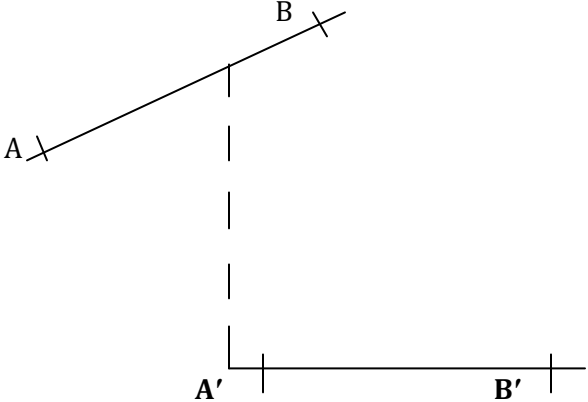NAME _____ INDEX NUMBER _____
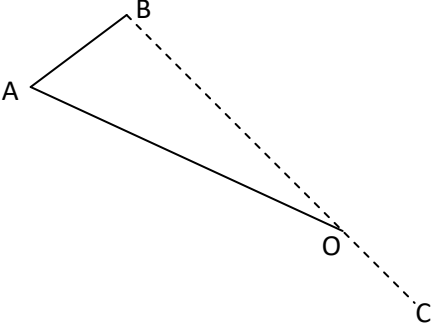
SCHOOL_____ DATE _____

TRANSFORMATIONS
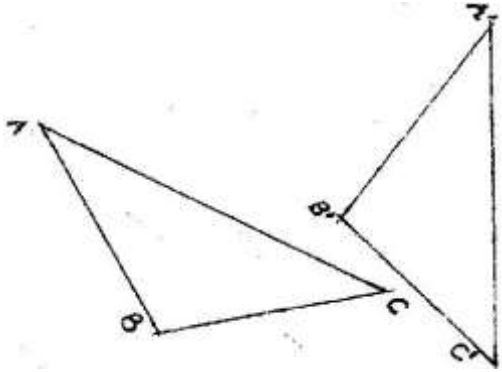
REFLECTION, ROTATION,

TRANSLATION, ENLARGEMENT

KCSE 1989 – 2012 Form 2 Mathematics	Working Space

1. **1989 Q22 P2**
(a) O n the grid provided, draw a square (s) with vertices (6,3), (7,0) (9,4) and (10,1).
Draw also two straight lines AB and AC where the coordinates of A,B and C are (1,-2), (3,2) and (0,1) respectively. S' is the image of S under reflection in the line AB and S'' is the image of S' under refection in the line AC. Draw S' and S''   (5marks)
 	
(b) Describe the transformation which maps S onto S'' if the transformation is
    (i)   translation   (1mark)
    (ii) rotation (2marks)	

2 **1991 Q7 P2** The image of P' (0, 2), under an enlargement with a scale factor 3 is P' (4, 6). Find the centre of enlargement (3marks)	

		Working Space
3	**1991 Q15 P2** In the figure below A'B' is the image of AB under rotation. Use geometrical instruments to locate the centre of rotation for the figure B A **A'** **B'**	
4	**1992 Q3 P1** The points A (3, 2) and B (4,-1) are the images of A and B respectively under a translation. Given that he coordinates of A are (0, 1) find the coordinates of B. (3marks)	
5	**1995 Q6 P2** A translation maps a point (1, 2) onto) (-2, 2). What would be the coordinates of the object whose image is (-3 , -3) under the same translation?	
6	**1999 Q2 P1** A point (-5, 4) is mapped onto (-1, -1) by a translation. Find the image of (-4, 5) under the same translation.	

|		Working Space
7	**1999 Q11 P2** In the figure below triangle ABO represents a part of a school badge. The badge has as symmetry of order 4 about O. Complete the figure to show the badge. B A O C	
8	**2000 Q9 P2** A triangle is formed by the coordinates A (2, 1) B (4, 1) and C (1, 6). It is rotated clockwise through 90^0 about the origin. Find the coordinates of this image.	
9	**2001 Q7 P2** A translation maps a point P (3,2) onto P′ (5,-4) a) Determine the translation vector. b) A point Q′ is the image of the point Q(2,5) under the same translation. Find the length of P′Q′, leaving the answer in surd form. (2marks)	

