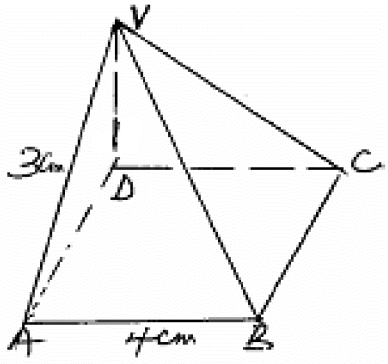
KAHURO/MURANG'A EAST JOINT EXAMINATION – 2016
Kenya Certificate of Secondary Education
121/1
MATHEMATICS ALT A
PAPER 1
JULY/AUGUST, 2016
TIME: 2½ HOURS

SECTION I: (50 MARKS)

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

1. Find the greatest number which when divided into 167, 260 and 389 leaves remainders of 11, 8 and 5 respectively. (2 marks)
2. The figure below shows a right pyramid with a square base of 4cm and a slant height of 3cm. Draw the net of the pyramid. (3 marks)



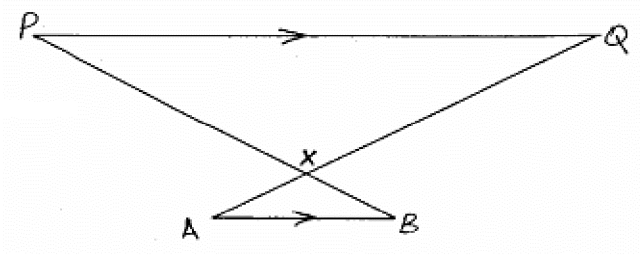
3. A tourist arrived in Kenya with 10000 US dollar which he converted to Kshs on arrival. He spent Kshs.428,500 and converted the remaining amount to sterling pounds. How much did he receive in sterling pounds. The currency exchange rates of the day were as follows:-

Currency	Buying	Selling
1 Sterling pound	135.50	135.97
1 US dollar	72.23	72.65

4. Without using calculators evaluate:
$$\frac{\frac{1}{2} + 2\frac{4}{5} \text{ of } 8 \div 6\left(2 \times 4\frac{2}{5}\right)}{\frac{1}{2} \text{ of } 6\left(8 \div 3\frac{1}{3}\right)}$$
(3 marks)
5. A man on top of a tower 300m sees two cars P and Q on a straight level road.
The angle of depression of P was 48° and that of Q was 28°. Calculate the distance between the two cars. (Give your answer to 2d.p.). (3 marks)
6. Solve for χ and y in the simultaneous equation. (3 marks)
$3^{2\chi} \times 3^{y} = 27$
$2^{\chi - y} \times 2^{\chi} = 32$
7. Use tables of squares, square roots and reciprocals to evaluate
$$\sqrt{\frac{1}{0.2365} + \frac{20}{2.6228^{2}}}$$
(4 marks)
8. Given $Cos\ \chi = \frac{5}{13}$, find the values of the following without using tables or calculators.
(a) Sin χ (1 mark)
(b) $Tan^{2}(90 - \chi)$. (2 marks)
9. Line L_1 passes through the points A (2, -4) and B (6, -8). Find the equation of the line L_2, the perpendicular bisector of AB leaving your answer in the form $a\chi + by + c = 0$. (3 marks)
10. A point P has co-ordinates (2, 4, 6).
If PQ = 10i + 2j + 4k , find
(i) the co-ordinates of Q. (2 marks)
(ii) the length of PQ. (1 mark)
11. The volume of a cube is $1728cm^3$. Calculate to 1 decimal place, the length of the diagonal of a face of the cube. (3 marks)
12. Find all the integral values of χ which satisfy the inequality

$3(1 + \chi) \leq 5\chi - 11 \leq \chi + 45$. (3 marks)

13. In the figure below AB // PQ. PB and AQ meet at X. Given that PQ = 15, AB = 2.5 and AQ = 10.5cm, find AX. (3 marks)



14. Simplify the expression:

$$\frac{(\chi + 1)(4y^2 - \chi y)}{\chi^2 + \chi - 4\chi y - 4y}$$ (3 marks)

15. A circle centre O has the equation $\chi^2 + y^2 = 4$. The area of the circle in the first quadrant is divided into 5 vertical strips each of width 0.4cm.

(a) Use the equation of the circle to complete the table below for values of y correct to 2d.p..

χ	0	0.4	0.8	1.2	1.6	2.0
y	2.00			1.60		0

(1 mark)

(b) Use the trapezoidal rule to estimate the area of the circle. (3 marks)

16. Find the area in hectares of a coffee field whose measurements are entered in a field book as shown below. Take XY = 200m as the baseline. (4 marks)

	Y	
	180	40 to Q
To R 80	140	
To S 160	100	
	40	100 to P
	X	

SECTION B: (50 MARKS)

Answer any FIVE questions from this section.

