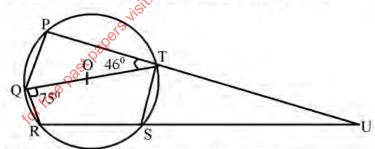
(ii) The beads selected were of the same colour

(2 Marks)

(iii) At least one of the selected beads is blue

(3 Marks)

 The figure below shows a circle centre Q in which line QOT is a diameter. Angle QTP = 46°, angle TQR = 75° and angle SRT = 38°, PTV and RSU are straight lines.



Determine the following, giving reasons in each case:

(a) angle RST	(2 Marks)
(b) angle SUT	(2 Marks)
(c) angle PST	(2 Marks)
(d)obtuse angle ROT	(2 Marks)
(e) angle SOT	(2 Marks)

- 19. P, Q and R are three villages such that PQ = 10km, QR = 8km and PR = 4km where PQ, QR and PR are connecting roads.
 - (a) Using a scale of 1cm rep 1 km, locate the relative positions of the three villages (2 Marks)

- A water tank T is to be located at a point equidistant from the three villages. By construction locate the water tank T and measure its distance from R. (3 Marks)
- (c) Determine the shortest distance from T to the road PQ by construction (2 Marks)
- (d) Determine the area enclosed by the roads PQ, QR and PR by calculation (3 Marks)
- For a sample of 100 bulbs, the time taken for each bulb to burn was recorded. The table below shows the result of the measurements.

Time (in hours)	15- 19	20- 24	25- 29	30- 34	35- 39	40- 44	45- 49	50-54	55- 59	60-64	65- 69	70- 74
Number of bulbs	6	10	9	5	7.	11	15	13	8	7	5	4

- (a) Using an assumed mean of 42, calculate
 - (i) the actual mean of distribution

(4 Marks)

(ii) the standard deviation of the distribution

(3 Marks)

(b) Calculate the quartile deviation

(3 Marks)

- A plane leaves an airport P (10°S, 62°E) and flies due north at 800km/h.
 - (a) Find its position after 2 hours

(3 Marks)

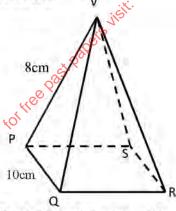
- (b) The plane turns and flies at the same speed due west. It reaches longitude Q, 12°W.
- (i) Find the distance it has traveled in nautical miles.

(3 Marks)

- (ii) Find the time it has taken (Take $\pi = \frac{22}{7}$, the radius of the earth to be 6370km and
- 1 nautical mile to be 1.853km)

(2 Marks)

- (c) If the local time at P was 1300 hours when it reached Q, find the local time at Q when it landed at Q (2 Marks)
- 22. PQRSV is a right pyramid on a horizontal square base of side 10cm. The slant edges are all 8cm long, Calculate



(a) The height of the pyramid

(2 Marks)

- (b) The angle between
- (i) Line VP and the base PQRS

(2 Marks)

(ii) Line VP and line RS

(2 Marks)

(iii) Planes VPQ and the base PQRS

(2 Marks)

c) Volume of the pyramid

(2 Marks)

23. Complete the table below for the functions $y = \sin 3\theta$ and $y = 2 \cos (\theta + 40^{\circ})$ (2 Marks)

θ_0	00	10 ⁰	20º	30º	40°	50°	60º	70°	80°	90°
3 Sin 3θ	0	1.50		3.00			0.00			-3.0
2 Cos (θ + 40°)	1.53	1.29			0.35			-0.69		-1.29

(a) On the grid provided, draw the graphs of Y = 3 Sin 3 θ and y = 2 Cos (θ + 40°) on the same axis. Take 1 cm to represent 10° on the x-axis and 4 cm to represent 2 unit on the y – axis. (5 marks)



- (b) From the graph find the roots of the equation.
 - (i) $\frac{3}{4} \sin 3\theta = \frac{1}{2} \cos (\theta + 40^{\circ})$

(2 Marks)

(ii) $2 \cos (0 + 40^{\circ}) = 0$ in the range $0 \le \theta \le 90^{\circ}$

(1 Mark)

- 24. The gradient function of a curve is given by the expression 2x + 1. If the curve passes through the point (-4, 6)
 - (a) Find:
 - (i) The equation of the curve

(3 Marks)

(ii) The values of x, at which the curve cuts the x-axis

(3 Marks)

Set8 121/1 MATHEMATICS PAPER 1

TIME: 2 1/2 HOURS

1. Evaluate without using a calculator

$$\frac{23.4 - 2(5.2 + 5.3)}{3.2 \times 1.2}$$

2. In Blessed Church choir, the ratio of males to females is 23. On one Sunday service, ten male members were absent and six new female members joined the choir as guests for the day. If on this day the ratio of males to females was 1:3, how many regular members does the choir have?

(3 Marks)

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

	Buying		Selling		
	Kenya shil	lings	Kenya shilling		
1 Euro	84	.15	84.26		
1 US Dollar	80.12	· iti.	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?

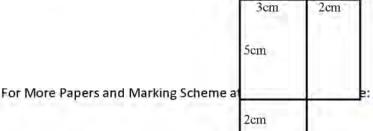
(3 Marks)

(3 Marks)

4. Simplify the expression.

$$\frac{4x^2 - 16y^2}{6x^2 - 8xy - 8y^2}$$

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



e: www.freekcsepastpapers.com or Call: 0720502479

- 6. The sum of the interior angles of a regular polygon is 1080°. Calculate
 - (a) The number of sides of the polygon

(2 Marks)

(b) The sizes of the exterior and interior angles of the polygon.

(2 Marks)

7. If $3^{(2x)} - 4(3^x) + 3 = 0$. Find the possible values of x

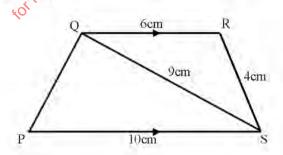
(3 Marks)

- 8. Three similar pieces of timber of length 240cm, 320cm and 380cm are cut into equal pieces. Find the largest possible area of a square which can be made from any of the three pieces. (3 Marks)
- 9. The sum of digits formed in a two digit number is 16. When the number is subtracted from the number formed by reversing the digits, the difference is 18. Find the number (3 Marks)
- 10. Solve for x given that

(3 Marks)

$$Log_{10}(x-1) + 1 = Log_{10}(x-4)$$

- 11. Three pens and four exercise books cost Sh. 87. Two pens and five exercise books cost Sh. 93. Find the cost of one pen and one exercise books (4 Marks)
- 12. A farmer has enough feed to last 45 cows for 30 days. If he buys 5 more cows, how long will the feed last? (2 Marks)
- Find the equation of the line perpendicular to 3x 7y 20 = 0, and passes through the point (5,2) (3 Marks)
- 14. Wanza sold a bag of potatoes for Sh. 420 and made a profit. If she sold it at Sh. 320, she could have made a loss. Given that the profit is thrice the loss, how much did she pay for the bag of potatoes? (3 Marks)
- 15. In the figure below PQRS is a trapezium with QR parallel to PS. QR = 6cm, RS = 4cm, QS = 9cm and PS = 10cm.



Calculate

(a) The size of angle SQR

(2 Marks)

16. Given that $Cos(x-20)^0 = Sin(2x+32)^0$ and x is an acute angle, Find $Cos(x-4)^0$ (3 Marks)

SECTION II (50 MARKS)

Answer Only Five Questions In This Section

17. An expedition has 5 sections AB, BC, CD, DE and EA. B is 200m on a bearing of 050° from A. C is 500m from B. The bearing of B from C is 300°. D is 400m on a bearing 230° from C. E is 250m on a bearing 025° from D.

(a) Sketch the route

(1 Mark)

(b) Use the scale of 1cm to 50m to draw the accurate diagram representing the route. (5 Marks)

(c) Use your diagram to determine

(i) Distance in metres of A from E

(2 Marks)

(ii) Bearing of E from A

- 18. A business lady bought 100 quails and 80 rabbits for Sh. 25,600. If she had bought twice as many rabbits and half as many quails she would have paid Sh. 7,400 less. She sold each quail at a profit of 10% and each rabbit at a profit of 20%.
 - (a) Form two equations to show how much she bought the quails and the rabbits

(2 Marks)

(b) Find the cost of each

(3 Marks)

- (c) Calculate the profit she made from the sale of the 100 quails and 80 rabbits(3 Marks)
- (d) What percentage profit did she make from the sale of the 100 quails and 80 rabbits (2 Marks)
- The table below shows the length of 40 seedlings.

Length in (mm)	Frequency
118-126	3
127 - 135	4
136 144	10
145 - 153	12
154 - 162	5
163 – 171	4
172-180	2

Determine

(a) (i) The modal class

(1 Mark)

(ii) The median class

(2 Marks)

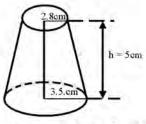
(b) (i) The mean of the seedlings

(4 Marks)

(ii) The median of the seedlings

(3 Marks)

20. Find



(a) The surface area of the frustrum

(5 Marks)

(b) The volume of frustrum shown.

(5 Marks)

Triangle ABC vertices A (-2, 6), B (2, 3) and C (-2, 3) is reflected in the line x = -3 to give the image $A_1B_1C_1$. $A_1B_1C_1$ is translated by the vector $\binom{10}{2}$ to give image $A_2B_2C_2$. $A_3B_3C_3$ with coordinates A_3 (6,-6) B_3 (2,-3) and C_3 (6,-3) is the image of $A_2B_2C_2$ after transformation. Plot all the triangles in the grid provided and determine



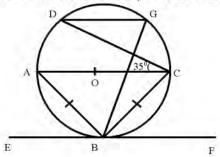
(i) The transformation that maps A₂B₂C₂ onto A3B₃C₃

(2 Marks)

(ii) The simple transformation that maps ABC onto A₃B₃C₃

(2 Marks)

22. In the figure below AOC is a diameter of the circle centre O; AB = BC and ∠ACD = 35°. EBF is a tangent to the circle at B. G is a point on the minor arc CD.



Giving reason

(a) Calculate the size of

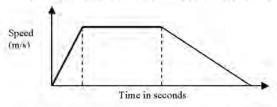
(i) ∠BAD (3 Marks)

(ii) The obtuse ∠BOD (2 Marks)

(iii) ∠BGD (2 Marks)

(b) Show that $\angle ABE = \angle CBF$ (3 Marks)

23. The diagram below shows the speed-time graph for a bus travelling between two stations. The bus begins from rest and accelerates uniformly for 30 seconds. It then travels at a constant speed for 60 seconds and finally decelerates uniformly for 40 seconds.



Given that the distance between the two stations in 2090m Calculate

(a)	The maximum speed, in km/h the bus attained	(3 Marks)
(b)	The acceleration	(2 Marks)
(c) Th	ne distance travelled during the last 20 seconds	(2 Marks)
7.114		4-2-1

(d) The time the bus takes to travel the first half of the journey

(3 Marks)

24. The members of a photograph club decided to buy a camera worth Shs. 4000 by each contributing the same amount of money. Fifteen member failed to pay their contribution due to various reasons. As a result each of the remaining members had to contribute Sh. 60 more.

(a) Find the number of members in the club

(7 Marks)

(b) What was the percentage increase in the contribution per month?

(3 Marks)

(ii) On the same axes draw line y = 7x + 1

(1 Mark)

(c) Determine the values of x at the points of intersection of the curve (1 Mark)

$$y = 2x^2 + 6x - 5$$
 and line $y = 7x + 1$

(d) Find the actual of the region bounded by the curve $y = 2x^2 + 6x - 5$ and line y = 7x + (4 Marks)

Set8

Paper 2

1. (4 Marks)

$$\sqrt[3]{\left(\frac{1.23 \times 0.0468}{Log_6}\right)}$$

2. Express in surd form.
$$\frac{1}{2+\sin 45^{\circ}}$$

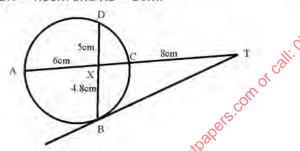
(3 Marks)

hence rationalize the denominator

- 3. A car is driven a distance of 30 km measured to the nearest Km in 20 min measured to the nearest min. Between what limit will the average speed be? (3 Marks)
- 4. Make r the subject of the formula.

$$S = \sqrt{\frac{r^2 + 2xt}{n}}$$

5. In the diagram below, BT is a tangent to the circle at B. AXCT and BXD are straight lines. AX = 6cm, CT = 8cm, BX = 4.8cm and XD = 5cm.



Find the length of BT.

6.

7.

(2 Marks)

Given that X:Y = 1:2 and Z:Y = 2:3, Find the value of

- $\frac{x+y}{2z+5y}$
- ______

(2 Marks)

(b) Hence evaluate (1.02)6 to 4 d.p.

(2 Marks)

8. Find the inverse of the matrix $\begin{pmatrix} 3 & 2 \\ 5 & 4 \end{pmatrix}$

(4 Marks)

Hence or otherwise solve the simultaneous equations

$$3x + 2y = 4$$

$$5x + 4y = 9$$

- A merchant blends 350kg of tea costing Sh. 84 kg with 140kg of tea costing Sh. 105 per kg. At what price must be sell the mixture to gain 25% (3 Marks)
- The life expectancy in hours of 106 bulbs are shown in the table below.

(a) Expand $(1 - 2x)^6$ in ascending powers of x up to the term in x^3 .

Expectancy	90-	95-99	100- 104	105- 109	110-	115- 119	120-	125-	130-	135-
(hrs) Frequency	94	14	16	17	24	13	124	129	134	139
(f)	3	1.5	10	17	24	12		3		1

Calculate the quantile deviation of the life expectancy

(4 Marks)

- 11. The equation of a circle is given as $3x^2 + 3y^2 12x + 18y + 8 = 0$. Find the centre and radius of this circle. (4 Marks)
- 12. Quantity Q partly varies as quantity R and partly varies inversely as the square of R. Given that Q = 3 when R = 1 and Q = 5 when R = $\frac{1}{2}$
 - (i) Find the equation connecting Q and R

(3 Marks)

(ii) Find the value of Q when $R = \frac{3}{2}$

(1 Mark)

13. Find the integral values of x for which; $5 \le 3x + 2$ and 3x - 14 < -2

(3 Marks)

- 14. Three soldiers Mutiso, Nzangi and Kisilu went for a shooting practice. The probability of Mutiso, Nzangi and Kisilu hitting the target are $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{1}{2}$ respectively. The three gentlement hit the target only once, one after the other. What is the probability that the target was hit atleast once? (2 Marks)
- 13. Solve for x in the equation.

(3 Marks)

 $Log_8(x + 6) - Log_8(x - 3) = \frac{2}{3}$

14. Given that OA = i + 2j - 3k and OB = 2i - j - 2k

Find | AB |

(2 Marks) 170502

SECTION II – 50 MARKS

Answer only five questions from this section

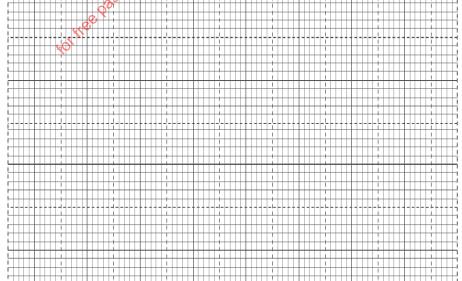
15. (a) Complete the table given below by filling the blank spaces.

Х	0 º	15°	30°	45°	60°	75° 💉	90°	105°	120°	135°	150°	165°	180°
4	4.00		2.00	0	-2.00	-3,46	-4.00	-3.46	-4.00	-3.46	-2.00		4.00
Cos						CSEX							
2x					e X	Ď,							
2 Sin	1.00	1.73	2.00	1.73	1410	0	-1.00	-1.73	-2.00	-1.73		0	1.00
(2x +					nn.								
30)				, J	1-								

(2 Marks)

(b) On the grid provided draw the graph of $y = 4 \cos 2x$ and $y = 2 \sin (2x + 30^0)$ for $0^0 \le x \cdot 180^0$.

Take the scale 1cm for 15° on the x – axis and 2cm for 1 unit on the y-axis. (5 Marks)



For More Papers a

Call: 0720502479

(c) (i) State the amplitude of $y = 4 \cos 2x$ (1 Mark) (ii) Find the period of $y = 2 \sin (2x + 30)^0$ (1 Mark) (d) Use your graph to solve $4 \cos 2x - 2 \sin (2x + 30) = 0$ (1 Mark)

18. A red and black dice are rolled and the events X, Y and Z are defined as follows.

X = The red die shows a 4

Y - The sum of the scores of the two dice is 6

Z - The black die shows a 3

(a) Find the probability of event X

(b) The probability of events X and Z

(c) Which event is mutually exclusive to X

(d) Which event is indepedent of X

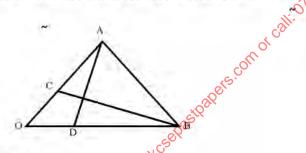
(e) The probability of event Y

(2 Marks)

(2 Marks)

(2 Marks)

19. The diagram given below show triangle OAB. OA = a, OB = b. C divides OA in the ratio 2:3 and D divides OB in the ratio 3:4 while AD and BC meet at E.



Find interm of a and b

(b) Given that CE = mCB and DE = nDA where m and n are scalars

(i) Write down two distinct expressions for OE (2 Marks)
(ii) Hence find the values of m and n (4 Marks)
(iii) Find OE interms of g and b only (1 Mark)

20. (a) Using a ruler and pair of compasses only, construct triangle ABC in which AB = 9cm, BC = 8.5cm and angle BAC = 60° (3 Marks)

(b) One the same side of AB as C:

(i) Determine the locus of a point P such that $\angle APB = 60^{\circ}$ (3 Marks) (ii) Construct the locus of R such that AR >B 4cm (2 Marks) (iii) Determine the region T such that $\angle ACT \ge \angle BCT$ (2 Marks)

21. An arithmetic progression has the first term a and the common difference d.

(a) Write down the third, ninth and twenty – fifth terms of the progression. (3 Marks)

(b) The progression is increasing and the third, ninth and twenty-fifth terms form the first three consecutive terms of a geometric progression. If the sum of the seventh term and twice the sixth term of the arithmetic progression is 78.

Calculate

(i) The first term and the common difference (5 Marks)
(ii) The sum of the first nine terms of the arithmetic progression (2 Marks)

22. An aircraft leaves A (60°N, 13°W) at 1300 hours and arrives at B (60°N, 47°E) at 1700 hrs

(a) Calculate the average speed of the aircraft in knots

(3 Marks)

(b)Town C (60°N, 133°N) has a helipad. Two helicopters S and T leaves B at the same time. S moves due West to C while T moves due North to C. If the two helicopters are moving at 600 knots.

