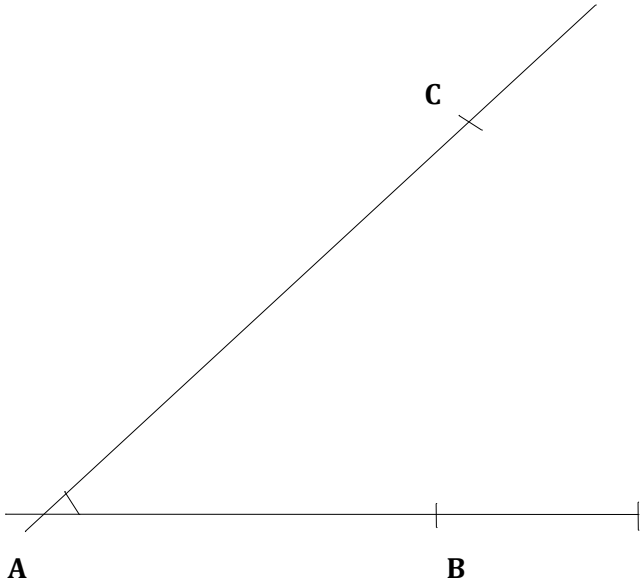
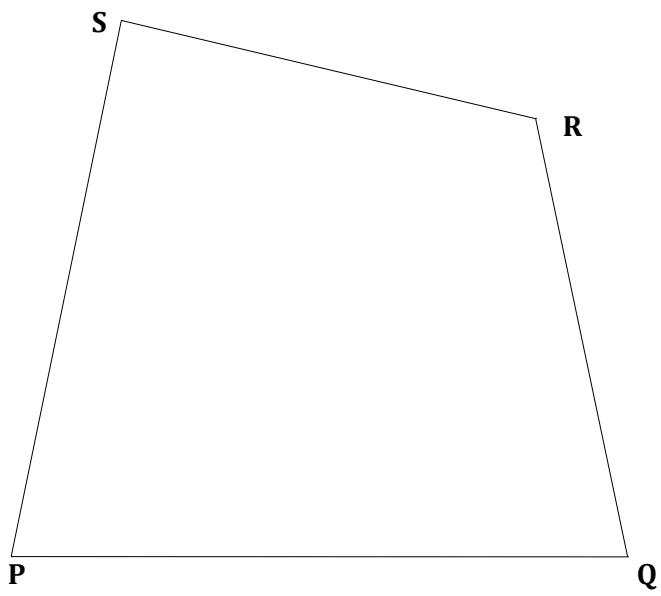
NAME _____ **INDEX NUMBER** _____

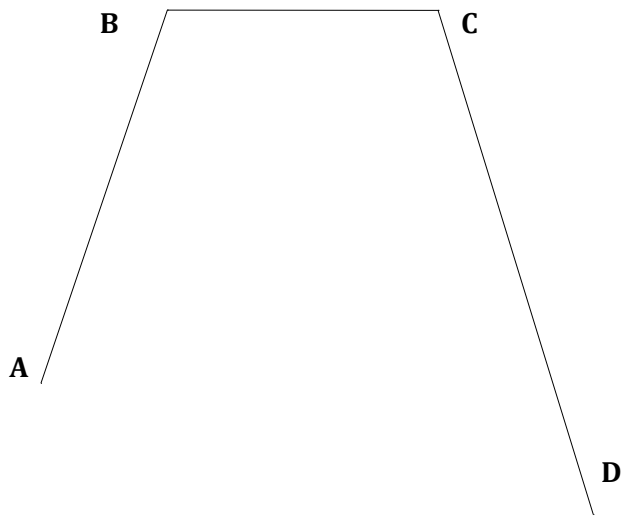
SCHOOL _____ **DATE** _____

GEOMETRIC CONSTRUCTION AND LOCI

KCSE 1989 – 2012 Form 4 Mathematics *Answer all the questions*		Working space
1.	**1989 Q20 P1** Use the straight lines AB and AC given below for the following construction. A circle centre, O touches the line AC at C and passes through B. (a) Use ruler and compasses only to locate the centre O. Draw the circle (3 marks) (b) The circle cuts AB produced at D. Mark D and measure BD (1mark) (c) Locate a point R on the minor arc BD such that BR = RD (2 marks) (d) Locate a point Q on AC such < COQ = < OQR (2 marks)  **BD = cm**	

		Working space
2.	**1989 Q5 P2** Construct triangle PST equal in area to quadrilateral PQRS such that T lies on PQ produced. (4 marks)  	
3.	**1990 Q8 P1** Draw a line AB of length 9cm. On one side of the line AB construct the locus of a point P such that the area of triangle APB IS 13.5cm^2. On this locus locate two positions of P, P_1 and P_2 such that $<AP_1B = <AP_2B = 90^0$. (4 marks)	