17. A transport company wishes to transport 288 tonnes of stones to sites P and Q. The company pays Shs.48,000 to transport 48 tonnes for every 28km. James transported 96 tonnes to site P, 49km away.

(a) Find how much he was paid. (3 marks)

(b) James spends Shs.6000 to transport every 8 tonnes of stones to site P. Calculate her total profit. (3 marks)

(c) Kimani transported the remaining stones to site Q, 84km away. If he made 44% profit, find his transport cost. (4 marks)

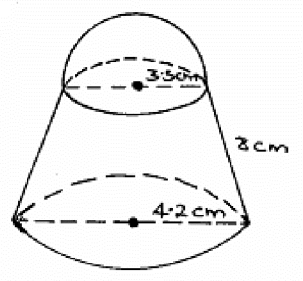
18. A trailer left town P at 11.45am and travelled towards town Q at an average speed of 60km/hr. A car left town P at 2.15pm on the same day and travelled along the same road at an average speed of 100km/hr. The distance between towns P and Q is 500km.

(a) Calculate the time of the day when the car overtook the trailer. (4 marks)

(b) The distance from P when the car overtook the trailer. (3 marks)

(c) After overtaking the trailer both vehicles continued towards Q at their original speeds. Find how long the car had to wait at town Q before the trailer arrived. (3 marks)

19. The figure below represents a solid made up of a conical frustrum and a hemispherical top. The slant height of the frustrum is 8cm and its base radius is 4.2cm.



If the radius of the hemispherical top is 3.5cm.

(a) Find the area of:

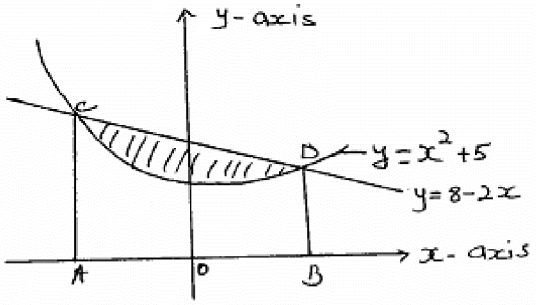
(i) the circular base. (2 marks)

(ii) the curved surface area of the frustrum. (4 marks)

(iii) the hemispherical surface. (2 marks)

(b) A similar solid has a total surface area of $81.51cm^2$. Determine the radius of its base. (2 marks)

20. The diagram below, not drawn to scale, shows part of the curve $y = \chi^2 + 5$ and the line $y = 8 - 2\chi$. 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. (4 marks)

(b) Use integration to calculate the area bounded by the curve and the χ-axis between points C and D. (3 marks)

(c) Calculate the area enclosed by the lines CD, CA BD and the χ-axis. (2 marks)

(d) Determine the area of the shaded region. (1 mark)

21. Three people Kariuki, Juma and Mwangi are having their homes situated within the same town. Mwangi's home is 10km away from Juma's home on a bearing of 150°. Kariuki's home is N30°E from Mwangi's home and on a bearing of 135° from Juma's home.

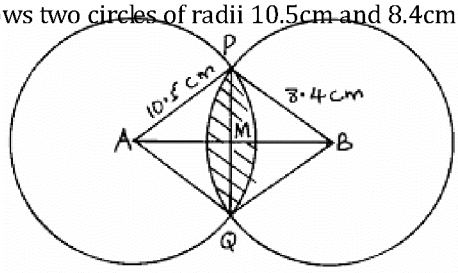
(a) Using a scale 1cm represent 2km, show the relative position of the three homes. (4 marks)

(b) Using your diagram, determine;

(i) bearing of Juma's home from Kariuki's home. (1 mark)

(ii) distance of Mwangi's home from Kariuki's home. (2 marks)

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



(a) Calculate angle PAQ. (2 marks)

(b) Calculate angle PBQ. (2 marks)

(c) Calculate the area of the shaded part. (6 marks)

23. Using a ruler and a pair of compasses only.

(i) Construct line AB = 6cm. (1 mark)

(ii) Construct triangle DAB where angle DAB = 75° and AB = BD. (2 marks)

(iii) Complete the parallelogram ABCD. (1 mark)

(iv) Drop a perpendicular from A to BD and hence find the area of the parallelogram. (3 marks)

(v) Construct a circle to touch line BC, AB produced and DC produced.
Measure its radius. (3 marks)

24. Two towns X and Y lie on the same latitude in the southern hemisphere. When it is 9,00am at X, the time at Y is 11.00am.

(a) Given that the longitude of X is 12°E, find the longitude of Y. (3 marks)

(b) A plane leave X for Y and takes 2 hours to arrive at Y travelling at 600km/hr along a parallel of latitude. Find.

(i) the radius of circle of latitude on which towns X and Y lies. (3 marks)

(ii) The positions of the two towns. (4 marks)