Find

(i) The time taken by S to reach C

(2 Marks)

(ii) The time taken by T to reach C

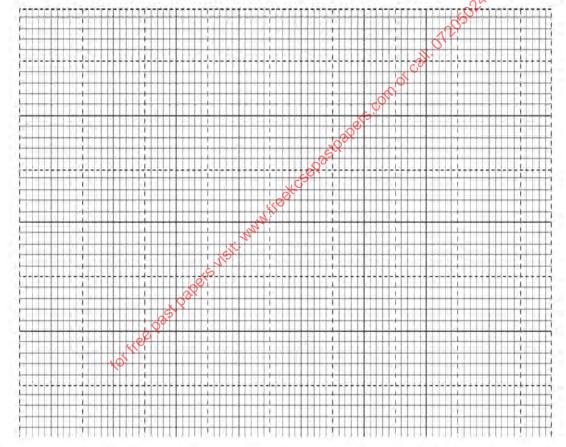
(2 Marks)

(c) The local time at a town D (23°N, 5°W) is 1000 hours. What is the local time at B. (3 Marks)

23. A firm has a fleet of vans and trucks. Each van can carry 9 crates and 3 cartons. Each truck can carry 4 crates and 10 cartons. The firm has to deliver not more than 36 crates and at least 30 cartons.

(a) If x vans and y trucks are available to make the delivery. Write down inequalities to represent the above information. (4 Marks)

(b) Use the grid provided, to represent the inequalities in (a) above (4 Marks)



(c) Given that the cost of using a truck is four times that of using a van, determine the number of vehicles that may give minimum cost (2 Marks)

24. (a) Sketch the graph of $y = x^2 + 5$

(2 Marks)

(b) Using the mid-ordinate rule, with six strips, estimate the area enclosed by the curve, x-axis, y - axis and the line x = 3. (4 Marks)

(c) Find the exact area by integration

(2 Marks)

(d) Calculate the percentage error made when the two methods above are used (2 Marks)

Set9

121/1 MATHEMATICS PAPER 1 TIME: 2 1/2 HOURS

SECTION I:(50 MARKS)

Answer all the guestions in the section.

- Find the difference between the GCD and the LCM of 36 and 54. 1. (2mks)
 - If three numbers 36, 54 and χ have a GCD of 6 and LCM of 216. (2mks) Find the least value of χ .
- Evaluate without using a calculator or Mathematical tables. 2.

Find the least value of
$$\chi$$
.

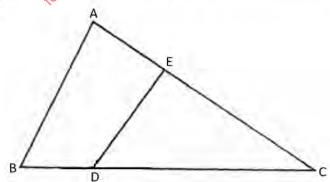
Evaluate without using a calculator or Mathematical tables.

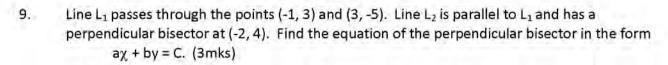
$$\frac{\frac{3}{4} + 1\frac{5}{7} \div \frac{4}{7} \text{ of } 2\frac{1}{3} \times \frac{2}{3}}{\left(1\frac{3}{7} - 2\frac{5}{8}\right) \times \frac{2}{3}}$$
(3mks)

- Convert 0.6331 into a fraction without using a calculator. 3. (3mks)
- 4. Use reciprocal and square tables to calculate to 3 significant figures the value of: (3mks) $0.04766^2 + \frac{1}{2754}$
- 5. Determine the values of χ that satisfy the following inequalities and show the solution on a number line.

$$-3 - \chi \le \frac{1}{3}\chi - 5 > \frac{2}{3}\chi - 6$$
 (4mks)

- The interior angle of a regular polygon is 20° more than three times the exterior angle of the same polygon. Determine the number of sides of the polygon. (3mks)
- Solve for χ in $27^{\chi+1}$ $3^{\chi+2}$ 400 = 86. 7. (3mks)
- In the triangle ABC below. AC = 8cm and BC = 5cm and angle BCA = 30°. Point D divides BC 8. in the ratio 1: 4 and point E divides AC in the ratio 2: 3. Find the area of the quadrilateral ABDE. (3mks)





10. Simplify:
$$\frac{6\chi^3 - 8\chi^2 y + 2\chi y^2}{18\chi^3 - 2\chi y^2}$$
 (4mks)

- 11. Martha has 26 coins whose total value is sh.205. There are thrice as many Sh.10 coins as there are Sh.20 coins. The rest are 50cts coins. Find the number of Sh.20 coins that Martha has.

 (3mks)
- 12. A solid hemisphere of radius 7cm has the same volume as a cube. Find the length of the cube to 1d.p. (3mks)
- 13. There are two grades of tea, grade A and grade B. Grade A cost Kshs.80 per kg and grade B cost Ksh.60 per kg. In what ratio must the two grades be mixed order to produce a blend worth Ksh.75 per kg. (3mks)
- 14. A forex bureau buys and sells American dollars in Kenya shillings at the rate shown below.

Buying Selling 85.40 86.00

An American tourist at the end of her tour in Kenya had Ksh. 107500 which he converted to the dollar through the forex bureau. How many dollars did she get? (2mks)

Without using Mathematical tables or a calculator evaluate:

$$\left(\frac{0.24 \times 1.56 \times 7.2}{1.3 \times 0.16 \times 0.09}\right)^{\frac{1}{2}}$$
 (3mks)

16. The image of point A (-3, 4) under a translation, T is A¹ (2, -2). If the image of a point B under T is (0, -1). Find the coordinates of B. (3mks)

SECTION II: (50 MARKS)

Answer only FIVE question from this section.

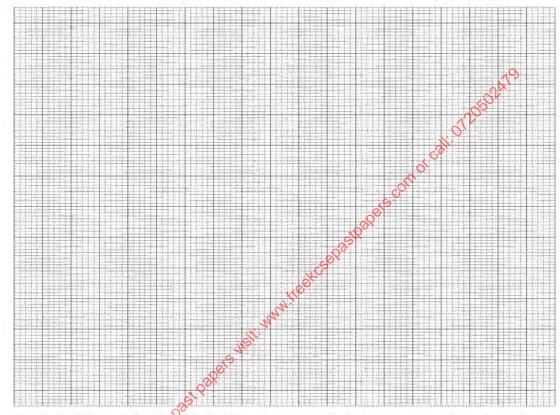
- 17. Milk in a cooling factor is stored in a rectangular tank whose internal dimensions are 1.7m by 1.4m by 2.2m one day the tank was 75% full of milk.
 - (a) Calculate the volume of milk in the tank in litres. (3mks)
 - (b) The milk is packed in small packets which are in the shape of a right pyramid on an equilateral triangle base of side 16cm. The height of each packet is 13.6cm. Each packet is sold at Sh.30. Calculate
 - (i) the volume of milk in milliliters, contained in each packet to 2 significant figures.

 (4mks)
 - (ii) the exact amount of money that was realized from the sale of all the packets of milk.

 (3mks)
- 18. (a) On the grid provided, draw a quadrilateral ABCD with vertices A (-6, -1), B (-6, -4), C (3, -7) and D (3, 2). (1mk)
 - (b) On the same grid, draw the image of ABCD under enlargement centre (0, -1)

scale factor $\frac{1}{3}$. Label the image A¹B¹C¹D¹. (3mks)

- (c) Draw A¹¹B¹¹C¹¹D¹¹, The image of A¹B¹C¹D¹ under rotation of +90° about (1, 0).
- d) Draw A¹¹¹B¹¹¹C¹¹¹D¹¹¹, the image of A¹¹B¹¹C¹¹D¹¹ under reflection in the line $y - \chi = 0$. (2mks
- Draw $A^{IV}\,B^{IV}\,C^{IV}D^{IV}$ the image of $A^{111}B^{111}C^{111}D^{111}$ under translation (e) and write the coordinates of the final image.



A matatu left Kilowezi at 7.00am and travelled towards Nairobi at an average speed of 19. 60km/hr. A car left Nairobi at 9.00am and travelled towards Kibwezi at an average speed of 80km/hr.

The distance between the two towns is 324km. Find:

- The time each vehicle arrived at their destination. (a)
 - (i) Matatu.

(ii) Car.

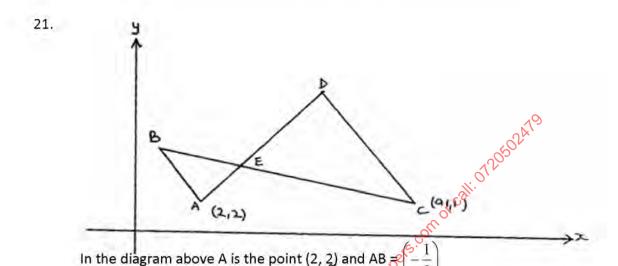
(2mks)

(b) The distance the matatu covered before the car started to move from Nairobi (i) to Kibwezi. (1mk)

(2mks)

- (ii) The time the two vehicles met on the way. (3mks)
- How far the car was from Kibwezi when they met. (2mks) (c)
- Determine the values of χ where the curve $y = \chi^2 2\chi 3$ cuts the χ -axis. (2mks) 20.

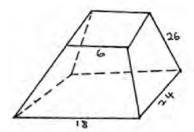
- (b) Using the mid-ordinate rule with four ordinates, estimate the area enclosed by the curve $y = \chi^2 2\chi 3$ and the χ -axis. (3mks)
- (c) Calculate the same area using integration method. (3mks)
- (d) Taking the area obtained by integration to be the exact area of the region, calculate the percentage error made when the mid-ordinate rule is used. (2mks)



- (a) Find
- (i) |AB| (2mks)
- (ii) The coordinates of B. (2mks)
- (b) The point C is (9, 1) and CD = 3AB. Find
- (i) the coordinates of D. (3mks)
- (c) The point E is (K, 4)
- (i) Find in terms of K, the vector AE.
- (ii) Give that AED is straight line, find K. (2mks)

(1mk)

- 22. Three boats X, y and Z are approaching a harbour H. X is 50km from the harbour on a bearing of 090°. It is 80km from the harbour on a bearing of 130° and Z is due West of Y and on a bearing of 200° from the harbour.
 - (a) Using a scale of 1cm rep 10km make a scale drawing showing the positions of the three boats relative to the harbour. (3mks)
 - (b) (i) Using the scale drawing find; the distance between X and Y.(2mks)
 - (ii) The distance of Z from the harbour. (2mks)
 - (iii) The distance between X and Z. (2mks)
 - (iii) The compass bearing of X from Z. (2mks)
- 23. The figure below shows a solid frustrum with a rectangular base measuring 18cm by 24cm and a rectangular top measuring 6cm by 8cm. The slant edges are each 26cm long.



Determine:

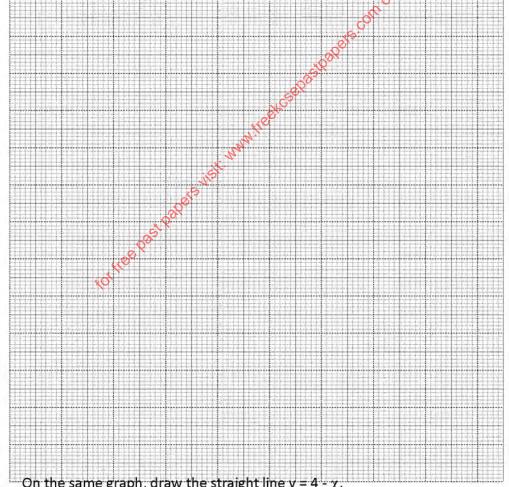
- Height of the original pyramid.
- Volume of the frustum. (b)
- Density in g/cm³ if the solid has a mass of 7.488kg. (3mks)
- Given that $y = 7 + 3\chi \chi^2$ complete the below. 24.

c -	3 -2	-1	0	1	2	3	4	5	6
/ -1	1		7			7			-11
(b)	Using a	suitabl	e scale	e, drav	v the	graph	of v =	7 + 3 ₂	- v2

(b) (3mks)

(4mks)

(3mks)



On the same graph, draw the straight line $y = 4 - \chi$. (1mk) (d) Use your graph to solve the equation $\chi^2 - 4\chi - 3 = 0$ (2mks)

(e) Determine the coordinates of the turning point. (2mks)

Set9 Paper 2

Answer all the questions in this section.

 In this question, show all the steps in your calculations. Use logarithms, correct to 4d.p to evaluate.

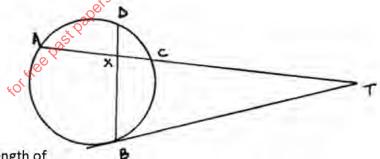
$$\left(\frac{8.429}{68.7 \times 0.9708}\right)^{\frac{2}{3}}$$
 (4mks)

- 2. A variable chord of length 6cm is drawn in a fixed circle with entre O and radius 5cm. Show the locus of the midpoint of the chord is a circle and state its radius. (4mks)
- 3. Tap A can fill a tank in 10 minutes while tap B can fill the same tank in 20 minutes. Another tap C can empty the tank when full in 30 minutes. Starting with an empty tank, the three taps are left open

for 5 minutes after which tap A is closed. How much longer does it take to fill the tank? (3mks)

4. In the figure below. BT is a tangent to the circle at B. AXCT and BXD are straight lines.

XC = 4cm, CT = 8cm, BX = 9,6cm and XD = 2.5cm



Find the length of

- (a) AX. (2mks)
- (b) BT. (2mks)
- 5. (a) Expand and simplify the expression $\left(1 + \frac{1}{2}\chi\right)^{\alpha}$ up to the term in χ^3 . (2mks
 - (b Hence use the results of (a) above to evaluate (0.99)⁸ giving your answer to 4 significant figures. (2mks)
- 6. The cash price of a fridge is sh.41400. Jane buys the fridge on hire purchase terms by paying

a deposit of sh.15960. Simple interest of 15% p.a. is charged on the balance. If Jane pays the balance in 24 equal monthly installments, calculate the amount of each installment.

(3mks)

Make a the subject of the formula. 7.

$$b = \sqrt{\frac{a^2 d}{a^2 - d^2}} \tag{3mks}$$

Simplify the expression below giving your answer in the form $a+b\sqrt{c}$, where a, b and c are 8, integers. (3mks)

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

- The fifth term of an arithmetic progression is 11 and the twenty fifth terms is 51. Calculate the first term and the common difference of the progression.
- Given the equation to a circle is $2\chi^2 + 2y^2 14y + 10\chi + 12.5 = 0$. Find the centre and the 10. radius of the circle.
- The distance S metres moved by a particle along a straight line after t sec in motion is given 11. by $S = 7 + 8t^2 - 2t^3$. Find the velocity at t = 2 sec. (2mks)
- Given that $A = \begin{pmatrix} 4 & 3 \\ -1 & 2 \end{pmatrix}$ and $C = \begin{pmatrix} 14 & 17 \\ -4 & 2 \end{pmatrix}$. Find B if A = C. 12. (3mks)
- 13. A sum of Sh.6000 is invested at 8% p.a. compound interest. After how long will this sum amount to Sh.9250? (Give your answer to the nearest month.) (3mks)
- 14. Solve the simultaneous equations.

$$\chi y = 4$$
$$\chi + y = 5$$

(3mks)

Solve for Θ in tan $(2\Theta + 45^\circ) = \sqrt{3}$ for $-90^\circ \le \Theta \le 90^\circ$. 15. 16.

Find the value of γ that satisfies the equation:

$$\log_3(\chi + 24) - 2 = \log_3(9, 2\chi)$$
. (3mks)

SECTION II: (50 MARKS)

Answer only FIVE questions from this section.

- The volume Vcm3 of a solid depends partly on the square of r and partly on the cube of r, 17. where r is one of the dimensions of the solid. When r = 1cm, the volume is 54.6cm³ and when r = 2cm the volume is 226.8cm³.
 - (a) Find an expression for V in terms of r.

(5mks)

(2mks)

(b) Calculate the volume of the solid when r = 4cm.

(2mks)

(3mks)

- Find the value of r for which the two parts of the volume are equal.
- 18. The table below shows the age in years of people leaving in a certain area.

AGE (Years)

No. of people

10 - 13

20

14 – 17	25
18 – 21	32
22 - 25	48
26 – 29	35
30 – 33	27
34 – 37	23

Calculate:

(a) The median age. (3mks)

(b) Using an assumed mean of 23.5, calculate

(i) the mean. (3mks)

(ii) the standard deviation.

(4mks)

19. (a) Complete the table below for the trigonometric equations $y = \cos 2\chi$ and $y = -\frac{1}{2}$

Sin 2χ , giving your values to 2 decimal places.

(2mks)

χ°	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°
2χ°	0	30	60	90	120	150	180	210	240	270	300	330	360
Cos 2χ°	1.00		0.50	0	-0.50		-1.00	-0.87		0	0.50		1.00
-½ Sin 2χ°	0	-0.25		-0.50	-0.43	Salara	0	0.25	0.43		0.43	0.25	

(b) On the grid provided and using the same axes, draw the graphs of y = Cos 2χ and $y = -\frac{1}{2}$ Sin 2χ for $0^{\circ} \le \chi \le 180^{\circ}$. Use the scale: 1cm for 15° on the χ -axis and 2cm for 0.5 units on the y-axis. (5mks)

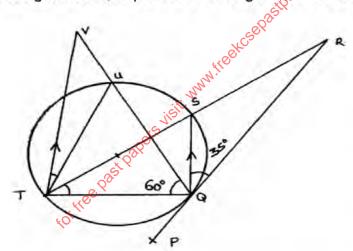
to thee past papers v

- (c) Using the graph in (b):
- Solve the equation $\cos 2\chi + \frac{1}{2} \sin 2\chi = 0$. (i)

(2mks)

(ii) State the period of $y = \frac{\pi}{2} \sin 2\chi$. (1mk)

Comor call. of 20502479 In the figure below, PQR is the tangent to the circle at Q. TS is a diameter and TSR and QUV 20. are straight lines. QS is parallel to TV. Angle SQR= 35° and TQV = 60°.



- Find the following angles, giving reasons for each answer. (a)
 - (i) QTS.

(3mks)

(ii) QRS. (2mks)

(iii) QVT. (2mks)

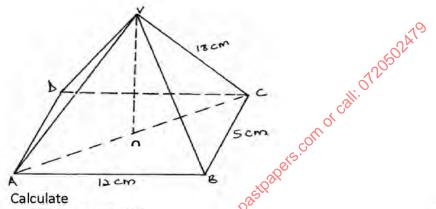
(iv) UTV.