		Working space
4.	**1990 Q17 P2** Use ruler and compass only for all the constructions in this question A triangular plot of land ABC is such that AC = 300m, AB =280m and angle BAC = 75^0. (a) Construct this plot of land using the scale 1cm : 50m (3 marks) (b) A borehole P is equidistant from BA and BC lies on the perpendicular from C to AB. Locate the position of P (3 marks) Find the point on this farm which is furthest from the borehole. What is its distance from the borehole? (2marks)	
5.	**1991 Q22 P2** Using ruler and compasses only construct an acute angled triangle ABC such that <ABC = 45^0, BC = 9cm and AC = 7cm. (3 marks) Locate appoint x in triangle ABC such that x is equidistant from A, B and C. (2 marks) Measure AX, AB and < AXC. (3 marks)	

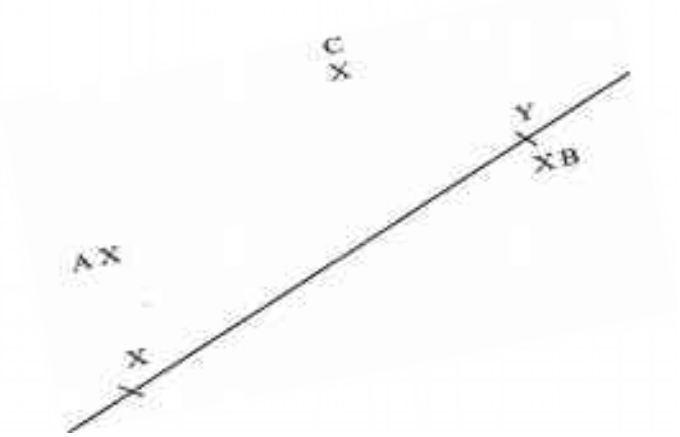
		Working space
6.	**1992 Q8 P1** A point P moves so that its distance from the fixed point Q (2,3) is equal to 5 units. Draw the locus of P on the grid provided. Hence find the coordinates of the points were the locus of P cuts the x axis. (grid was provided) (3 marks)	
7.	**1992 Q13 P2** Using a ruler and a pair of compasses only, construct a circle to touch the three lines AB, BC and CD given below. (3 marks)  	

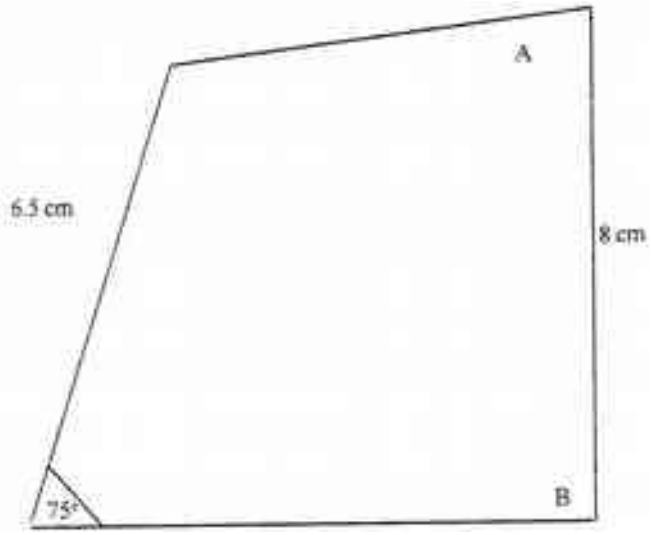
		Working space
8.	**1992 Q21 P2** (a) Use the points given below to construct (i) The locus of a point Q such that AQ = AC (ii) The locus of a point P such that P lies on the same side of AB as the point C and <APB = 45^0. (b) The loci intersect at M and N. measure the distance MN. (1 mark) **X C** **X** **X** **A** **B**	
9.	**1993 Q11 P1** In the figure below triangle AOB is isosceles with AO = 0B and <AOB = 150^0. Draw the locus of a point P such that <APB = 75^0. **O** **B** 150^0 **A**	

