High School Mathematics Test 2013

Year 8

Transformations & Congruence

Non Calculator Section

Name_____

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)

Answer all questions in the spaces provided on this test paper by:

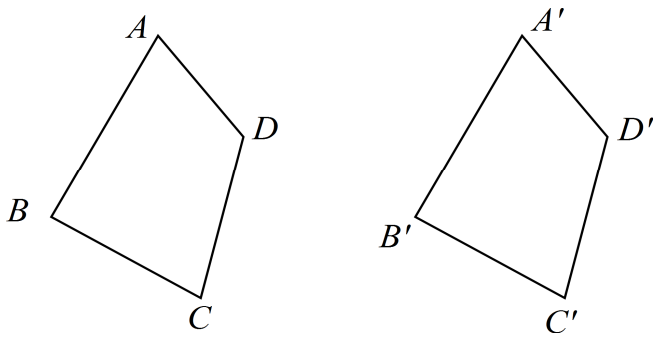
Writing the answer in the box provided.

or

Shading in the bubble for the correct answer from the four choices provided.

Show any working out on the test paper.

1. The figure $ABCD$ could be transformed to the figure $A'B'C'D'$ by:



- ☐ Rotation through 180^o.
- ☐ Reflection.
- ☐ Translation.
- ☐ Rotation through 90^o.

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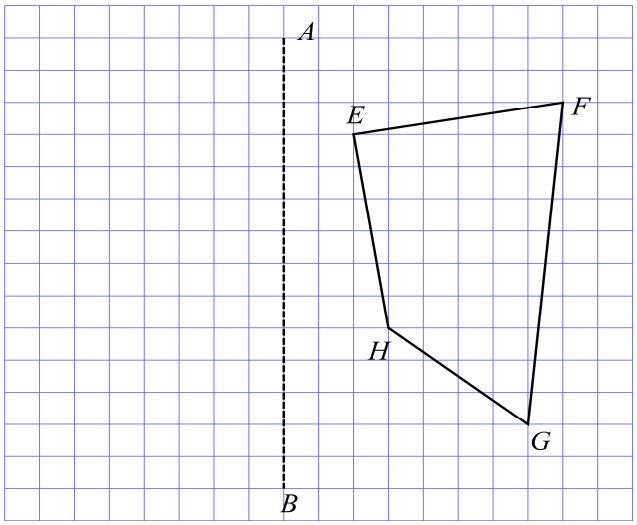
2. Use geometric instruments to draw the image when $EFGH$ is reflected in the line AB.



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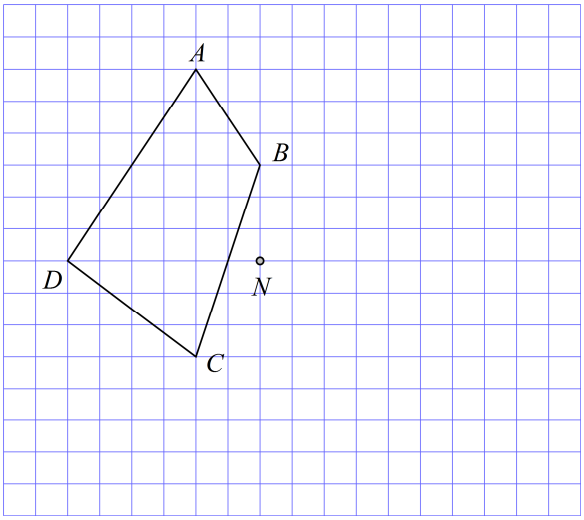
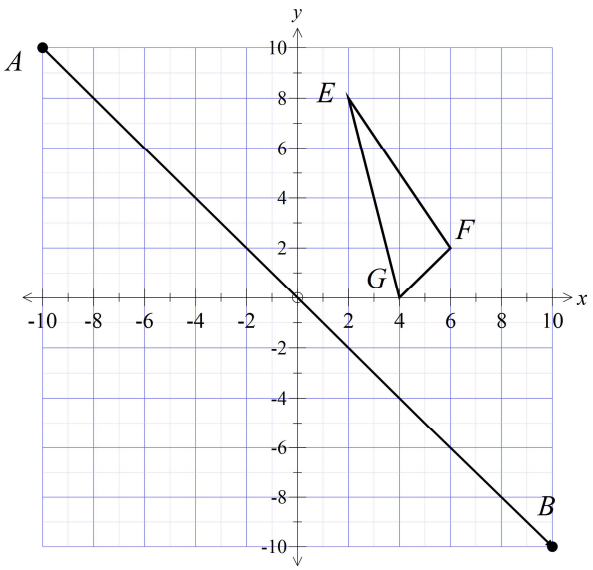
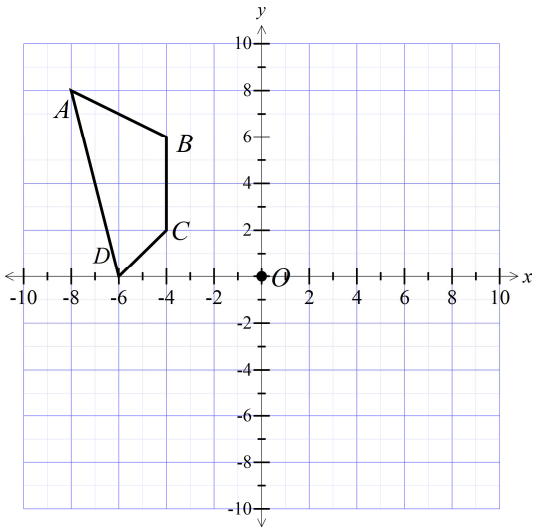
3. Use geometric instruments to draw the image after $ABCD$ is rotated through 90^o in a clockwise direction about N.