(2mks)

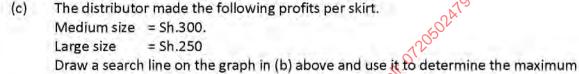
(v) QUT. (2mks)

21. A teacher had 5 red, 6 black and 9 blue pens in a box. The pens were all identical except for the colour.

- (a) If one pen is picked from the box, what is the probability that it is
 - (i) Red. (1mk)
 - (ii) Not black. (1mk)
- (b) The teacher asked a student to pick two pens from the box, one at a time, without replacement. Find the probability that
 - (i) both pens are of the same colour. (3mks)
 - (ii) they are of different colours. (2mks)
- (c) If the first student was allowed to take away two blue pens and another student was asked to pick two pens without replacement. What is the probability that the second student picked pens of same colour. (3mks)
- 22. In the figure below, VABCD is a right pyramid on a rectangular base. Point O is vertically below the vertex V. AB = 12cm, BC = 5cm and VA = VB = VC = VD = 18cm.



- (a) the height VO. (3mks)
- (b) the angle between
- (i) VC and the plane ABCD. (2mks)
- (ii) the planes VAB and ABCD. (2mks)
- (iii) the planes VAD and VBC. (3mks)
- 23. A uniform distributor is required to supply two sizes of skirts to a school: medium and large sizes. She was given the following conditions by the school.
 - (i) The total number of skirts must not exceed 600.
 - (ii) The number of medium size skirts must be more than the number of large size skirts.
 - (iii) The number of medium size skirts must not be more than 350 and the number of large size skirts must not be less than 150. If the distributor supplied χ medium size and y large size skirts.
 - (a) Write down, in terms of χ and y, all the linear inequalities representing the conditions above. (4mks)
 - (b) On the grid provided, represent the inequalities in (a) above by shading the unwanted regions. (3mks)



profit. (3mks)

An aeroplane flies due East at an average speed of 500 knots from an airport P (5°N, 45°E) to

- 24. An aeroplane flies due East at an average speed of 500 knots from an airport P (5°N, 45°E) to another airport Q. The flight took $2\frac{1}{4}$ hours.
 - (a) Calculate:
 - (i) the distance between P and O in nautical miles, correct to one decimal place.
 (2mks)
 - (ii) the position of airport Q

(3mks)

- (iii) the distance between and Q inn kilometers, correct to the nearest kilometer. (Take radius of earth = 6370km). (2mks)
- (b) The local time at P when the plane took off was 11.15am. What was the local time at Q when the plane landed? (Give your value to the nearest minute). (3mks)

or tree ?

Set 10 121/1 MATHEMATICS PAPER 1

TIME: 2 1/2 HOURS

SECTION I: (50 MARKS)

Answer ALL Questions in this section

1. Without using a calculator, evaluate:

$$8\frac{2}{5} \cdot 6^{2}/_{3} \div \frac{4}{9}$$

(3mks)

2. A tourist visited Kenya with 2500 U.S dollars and changed the U.S dollars into Kenya Shillings at a local bank in Kenya when the exchange rates at the time were as follows:

Buying Selling
1 U.S. 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?

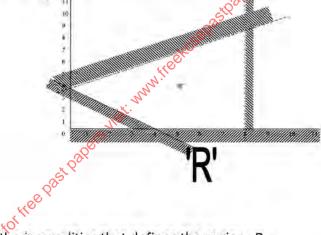
(2mks)

- (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)
- 3. The size of an interior angle of a regular polygon is 5 times the size of its exterior angle. Find the number of sides of this polygon. (3mks)
- 4. Given that in a right angled triangle, $\sin \theta = \frac{5}{12}$, find: (2mks) $\cos (90^{\circ} - \theta)$
- 5. The column vectors of b, c and d are given as:

 $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \qquad \begin{bmatrix} 4 \\ -2 \\ 3 \end{bmatrix} \quad \text{and} \quad \begin{bmatrix} 0 \\ 3 \\ -2 \end{bmatrix} \quad \text{respectively and }$ that P = b + 2c - d

Express vector P as a column vector and hence calculate the magnitude of P. (3mks)

6. The diagram below shows the region enclosed by inequalities.



Determine the inequalities that defines the regions R.

(3mks)

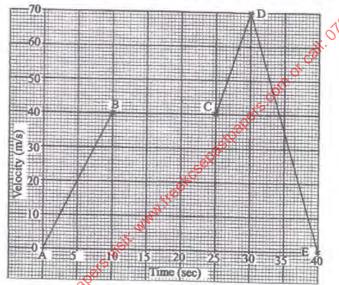
- 7. The diagonal of a rectangular flower garden is 20m. If the width of this garden is 8m, calculate its length and perimeter to 4 s.figures. (3mks)
- 8. Expand $(\sqrt{5} + \sqrt{3})$ $(\sqrt{5} \sqrt{3})$ hence or otherwise simplify by rationalising the denominator of $\sqrt{2}$ $\sqrt{5} + \sqrt{3}$
- 9. Given the matrix $\begin{pmatrix} y & c \\ 4 & d \end{pmatrix}$

- (a) Determine y^2 (1mk) (b) If $y^2 = I$, determine the possible values of c and d. (2mks)
- 10. Change 0.24 and 3.04 into fractions hence evaluate:
 - $\begin{pmatrix}
 411 & \bullet \\
 44 & 0.24
 \end{pmatrix}$ \div 3.04 leaving your answer as a fraction in its simplest form. (3mks)
- 12. Factorise xy zy xw + zw hence simplify the expression completely. (3mks) (xy zy xw + zw (y + w)

$$W^2 - y^2$$

- 13. Pipe Q and R can fill a tank in 20 minutes and 30 minutes respectively. Pipe T can empty the full tank in 40 minutes. Starting with an empty tank, how long does it take to fill the tank if:
 - a) All the three pipes are open? (1mk)
 - b) Pipe R is closed after 10 minutes? (3mks)

The gradient of the curve is $ax^2 + 3x$ at x = 2 is 8. Find the value of a. (2mks)



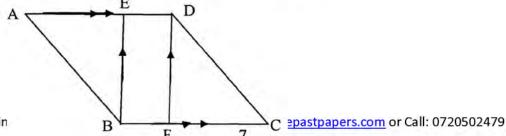
14.` The graph below is a velocity time graph.

Determine the acceleration in the sections:

(a) (i) CD (1mk) (ii) DE (1mk)

(ii) DE (1mk)
(b) Calculate the total distance covered. (2mks)

- 15. How many terms of the arithmetic series 2, 5, 8, 11 May be added to make their sum 301?
- 16. The diagram ABCD is a parallelogram. Line BE is parallel to line FD.



For More Papers and Markin

Show that triangles ABE and CDF are congruent. Show that triangles ABE and CDF are congruent. (3mks)

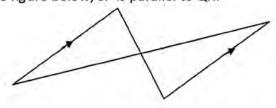
SECTION II (50 MARKS)

Answer ONLY five questions in this section

- 17. The ratio of a spherical balloon increases by 4%. Find the percentage increase in its;
 - a) Surface area.

(2mks) (2mks)

- b) Volume
- c) In the figure below, SP is parallel to QR.



(i) Show that triangles SPX and RQX are similar.

(2mks)

(ii) If PS = 8cm, PX = 6cm, SX = 4cm and RX = 3cm, find the length of RQ and QX.

(4mks)

- 18. A and B are two points 10cm apart.
 - (b) Draw a circle centre A, radius 2cm and a circle centre B, radius 4cm. (2mks)
 - (c) Draw a transverse common tangent to the two circles.

(5mks)

(d) Find by calculation the length of a direct common tangent correct to 3 significant figures.

- 19. A metallic cuboid 8cm by 10cm by 14cm is melted. Half of it is used to make a cylinder of radius 4.2cm, the remaining is used to make a sphere. Determine using $\pi = \frac{22}{7}$:
 - The height and surface area of the cylinder to 1 decimal place.

(5mks) (5mks)

- The radius and surface area of the sphere correct to 1 decimal place.

20. (a) Complete the table below to 2 decimal places for

 $y = -v^3 - v^2 + 3v + 1 \stackrel{\wedge}{=}$

X	-4	-3	-2.5	-2	-1.5	-1.0	-0.5	0	0.5	1.0	1.5	2.0
У		५०				-2					14.	

(b) On the grid provided, draw the graph for $y = -x^3 - x^2 + 3x + 1$ for -4 < x < 3.

(c) Use the graph to solve the equation $-x^3 - x^2 + 3x + 1 = 0$ (2mks)

(d) By drawing a suitable straight line on the graph, solve $-x^3 - x^2 + 3x + 1 = -2x$ (3mks)

21. The table below shows the masses of population randomly chosen in a certain town in kilogrammes.

Mass group	Number of people
0-2	3 85.0
2-5	6 200
5-12	12
12 - 20	24
20 - 35	30 30
35 - 60	30 20 30 5
60 - 90	nn 5

(i) Represent this information on a histogram. (5mks)

(ii) Draw a frequency polygon. (2mks)

(iii) Calculate the mean of the population in this town. (3mks)

22. A school has two students whose age difference is 9. Twice the sum of their ages is equal to the age of their teacher.

a)By letting the age of the younger student be y, write an expression of the:

b) Age of the elder student. (1mk)

c) Age of their teacher. (1mk)

iii) If in 19 years time, the product of the ages of the two students is equal to 14 times the age of their teacher;

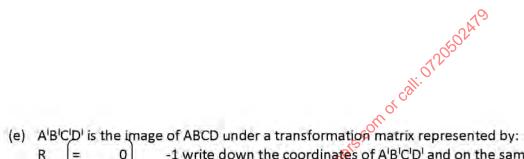
iv) Form an equation in y and hence determine the present possible age of the younger student. (4mks)

v) Determine the possible age of the elder student in 19 years time. (2mks)

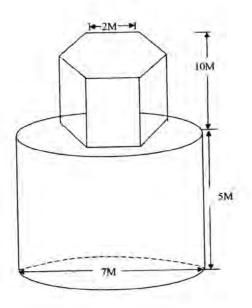
vi) Find the possible age of the teacher. (2mks)

23. A quadrilater ABCD has the coordinates A (1,1), B(4,1), C(5,3) and D(2,3).

a) On the graph provided draw the quadrilateral ABCD.



- (f) A"B"C"D" with coordinates A"(1,-2), B"(4,1), C"(5,-4), D"(2,-7) is the image of A'B'C'D' under transformation whose matrix is To Find matrix T. (4mks)
- (g) (i) On the same grid, draw quadrilateral A"B"C"D". (1mk)
 - (ii) A single transformation matrix K maps ABCD onto A"B"C"D". Determine the matrix K. (2mks)
- 24. The diagram below represents a community water tank made up of cylindrical and regular hexagonal parts. The diameter and the height of the cylindrical part are 7m and 5m respectively. The side of the regular hexagonal face is 2m and the height of the hexagonal part is 10m. (Take $\pi = \frac{22}{7}$)



- (a) Determine:-
- Cylindrical part.
- (ii) Hexagonal part.
- (iii) The whole tank.

(2mks) (b) An identical structure is to be built with a hollow cross-sectional area of 1.5m2 and mass of 440kgs. Calculate the density of this structure. (3mks)

Set10

Paper 2

SECTION I: (50 MARKS)

Answer ALL Questions in this section

Use logarithm table to evaluate: 1,

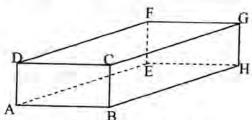
(4mks)

2mks)

(3mks)

0.7493cos216.3350 Log 559.3 + 10tan30

- 2. What must be added to $\frac{1}{2}x^2 + \frac{1}{9}$ in order to make it a perfect square? (2mks)
- 3. Expand $(x a/x^2)^6$ in ascending powers of x, up to the term independent of x. If this independent term is 1215, find the value of a. (3mks)
- 4. An angle of 1.75 radians at the centre of a circle subtends an arc of length 24.8cm. Find the diameter of the circle. (2mks)
- ABCDEFG is a rectangular box in which AB, AD, AE are 3cm, 4cm and 5cm long respectively. M is the midpoint of FG.



Find the length AM and determine the inclination of AM to EFGH.

(3mks)

6. Use square roots, reciprocals and square tables to evaluate the expression: (3mks)

$$(0.00546667)^{\frac{1}{2}} + \underbrace{3 \left(\frac{2}{0.043279} \right)}$$

- 7. A member of a county assembly sold his car for shs. 1,250,000 and deposited this money in a savings account in one of the banks in Kaiboi town. The banks paid 18%p.a compounded quarterly. After two years, the member of the county assembly withdrew a half of the amount from the account. He left the rest for a further two and a half years. Calculate the total interest he earned in the 4½ year period. (4mks)
- 8. Given that x^0 is an angle in the third quadrant such that $16\sin^2 x^0 + 4\cos x^0 = 10$. Find $\tan x$.

 (3mks)
- 9. Two variables P and L are such that P varies partly as L and partly varies inversely as the square root of L.
 - a) Determine the relationship between P and L given that L = 16 when P = 500 and L = 25 when P = 800. (3mks)
 - b) Hence find Rwhen L = 81.

(1mk)

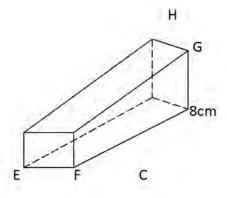
- 10. The angle of elevation from the base of a wall to the top of the flag post 70 metres away is 62. The angle of depression from the top of the flag post to the wall is 25°. Calculate:
 - a) The height of the flag post.

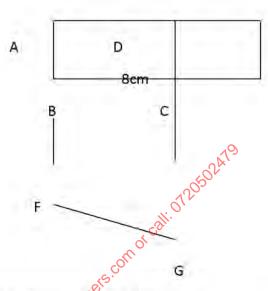
(1mk)

b) The height of the wall.

(2mks)

- 11. Given that $\log 3 = 1.583$ and $\log 5 = 2.322$, evaluate without using table or calculator: Log 135 (2mks)
- 12. Two values of **a** and **b** are such that $7.1 \le 7.3$ and $12.5 \le b \le 12.7$. Calculate the percentage error in b, giving your answer correct to 2 decimal places. (3mks)
- 13. The following figure is a solid and its incomplete net.
 - (i) Complete and label the net.





b) Hence or otherwise, find the surface area of the solid.

(2mks)

Solve for x in the equation:

(3mks)

$$9^{x+1} - 54 = 3^{2x+1}$$

14. The points P (-6, 5) and Q (2, -1) are the ends of a diameter of a circle centre M. Determine:-

a) The coordinates of M.

(1mk)

b) The equation of the circle in the form $x^2 + y^2 + ax + by + c = 0$.

(2mks)

15. Solve the simultaneous equations:

(3mks)

$$y + 2x + 1 = 0$$
$$x^2 + xy = -6$$

SECTION II (50 MARKS)

Answer ONLY FIVE questions in this section in the spaces provided

- 16. Mr. Maiyo, who works in a sugarcane plantation, owns a bicycle which he sometimes rides to work. Out of the 21 working days in a month, he rides to work for 18 days. If he rides to work, the probability that he is bitten by a rabid dog is $^4/_{15}$ otherwise it is only $^1/_{13}$. When he is bitten by the dog, the probability that he will get treated is $^4/_5$ and if he does not get treated, the probability that he will get rabies is $^5/_7$.
 - a) Draw a tree diagram using the given information.

(3mks)

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

(i) Maiyo will not be bitten by a rabid dog.

(2mks)

(ii) He will get rabies.

(3mks)

17. Tax rates in operation in a certain year in Kenya are as given in the table below.

Income	Tax Rates
(kf p.a.)	(sh. Per £)
1-4,512	2
4,513 – 9,024	3
9,025 – 13,536	4
13,537 – 18,048	5
18,049 – 22,560	6
Over 22,560	6.5

- a) Mr. Koech pays Ksh. 2,172 P.A.Y.E. monthly. He was entitled to a house allowance of Ksh. 5,000 and a medical allowance of Ksh. 2,000 and gets a monthly tax relief of Ksh. 1,093. Calculate his monthly basic salary. (8mks)
- b) Mr. Koech's other deduction per month were as follows:
 NHIF Kshs. 320

Co-op Loan – Kshs. 4,000 Calculate Koech's net pay per month.

(2mks)

- 18. Using a ruler and a pair of compasses only:
 - (a) Three points A, B and C are vertices of a triangle ABC such that AB = 8cm, BC = 5cm and AC = 6.4cm. Draw triangle ABC with AB as the base. (2mks)
 - (b) Construct the locus of P such that it is equidistance from the sides AB, BC and AC. (3mks)
 - (c) On the opposite side of point C on AB, construct the locus L such $\langle ALB = 60^{\circ}$. (3mks)
 - (d) Hence determine the area of the major sector bounded by the locus L. (2mks)
- 19. (a) Complete the table below for the functions y = 4 Cos 2x and y = 3 Sin (2x + 30°) giving the values to 1 decimal place. (2mks)

~	~	
1	u	Ų
_	~	٠

			-()-1								
	-30°	00	300	60°	900	120°	150°	180°	210°	240°	2700
4 Cos 2x	2.0	4.0	2.0		-4.0	-2.0		4.0	2.0		-4.0
3 Sin (x+30°)	0.0	1.5	2.6	3.6		1.5	0		-2.6		-2.6

(b) Draw the graphs of $y = 4 \cos 2x^0$ and $y = 3 \sin (x + 30^0)$ for $-30 \le x \le 270^0$ on the same axes. Use a scale of 1cm for 30^0 on x-axis and 1cm for 1 unit on the y-axis (4mks)

- (c) Use your graphs in (b) above to solve the equation:
- (i) $3 \sin (x + 30^{\circ}) 4 \cos 2x = 0$.

(1mk)

(ii) $\sin(2x + 30^{\circ}) + 1 = 0$

THIK)

(2mks)

(d) Determine the period of the function $y = 4 \cos 2x$.

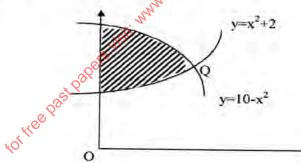
(1mk)

21. An aircraft takes off from the airport X(65°N, 36°E) and flles by the most direct route to another airport Y (R°N, 144°W) covering a distance of 4800nm.

a) Find R⁰

(1mk)

- b) If instead, the aircraft had flown along the meridian 1440W to point Y, find how much further it would have flown. (5mks)
- © Two aircrafts takes off from X to Y at the same time. Given that both fly at the same speed and one flies on the direct route and the other takes the route described in (b) above, state the position of the second aircraft when the first is landing at Y. (2mks)
- 22. The diagram shown below represents the area between the curves $y = x^2 + 2$ and $y = 10 x^2$ and y-axis.