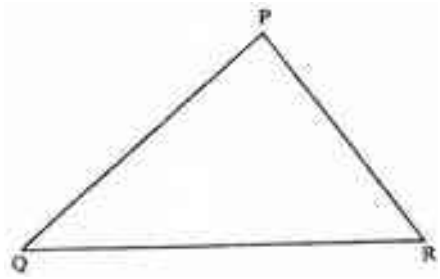
		Working space
10.	**1993 Q19 P2** Using a ruler and a pair of compasses only, construct a triangle ABC in which ABC = $37\frac{1}{2}^{0}$, BC = 7cm and BA = 6cm. Drop a perpendicular from A TO BC to meet BC at D. Measure AD. Hence calculate the area of the triangle (8 marks)	
11.	**1994 Q19 P1** On the line AB below and on the same side of the line, use ruler and compasses only to construct the following: (a) Triangle ABC whose area is $20cm^2$ and ACB = 90^0. (b) (i) the locus of a point P such that APB = 45^0 (ii)locate the position of P such that triangle APB has maximum area and calculate this area (3 marks)	

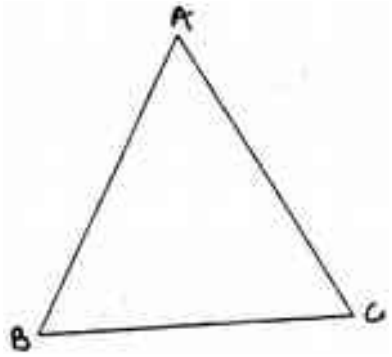
	A **B**	Working space
12.	**1995 Q22 P2** Using ruler and compasses only, construct a parallelogram ABCD such that AB = 10cm, BC = 7cm and < ABC = 105^0. Also construct the loci of P and Q within the parallel such that AP ≤ 4 cm, and BC ≤ 6 cm. Calculate the area within the parallelogram and outside the regions bounded by the loci.	
13.	**1996 Q5 P2** Using the equilateral triangle below, construct the locus of a point P such that <APC = 30^0 (3 marks) C **B** **A**	
14.	**1996 Q23 P1** Use ruler and compasses only in this question. The diagram below shows three points A, B and D. (a) Construct the angle bisector of acute angle BAD. (1 mark) D A B	

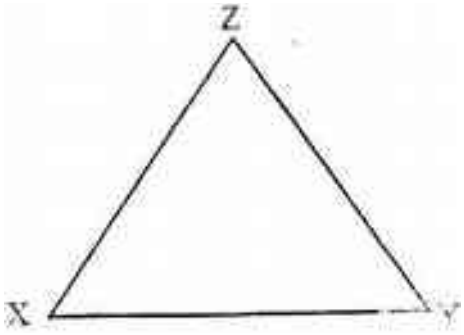
	(b) A point p, on the same side of AB as D, moves in such a way that <APB = $22\ ^1/_2.^0$ Construct the locus of P (6 marks) (c) The locus of P meets the angle bisector of < BAD at C. Measure <ABC (1 mark)	Working space
15.	**1997 Q19 P1** Using ruler and compasses only construct triangle ABC such that AB = 4 cm, BC = 5cm and < ABC = 120^0. Measure AC. On the diagram, construct a circle which passes through the vertical of the triangle ABC. Measure the radius of the circle Measure the shortest distance from the centre of the circle to line BC.	
16.	**1997 Q4 P2** On the figure below construct (i) the perpendicular bisector of BC (ii) The locus of a point P which moves such a way that ∠ APB = ∠ AVB and P is on the same side of AB on the same side of AB as C  	
17.	**1998 Q23 P1** Use a ruler and a pair of compasses only for all constructions in this question. (a) On the line BC given below, construct triangle ABC such that < ABC = 30^0 and BA = 12 cm (b) Construct a perpendicular from A to meet BC produced at D. Measure CD	

	(c) Construct triangle A'BC such that the area of triangle A'BC is three quarters of the area of triangle ABC and on the same side of BC as triangle ABC. (d) Describe the locus of A' B C	Working space
18.	**1998 Q8 P2** In the figure below a line XY and three points. A,B and C are given. On the figure construct (a) The perpendicular bisector of AB (b) A point P on line xy such that < APB= < ACB  	
19.	**1999 Q11 P1** Given below is line BC. Without using a protractor construct another through B making an angle of 37 ½^0 with BC. Using the constructed line subdivide BC into 7 equal parts. B C	