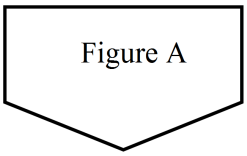
4. Sketch the position of triangle EFG after it is reflected in the line AB.



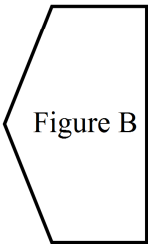
5. Sketch the position of quadrilateral *ABCD* after it is translated 12 units to the right and 10 units downward.



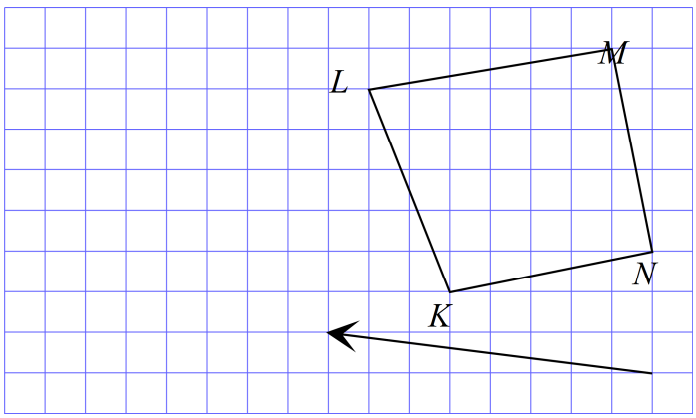
6. Figure A is transformed to Figure B by which transformation?



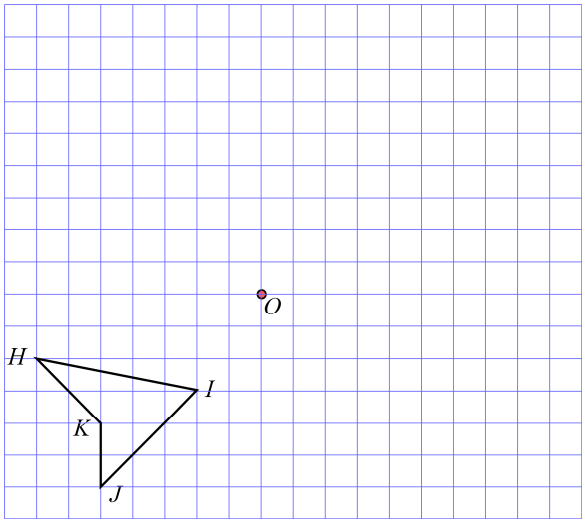
- ☐ Anticlockwise rotation through 270°.
- ☐ Anticlockwise rotation through 90°.
- ☐ Clockwise rotation through 180°.
- ☐ Clockwise rotation through 90°.



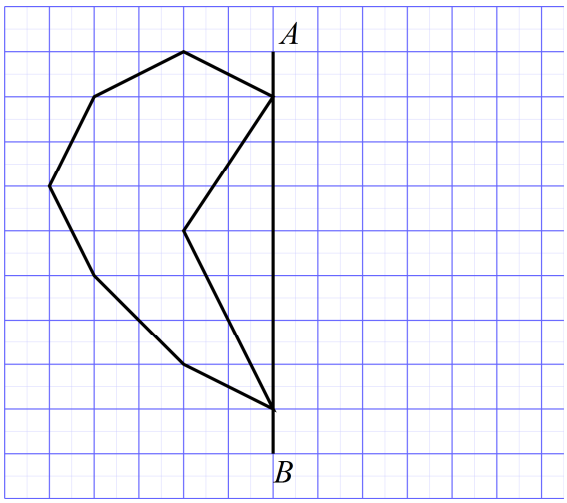
7. Use geometric instruments to draw the image after *KLMN* when it is translated in the distance and direction of the arrow.



