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| *School Name*  *Mathematics 2017* | | | |
| Year 8 | | *Transformations and Congruence* | Non Calculator  Test |
| **Skills and Knowledge Assessed:**   * Describe translations, reflections in an axis, and rotations of multiples of 90° on the Cartesian plane using coordinates. Identify line and rotational symmetries (ACMMG181) * Define congruence of plane shapes using transformations (ACMMG200) * Develop the conditions for congruence of triangles (ACMMG201) * Establish properties of quadrilaterals using congruent triangles and angle properties, and solve related numerical problems using reasoning (ACMMG202) | | | Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| **Section 1** Short Answer Section | | | |
| Write all working and answers in the spaces provided on this test paper.  **Geometric Instruments will be needed for this test.** | | | |
|  | Questions 1 and 2 refer to the diagram below. | | |
|  | Draw all the axes of line symmetry on the shape. | | |
|  | What order of rotational symmetry does the shape have?  Order 2 Order 4 Order 8 It has none | | |
|  | A triangle *ABC* is rotated through 180o about the point *B*.  Which point does not change position?    Every point changes position.  Point *A* does not change position.  Point *B* does not change position.  Point *C* does not change position. | | |
|  | Use geometric instruments to draw the image after *ABCDEF* is reflected in the line *XY*. | | |
|  | Use geometric instruments to draw the image after *NOPQ* has been rotated through 270o in a clockwise direction. | | |
|  | What order of rotational symmetry does the shape below have?    None 2 3 6 | | |
|  | Use geometric instruments to draw the image after *EFGH* is translated in the distance and direction indicated by the arrow. | | |
|  | The triangle *OPQ* is reflected in the line *OQ*.      Which triangle could be the image? | | |
|  | The figure *PQR* could be transformed to the figure  by:  Rotation through 180o***.***  Reflection.  Translation.  Rotation through 90o. | | |
|  | Which polygon has exactly 2 axes of symmetry? | | |
|  | Complete the figure given that *LM* is an axis of line symmetry. | | |
|  | A polygon *ABCDE* which has its vertices labelled in a clockwise direction, is transformed to a congruent image which is also labelled in a clockwise direction.  Which of these transformations could have been used?  A reflection, a rotation or a translation. Only a reflection and a rotation.  Only a reflection and a translation Only a rotation and a translation. | | |
|  | The point *K* (–5, –8) is translated through the distance and direction indicated by the arrow.  Which point is the image after the transformation?  A (–5, 8)  B (1, 2)  C (1, –2)  D (5, 8) | | |
|  | Draw the image of triangle *ABC* after a rotation through 180o about the origin *O*. | | |
|  | The point *P* (–8, –2) is reflected in the line *AB*.  Which are the coordinates of the image after the transformation?  HHlll | | |
|  | Draw the position of the figure *PQRS* after a reflection in the line *y* = 2. | | |
|  | The point *K* (– 5, 3) is rotated through 90o in a clockwise direction about the origin *O*.  Which point is its image?  A (3, 5)  B (5, 3)  C (3, –5)  D (–5, –3) | | |
|  | Figure *ABCD* is moved to an image *A’B’C’D’* by a single transformation.  What was the transformation?  A reflection in the line *y = x*.  A reflection in the line *y = -x*  A rotation of 180o.  A translation. | | |
|  | Quadrilateral *STUV* is a parallelogram.  What transformation could move    A reflection.  A rotation of 90o.  A rotation of 180o.  A translation. | | |
|  | A rhombus *DEFG* has its diagonals drawn, intersecting at H.  Which pair of triangles are not congruent? | | |
|  | The rhombus *WXYZ* is reflected in the line segment *AB*, to give the rhombus *EFGH*.  Which distances are equal? | | |
|  | *POQ* is rotated through 180o about *O* and then the image is reflected in the *y* axis.    Which figure is its image?  Triangle A  Triangle B  Triangle C  Triangle D | | |
|  | Which of the congruence tests could be used to show that    AAS RHS SAS SSS | | |
|  | The point A (–5, 3) is reflected in the line *y* = *x*. The image is then rotated through 90o in a clockwise direction about the origin.  Give the coordinates of the point which is the image after these transformations?  (–5, 3)  (–5, –3)  (–4, –4)  (3, –5) | | |
|  | A congruence proof has been started below.      *WT* = *UT* (given)    Which of the congruence tests is used?  AAS  RHS  SAS  SSS | | |
|  | In the figure below *AB* = *DE*, *BC* = *EF,*  and      Which two congruence tests could be used to prove  AAS and RHS  AAS and SAS  AAS and SSS  SAS and SSS | | |
|  | is reflected in the line *y = – x* and the image is then translated the distance and direction indicated by *RS*.  Draw the image after the two transformations. | | |
|  | Which of the congruence tests could be used to show that .  AAS RHS SAS SSS | | |
|  | A roof truss for a house is a series of welded steel triangles, as shown below.  The shape has line symmetry along the line *CG*.  Name two pairs of congruent triangles in the figure.  \_\_\_\_\_\_\_\_\_\_ and  \_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_ and  \_\_\_\_\_\_\_\_\_\_\_\_ | | |
|  | In the diagram below, *AB = CD, BC = AD*    Name two congruence tests that could be used to prove that  HHlll  HHlll  and | | |