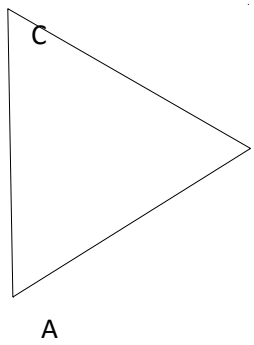
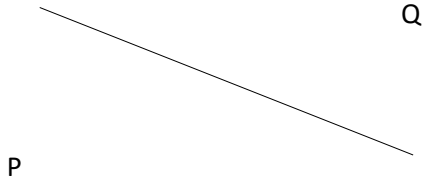
		Working space
20.	**1999 Q21 P2** The diagram below shows a garden drawn to scale of 1: 400. In the garden there are already tow trees marked A and B. The gardener wises to plant more trees. There are a number of rules he wishes to apply.  Rule 1: Each new tree must be an equal distance from both trees A and B. Rule 2: Each new tree must be atleast 4 m from the edges of the garden. Rule 3: each new tree is atleast 14 m from tree B. (a) draw the locus given by each of these rules on the diagram (b) If the new trees are to be planted 4m apart, show on your diagram the possible planting points for the new trees.	
21.	**2000 Q22 P2**	

	The line segment BC given below is one side of triangle ABC (a) Use a ruler and compasses to complete the construction of a triangle ABC in Which < ABC = 45^0. AC = 5.6 cm and angle BAC is obtuse (b) Draw the locus of point P such that P is equidistant from a point O and passes though the vertices of triangle. (c) Locate point D on the locus of P equidistant from lines BC and BO. Q lies in the region enclosed by lines BD, BO extended and the locus of P. Shade the locus of Q.	Working space
21.	**2001 Q8 P1** Use a ruler and compasses in this question. Draw a parallelogram ABCD in which AB = 8 cm, BC = 6 cm and <BAD = 75^0. By construction, determine the perpendicular distance between AB and CD.	
22.	**2001 Q14 P2** The diagram below represents a field PQR.  a) Draw the locus of points equidistant from sides PQ and PR. b) Draw the locus of points equidistant from points P and R. c) a coin is lost within a region which is nearest to point P than to R and closer to side PR than to side PQ.Shade the region where the coin can be located.	
23.	**2002 Q10 P1** The figure below shows a triangle ABC	

	 a) Using a ruler and a pair of compasses, determine a point D on the line BC such that BD:DC = 1:2. (2 marks) b)Find the area of triangle ABD, given that AB = AC. (2 marks)	Working space
24.	**2002 Q21 P1** In this question use a ruler and a pair of compasses. **a)** Line PQ drawn below is part of a triangle PQR. Construct the triangle PQR in which < QPR = 30^0 and line PR = 8cm  **b)** On the same diagram construct triangle PRS such that points S and Q are no the opposite sides of PR<PS = PS and QS = 8cm **c)** A point T is on the a line passing through R and parallel to QS.If <QTS =90^0, locate possible positions of T and label them T_1 and T_2, Measure the length of T_1T_2.	
25.	**2003 Q22 P2** The line PQ below is 8cm long and L is its midpoint	

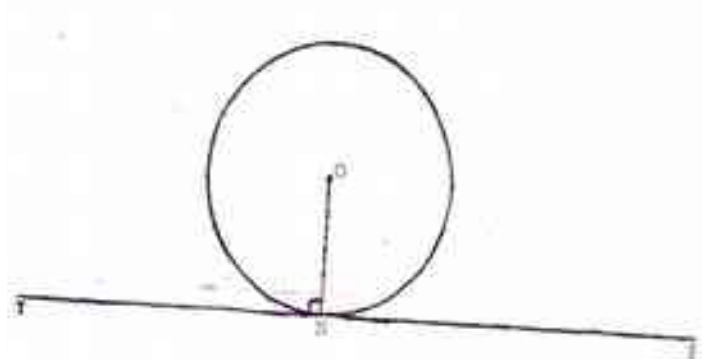
	P L Q a) i) Draw the locus of point R above line PQ such that the area of triangle PQR is $12cm^2$. ii) Given that point R is equidistant from P and Q, show the position of point R.. b) Draw all the possible loci of a point T such that < RQL = <RTL. (4 marks)	Working space
26.	**2004 Q6 P1** Point C divided the line AB given below externally in the ratio 5:2 BB A By construction, determine the position of point c	
27.	**2004 Q15 P2** The figure below is a triangle XYZ. Using a pair of compasses and a ruler only, construct an inscribed circle such that the centre of the circle and the point x are the opposite sides of line YZ.  	