8. Use geometric instruments to draw the image after $HIJK$ is rotated through 180^o in a clockwise direction about O.

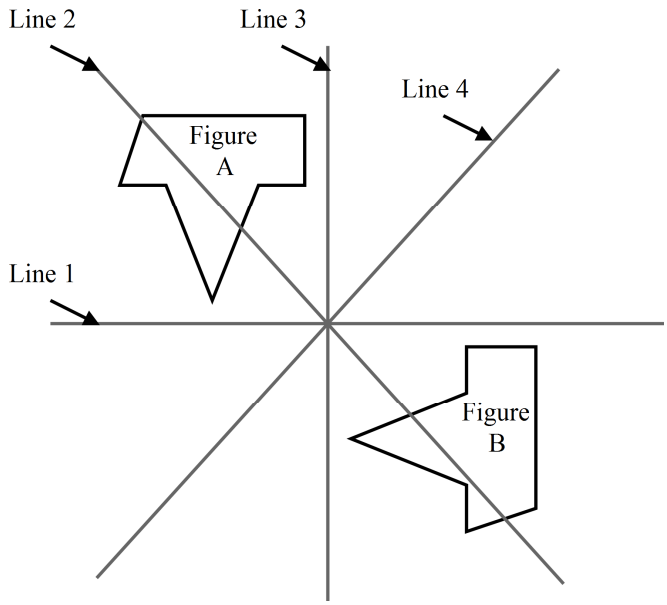


9. Use geometric instruments to complete the figure below so that it has the line AB as an axis of symmetry.



10. Reflection in which line would transform Figure A to Figure B?

- ☐ Reflection in Line 1.
- ☐ Reflection in Line 2.
- ☐ Reflection in Line 3.
- ☐ Reflection in Line 4.

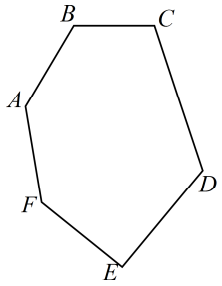


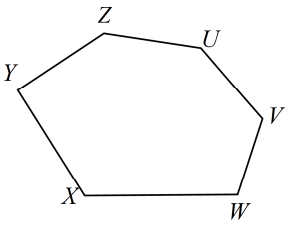
11. The two irregular hexagons are congruent.

Complete the following statements.

Side EF matches with side ☐.

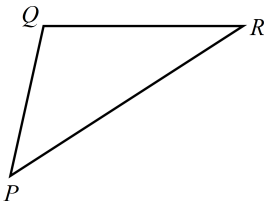
Angle C matches with angle ☐.



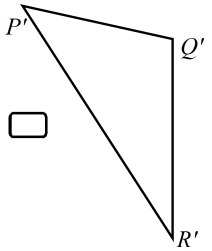


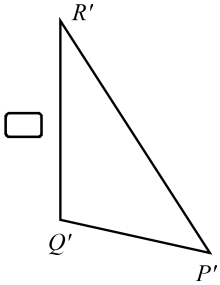
12. Use a compass and a ruler to construct a triangle which has sides of 5 cm, 12 cm and 13 cm.

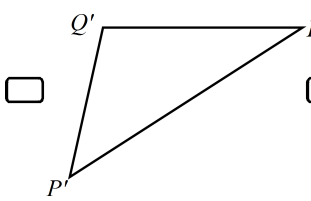
13. The triangle PQR is rotated through 270^o in a clockwise direction.

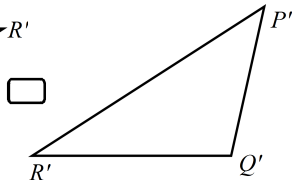


Which figure could be the image after this rotation?