Find:-

(a) The coordinates of Q (a point of intersection)

(1mk)

- (b) The area of the shaded region, by use of mid-ordinate rule with 8 ordinates(6mks)
- (c) Use integration method to calculate the same area as in (b) above.

(3mks)

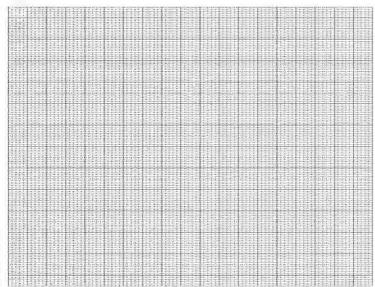
23. Two quantities of p and r are given below.

Р	1.2	1.5	2.0	2.5	3,5	4.5
r	1.58	2.25	3.39	4.74	7.86	11.5

(a) State the linear equation connecting p and r.

(1mk)

(b) Using the scale 2cm to represent 0.1 units on both axes, draw a suitable straight line graph on the grid provided;



Hence estimate the value of k and n.

(c) Write an equation connecting p and n.

(1mk)

- An aircraft leaves point A and flies on a bearing of 0200 to a second point B, which is 600km 24. from A. From B, the aircraft then flies on a bearing of 3200 to a third point C which is from B. The aircraft then flies directly back to A from C at a speed of 200km/hr. By drawing, find:-
 - (c) Time taken to fly directly from C to A.

(6mks)

(8mks)

(d) The bearing in which it would fly from C to A.

(1mk)

(e) Locate point D on a bearing 170° from C and 280° from A. Calculate BD in kilometers.

(2mks)

(f) What is the bearing of D from B?

(1mk)

Set11

121/1

MATHEMATICS

PAPER 1

TIME: 2 ½ HOURS

SECTION A (50 MARKS)

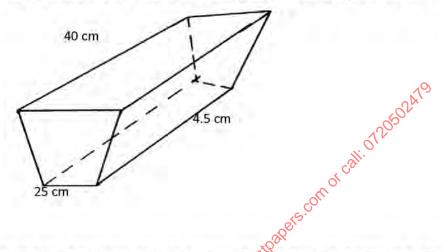
1. Evaluate $\frac{3}{4} + 1\frac{5}{7} \div \frac{4}{7} \circ f 2\frac{1}{3}$

(3mks)

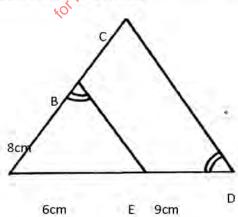
$$\left(1\frac{3}{7} - \frac{5}{8}\right)x\frac{2}{3}$$

- 2. A fruit juice dealer sell the juice in pacjket of 300ml, 500ml and 750ml. find the size of the smallest container that can fill each of the packets and leave a remainder of 200ml. (3mks)
- 3. Without using table or calculators, evaluate

- 4. Simplify the following quadratic expression. $\frac{8b^2 50a^2}{(2b + 5a)^2}$ (2mks)
- In a fundraising committee of 45 people, the ratio of men to women is 7:2. Find the number of women required to join the existing committee so that the ratio of men to women is changed to 5:
 (3mks)
- 6. A student expanded (x + y)2 incorrectly as x 2+ y 2 calculate the percentage error in the answer if x = 4 and y = 6 (3mks)
- 7. The figure below shows a trough which is 40 cm wide at he top and 25 cm wide at the bottom. The trough is 20cm deep and 4.5 m long. Calculate the capacity of the trough in litres. (3mks)



- B. Jemima's team entered a contest where teams of students compete by answering questions that earn either 3 points of 5 points. Jemima's team scored 44 points after answering 12 questions correctly. How many five-points questions did the team answer correctly.
 (3mks)
- 9. Using compass and ruler only construct a triangle Arc such that AB= 6cm ,BC = 5cm and angle ABC = 67.50 measure the length of AC (4mks)
 - 10. Use table of reciprocals only to work out : $\frac{13}{0.156} \frac{3}{0.6735}$ (3mks)
 - 11. In the figure below, angle ABE is equal to angle ADC AE = 6cm, Ed = 9cm and AB = 8cm, calculate the length of BC (3mks)



A

- 12. Simplify the expression below leaving your answer in rationalized surd form of a + b \sqrt{c} $\frac{1+\tan 120^o}{1+\cos 330^o}$ (4mks)
- 13. The two sides of a triangle are given 6 cm and 5 cm. the angle between them is 130o. calculate the are of the triangle (giving your answer to 2 decimal places) (3mks)
- 14. Given that Km + hn = r and that $m = \begin{pmatrix} -3 \\ -2 \end{pmatrix} n = \begin{pmatrix} 0 \\ 4 \end{pmatrix}$ and $r = \begin{pmatrix} -6 \\ 0 \end{pmatrix}$. Find the scalars k and h (3mks)
- 15. Give the matrices $A = \begin{pmatrix} 3 & 2 \\ 4 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix}$ and that C = Ab, find the inverse of C. (3mks)
- 16. The length of a rectangular mat is 1.5 M longer that its width, Find the length of the mat if its area is 6.5 m²(give your answer to 4 significant figures) (3mks)

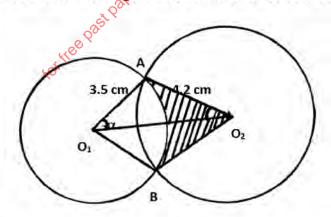
SECTION II

Answer only five questions from this section

- 17. Five towns V,W,X,UY and Z are situated such that W is 200km east of V. X is 300km from W on a bearing of 150°. Y is 350km on a bearing of 240oX. Z is 250o from V but 200° from X. Draw the diagram representing the position of the towns (use a scale of 1cm to represent 50km).
 - (b) From the diagram determine
 - (i) the distance in km of V from Z
 - (ii) The bearing of Y from W

- (1mk) (1mk)
- (c) A plane heading to town X takes off from town y and flies upwards of a constant angle which is less than 90°. After flying a distance of 350°km in the air it sees town x at an angle of depression of 50°. calculate the distance of the plane from x at this point to the nearest km.

 (3mks)
- 18. Two circles of radii 3.5 and 4.2 cm with centres O₁ and O₂ respectively intersect at points A and B as shown in the figure below. The distance between the two centres is 6 cm.



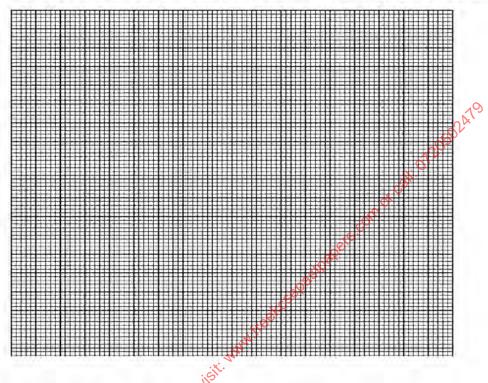
Calculate

- (a) The size of ∠AO1B (to the nearest degree) (3mks)
- (b) The size of \angle A O2 B (to the nearest degree) (3mks)
- (c) The area of quadrilateral O1AO2B, correct to 2 decimal places. (2mks)

19

X	-4	-3	-2	-1	0	1	2
2x2	32		8	2	0	2	
4x-3			-11		-3		
Υ			-3			3	13

(b) Draw the graph of the function y = 2x3 + 44x - 3 on the grid provided. (3mks)



- (c) Use your graph to estimate the roots of the equation $2x^2 + 4x 3 = 0$ (1mk)
- (d) Use your graph to obtain the roots of the equation 2x2 + x 5 = 0 to 1 decimal place. (3mks)
- (e) Draw the line of symmetry to pass through the turning point of this curve. 1mk)
- 20 The table below shows patients who attend a clinic in one week and were grouped by age as shown in the table below.

Age x years	0≤x<5	5≤x< 15	15≤x< 25	25≤ x < 45	45≤x<75
Number of patients	14	41	59	70	15

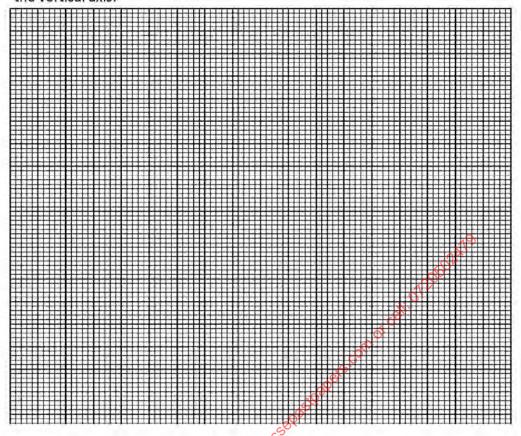
(a) Estimate the mean age

(4mks)

(b) On the grid provided draw a histogram to represent the distribution.

(3mks)

Use the scales: 1cm to represent 5 units on the horizontal axis 2 cm to represent 5 units on the vertical axis.



c) (i) State the group in which the median mark lies

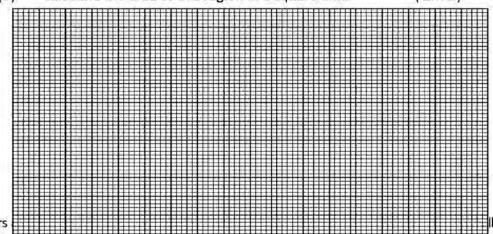
(1mk)

- (ii) A vertical line drawn through the median mark divides the total area of the histogram into two equal. Using this information estimate the median mark. (2mks)
- 21. (a) Show by shading the unwanted region, the region which satisfies the following inequalities (8mks)

$$4y \le -3 \ 3x - 12$$

(b) calculate the area of this region in a square units

(2mks)

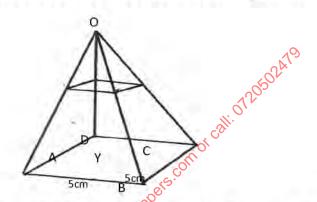


For More Papers

II: 0720502479

- 22. (a) Use trapezium rule with 8 strip to find the are bounded by the curve y = x + 2 and the x axis, x = 2 and x = 2 (5mks)
 - (b) Calculate the actual area in (a) above Hence find the percentage error in the area. (5mks)

23.



The diagram shows a frustum ABCDEF GH formed from a smaller pyramid ABCDO. The base the top of the frustums are squares of sides 12cm and 5 cm respectively. If Ob = 6cm and each of the slant edges of the frustum is 15 cm long. Calculate to 1 decimal place:

(a) the height OY of the small pyramid

(3mks)

(b) the vertical height X Y of the frustum

(4mks)

(c) the volume of the frustum

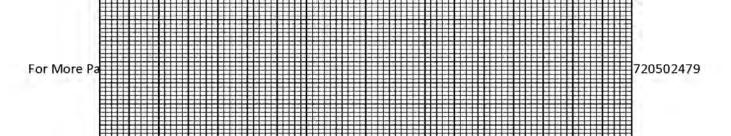
(3mks)

24. Complete the table below.

(2mks)

X	-180°	-150°	-120°	-90°	-60°	-30°	0°	30°	60°	90°	120°	150°	180°
$3 \sin \left(\frac{x}{2} + \right)$	-2.90	ortreep	3 -	-1.50						2.60		3.0	
Cos (2x + 30)°	0.87		-0.87		0			0			0	0.87	

(b) On the same set of axes draw the graph of y = 3 sin $\left(\frac{x}{2} + 15\right)$ and y = Cos (2x + 30) for $-180 \le x \le 180^{\circ}$ (5mks)



(c) (i) Use the graph in (b) above to solve 3 sin (x/2+15) Cos (2x+30)=0 (1mk) (ii) State the period and the amplitude of 3 sin (x/2+15) (2mk)

Set11 Paper 2

1. Use logarithms to evaluate: $\frac{34.33}{\sqrt{5.25x0.042}}$ (4mks)

A sales man gets a commission of 2.5 % on sales upto sh. 100.00 . He gets an additional commission of 1.6 % on sales above this. Calculate the commission he gets on sales worth sh. 320.00 (3 mks)

3. Make P the subject of the formula (3mks)

 $w = \frac{PQ}{\sqrt{(P^2 - Q)}}$

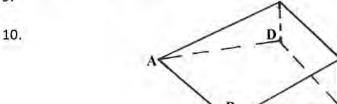
4. Two dice are tossed and the outcome on each fie recorded. Find the probability that the sum shown on both die is greater or equal to 7. (2mks)

5. Brain and Bonface working together can do a piece of work in 6 days. Bonface working a lone would take 10 days to complete the work. They start working together but after 4 days Bonface leaves and the remaining work is done by Brian. Find how long Brian takes to complete the remaining work.

(4mks)

- 6. Two variables M and N are such that M varies partly as N and Partly as the square root of N. given that N = 16 when M = 500 and N = 25 when M = 800. Find the equation connecting M and N (4mks)
- 7. Given $\log = 0.4771$ and $\log 5 = 0.6990$, find without using table or calculator $\log 0.045$.
- A certain sum of money put to compound interact amounts to sh.5600 at the end of the first year.
 The interest added at the end of the second year is sh.672, calculate the rate percent p.a and the sum invested. (4mks)

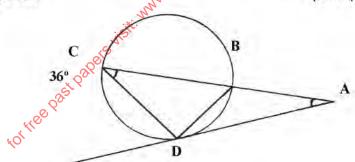
9.



The diagram above represents a redge in which AB= BC= 12cm and CF = 5cm. determine the angle between the plane ABFE and the plane ABCD (2mks)

- 11. Find the constant term in the expansion $\left(3x \frac{1}{2x}\right)^8$ (3mks)
- 12. A tuktuk taxi travelling at 20m/s accelerates uniformly and in 4 seconds, its velocity is 30m/s. it maintains this velocity for another 5 seconds before decelerating uniformly to rest after 3 seconds. calculate the total distance travelled by the tuktuk during the journey.

13. In the figure below, AB X is a tangent Angle CAB = 170 and angle ACB = 360 calculate the size of angle BDC (3mks)

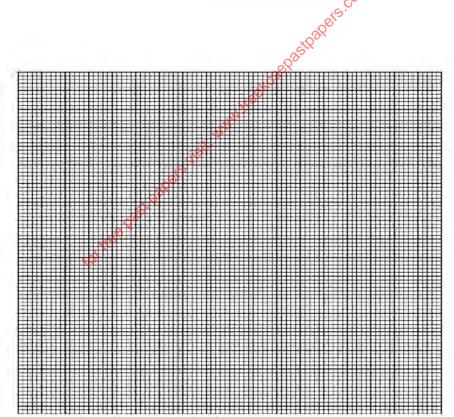


- 14. Find $\frac{dy}{dx}$ given that $y_X \frac{x^2 + 4x + 4}{x + 2}$ (3mks)
- 15. The perimeter of a triangular field is 120m. two of the sides measures 21m and 40m. calculate the size of the largest angle of the field. (3mks)
- 16. Solve for $x 2^{2x+3} 9(2^x) + 1 = 0$ 3mks)
- 17. Peters joined a firm with a commencing salary of 20,000 per month with an animal monthly increment of 10%. How much does he receive per moth during the seventh year. (3mks)

- 18. An examination involves a written and a practical test. The probability that a candidate passes the written test is 6/11. If a candidate passes a written test then the probability of passing the practical test is 3/5, other wise it would be 2/7.
 - (a) Illustrate this information on a tree diagram
 - (b) Determine the probability that a candidate is awarded
 - (c) (i) credit for passing both tests (2msk)
 - (ii) pass for passing the written test (2mks)
 - (iii) retake for passing the test (2mks)
 - (iv)Fail for not passing the test (2mks)
- 19. . The relationship between the variables a and y is believed to be y = a/x + bx. Where a and b are constants. The table below shows corresponding values of x and y

X	1	2	3	4	5
Υ	5.00	7.00	9.67	12.50	15.40

- (a) Write the relationship in the form of y = mx + c (1mk)
- (b) By drawing a suitable straight line graph estimate the values of a and b (7mks)



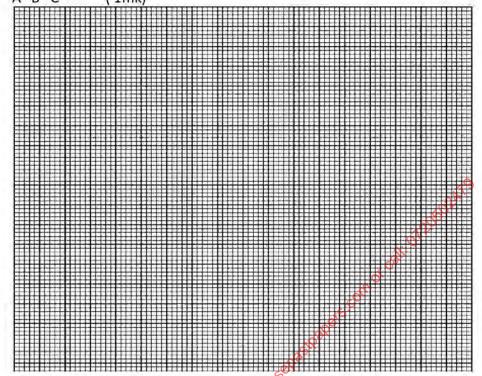
(c) Find the value of y when x = 1000

(2mks)

(2mks)

- 20. The vertices of triangle ABC are a(3,1) B (0,2) and c (2,-1)
 - (a) A'B'C' is the image of ABC under reflection on the line y = 0. Draw A'B'C' on the grid provided hence state the co-ordinates of its vertices (3mks)

- (b) A"B"C" is the image of A'B'C' under positive quarter turn about the origin. Draw triangle A"B"C" and state the co-ordinates of its vertices. (3mks)
- (c) A"B"C" is the image of triangle ABC under shear matrix, y axis invariant and linear scale factor 3. Write down the shear matrix hence find the co-ordinates of the vertices of triangle A"B"C" (1mk)



- 20. Two points P and Q are found on the earth's surface the position of P is (52°S,66°W) and Q (52°S,144°E). Taking earth's radius as 6370km,
 - (a) find the difference in longitude between the two points P and Q(1mk)
 - (b) (i) calculate the shortest distance between points P and q along (i) the latitutde in km (1mk)
 - (ii) The longitude in Km

(4mks)

- (d) A plane travelling at 800km/hr leaves point P At 10.00am and sais through south pole to point q. Find the local time the plane arrives at point Q to the nearest minute.