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| **Section 2** Longer Answer Section | | |
| Write all working and answers in the spaces provided on this test paper. | | |

|  | | **Marks** |
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| 1. | (a) Draw the image when the triangle *ABC* is rotated through 90o in a clockwise direction about *C*.    Use geometric  instruments. | **2** |
|  | (b) Translate the figure below so that the side *ST* coincides with *VW*. | **2** |
| 2. | (a) Draw a figure congruent to *ABCD*, by rotating through 180o in a clockwise direction. | **2** |
|  | (b) Draw the image of the quadrilateral *ABCD* after a reflection in the line *XY.* | **2** |
| 3. | (a) *KL = NO, LM = PO* and  Prove that    ……………………………………………………………………………………..  ……………………………………………………………………………………..  ……………………………………………………………………………………..  ……………………………………………………………………………………..  …………………………………………………………………………………….. | **2** |
|  | (b) *EFGH* is a parallelogram with the diagonal EG drawn.  Using **only** the property that *the opposite sides of a parallelogram are parallel*, prove that    ……………………………………………………………………………………..  ……………………………………………………………………………………..  ……………………………………………………………………………………..  ……………………………………………………………………………………..  ……………………………………………………………………………………..  …………………………………………………………………………………….. | **3** |

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ANSWERS

| Question | Working and Answer |
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|  | There are 4 axes as shown |
|  | Order 4 as each point can be rotated to a new position and it still looks the same.  **2nd Answer** |
|  | Since *B* is the centre of the rotation it’s image is in the same position.  **3rd Answer** |
|  |  |
|  |  |
|  | Order 3 as it can be rotated through 120o twice and appears the same each time.    **3rd Answer** |
|  |  |
|  | O and Q have their image in the same position and P is flipped over, to give the third diagram.  **3rd Answer** |
|  | It is a rotation through 180o  **1st Answer** |
|  | The rectangle has two axes of symmetry.  **2nd Answer** |
|  |  |
|  | **4th Answer** |
|  | *K* goes to *B* as shown.    **2nd Answer** |
|  |  |
|  | (4, 10) |
|  |  |
|  | **1st Answer** |
|  | A translation in the direction of the arrow shown  **4th Answer** |
|  | A rotation of 180o.  **3rd Answer** |
|  | 2nd Answer |
|  | 2nd Answer |
|  | Rotation through 180o gives triangle *B* which is then reflected in the *y* axis to give triangle *D*.  **4th Answer** |
|  | There are two pairs of corresponding angles equal with the included side also equal.  ASS  **1st Answer** |
|  | **3rd Answer** |
|  | Two sides and an included angle (SAS).  **3rd Answer** |
|  | AAS and SAS  **2nd Answer** |
|  | **Diagram with two triangle drawn.** |
|  | There are a pair of equal vertically opposite angles and a pair of equal alternate angles, which together with the given sides being equal allow proof using AAS.  **1st Answer** |
|  | Any two pairs.  Some examples are : |
|  | *AC* is common, so this allows SSS, since two sides are already given.  *AC* being common, along with *BC* = *AD* and the angle given allows SAS. |

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ANSWERS

| Question | Answer | Marks |
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| 1. | (a) | 2 marks for an accurate drawing.  1 mark if inaccurate or a minor error. |
|  |  | 2 marks for an accurate drawing.  1 mark if inaccurate or a minor error. |
| 2. | (a) | 2 marks for an accurate and correct drawing of the image.  1 mark for an inaccurate drawing or one with a minor error |
|  | (b) | 2 marks for an accurate and correct drawing of the image.  1 mark for an inaccurate drawing or one with a minor error |
| 3. | (a) | 2 marks for stating the three equal features and stating congruence with SAS.  1 mark for a partial proof or incorrect conclusion |
|  | (b) | 3 marks for stating the three equal features and including the reasons for the two angles being equal and stating congruence with AAS.  2 marks for a proof without one of the reasons or with another minor error or an incorrect conclusion  1 mark for a proof without reasons or incorrect reasons, or which is only a partial attempt at the proof |