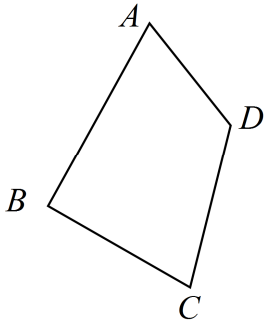


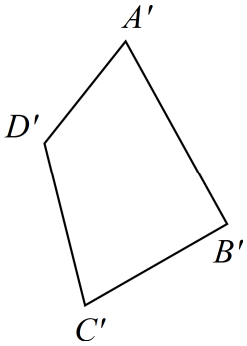




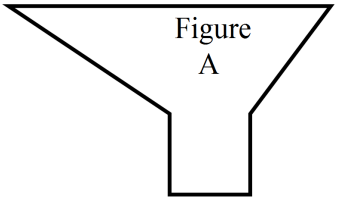
14. The figure $ABCD$ could be transformed to the figure $A'B'C'D'$ by:

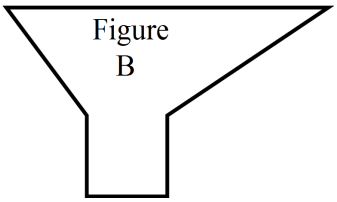
- ☐ Rotation through 180^o.
- ☐ Reflection.
- ☐ Translation.
- ☐ Rotation through 90^o.





15. Which transformation(s) could transform figure A to figure B?





- ☐ Reflection and Translation.
- ☐ Reflection only.
- ☐ Rotation and Reflection.
- ☐ Rotation only.

High School Mathematics Test 2013

Year 8

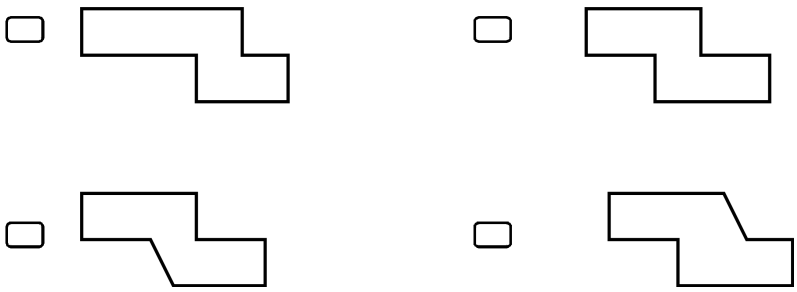
Transformations & Congruence

Calculator Allowed Short Answer Section

Name_____

Answer all questions in the spaces provided on this test paper by:
Writing the answer in the box provided.
or
Shading in the bubble for the correct answer from the four choices provided.
Show any working out on the test paper. Calculators are allowed.

1. Which of these figures would look the same if rotated through an angle of 180^o?



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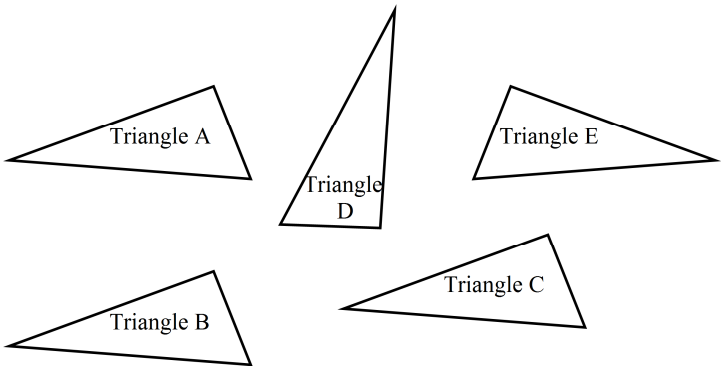
2. Triangle A is <u>reflected</u> to a new position.

Which triangle could be the image?

- ☐ Triangle B.
- ☐ Triangle C.
- ☐ Triangle D.
- ☐ Triangle E.



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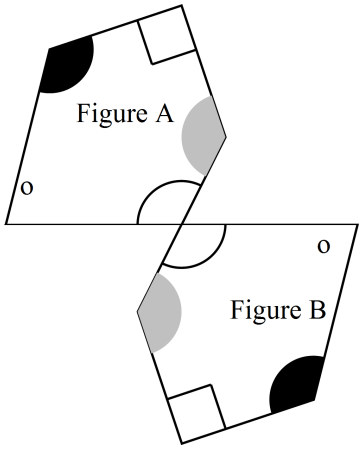
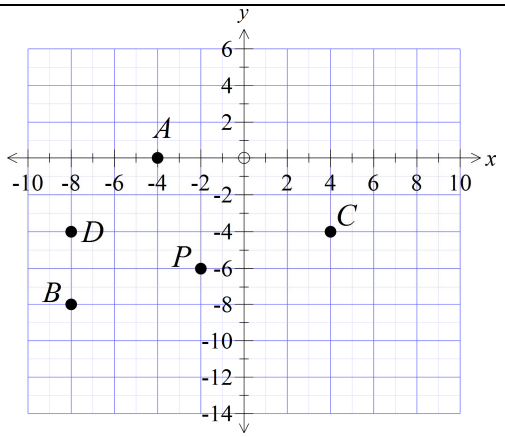
3. Figure A is transformed to Figure B by which transformation?