 (4mks)
- 21. Tosincompany has two types of machines, A and B for juice production. Type A machine can produce 800 litres per day while type A machine can produce 1600 litres per day. Type A machine needs four operators and type B needs seven operators. At least 800 litres must be produces daily and the total number of operators should not exceed 41. There should be two or more machine of each type.
 - Leting x be the number of machines of type A and y for type B.
 - (a) Form all inequalities in x and y to represent the above information

(4mks)

(b) On the grid provided below, draw the in equalities and shade the unwanted region (4mks)

 (c) Use the graph I (b) above to determine the least number of operators required for the maximum possible production. (2mk)

- 22. Using a ruler and a compass only, construct a triangle ABC such that AB = 6.8 cm, BC = 5.6 cm and angle ABC = 37 ½ ° (3mks)
 - (b) Locate the:
 - (i) Locus P such that angle APB = angle ACB

(3mks)

(ii) Locus Q such that Q is equidistant to points A and B

(2mks)

(iii) Locus R such that R is equidistant to lines AB and AC

(2mks)

- The distance S meters from a fixed point O, covered by a particle after t seconds B given by the equation $S = t^3 6t^2 + 9t + s^{-1}$
 - (a) calculate the gradient of the curve at t = 0.5 seconds

(3mks)

(b) Determine the values of S at the turning points of the curve

(3mks)

(c) Sketch the curve in the space provided.

(4mks)

24. The table below shows the distribution of marks obtained by 50 students

Marks	45- 49	50-54	55-59	60-64	65-69	70-74	75-79
No of students	3	9	13	15	5	4	1

(a) Calculate the mean using asuitable assumed mean

(3mks)

(b)

(c) calculate the variance

(3mks)

(d) calculate standard deviation

(1mk)

(e) If 30 students were to pass, calculator the pass mark (give your answer to nearest

(f) whole mark)

(3mks)

Set12 121/1 MATHEMATICS PAPER 1

TIME: 2 1/2 HOURS

SECTION I: (50 MARKS)

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

1. Without using a calculator, evaluate:

$$\frac{1\frac{4}{5} \text{ of } \frac{25}{18} \div 1\frac{2}{3} \times 24}{2\frac{1}{3} - \frac{1}{4} \text{ of } 12 \div \frac{5}{3}}$$

Leaving your answer as a mixed number.

(3mks)

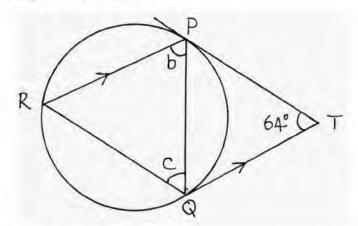
2. Simplify:

$$\frac{2a^2 - 3ab - 2b^2}{4a^2 - b^2}$$
 (3mks)

3. Without using Mathematical tables or a calculator evaluate:

$$6 Log_{2} \sqrt[3]{64} + 10 Log_{3} \sqrt[5]{243}$$
 (3mks)

4. In the figure below TP and TQ are tangents to the circle and PR is parallel to TQ. Find the angle marked b and c. (2mks)



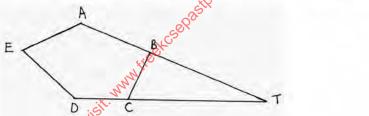
5. A train 20m long is moving at an average speed of 52km/h. Another train 30m long is moving in the opposite direction at an average speed of 48km/h. How long do the trains take to

the opposite direction at an average speed of 48km/h. How long do the trains take to completely

pass each other. Leave your answer in seconds.

(3mks)

6. ABCDE is a regular pentagon. Its sides AB and DC are produced to meet at T. Calculate ∠BTC.



- 7. Two cylindrical buckets are similar in shape with base radius 7cm and 10.5cm. The smaller bucket holds 4 litres. Calculate the volume of the larger bucket. (3mks)
- 8. A fridge costs Sh.1400. It may be bought at hire purchase by paying a deposit of Sh.3500 and the remainder, which has an interest charge of 18% added, in 12 equal monthly installments. Calculate:

The monthly installments to the nearest shilling.

(4mks)

(2mks)

- 9. The second term of four consecutive odd numbers is 2n + 1. If the sum of the three numbers is 10104. Find the value of n. (3mks)
- 10. A translation maps a point P (3, 2) onto P¹ (5, -4)

(a) Determine the translation vector.

(1mk)

(b) A point Q¹ is the image of the point Q (2, 5) under the same translation. Find the length

of P¹Q¹, leaving the answer in surd form.

(3mks)

 A contractor employs 40 men to do a piece of work in 60 days each man working 9 hours a day.

He is then requested to do the job in 48 days. How many more men working 10 hours a day For More Papers and Marking Scheme at a Small Fee: Website: www.freekcsepastpapers.com or Call: 0720502479

does he need to employ.

- Solve for y if: $9^{(y^2)} = 27^{(2y+2)}$. 12. (4mks)
- Solve for χ : 13.

$$\sin(2\chi + 20) = \cos\frac{\chi}{3}.$$
 (3mks)

- 14. Express 48 and 60 as a product of their prime factors. (2mks)
 - (ii) A room of side 48m and 60m is to be decorated using square tiles side XM. Find the greatest area of the tile. (2mks)

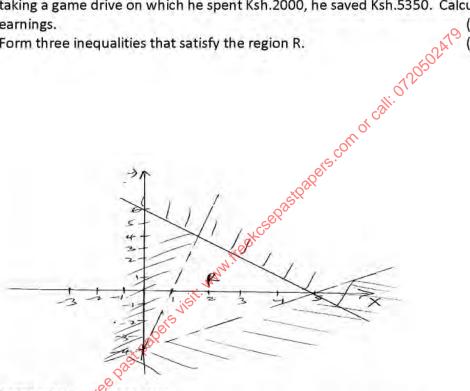
(3mks)

A man spent $\frac{1}{9}$ of his salary on food and $\frac{1}{4}$ of the remainder on electricity and water bills. 15. He paid fees with 20% of his salary and invested 16% of what was left on business. After

taking a game drive on which he spent Ksh.2000, he saved Ksh.5350. Calculate his monthly

earnings.

Form three inequalities that satisfy the region R. 16.



SECTION II: (50 MARKS)

Answer only five questions from this section in the spaces provided:

- 17. Three hundred and sixty litres of a homogeneous paint is made by mixing three paints A, B and C. The ratio by volume of paint A to paint B is 3: 2 and paint B to paint C is 1: 2. Paint A costs Sh.180 per litre, paint B Sh.240 per litre and paint C Sh.127.50 per litre. Determine:
 - (a) The volume of each type of paint in the mixture. (5mks)
 - (b) The amount of money spent in making one litre of the mixture. (3mks)
 - the percentage profit made by selling the mixture at Sh.221 per litre. (c) (2mks)

- 18. The length and breadth of a rectangle are given as $(6\chi 1)$ and $(\chi 2)$ cm respectively. If the length and breadth are each increased by 4cm, the new area is three times that of the original rectangle.
 - (a) Form an equation in χ and solve it. (4mks)
 - (b) Find the dimensions of the original rectangle. (2mks)
 - (c) Express the increase in area as a percentage of the original area. (4mks)
- 19. Three points A (0, 4), b (2, 3) and C (-2, -1) are vertices of a triangle.
- (a) (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 line AB. (1mk)
 - (iii) The coordinates of the mid-point of AB. (1mk)
- (c) (i) Find the equation of perpendicular bisector of AC. (1mk)
 - (ii) Perpendicular bisector of AB. (1mk)
 - (iii) Hence find the coordinates of the circumcentre of the triangle. (2mks)
- 20. A bird flies from a tree P to another tree Q which is 50 metres on a bearing of 030° from P.

 Form Q the bird flies 80 metres due West to another tree R and finally flies due South to another tree S which is on a bearing of 240° from P.
 - (a) Construct an accurate scale drawing showing the positions of P, Q, R and S. Use a scale of (1cm = 10m).
 - (i) From your diagram measure the distance and bearing of R from P. (3mks)
 - (ii) The distance of S from R in metres. (1mk)
 - (iii) The distance of S from P in metres.
- 21. The table below shows marks out of 40 obtained by 100 students in form 2.

Marks	1-5	6-10	11 - 20	21 - 25	26 – 40
No. of students	ONE POR	3χ - 2	38	5χ + 3	χ

(a)

Determine the value of χ.

(2mks)

- (b) Using a scale 1cm to represent 5 marks on the horizontal axis and an area of 1cm² to represent 5 students, draw a histogram to represent this data. (5mks)
- (c) Use histogram to estimate the median. (3mks)
- 22. (a) Use the trapezium rule to estimate the area between the curve $y = 3\chi^2 + 1$, lines $\chi = 1$ and $\chi = 3$ and X-axis. Use five ordinates. (3mks)
 - (b) Use integration method to find the exact area under a curve $y = 3\chi^2 + 1$. (3mks)
 - (c) Find the percentage error in estimating the area. (2mks)
- 23. (a) The figure below is a model representing a rocket capsule. The model whose total height is 15cm is made up of a conical top; a hemispherical bottom and the middle part is cylindrical. The radius of the base of the cone and that of the hemisphere are each 3cm. The height of the cylindrical part is 8cm.

For More Papers and Marking Sche

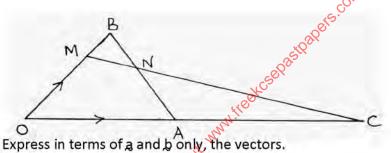
Website: www.freekcsepastpapers.com or Call: 0720502479

Calculate the external surface area of the r	model.	
----------------------------------------------	--------	--

(4mks)

- (b) The actual rocket has a total height of 6 metres. The outside of the actual rocket capsule is to be painted. Calculate the amount of paint required if an area of 20m² requires 0.75 litres of the paint. (6mks)
- In the triangle OAB, \sim OA = a \sim OB = b and OC = $\frac{3}{2}$ OA. 24.

M divides OB in the ratio 3: 2.



(a)

(1mk) AB.

(ii) MC. (1mk)

(b) Given the MN = hMC and BN = KBA, express vector MN in two different ways hence find the value of h and K. (6mks)

(c) Show that the points M, N and C are collinear. (2mks)

Set12 Paper 2

SECTION I: (50 MARKS)

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

1. Find the percentage error in:

$$\frac{20 \times 25.0}{10.5} \tag{3mks}$$

2. Use reciprocal and square tables to evaluate, to 4 significant figures.

$$\frac{1}{485.6} + 8,254^2$$

(3mks)

3. Make K the subject of the formula and simplify.

$$t = \frac{2y+1}{\sqrt{2Ky+K}} \tag{3mks}$$

- 4. Expand $\left(5 \frac{\chi}{2}\right)^6$ up to term in χ^3 uses your expansion to estimate the value of $\left(4\frac{1}{2}\right)^6$ correct to one decimal place. (2mks)
- 5. Find the number of terms in the series. a + 3a + 9a + --- 243a. (3mks)
- 6. The number χ is chosen at random from the set (0, 3, 6, 9) and the number y is chosen at random

from the set (0, 2, 4, 6, 8). Calculate the probability of each of the following separate evens.

(a) $\chi > 6$.

7.

15.

(b) $\chi + y = 11$.

(1mk) (2mks)

- Given that $4y = 3 \sin \frac{2}{5}\theta$ for $0 \le \theta \le 360^{\circ}$ determine.
- (a) Amplitude of the curve.

(1mk)

(b) Period of the curve.

(2mks)

8. Find the radius and centre of the circle whose equation is:

$$\frac{\chi^2}{2} - 2\chi + \frac{y^2}{2} - 5y + 2 = 0.$$
 (3mks)

9. Simplify the following:

Determine



- Construct the locus of point P such that ∠APB = 120° using a pair of compasses and ruler only.
 (3mks)
- 11. Given that $5^{\chi} = 7^{\gamma}$ find the ratio χ : y.

(3mks)

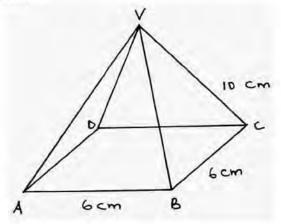
- 12. Find the equation of the normal to a curve $\chi^2 = 4y + 1$ at the point (2, 0.75).(4mks)
- 13. Calculate the standard deviation of 42, 45, 46, 50, 52, 56, 59.

(3mks)

- 14. OA = 3i + 4j 6K and OB = 2i + 3j + K. P divide line AB in the ratio 3: -2. Write the coordinate of P. (3ml)
 - Write the coordinate of P. (3mks)
 Two variables y and χ are such that y varies partly as χ and partly as the square of χ .

the relationship between y and χ given when $\chi=2$, y=28, $\chi=3$, y=48. (3mks)

Draw the net of the solid below and calculate surface area of its surfaces VA = VB = VC = VD = 10cm. (3mks)



SECTION II: (50 MARKS)

- Answer only five questions from this section in the spaces provided:

 The first, fourth and thirteenth terms of an Arithmetic Progression (AP) correspond to the first three consecutive terms of an increasing Geometric Progression (G.P). Given the first term of the AP is a and the common difference is defined.
 - (a) Write down the first three terms of the G.P in terms of a and d. (1mk)
 - (b) The sum of the third and the eleventh terms of the A.P is 30. Calculate:
 - (i) the common difference of the A.P. (5mks)
 - (ii) the first term of the A.P. (1mk)
 - (iii) the common ratio of the G.P. (1mk)
 (iv) sum of the first 10 terms of the G.P. (2mks)
- 18. (a) Complete the table below.

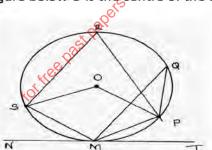
θ	0°	30°	60 °	90	120	150	180	210	240	270	300	330	360
$\operatorname{Tan}\frac{1}{2}\theta$	0.0	0.2 7		1	1.73	3.73		3.73	1.73				
2 Cos θ		1.7	1			1.73				0	1	1.73	2

- (b) Using the grid provided and the table above, draw the graph of $Y = \tan \frac{1}{2}\theta$ and Y = 2Cos θ . (5mks)
- c) Use your graph to:
- (i) Solve $\tan \frac{1}{2}\theta 2 \cos \theta = 0$. (1mk)
- (ii) determine period of $\tan \frac{1}{2}\theta$. (1mk)
- (iii) determine amplitude of $y = \cos \theta$. (1mk)

19. Income tax for all the income earned is charged at the rate shown in the table below.

Salary in Kf per month	Tax in Shs. per f	Total tax per slab
The first 300	2	
Next 300	3	o d
Next 300	5	am
Next 300	7	,s.
Excess χ	11	aper

- (a) Complete the table by filling the value for the total tax per slab.
- (2mks) (b) Emma claiming a tax relief of Ksh.600 discovered that a total of Kshs.5710 is deducted from her earnings in form of income tax. How much is her taxable amount in Ksh. (6mks)
- (c) Determine her net income if she earns a non-taxable entertainment allowance of Shs.3010 and that she pays a bank loan of Kshs.400. (2mks)
- 20. In the figure below O is the centre of the circle TN is a tangent to the circle of m



 $\angle PQM = 15^{\circ}$

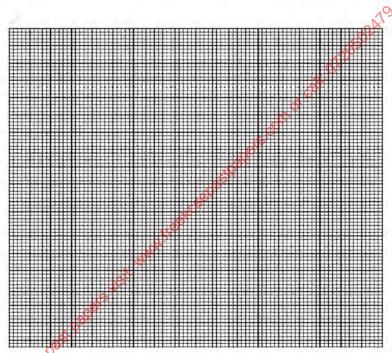
 \angle SMN = 33°

Giving reasons; find

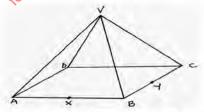
- ∠POM. (i)
- **ZPMT** (ii)
- (iii) ∠PRS.
- (iv) ∠OSM
- ∠OPM (v)
- 21. Draw the table for the equation $y = \chi^3 + 2\chi^2$. (2mks) (a) -2.5 -1.50-0.5-1 1.5

$2\chi^2$	18	12.5	8	4.5	2	0	1	4.5
χ³	-27		-8	1 1	1	0	1	
У	-9		0	11	3	0	2	

- (b) On the grid provided, draw the graph of $y = \chi^3 + 2\chi^2$ for $-3 \le x \le 1.5$. Take the scale 2cm for 1 unit on the X-axis and 1cm for 1 unit on the Y-axis. (3mks)
- (c) (i) Solve the equation $\chi^3 + 2\chi^2 = 0$.
 - (ii) Solve the equation $\chi^3 + 2\chi^2 \chi 2 = 0$ using your graph and another line graph. (3mks)



22. The figure below shows a right pyramid with a square base ABCD. VC = 20cm, AB = BC = 10.



X and Y are the mid-point of AB and BC respectively. Calculate

(a) the vertical height VO to 2d.p.

(3mks)

(b) the angle between VD and ABCD.

(2mks)

(c) the angle which plane VXY makes with the base.

(5mks)

- 23. P and Q are two points on the same parallel of latitude 66°251, whose longitudes differ by 120°. Calculate
 - (a) the radius of the parallel of latitude where P and Q lie R (6370km). (2mks)
 - (b) the distance of P and Q measured along the parallel of latitude. (2mks)
 - (c) the length of the straight line joining PQ. (2mks) (i)
 - (ii) the distance PQ along the latitude in nautical mile. (2mks)
 - If an aircraft took 30min to fly P to Q. Calculate its speed in knots. (2mks)
- 24. In a certain Mathematical relationship, the values of A and B are found to obey the relationship $B = CA + KA^2$ where C and K are constants. Below is a table of values of A and B.

Α	1	2	4	6
В	3.2	6.75	15.1	25.2

- By drawing a suitable straight line graph, determine the values of C and K.(8mks) (a)
- (b) Hence write the relationship between A and B.

(1mk)

Determine the value of B when A = 7. (c)

(1mk)

Set13 121/1

MATHEMATICS

PAPER 1

TIME: 2 1/2 HOURS

Thee past pages visit. In the last pages of the pages of

INSTRUCTIONS TO CANDIDATES

- 1. Write your name, index number, class and school in the spaces provided above.
- This paper consists of TWO sections I & II
- 3. Answer ALL the questions in section I and only FIVE questions from section II
- All answers and working must be written on the question paper in the spaces provided below each question.
- 5. Show all the steps in your calculations giving your answers at each stage in the spaces below each question.
- 6. Marks may be given for correct working even if the answer is wrong.

 Non-programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.