|		Working Space
10	**2003 Q7 P2** In the figure below, triangle A 'B' C' is the image of triangle ABC under a rotation, centre O. By construction, find the label the centre O of the rotation. Hence, determine the angle of the rotation.	
11	**2005 Q4 P2** The diagram below is a part of a figure which has rotational symmetry of order 4 about O. 	
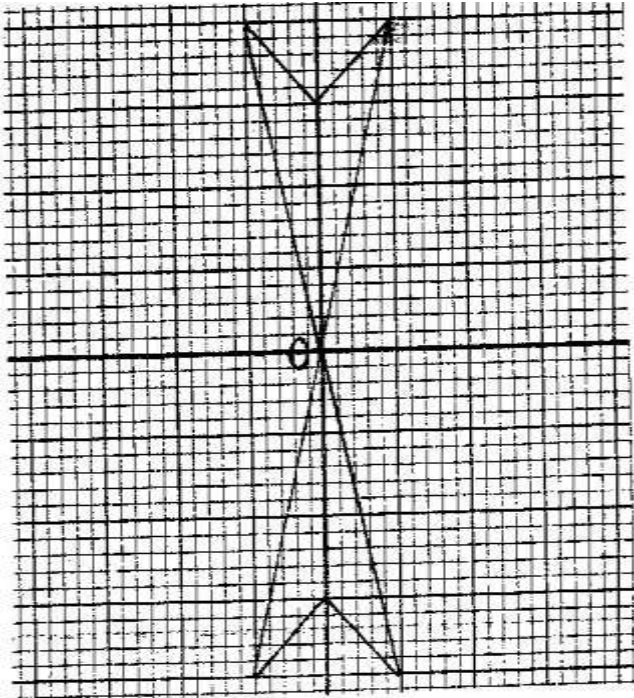
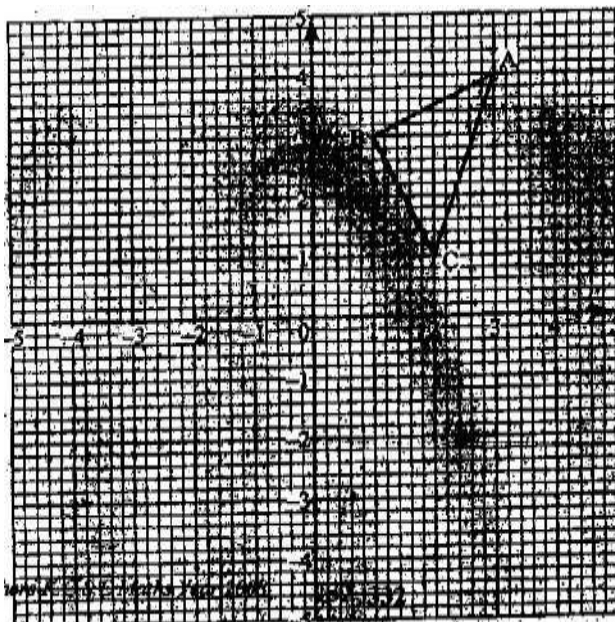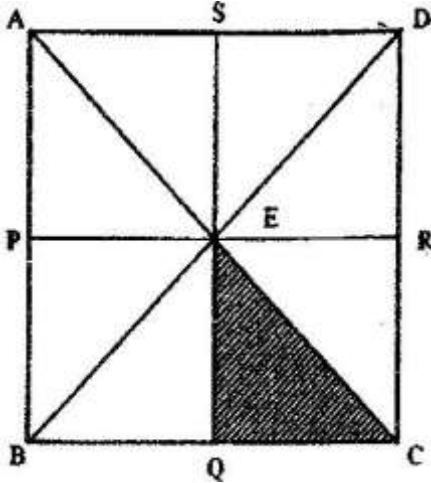|		Working Space
	(a) Complete the figure (1 mark) (b) Draw all the lines of symmetry of the completed figure (2 marks)	

12	**2006 Q18 P1**
	On the Cartesian plane below, triangle PQR has vertices
	P(2, 3), Q (1,2) and R (4,1) while triangles P ″Q ″ R″
	has vertices P″ (-2, 3), Q ″ (-1,2) and R ″ (-4, 1)
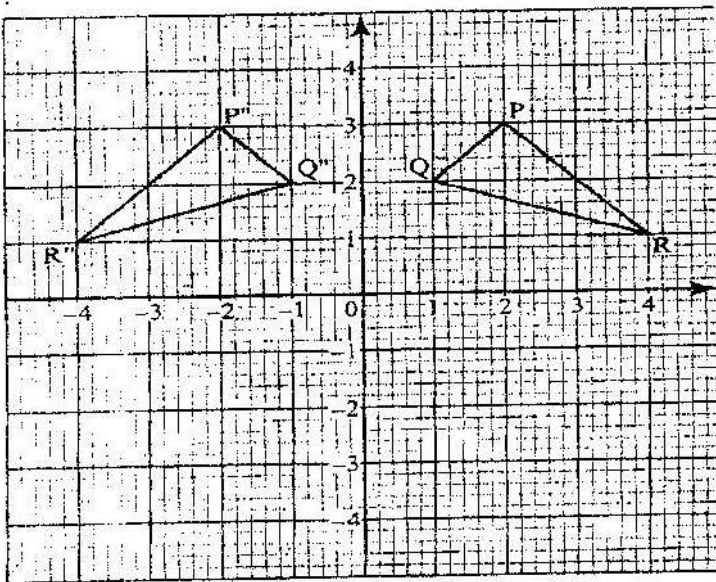	
	(a) Describe fully a single transformation which
	    maps triangle PQR onto triangle P ″Q ″ R″
	                                                (2 marks)
	(b) On the same plane, draw triangle P'Q'R', the image
	    of triangle PQR, under reflection in line y = -x
	                                                (2 marks)
	(c) Describe fully a single transformation which maps
	    triangle P'Q'R', onto triangle P″ Q ″ R″
	                                                (2 marks)
	(d) Draw triangle P ″'Q″' R″' such that it can be
	    mapped onto triangle PQR by a positive quarter
	    turn about (0,0) (2 marks)
	(e) State all pairs of triangle that are oppositely
	    congruent (2 marks)	