- ☐ Anticlockwise rotation through 180°.
- ☐ Anticlockwise rotation through 90°.
- ☐ Clockwise rotation through 270°.
- ☐ Clockwise rotation through 90°.



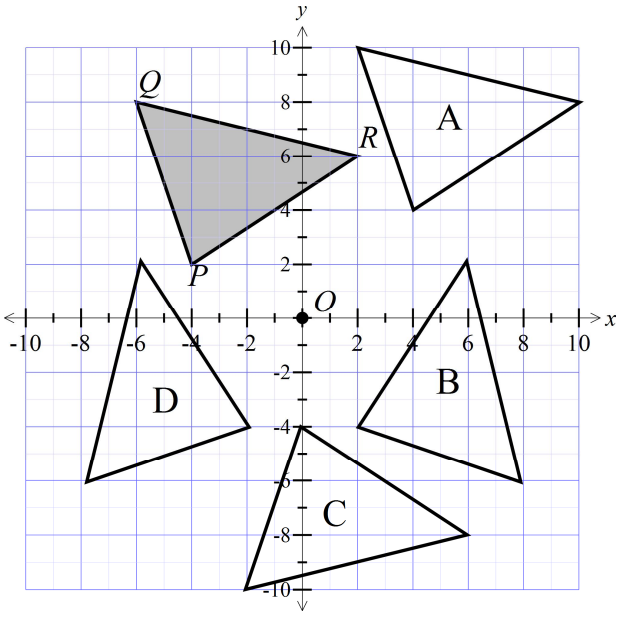
4. The point P (-2, -6) is translated 6 units to the left and then 2 units directly downward. Which point is the image after these two transformations?

- ☐ A (-4, 0)
- ☐ B (-8, -8)
- ☐ C (4, -4)
- ☐ D (-8, -4)

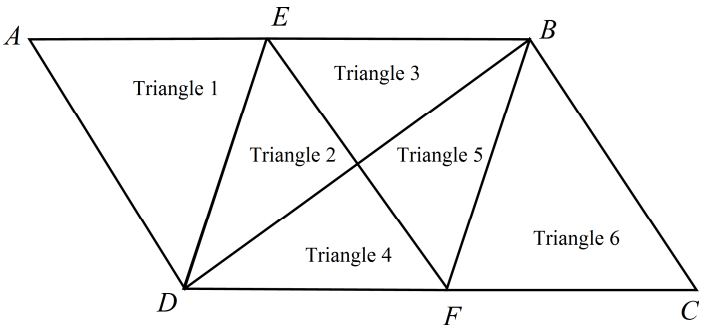


5. *PQR* is rotated anticlockwise through 90° about the origin O.
Which figure is its image?

- ☐ Triangle A
- ☐ Triangle B
- ☐ Triangle C
- ☐ Triangle D

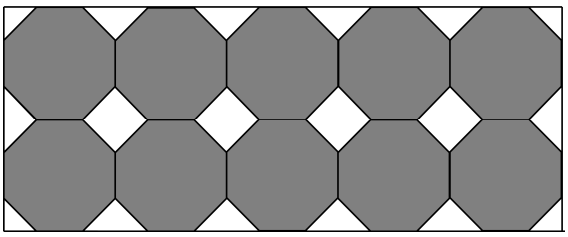


6. *ABCD* is a parallelogram and *EBFD* is a rhombus. Which pair of triangles is not congruent?



- ☐ Triangle 1 and Triangle 6
- ☐ Triangle 2 and Triangle 5
- ☐ Triangle 1 and Triangle 4
- ☐ Triangle 3 and Triangle 5

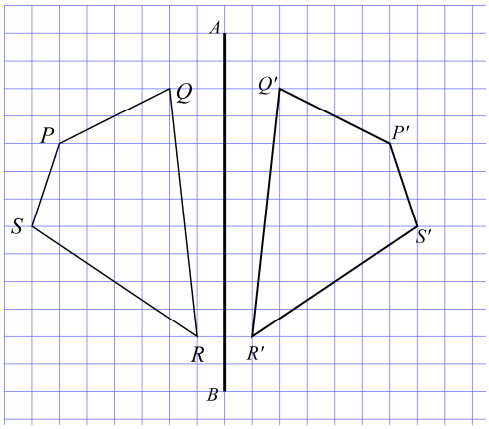
7. Hank is using the tiling pattern below to tile a corridor. He is using tiles which are regular octagons, squares and triangles.
Which is **not** true?