FOR EXAMINERS USE ONLY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL
		12.1						-1								44

17	18	19	20	21	22	23	24	TOTAL	GRAND
									TOTAL

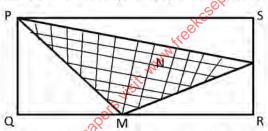
SECTION 1 (50 Marks)

Answer ALL questions from this section

1. Evaluate:
$$\frac{\frac{1}{2}of \ 18 \div -3 + 2\frac{1}{2}x\frac{3}{-5}}{\frac{1}{2} + 3\frac{3}{4} \div \frac{3}{4}}$$

(3 marks)

- 2. A line L passes through point (3, 1) and is perpendicular to the line 2y = 4x + 5. Determine the equation of L (3 marks)
- 3. Solve the following inequalities and represent the solution on a number line and hence state the integral values of x $7x 4 \le 9x + 2 < 3x + 14$ (4 marks)
- 4. In the figure below PQRS is a rectangle in which PS = 10Kcm and PQ = 6Kcm M and N are midpoints of QR and RS respectively. Find the area of the shaded part. (4 marks)



- 5. A seven sided polygon has three of its angles equal to θ and the other angles are (2 θ 30), (θ 28), 3(θ 4) and (126 θ). Calculate the value of θ (3 marks)
- 6. Solve for x in the equation.

$$\frac{81^{2x} \times 27^x}{9^x} = 729$$

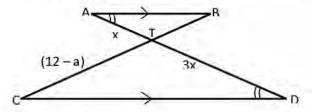
- 7. The GCD and LCM of three numbers are 3 and 1008 respectively. If two of the numbers are 48 and 72, find the least possible value of the third number. (3 marks)
- 8. Mr. Waweru needs to import a car from Japan where cost is USD 5000 outside Kenya. He intends to buy the car through an agent who deals in Japanese yen. The agent will charge him 20% commission on the price of the car and further 80,325 Japanese yen for shipment of the car. How many Kenya shillings will he need to send to the agent to obtain the car given that?

1USD = 105.00 yen and 1USD = KSh. 63.00

 Two containers have base area of 750cm² and 120cm² respectively. Calculate the volume of the larger container in litres given that the volume of the smaller container is 400cm³.

(3 marks)

The figure below AB//CD, AD and BC intersect at T. Given that AT:TD = 1:3 and CB = 12cm.
 Calculate the length of TB.

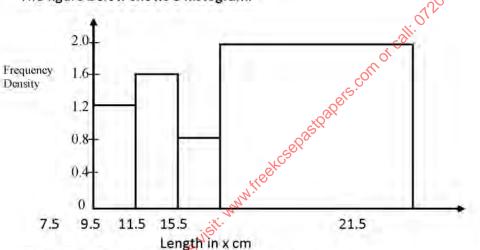


11. Use a calculator to work out.

(3 marks)

$$\frac{1}{4} \left(\frac{34^3 - 257}{97 \times 1243} \right)$$

12. The figure below shows a histogram.



Fill in the table below the missing frequencies.

Frequency
12

13. Solve for x²: $(Log_2 x) Log_2 x^3 = 4$

(4 marks)

14. Mutua bought 8 pairs of trousers and six shirts at Sh. 4160. Had he bought twice as many shirts and half as many trousers, he would have saved Sh. 160. Find the cost of each item.

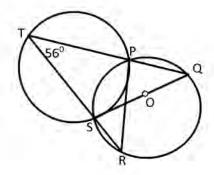
(3 marks)

Simplify the following expression.

(3 marks)

$$\frac{x-3}{x+3} - \frac{3x-9}{x^2-9}$$

 In the figure below O is the centre of circle PQRS. ∠PTS = 56° and ∠PQS = 28° and TPQ is a straight line.



Find: (a) ∠TSP (b) ∠PRQ (1mark) (1 mark)

SECTION II: (50 marks)

17. Three partners Mutua, Muthoka and Mwikali contributed Sh. 600,000, Sh. 400,000 and Sh. 800,000

respectively to start a business of a matatu plying Mbumbuni - Machakos route. The matatu carries 14

passengers with each paying Sh. 250. The matatumakes two round trips each day and ever full. Each day

Sh. 6000 is used to cover running costs and wages.

(a) Calculate their net profit per day.

(2 marks)

- (b) The matatu works for 25 days per month and is serviced every month at a cost of KSh.10, 000. Calculate their monthly profit in June. (1 mark)
- (c) The three partners agreed to save 40% of the profit, 24% to be shared in the ratio of their contribution.

Calculate Muthoka's share in the month of July

(4 marks)

- (d) The matatu developed mechanical problems and they decided to sell it through an agent who charged a commission of 5% on selling price. Each partner received KSh. 475,000 from the agent after he had taken his commission. Determine the price at which the agent sold the matatu (3 marks)
- 18. T he diagram below shows two circles centre A and B which intersect at point P and Q. Angle $PBQ = 40^{\circ}$ and angle $PAQ = 70^{\circ}$, and PA = AQ = 8cm.

Use the diagram to calculate to two d.p

a) The length PQ (2 marks)

b) The length PB (2 marks)

c) Area of minor segment of circle centre A (2 marks)

d) Area of minor segment of circle centre B (2 marks)

e) The area of shaded region. (2 marks)

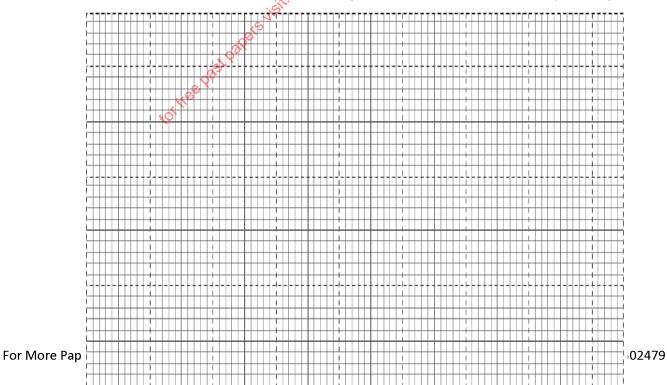
19. (a) (i) Fill the table below for the function.

$$y = 2x^2 + 5x - 12$$
 for $-8 \le x \le 4$

(2 marks)

Х	-8	-7	-6	-5	-4	-3	-2	-1	000	1	2	3	4
2x ²	128					18		call.	5	2			32
5x	-40					-15	د٥	non		5			20
- 12	-12					-12	Pagers.			-12			-12
У	76					-3°6,				-5			40

(ii) Using the table, draw the graph of the function $y = 2x^2 + 5x - 12$. Use the scale 1cm to 1 unit on the x-axis and 1cm for 10 units for the y – axis (4 marks)



(b) Use the graph drawn above to solve the following equations.

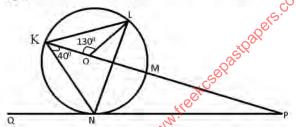
(i)
$$2x^2 + 5x - 12 = 0$$

(2 marks)

(ii)
$$3 - 7x - 3x^2 = 0$$

(2 marks)

- 20. A country bus left Emali at 11.45 a.m. and travelled towards Mombasa at an average speed of 80km/hr. A Nissan matatu left Emali at 1.15 p.m on the same day and travelled along the same road at an average speed of 120km/hr. The distance between Emali and Mombasa is 400km.
 - a) Determine the time of the day when the Nissan matatu overtook the bus. (5 marks)
 - **b**) Both vehicles continue towards Mombasa at their original speeds. Find how long the matatu had to wait at Mombasa before the bus arrived. (5 marks)
- In the figure below, K,L,M and N are points on the circumference of the circle centre O. The 21. points K, O, M and P are on a straight line. PN is tangent to the circle at N. ZKOL = 1300 and \angle MKN = 40° .



Stating the reason in each case, find the values of the following angles,

a) MLN b) OLN c) LNP

(2 marks)

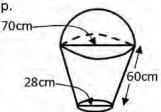
(2 marks)

(2 marks) (2 marks)

MPN d) KNQ

(2 marks)

22. The figure below shows a model of a solid in the shape of a frustum of a cone with a hemispherical top.



The diameter of the hemispherical top is 70cm and is equal to the diameter of the top of the frustum. The frustum has a base diameter of 28cm and a slant height of 60cm.

(a) Calculate the area of the hemispherical surface.

(1mark)

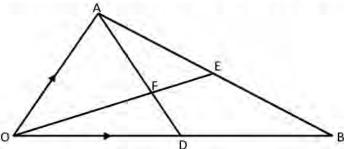
(b) Calculate the slant height of the cone from which the frustum was cut.

(4marks)

(c) Calculate the total surface area of the model

(5 marks)

23. In the figure, E is the midpoint of AB and OD:OB = 2:5 and F is the point of intersection of OE and AD.



Given that OA = band CB = , Express in terms of and a

(a) (i) OE

(1 mark)

(1 mark)

(ii) AD

- (b) Given further that AF = tAD and OF = hOE where t and h are scalars, find the values of t and h (5 marks)
- (c) Show that the points O, F and E are colliner

(3 marks)

- 24. The displacement S metres of a body moving along a straight line after t seconds is given by $S = -2t^3 + \frac{3}{2}t^2 + 3t$
 - Find its initial acceleration. (a)

(3 marks)

- (b) calculate:-
 - (i) The time when the body was momentarily at rest.
- (3 marks)
- (ii) Its displacement by the time it comes to rest momentarily
- (2 marks)

(c) Calculate the maximum velocity attained (2 marks)

Set13

Paper 2

1. Use logarithm tables to evaluate

(4 Marks)

- Solve for x in the equation 2.
 - $2Sin^2x 1 = Cos^2x + Sinx for 0 \le x \le 360$

(3 Marks)

(a) Expand $\left(1+\frac{3}{x}\right)$ upto the fifth term

(2 Marks)

Hence use your expansion to evaluate the value of $(2.5)^5$ to 3 d.p.

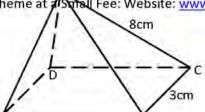
(2 Marks)

Make p the subject of the formula

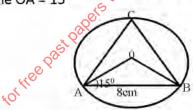
(3 Marks)

$$E + x = x + \sqrt{\frac{p - 3u}{y - 3xp}}$$

The figure below shows a rectangular based right pyramid. Find the angle between the 5. planes ABCD and ABV, (2marks)



- 6. A object A of area 10cm^2 is mapped onto its image B of area 60cm^2 by a transformation whose matrix is given by $P = \begin{pmatrix} x & 4 \\ 3 & x+3 \end{pmatrix}$. Find the possible value of x (3 Marks)
- 7. The position vector of A and B are a = 4i + 4j 6k and b = 10i + 4j + 12k. D is a point on AB such that AD:DB is 2:1. Find the co-ordinates of D (3 Marks)
- 8. A dealer has two types of grades of tea, A and B. Grade A costs Sh. 140 per kg. Grade B costs Sh. 160 per kg. If the dealer mixes A and B in the ratio 3:5 to make a brand of tea which he sells at Sh. 180 per kg, calculate the percentage profit that he makes (3 marks)
- 9. A variable Z varies directly as the square of X and inversely as the square root of Y. Find the percentage change in Z if X increased by 20% and Y decreased by 19% (3 Marks)
- By rounding each number to the nearest tens, approximate the value of ^{2454 x 396}/₆₆
 Hence calculate the percentage error arising from this approximation to 4 significant figures
 (3 Marks)
- 11. Find the centre and radius of the circle whose equation is $2x^2 + 2y^2 8x + 12y 2 = 0$ (3 Marks)
- 12. In the figure below AB = 8cm and O is the centre of the circle. Determine the area of the circle if angle OA = 15° (3 Marks)



- 13. Pipe A can fill a tank in 2 hours, pipes B and C can empty the tank in 5 hours and 6 hours respectively. How long would it take
 - (a) To fill the tank if A and B are left open and C closed

(2 Marks)

(b) To fill the tank with all the pipes open

(2 Marks)

14. (a) Find the inverse of the matrix $\begin{pmatrix} 4 & 3 \\ 3 & 5 \end{pmatrix}$

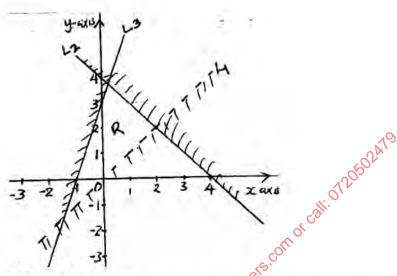
(1 Mark)

(a) Find the inverse of the matrix (3 5)

(b) Hence solve the simultaneous equation below using matrix method

(3 Marks)

- 4x + 3y = 6
- 5y + 3x 5 = 0
- 15. Evaluate by rationalizing the denominator and leaving your answer in surd form. (2 Marks)



SECTION II - 50 MARKS

Answer any FIVE questions from this section

17. Mr. Muema is a teacher and his monthly earnings are a basic salary of Sh. 42,000, a house allowance of Sh. 12,000, medical allowance of Sh. 2, 680 and hardship allowance equivalent of 30% of his basic salary. He is entitled to a personal relief of Sh. 1056 per month. He also has an insurance scheme for which he pays a monthly premium of Sh. 4000. He is therefore entitled to a relief on the premium of 15% of the premium paid. Using the taxation schedule below.

Income (K£ p.a.	Rate (%)	
1-5808	10	
5809 - 11,280	15	
11,281 - 16,752	20	
16,753 - 22, 224	25	
22, 225 – 27,696	30	
27,697 and above	35	

Calculate

(a) Mr. Muema's taxable pay in K£ p.a.

(2 Marks)

(b) Mr. Muema's net tax per month.

(6 Marks)

(c) Mr. Muema's net pay per month.

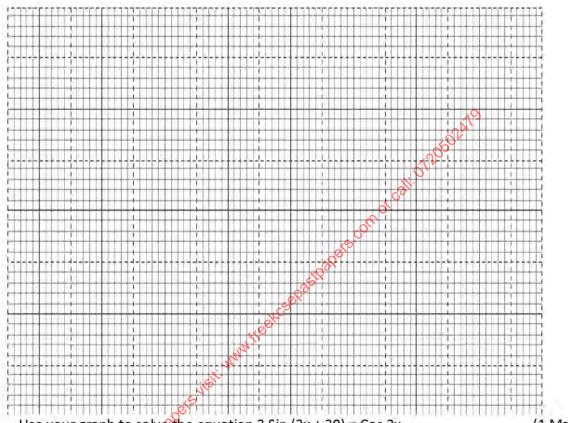
(2 Marks)

18. (a) Find the table for the curses given by $y = 3\sin(2x + 30^{\circ})$ and $y = \cos 2x$ for x values in the range $0 \le x \le 180^{\circ}$

x	0	15	3	4	6	75	90	105	120	135	150	165	180
			0	5	0								

$y = 3 \sin (2x + 30)$	1.5	3		1. 5		-1.5			-2.60	-1.00		1.5
y = Cos 2x	1		0		- 0.86 6		-0.866	-0.5			0.8 66	1

(b) Using the scale Horizontal axis 1cm represent 30° , vertical axis 1cm represent 1 unit, draw the graphs of y = 3 Sin (2x + 30) and y = Cos 2x (4 Marks)



- (c) Use your graph to solve the equation $3 \sin(2x + 30) = \cos 2x$ (1 Mark)
- (d) Determine the following from your graph
 - (i) Amplitude of $y = 3\sin(2x + 30)$ (1 Mark)
 - (ii) Period of $y = 3 \sin(2x + 30)$ (1 Mark)
 - (iii) Period of y = Cos 2x (1 Mark)
- 19. The positions of two towns on the earths surface are A (40°S, 45°W) and B (40°S, 135°E) Calculate:
 - (a) The difference in distance between towns A and B along the parallel of latitude and along the great circle (in nm) (4 Marks)
 - (b) Two planes X and Y left town A at 8:00 a.m. flying at 758 knots each towards town B. If plane X flies along the parallel of latitude and plane Y along the great circle; then determine the position of one of the planes when other lands at town B (4 Marks)
 - (c) What is the local time at town B when the second plane lands (2 Marks)
- 20. The probability of passing KCSE depends on the performance in the KCPE. If the candidate passes the KCPE, the probability of passing KCSE is $\frac{4}{5}$. If the candidate fails in the KCPE, the

probability of passing KCSE is $\frac{3}{5}$. If a candidate passes KCSE the probability that he/she will get employed is $\frac{5}{8}$. If he/she fails KCSE the probability of getting employed is $\frac{1}{3}$. The probability of passing KCPE is $\frac{2}{3}$.

- (a) Draw a well labelled tree diagram to represent the above information. (2 Marks)
- (b) Using the tree diagram, find the probability that a candidate:-

(i) Passes the KCSE (2Marks)

(ii) Gets employed (2 Marks)

(iii) Passes KCSE and get employed (2 Marks)

(iv) Passes KCPE and does not get employed (2 Marks)

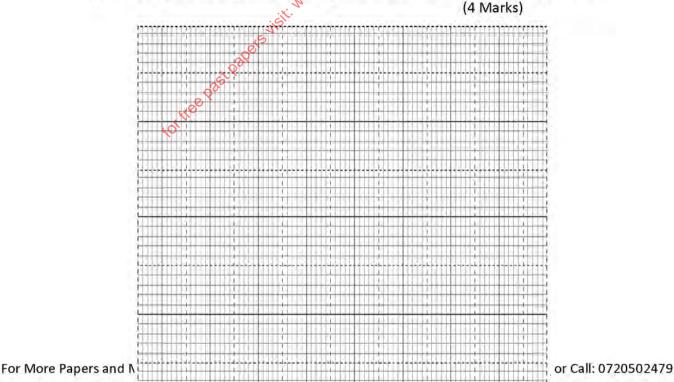
 The heights of 100 maize plants were measured to the nearest centimeter and the results recorded in the table shown below.