28.	**2005 Q20 P2** (a) BCD is a rectangle in which AB = 7.6 cm and AD = 5.2 cm. draw the rectangle and construct the locus of a point P within the rectangle such that P is equidistant from CB and CD (3 marks) (b) Q is a variable point within the rectangle ABCD drawn in (a) above such that $60^0 \leq < AQB \leq 90^0$ On the same diagram, construct and show the locus of point Q, by leaving unshaded, the region in which point Q lies	Working space
29.	**2006 Q8 P1** In this question use a pair of compasses and a ruler only (a) construct triangle ABC such that AB = 6 cm, BC = 8cm and $\angle ABC\ 135^0$ (b) Construct the height of triangle ABC in a) above taking BC as the base (1 mark)	
30.	**2006 Q7 P2** The figure below shows a circle centre O and a point Q which is outside the circle Q o Using a ruler and a pair of compasses, only locate a point on the circle such that angle OPQ = 90° (2 marks)	

31.	**2006 Q13** The figure below is drawn to scale. It represents a field in the shape of an equilateral triangle of side 80m The owner wants to plant some flowers in the field. The flowers must be at most, 60m from A and nearer to B than to C. If no flower is to be more than 40m from BC, show by shading, the exact region where the flowers may be planted (4 marks)	 Working space
32.	**2007 Q12 P1** (a) Draw a regular pentagon of side 4 cm (1 mark) (b) On the diagram drawn, construct a circle which touches all the sides of the pentagon (2 marks)	
33.	**2007 Q21 P2** *In this question use a ruler and a pair of compasses only* In the figure below, AB and PQ are straight lines 	

	A B (a) Use the figure to: (i) Find a point R on AB such that R is equidistant from P and Q (1 mark) (ii) Complete a polygon PQRST with AB as its line of symmetry and hence measure the distance of R from TS. (5 marks) (b) Shade the region within the polygon in which a variable point X must lie given that X satisfies the following conditions I: X is nearer to PT than to PQ II: RX is not more than 4.5 cm III. $\angle PXT > 90^0$ (4 marks)	Working space
34.	**2008 Q8 P1** Line BC below is a side of a triangle ABC and also a side of a parallelogram BCDE.  Using a ruler and a pair of compasses only construct: (i) The triangle ABC given that $\angle ABC = 120^0$ and AB= 6cm (1mark) (ii) The parallelogram BCDE whose area is equal to that of the triangle ABC and point E is on line AB (3marks)	
35.	**2008 Q3 P2** Line AB given below is one side of triangle ABC. Using a ruler and a pair of compasses only;  	

	Complete the triangle ABC such that BC=5cm and $\angle ABC=45^0$ (ii) On the same diagram construct a circle touching sides AC, BA produced and BC produced.	Working space
36.	**2009 Q11 P1** Line AB shown below is a side of a trapezium ABCD in which angle ABC = 105◦,BC= 4 CM, CD=5cm and CD is parallel to AB.  Using a ruler and a pair of compasses only. (a) Complete the trapezium (3 marks) (b) Locate point T on line AB such that angle ATD = 90◦ (1 mark)	
37.	**2009 Q4 P2** In the figure below, O is the centre of the circle and radius ON is perpendicular to the line TS at N	

	 Using a ruler and a pair of compasses only, construct a triangle ABC to inscribe the circle, given that angle ABC = 60°, BC = 12mm and points B and C are on the line TS. (4 marks)	Working space
38.	**2010 Q10 P1** Using a ruler and a pair of compasses only, construct a rhombus QRST in which an angle TQR =60^0 and QS = 10cm. (3 marks)	
39.	**2010 Q13 P2** a) Using line AB given below, construct the locus of a point P such that APB = 90^0 (1 mark) A **B**	

	b) On the same diagram locate **two** possible position of point C such that point C is on the locus of P and is equidistance from A and B. (2 marks)	
40.	**2011 Q9 P1** Using a ruler and a pair of compasses only: a) Construct a parallelogram PQRS in which PQ= 6cm, QR = 4cm and angle SPQ = 75^0; (3 marks) b) Determine the perpendicular distance PQ and SR (1 mark)	Working space
41.	**2011 Q12 P2** The figure below represents a scale drawing of a rectangular piece of land, RSTU. RS =9cm and ST =7cm U T  7cm R 9cm S An electric post, is to be erected inside the piece of land. On the scale drawing, shade the possible region in which P would lie such that PU > PT and PS ≤ 7cm. (3 marks)	

42.	**2012 Q6 P2** Construct a circle centre *x* and radius 2.5cm. Construct a tangent from a point P, 6cm from *x* to touch the circle at R. Measure the length PR. (4 marks)	Working space
43.	**2012 Q21 P2** (a) On the same diagram construct: (i) Triangle ABC such that AB=9cm,AC=7cm and angle CAB=60^0 (2 marks) (ii) The locus of a point P such that P is equidistant from A and B; (1 mark) (iii) The locus of a point Q such that CQ≤3.5 cm. (1 mark) (b) On the diagram in part (a): (i) Shade the region R, containing all the points enclosed by the locus of P and the locus of Q, such that AP≥BP; (2 marks) (ii) Find the area of the region shaded in part (b)(i) above. (4 marks)	