- ☐ All the octagons are congruent.
- ☐ All the squares are congruent.
- ☐ All the triangles are congruent.
- ☐ Not all the tiles are congruent.

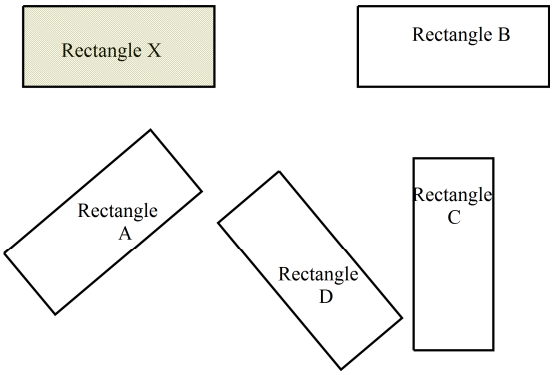
8. The image is shown of *PQRS* after it is is reflected in the line AB.

Which is true?



- ☐ $QR \,||\, Q'R'$.
- ☐ $SS' \perp AB$.
- ☐ $QR \perp Q'R'$.
- ☐ $SS' \,||\, AB$.

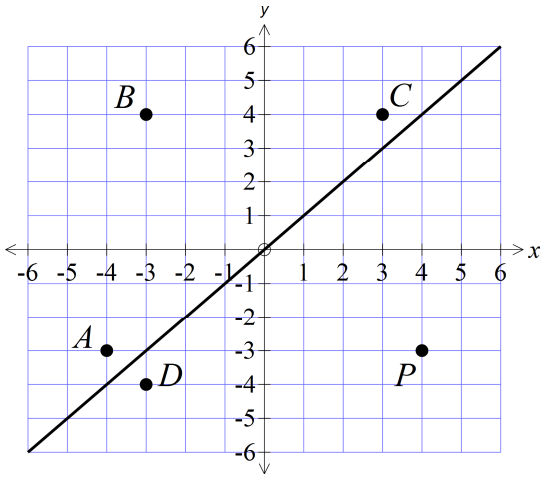
9. Rectangle X is rotated through an angle of 90° clockwise. Which Rectangle could be the image?



- ☐ Rectangle A.
- ☐ Rectangle B.
- ☐ Rectangle C.
- ☐ Rectangle D.

10. The point P (4, -3) is translated 7 units upward and then 1 unit to the left. Which point is the image after these two transformations?

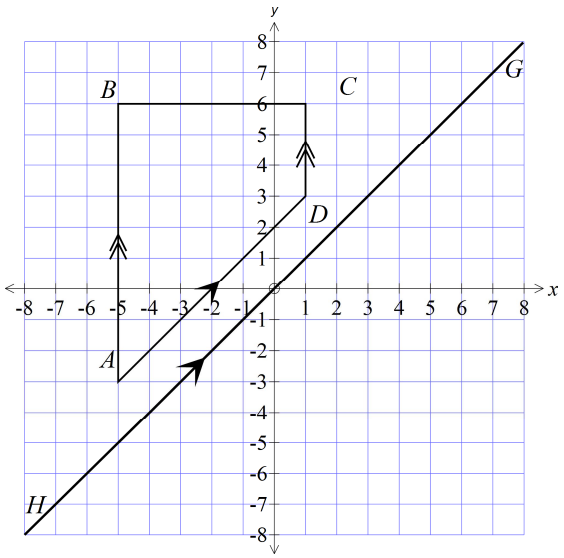
- ☐ Point A.
- ☐ Point B.
- ☐ Point C.
- ☐ Point D.



11. The image of the trapezium *ABCD* after it is reflected in the line *GH* is drawn and labelled *A'B'C'D'* .

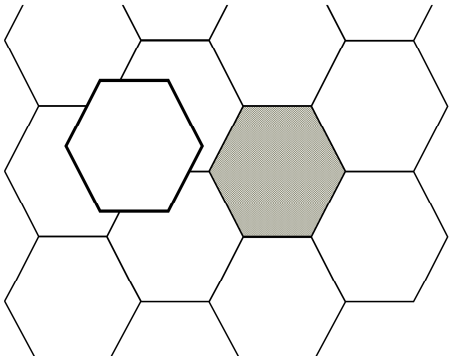
Which is true?