Height x (cm)	Frequency	d	d ²	fd	fd ²	cf
25 – 29	5			-15	19	5
30 – 34	12			-24	02/2	17
35 – 39	18	-1	1	-18,7	32	35
40 – 44	30	0	0	0.0	4	65
45 – 49	17	1	1	Car		
50 – 54	11	2		40,		
55 – 59	7	3	- 60	2,		

(2 Marks)

- (a) Complete the table
- (b) Calculate to 2 d.p.
 - (i) The mean (2 Marks)
 - (ii) The standard deviation (2 Marks)

(c) Using the data above plot an ogive and use it to find the quartile deviation



22.	With	out plotting estimate the area bounded by $y = x^2+4$, the $x - axis$ and the = 3 by using	lines x = 1 and x
	(a)	Mid-ordinate rule with 4 strips of equal width	(3 Marks)
	(b)	Trapezium rule with 4 strips of equal width (3	Marks)
	(c)	The percentage error arising from using the Mid-ordinate rule	(4 Marks)
3.	(a)	Construct a parallelogram ABCD in which AB = 9cm, AD = 5cm and an (2 Marks)	
	(b) N	Measure the length AC	(1 Mark)
	(c)	Show the locus of point P which moves so that it is equidistant from	A to C.(1 Mark)
	(d)	Show the locus of point Q which moves such that angle $BQD = 90^{\circ}$.	(2 Marks)
	(e)	The position of point X such that $AX \ge XC$ and angle $BXD = 90^{\circ}$	(2 Marks)
	(f)	Shade the region inside the parallelogram such that AX≥XC and angle	e BXD ≥900
	1.		(2 Marks)
4.	The thas reas mand reas ma	bua owns a restaurant where she stocks two types of drinks called Katwo drinks are produced in cans of the same size. She needs to order for own for upto 1000 cans. Malezi is more popular and she decides to order for upto 1000 cans. Malezi is more popular and she decides to order for upto 1000 cans. Malezi is more popular and she decides to order to make at least 10 more than 800 cans of Malezi. Taking X and Y to be the number of and Malezi respectively.	resh supplies and der at least twice 00 cans of Kazuri
		rite down 4 inequalities involving X and Y which satisfy these condition	s (4 Marks)
	200	sing a scale 1cm to represent 100 cans on each axis, plot the inequ	alities and graph
			Marks)
		he profit of a can of Kazuri is Shs. 2. Using your graph determine the n ach drink that the shopkeeper should order to give maximum profit	
		THE ENGLISH STREET, AND STREET, AND STREET, ST	(2 Marks)

Set14

121/1 MATHEMATICS PAPER 1

TIME: 2 1/2 HOURS

SECTION 1(50MARKS) Answer ALL questions in the section

1. Without using tables or calculators evaluate

(3mrks)



$$5^{5}/_{8} \times 1^{7}/_{9} - 5/4 \text{ of } 4^{4}/_{5} + 2^{4}/_{5} \div 7/_{10}$$

2 Factories completely: 28x²+ 3xy - y²

(2mrks)

Aman walks directly from point A towards the foot of a tall building 240m away. After covering 180m, he observes that the angles of elevation of the top of the building is 45°.
 Determine the angle of elevation of the top of the building from A. (4mrks)

4. Solve for x in the equation

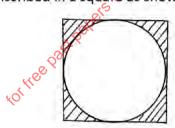
(3mrks)

$$x - 2 2x - 1 = 1 - x$$

5

63

- A perpendicular is drawn from the point T (3,5) to the line 2y + x =3. Find the equation of the perpendicular. (3mrks)
- 6. Acircle is inscribed in a square as shown below.



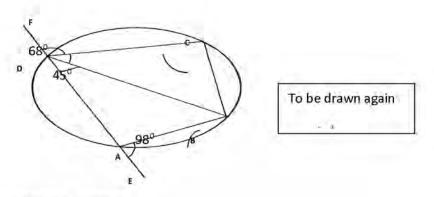
What percentage of the square to 2dp is not covered by the circle?

(3mrks)

- 7 Food aid 369,880 French Franc was donated to the Turkana drought stricken area. The food was purchased from United states of America (USA) and paid for in US dollars. Calculate the exact value of the food aid in dollars if:
 - 1 French Franc = ksh 12.70 and 1 Us dollars = ksh 84.50

(3mrks)

8. In the figure below, EADF is a straight line, \angle CDF = 68°, \angle BDC =45° and \angle BAE = 98°



Calculate the size of

(a) ∠ABD

(2mrks)

(b) Z CBD

(2mrks)

- (a) Use a ruler and apair compasses only to construct triangle ABC in which AB = 6cm, BC =8cm and angle ABC =60°.
 - (b) Determine the distance from A to the ortho-centre of the triangle in (a) above. (2mrks)
- 10. Simplify the expression

 $4t^2 - 25a^2$

(3mrks)

 $6t^2 + 9at - 15a^2$

- 11. A cyndrical piece of wood of radius 3.5cm and length 130cm is cut lengthwise into two equal pieces. Calculate the surface of one piece. (Take $\pi = 22/7$) (3mrks)
- 12. The gradient of a curve is given by $(1 x)^2$ and the curve cuts x axis at x=3. Determine the equation of the curve. (3mrks)
- 13. Simplify 25^{3/4} x 0.9² x 2² in the form A/B where A and B are integers. (3mrks)

$$5^{3/2} \times 3^3$$

- 14. Given that $\sin (x + 30)^0 = \cos 2x^0$ for $0^0 \le x \le 90^0$
 - (a) Find the value of x

(2mrks)

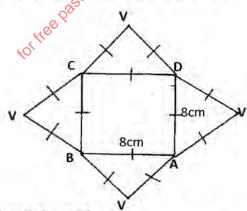
(b) Hence find the value of Cos² 3x⁰.

(2mrks)

15. Find the range of x if $2 \le 3 - x < 5$.

(2mrks)

16. The diagram below shows the net of a solid.



(a) Sketch the solid.

(2mrks)

(b) State the order of rotational symmetry of the solid.

(1mrk)

SECTION II: (50MRKS)

Answer only FIVE questions from this section

X	-4	-3	-2	-1	0	1	2	3
2x ²			8		0	2		
6x	-24		-12		0			18
-5	-5	-5	-5	-5	-5	-5	-5	-5
У			-9	1 2	-5	. 14		

- 17 Chemelil Sugar Academy hall has 200seats. During the District Drama Festival, tickets were sold atsh 150 for a dults and sh 75 for students.
 - (a) On day one of the festival 80% of the seats in the hall were occupied and twenty of the seats were occupied by students. Calculate the total money collected from the sale of tickets this day. (3mrks)
 - (b) On the last day of the festival, **x** students occupied the seats and all seats were occupied. The money collected from the tickets sales was sh 25,350.
 - (i) Write down an equation of x.

(2mrks)

(ii) Calculate the value of x.

(2mrks)

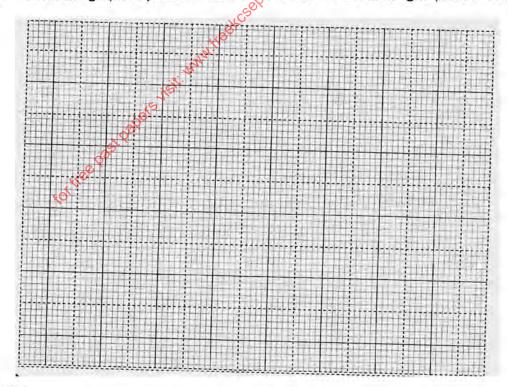
- (c) The money collected from the sale of tickets during the festival was divided among cost of hosting, allowances for adjudicators and electricity bill in the ration 7: 3: 2. If the allowances amounted to sh 126,000 calculate the
- (i) Amount collected during the festival.

(3mrks)

(ii) The cost of electricity bill during the festival

(1mrk)

- 18. (a) Complete the table below for the function $y = 2x^2 + 6x 5$ for $-4 \le x \le 3$ (2mrks)
 - (b) Draw the graph of $y = 2x^2 + 6x 5$ for $0 4 \le x \le 3$ in the grid provided below.



(3mrks)

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

(i) $2x^2 + 6x - 5 = 0$ (2mrks)

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

19. The frequency table below shows the marks scored by the 40 pupils in a mathematics test.

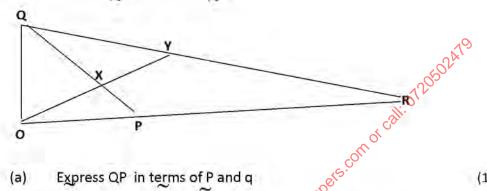
Marks	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	80 - 89	90 - 99
Number of pupils	2	3	10	12	8	3	2

State the modal mark. (1mrk) (a)

(b) Calculate the mean mark. (5mrks)

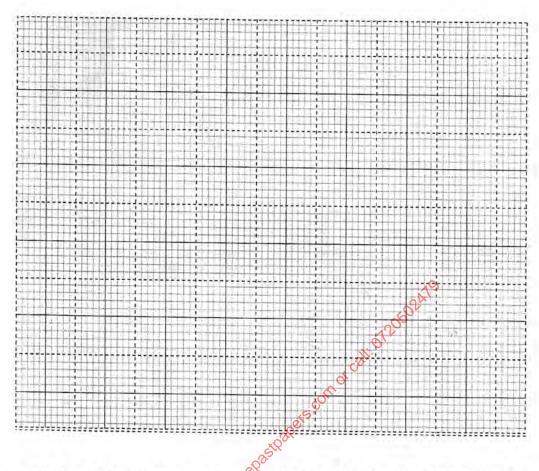
(c) Calculate the median mark. (4mrks)

20. In the figure below OP = p and OQ = q



Express QP in terms of P and q (a) (1mrk

- (b) If X is the mid point of QP, find OX in terms of Pand q. (1mrk)
- (c) Given that OR = 3p, express QR in the terms of P and q (2mrks)
- Given that QY = mQR and OY = mOX, where m and n are scalars. Express (d)
- OY in terms of m, p and q. (i) 2mrk)
- (ii) OY in terms of n,p and q. (1mrk)
- Use the results in (d) (i) and (ii) above to find the values of m and n.
- A triangular plot ABC is such that the length of the side AB is two thirds that of BC. The ratio 21. of the lengths AB:AC = 4.9 and angle at B is obtuse. If the perimeter of the plot is 38m calculate:
 - The length of the side BC (a) (4mrks)
 - (b) The area of the plot to 2dp. (4mrks)
 - (ii) the size of angle ABC to 2dp (2mrks)
- 22. Triangle PQR has vertices at P(3,-1), Q(5, 2) and R(2, 3). Plot and draw P'QR'on the (a) grid provided.
 - (b) Given that triangle P' Q' R'is the image of PQR under positive quarter turn about the origin, plotand draw P'Q'R' on the same axes as PQR
 - P"Q"R" is the image of P'Q'R'after reflection in the line y+x =0. Plot and draw P"Q"R" (c) on the same axes as PQRand P'Q'R' above. (3mrks)
 - (d) State the pairs of triangles above that are:
 - (1)oppositely congruent (2mrks)
 - (11) directly congruent (1mrk)



- 23. Two planes, **P** and **Q** leaves Kisumu international Airport at 8.00a.m. Plane p flies in the direction 320° at a speed of 180km/h while plane **Q** flies in the direction 088° at a speed of 210km/h.
 - (a) Use scale drawing to show the relative positions of the Airport plane, planeP and Q at 9.40a.m. (5mrks)
 - (b) Use the scale drawing above find
 - (i) The distance between the planes at 9.40 a.m. (2mrks)
 - (ii) The compass direction of the airport from plane P at 9.40a.am. (1mrk)
 - (iii) The shortest distance from the airport to the joining the two planes at 9.40a.am. (2mrks)
- 24. The velocity, V m/s, of the particles projected into space is given by the formula: V = 5t² 2t² +9 where t is time in seconds elapsed since projection, Determine:
 - (a) The acceleration of the particle when t = 4 (3mrks)
 - (b) The value of t which minimizes the acceleration. (2mrks)
 - (c) The velocity of the particle when acceleration is minimum. (2mrks)
 - (d) The total distance moved by the particle between t = 1 to t= 4 seconds.

 (3mrks)

Set14

Paper 2

SECTION 1

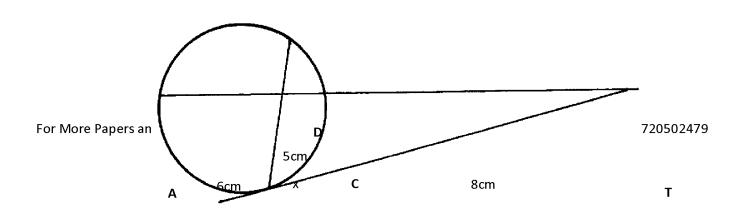
1. Evaluate without using tables or calculator. (3mrks)

- 2. Given that $6 \le x \le 13$ and $2 \le y \le 5$. Find the range within which $\frac{x + y}{x y}$ lies (3mrks)
- 3. (a) Find the standard deviation for the set of numbers 2, 5, 6, 7, 3, 8, 9, 8, (3mrks)
 - (b) Suppose a constant term 5 is added to every number. Find the new standard deviation give a reason for your answer. (1mrk)
- 4. A point P divides the line RT in the ratio -2:5. Find the coordinates of P given R(3,1) and T(6,-5) (3mrks)
- 5. Expand $(1 + 2x)^7$ upto the term in x^3 . Use your expansion to estimate $(1.02)^7$ to 4dp.(3mrks)
- 6. Three business partners Denga, Nyamita and cobe agreed to share shs. 1800 gained after a sale ofproperty. For every shs. 1 that Denga gets, Nyamita gets 50cts and for every shs 2 that Nyamita's gets cobe gets shs. 3. Find Nyamita's share. (3mrks)
- 7. The probability of a couple getting a baby gir is 0.55 and that of a baby boy is 0.45. The couple intend to have two children. Find the probability that they will be of different sexes.

 (3mrks)
- 8 Use logarithm table to evaluate. (4mrks)

- 9. In what ratio will coffee grade **A** costing kshs. 90 per kg be mixed with grade **B** costing kshs.60 per kg so that a profit of 25% is realized by selling the mixture at kshs.80 per kg.

 (3mrks)
- 10. **h** varies directly as **v** and inversely as the square of **r**. Find the percentage change in **h** if **v** is increased by 20% and at the same time **r** is increased by 50%. (3mrks)
- 11. In the figure below, **BT** is a targent to the circle at **B**. **AXCT** and **BXD** are straight lines. **AX** 6cm **CT** = 8cm, **BX** =4.8cm and **XD** =5cm.



Find the length of BT.

(2mrks)

12. Solve the simultaneous equations

Log (x - 1) + 2 log y = 2 log 3

Log x + log y = log 6

Given that the area of an image is four times the area of the object under a transformation whose matrix is

Find the value of x.

(3mrks)

- 14. Find the amplitude period and phase angle of $\frac{3x}{7} = \frac{5}{4} \cos \left(\frac{3x}{7} \frac{25}{4}\right)$ without sketching the graph. (3mkrs)
- 15. Two planes P and Q are at (36°N 125°W) and (36°N 55°E) respectively. Calculate the distance in nautical mile between P and Q measured along the circle through the North Pol (3mrks)
- Draw a line AB 6cm. P is a variable point in the plane of the paper above AB such that ∠APB =60° and the area of the triangle APB = 12.5cm². By accurate construction locate the locus of P. (4mrks)

SECTION 11

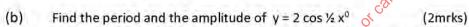
Attempt any five questions from this section

17. Complete the table by filling the black spaces.

(2mrks)

X ₀	0	3	6	9	120	150	180	210	240	270	300	330	360
Cos x	1.00						-1.0						1.00
2 cos ½ x ⁰	2.00						0.0						- 2.00

Using the scale 1cm to represent 30° on the horizontal axis 4cm to represent 1 unit on the vertical axis draw, on the grid provided, the graphs $\mathbf{y} = \cos x$ and $\mathbf{y} = 2 \cos \frac{1}{2} x^{\circ}$ on the same axis. (4mrks)



(c) Describe the transformation that maps the graph of $y = \cos x$ on the graph of $y = 2\cos \frac{x}{2}$ x^0

(1mrk)

(d) State the value of x for which $\cos x - 2\cos \frac{1}{2}x = 0$

(1mrk)

- 18. The product of the first three terms of a geometric progression is 64. If the first term is a and the common ratio is **r**.
 - (a) Express r in terms of a.

(3mrks)

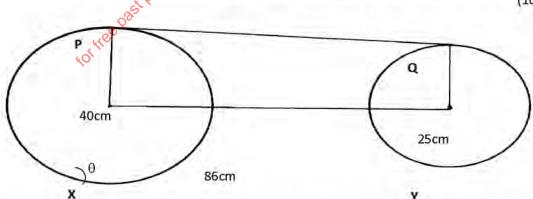
- (b) Given that the sum of the three terms is 14; Find the values of a and r and hence write down two possible sequences each upto the 4th term. (5mrks)
- (c) Find the product of the 50th terms of the two Sequences.

(2mrks)

19. The figure below shows a direct -belt drive system consisting of two pulleys of radii 40cm and 25cm.

The centres of the pulleys wand y are 86cm apart. Calculate the total length of the belt to 4 s.f.

(10mrks)



- 20. Water is flowing through a cylindrical pipe at the speed of 1.2m/s. If the pipe has an internal radius of 1.4cm, Calculate
 - (a) The volume of water delivered by the pipe per second in cm³ (Take $\pi = 22/7$ (2mrks)

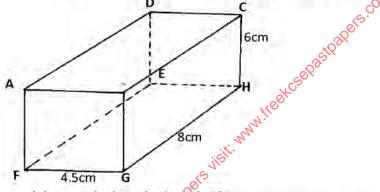
- (b) The depth to which the pipe fills a rectangular tank of base dimensions 1.5m x 2m in one hour to thenearest 0.1cm. (3mrks)
- (c) The time taken, to the nearest second for the pipe to fill a 50 litre bath tub (initially empty) which has a hole at the base that drains the tub at the rate of 3 litres per minute.

 (5mrks)
- 21. The table below gives some of the values of x and y for the function $y = \frac{1}{2}x^2 + 2x + 1$ for

$0 \le x \le 6$

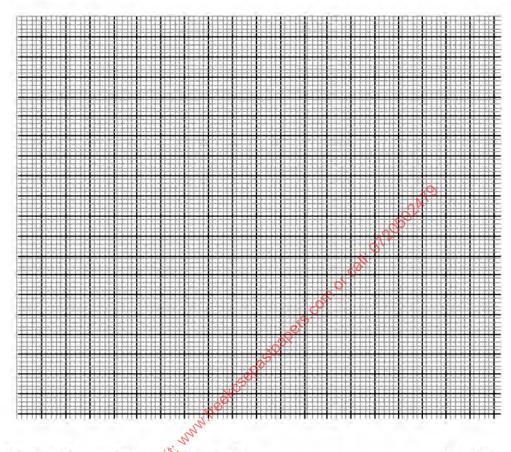
X	0	1	2	3	4	5	6
У	1.	3.5	7	11.5	17	23.5	31

- a) Use the values in the table above to draw the graph of $y = \frac{1}{2}x^2 + 2x + 1$ (2mrks)
- (b) Using Trapezoidal rule, estimate the area bound by the curvexaxis, y axis and the line x = 6 using 6 trapezia. (3mrks)
- (c) Use the mid ordinate rule with 6 trips to estimate the area bound by the curve, x axis and x =6. (3mrks)
- (d) If the exact area of the region described above is 78cm? Calculate the percentage error made when mid ordinate rule is used. Give your answer to two d.p. (2mrks)
- 22. The diagram below represents a Cuboid ABCDEFGH in which FG =4.5cm, GH =8cm HC=6m



- (a) Calculate the length FC 2mrks)
- (b) (i) The size of the angle between the lines FC and FH (2mrks)
 - (ii) Size of the angle between the line AB and FH. (2mrks)
- (c) The size of the angle between the planes ABHE and the plane FGHE. (2mrks)
- (d) The total surface area of the cuboid (closed) (2mrks)
- 23 Mr. Olik a drapper in Muhoroni town is required to supply two types of shirts, type A and type B to Muhoroni Secondary School. The total number of shirts must not be more than 400. He has to supply more of type Athan type Bshirts. However the number of type A shirts must not bemore than 300 and the number of type B shirts must not be less than 80 let x be number of type Ashirts and y be the number of type B shirts.
 - (a) Write down in terms of x and y all the linear inequalities representing the information above. (4mrks)
 - (b) On the grid provided, draw the inequalities and shade the unwanted regions. (4mrks)

- (c) Mr. Olik made profit of kshs. 600 per shirt of type A and shs. 400 per shirt of type B.
- (i) Use the graph to determine the number of shirts of each type that should be made to maximise the profit. (1mrk)



(ii) Calculate the maximum possible profit.