		Working Space
13	**2008 Q21 P1** The diagram below shows a triangle ABC with A (3, 4), B (1, 3) and C (2, 1). a) Draw △A 'B'C' the image of ABC under a rotation of +90^{0+} about (0, 0). (2mks) b) Draw △ A″B″C ″ the image of A 'B'C 'under a reflection in the line y=x. (2mks) c) Draw △ A‴B‴C‴ the image of Δ A″B″C″ under a rotation of -90^0 about (0, 0) (2mks) d) Describe a single transformation that maps △ABC onto △ A‴B‴C‴ (2mks) e) Write down the equations of the lines of symmetry of the quadrilateral BB″A'A' (2mks)	

|		
14	**2010 Q22 P1** In the figure below, ABCD is a square .Points P, Q, R and S are the midpoints of AB, BC, CD and DA respectively. (a).Describe fully: (i) A reflection that maps triangle QCE onto triangle SDE. (1mark) (ii) An enlargement that maps triangle QCE onto triangle SAE. (2 marks) (iii) A rotation that maps triangle QCE onto triangle SED. (3 marks) (b).The triangle ERC is reflected on the line BD. The image of ERC under the reflection is rotated clockwise through an angle of 90^0 about P. Determine the images of R and C: (i) Under the reflection (2marks) (ii) After two successive transformations (2marks)	
15	**2011 Q7 P2** The vertices of a triangle are A(1,2), B(3, 5) and C(4, 1).The coordinates of C' the image of C under a translation vector T, are (6, -2). (a) Determine the translation vector T. (1mark) (b) Find the coordinates of A' and B' under translation vector T. (2marks)	

		Working Space

16	**2012 Q21 P1**
	
	The vertices of quadrilateral OPQR are O (0, 0), P (2, 0), Q (4, 2) and R (0, 3). The vertices of its image under a rotation are O' (1, -1), P'(1, -3) Q'(3, -5) an R'(4, -1).
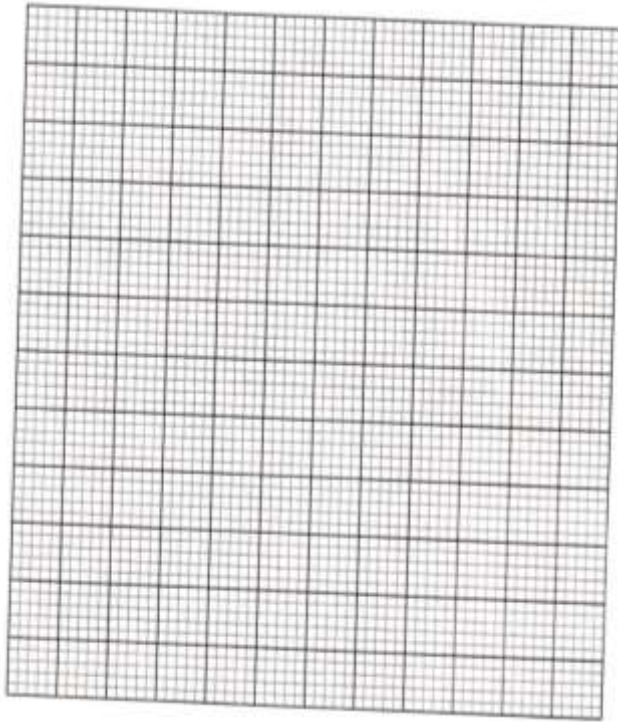	
	(a) (i) On the grid provided, draw OPQR and its image O'P'Q'R' (2marks)
	(b) (ii) By construction, determine the centre and angle of rotation. (3marks)
	
	(c) On the same grid as (a) (i) above, draw O''P''Q''R'', the image of O'P'Q'R' under a reflection in the line
	    $y = x$ (2marks)
	(d) From the quadrilaterals drawn, state the pairs that are:
	      (i) Directly congruent; (2marks)
	      (ii) Oppositely congruent (2marks)	