- ☐ $AD \,||\, A'D'$
- ☐ $AD \,||\, C'D'$
- ☐ $CD \,||\, C'D'$
- ☐ $C'D' \,||\, GH$



12. The pattern shown below is made from tiles which are regular hexagons.

A tile is removed, and rotated clockwise before being replaced into the spot from which it was removed.



What is the least angle through which it can be rotated before being replaced?

The abbreviations below are used for congruence tests for triangles in the following questions.

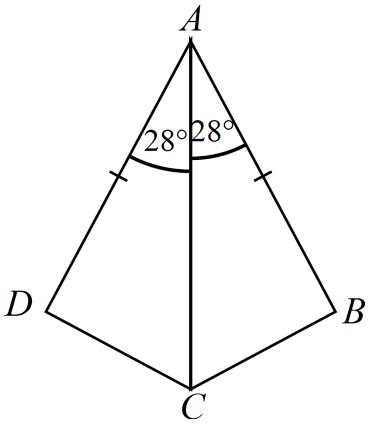
SSS Three sides of one triangle are equal to three corresponding sides of a second triangle.

SAS Two sides and an included angle of one triangle are equal to two corresponding sides and an included angle of a second triangle.

AAS Two angles and a side of one triangle are equal to two angles and a corresponding side of a second triangle.

RHS Two right angled triangles have the hypotenuse equal and one other side equal in length.

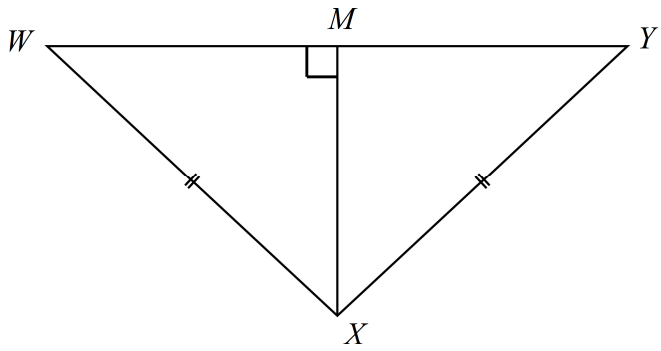
13. Which of the congruence tests could be used to show that $\Delta ADC \equiv \Delta ABC$.



☐ AAS ☐ RHS ☐ SAS ☐ SSS

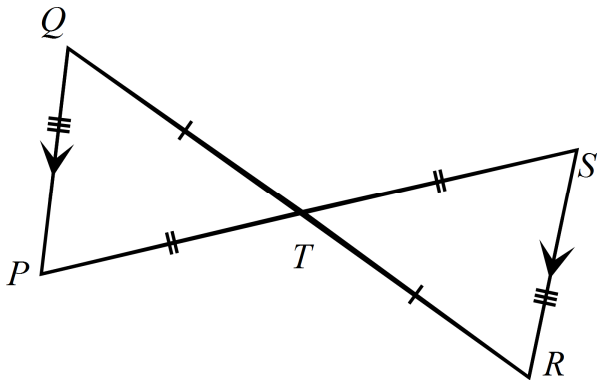
14. In ΔWXY, $WX = YX$ and M is the midpoint of WY.

Which of the congruence tests could be used to show that $\Delta WXM \equiv \Delta YXM$.



☐ AAS ☐ RHS ☐ SAS ☐ SSS

15. $PQ \parallel SR$.
$QT = TR$, $PT = TS$ and $QP = SR$.
Which of the congruence tests could **not** be used to show that
$\Delta QTP \equiv \Delta RTS$



- ☐ AAS
- ☐ RHS
- ☐ SAS
- ☐ SSS

High School Mathematics Test 2013

Year 8

Transformations & Congruence

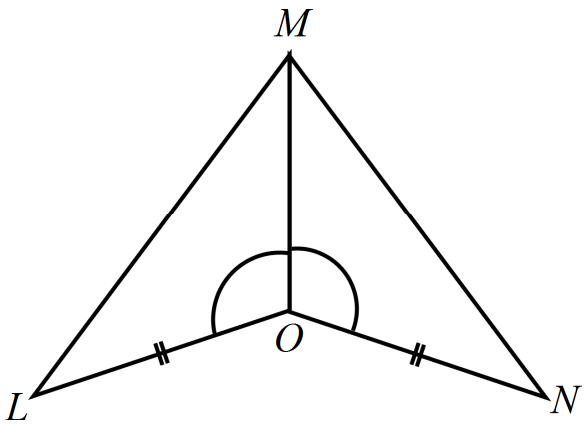
Calculator Allowed Longer Answer Section

Name_____

Write all working and answers in the spaces provided on this test paper.
Marks may not be awarded if working out and/or answers are not clear.
Marks allocated are shown beside each question.
Calculators are allowed.