(1mrk)

- 24. The position of two towns X and Y are given to the nearest degree as $X(45^{\circ} \text{ N}, 110^{\circ} \text{ W})$ And $Y(45^{\circ} \text{ N}, 70^{\circ} \text{ E})$. Take π 3.142, R = 6370 km. Find:
 - (a) The distance between the two towns along the parallel of latitude in km. (2mrks)
 - (b) The distance between the towns in nautical miles. (2mrks)
 - (c) A plane flew from X to Y taking the shortest distance possible. It took the plane 15hrs to move from X and Y. Calculate its speed in Knots. (3mrks)
 - (d) Find the local time at Y when the local time at X on 10th April is 10.00pm. (3mrks)

Set15 121/1 MATHEMATICS PAPER 1

TIME: 2 1/2 HOURS

SECTION 1: (50 MARKS)

Attempt ALL Questions in this section

1. Evaluate: (3mks)

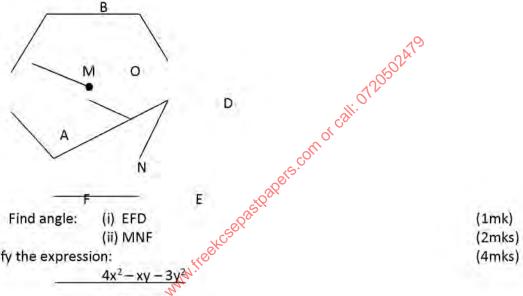
- 2. The prime numbers less than 10 are multiplied to form a number.
 - Write down the number formed.

(2mks)

- b) State the total value of the first digit in the number formed in 2(a) abov (1mk)
- A rhombus A B C D with its side 15cm and diagonal AC = 24cm. Find the other diagonal BD. 3.

(2mks)

The figure below is a regular hexagon. O is the centre and M is the mid point of AB. 4.



5. Simplify the expression:

32x2 - 18y2

A pool of water with surface area of 0.8ha has a uniform depth of 4m. A pipe drains the 6. pool at the rate of 400 litres per second. How many hours does it take to empty the pool?

(2mks)

7. Evaluate, giving your answer to 1s.f figure: (3mks)

0.0065 x 6.48

0.27

- 8. In a class of boys and girls, the probability of selecting a girl at random is 2/5. given that there are 18 boys in the class, calculate:
 - a) The number of students in the class.

(1mk)

b) The probability of choosing at random two students of the same sex.

(2mks)

- 9. Solve the simultaneous inequality given below and represent the solutions on a number line. 2x+3>x-4>3(x-2)(4mks)
- 10. 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 th	e average speed for the	whole journey	

(3mks)

(2mks)

11. Simplify the following expression without using tables or calculator: (3mks)

$$4\cos 60^{\circ} + 16\cos^2 45 + 2\sin 30$$

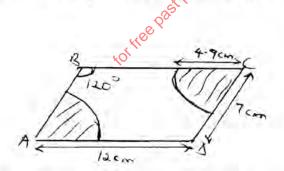
12. Given that
$$PQ = \begin{cases} \sin^2 45 \\ 9 \\ -4 \end{cases}$$
 and $OQ = 3$, determine:

OP and find the magnitude of OP giving your answer in surd form. (3mks)

13. A tourist arrived from USA and changed his US \$1500 TO Ksh. He spent Ksh. 3000 per night in a hotel for 20 nights and a further Ksh. 9000 daily for the entire period. He left for South Africa having changed the balance to South African Rand. Calculate the amount of South African Rands he left without the bank buys and sells currencies using the table below.

Currency	Buying	Selling
1 US Dollar (\$)	78.4133	78.4744
1 Sterling Pound (£)	114,1616	114.3043
1 South African Rand	7.8842	7.9141

- 14. Two similar containers can hold 1000ml and 8 litres of water respectively. The larger has a surface area of 800cm². Find the surface area of the smaller container. (3mks)
- 15. The diagram below represents a parallelogram. Calculate the area of the shaded region.

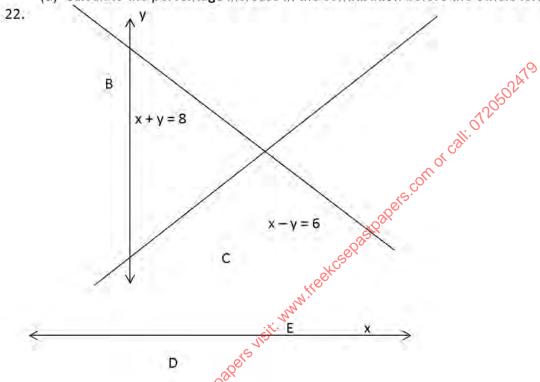


16. A flag post 10m long is fixed on top of a tower. From a point on horizontal ground, the angle of elevation of the top of flag post is 40° and the angle of depression from the bottom of the flag post is 33°. Taking 1cm represent 2m, determine by scale drawing the height of the tower.
(4mks)

SECTION II (50 MARKS)

Answer any five questions in this section

- 18. 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, that meant the remaining contributors had to pay more to achieve the target.
 - (b) Show that the increase in the contribution per member was:
 - Sh. $\underline{18,000}$ if n is the initial number of members. n(n-5)
 - (c) If the increase in the contribution per member was sh. 24, what was the original contribution before the other members left?
 - (d) Calculate the percentage increase in the contribution before the others left.



The diagram above represent Cartesian plane.

Determine the:

(a) Coordinates of points A.

(2mks)

(b) Coordinates of points C.

(3mks)

(c) If a line passes through the point C and the origin, find the equation of the line. (3 mks)

(d) Coordinates of point D.

(1mk)

(e) Coordinates of point E.

(1mk)

The table below shows the marks scored by form four students in a mathematical test.

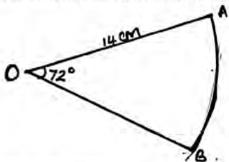
Marks	5≤marks≤14	≤24	≤34	≤54	≤64	≤84	≤94
Frequency	3	10	22	72	87	98	100

(a) State the modal class.

(1mk)

(b) Calculate the mean mark.	(3mks)
(c) Calculate the 70 th mark.	(3mks)
(d) Draw a histogram to represent this information	(3mks)

24. The figure below shows a sector of a circle. If the radius OA = 14cm and the angle AOB = 72°.



(a) Calculate the area of the sector. (2mks)

(b) The sector is folded to form a cone. Calculate:-

(i) The radius of the cone formed.

(2mks)

(ii) The volume of the solid formed.

(3mks)

- (c) A solid cone of same size in (b) above is melted down and casted into circular washers. Each washer has an external diameter of 4cm onternal diameter of 1½ cm and 0.3cm thick. Calculate number of washers made. (3mks)
- 25. A bus left Kisumu for Nairobi at an average speed of 60km/hr. After 1½ hours another car left Kisumu for Nairobi along the same route at an average speed of 100km/h. If the distance between Kisumu and Nairobi is 500km, determine:-
 - (a) (i) The distance of the bus from Nairobi when the car took off.

(2mks)

(ii) The distance the car travelled to catch up with the bus.

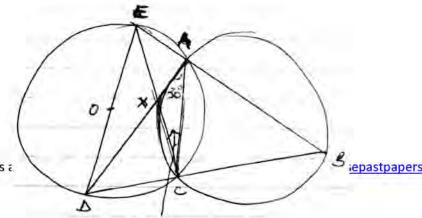
(4mks)

- (b) Immediately the car caught up with the bus, the car stopped for 25 minutes. Find the new average speed of which the car travelled in order to reach Nairobi at the same time as the bus. (to the nearest whole number). (4mks)
- 26. A metal R is an alloy of two metals X and Y. Metal X has a mass of 70g and a density of 16g/cm³. Metal Y has a mass of 19g and a density of 4g/cm³.
 - (a) Calculate the density of the metal R.

(4mks)

- (d) If metal R is divided into two equal parts and each half reinforced by adding metal X to get to initial volume. Find the density of the new alloy. (4mks)
- (e) The two metals are mixed in a ratio of 4:1 respectively. What is the density of the alloy? (2mks)

27.



20

💪 iepastpapers.com or Call: 0720502479

For More Papers a

The figure above ABCX and ACDE are cyclic quadrilaterals of two circles intersecting at A C D E O is a diameter of the circle, angle C A D = 30° and ACE = 20° .

Find the following angles, giving reasons for each answer.

(i) BAC	(2mks)
(ii) ABC	(2mks)
(iii) CED	(2mks)
(iv) ADE	(2mks)
(v) AEC	(2mks)

- 28. (a) Draw a regular pentagon PQRST of sides 7cm. On it draw a line AR such that it is a line of symmetry to the figure.
 - (b) Locate a point M on AR such that M is equidistant from P and whence measure the shortest distance of M from TS. (2mks)
 - Thee Dast Dagers visit. www.freekcsepastpagers.com.or (c) Shade the region within the figure such that a variable X must lie, given that X satisfies the following conditions: (4mks)
 - (i) X is nearer to PT than to PQ.
 - (ii) RX is not more than 7.5cm.
 - (iii) Angle PXT is greater than 90°.

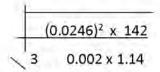
Set15 Paper 2

SECTION 1: (50 MARKS)

Answer ALL the Questions in this section in the spaces provided.

Use logarithm table to evaluate:

(4mks)



2. Expand the expression: $(3\sqrt{2} + 5)(3\sqrt{2} - 5)$. Hence work out the following: (3mks)

- 3. Expand $(2 + \frac{1}{5}x)^8$ up to the term in x^5 . Use your expansion to evaluate $(2.04)^8$ correct to 4 decimal places. (4mks)
- 4. Evaluate without using mathematical tables or calculators:

(2mks)

5. Make r the subject in the formular:

(3mks)

$$s = rt \over (r^2 - t)$$

- 6. The nth term of a sequence is 2n + 1.
 - (i) State the first four terms of the sequence.

(1mk)

(ii) Determine the sum of the first 40 terms of the series.

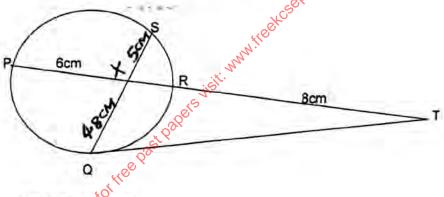
(2mks)

7. If matrix A = $\begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}$

Find B given that $A^2 = (A + B)$.

(3mks)

8. In the figure below QT is a tangent to a circle at QPXRT and QXS are straight lines. PX = 6cm, RT = 8cm, QX = 4.8cm and XS = 5cm.



Find the length of:

(a) XR

(2mks)

(b) QT

(2mks)

- 9. A circle whose equation is $(x-1)^2 + (y-k)^2 = 10$ passes through point (2,5). Find the coordinates of the two possible centres of the circle. (3mks)
- 10. A machine A can do a piece of work in 6 hours while machined B can do the same work in 9 hours. Machine A was set to do the work but after 3½ hours it broke down and machine B did the rest of the work. Find how long machine B took to do the rest of the work.

 (2mks)
- 11. The marks of 80 students in a Mathematics test are shown in the table below.

Marks	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90- 100
No. of students	8	10	15	14	11	8	7	5.	2	0

Find the quartile deviation of the marks.

(4mks)

(Give your answer to the nearest whole number)

12. Solve for x in the equation:

 $3\cos^2 x + \sin x + 1 = 0$

For $0 \le x \le 360$

(3mks)

- 13. A stone is thrown vertically upwards from Point O. After t seconds the stone is S metres from O. Given that $S = 29.4t 4.9t^2$, find the maximum height reached by the stone. (3mks)
- 14. A blender mixes two brands of Juice A and B to obtain 70m/s of the mixture worth Ksh. 165 per litre. If brand A is valued at Ksh. 168 per 1 litre bottle and brand B at Ksh. 153 per 1 litre bottle, calculate the ratio in which the bands A and B are mixed.
- 15. A quantity y varies partly as the square of X and partly as X. When y = 20, x = 2 and when y = 36 x = 3. Determine the equation relating y and x. (3mks)
- 16. The image of a point Q(1,2) after a translation is $Q^1(-1,2)$. What is the co-ordinate of the point R whose image is $R^1(-3, -3)$ after undergoing the same translation?

SECTION II: (50 MARKS)

Answer any five questions in this section

17. The table below shows monthly income tax rates.

Monthly taxable pay K£	Rate of tax Kshs per K£
1-342	2
343 – 684	3
685 - 1026	4
1027 - 1368	5
1369 - 1710	6
Over 1710	7
No. Section Control	

A government employee earns a monthly salary of Ksh. 24,200 and is provided with a house at a nominal rent of Ksh. 700 per month.

(b) Calculate the employee's taxable pay in K£.

(2mks)

(c) Calculate the total tax.

(4mks)

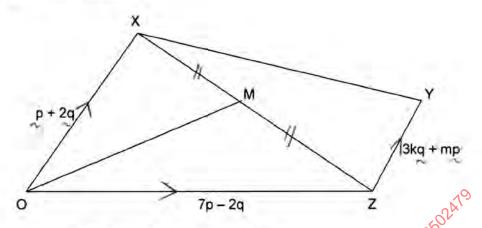
(d) The employee is entitled to a personal relief of Kshs. 1056 per month; and a monthly insurance relief at the rate of 15% of the premium paid. Calculate the net tax paid by the employee if the monthly premium amounts to Kshs. 2,400 for life insurance cover.(3mks)

(e) Calculate his / her net pay that month.

(1mk)

(2mks)

18. In the diagram M is the midpoint of XZ. OX = p + 2q. Oz = 7p - 2q and ZY = 3Kq + Mp where k, and m are constants.



- (a) Express the following in terms of p and q.
- (i) XZ
- (ii) XM (1mk)
- (iii) OM (1mk)
- (b) Express OY in terms of p, q, k and m. (2mks)
- (c) If y lies on OM produced with OY:OM = 3:2. Find the values of k and m. (4mks)
 19. The figure below shows a net of solid. The dimensions AC = CB = BA = 5cm, AF = 10cm and the triangles ABC and DEF are equilateral and equal.



- (f) Taking BCDE as the base of the solid, draw a proportionately well labelled solid that can be made from the set. (2mks)
- (g) Name the solid formed. (1mk)
- (h) Using the figure, calculate:-
 - (i) The angle between line CF and the plane BCDE. (3mks)
 - (ii) The angle between lines BD and DF. (3mks)
 - (iii) The angle between the planes BCDE and CDFA. (1mk)
- 20. The position of two towns P and Q are given to the nearest degree as P(45°N, 20°W) and Q(45°N, 160°E).

 Find:
 - (i) Shortest distance between the two towns in:-
 - (i) Kilometres (take radius of the earth as 6370km) (3mks)
 - (ii) Nautical miles. (Take $\pi = \frac{22}{7}$) and the earth's radius = 6370km. (2mks)
 - (j) A ship leaves town P and sails due east for 120 hours to another town R at an average speed of 27 knots.

(i) Calculate the distance between the two towns in nautical miles. (2mks)

(ii) Find the position of town R.

(3mks)

21. The parallelogram OABC has vertices (0,0), (1,0), (4,2), (3,2) respectively.

- (a) (i) OABC is mapped onto $O_1A_1B_1C_1$ by a reflection on the line y = x. Draw and label the image $O_1A_1B_1C_1$. (2mks)
- (ii) State the matrix which represent this reflection. (1mk)
- O₁A₁B₁C₁ is mapped onto parallelogram O A₂B₂C₂ by a rotation through 180⁰ about O.
- (i) Draw and label O A₂B₂C₂ on your diagram.

(2mks)

- (ii) Describe the transformation that maps O A B C onto O A₂B₂C₂ (1mk)
 - (b) OABC is mapped onto the rectangle O $A_3B_3C_3$ by a shear X axis invariant. If the co-ordinates of B_3 are (1,2), find:-
- (i) The co-ordinates of C3.

(2mks)

(ii) The matrix representing the shear.

(2mks)

- 22. A farmer has at least 50 acres of land on which he plans to plant potatoes and cabbages. Each acre of potatoes requires 6 men and each acre of cabbages requires 2 men. The farmer has 240 men available and he must plant at least 10 acres of potatoes. The profit on potatoes is Ksh. 1000 per acre and on cabbages is Ksh. 1200 per acre. If he plants x acres of potatoes and y acres of cabbages:
 - (iii) Write down three inequalities in x and y to describe this information. (3mks)

(b) Represent these inequalities graphically.

(4mks)



- © Use your graph to determine the number of acres for each crop which will give maximum profit and hence find the maximum profit. (3mks)
- 23. (a) Complete the table below for the function:

 $y = x^2 - 3x + 5$ (2mks)

- (b) Use the mid-ordinate rule with six ordinates to estimate the area enclosed by the curve of the functions $y = x^2 3x + 5$, x axis and the lines x = 2 and x = 8. (3mks)
- (c) Find the exact area of the region described in (b) above. (3mks)
- (d) If the mid-ordinates rule is used to estimate the area under the curve between x = 2 and x = 8, what will be the percentage error in the estimation? (2mks)
- 24. In a triangle ABC, AB = 17cm, BC = 28cm and AC = 34cm. Find:
 - a) BAC (3mks)
 - b) Using the angle BAC in (a) (i) above, find the area of triangle ABC. (2mks)
 - The radius of its circumcircle that can be drawn on the triangle. (2mks)
- b) A stone is hung from a horizontal beam by two strings. The longer string makes an angle of with the horizontal and is 3.2m long. If the shorter string makes an angle of 60° with the horizontal, calculate its length. (3mks)