Marks

1. In the figure below, $LO = ON$ and $\angle LOM = \angle MON$. **3**
Prove that
$\Delta LOM \equiv \Delta NOM$



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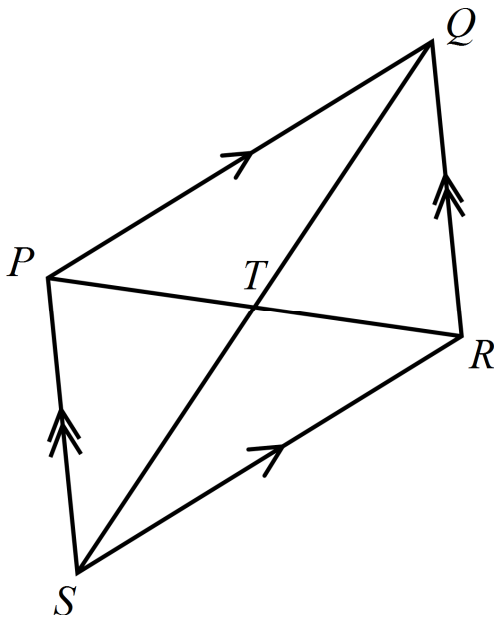
Marks

2. *PQRS* is a parallelogram. The diagonals meet at *T*. **3**

Prove that $\Delta PTS \equiv \Delta RTQ$ and hence that *QS* bisects *PR*.



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High School
Mathematics Test 2013

Year 8

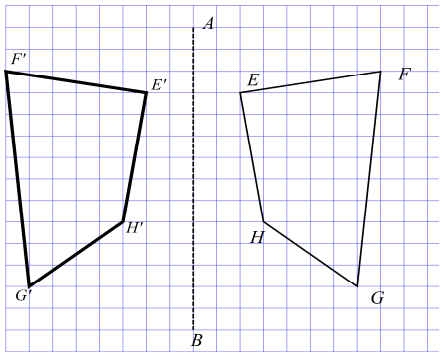
Transformations & Congruence

ANSWERS

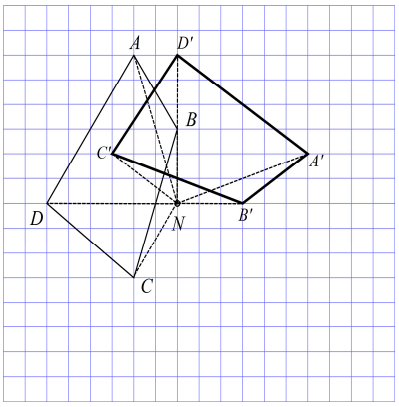
Non Calculator Section

1. Translation.

2.



3.



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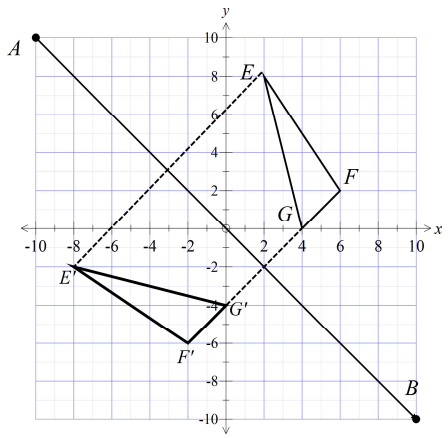
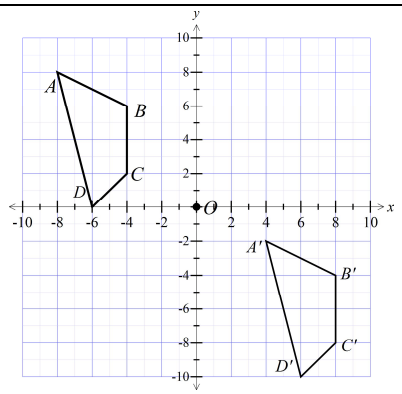
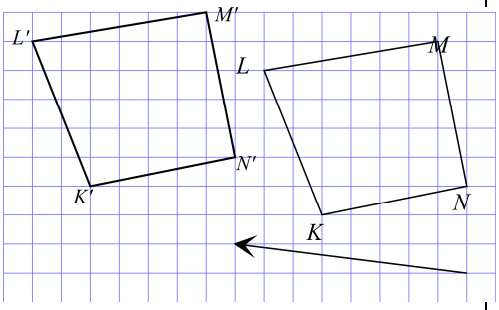


5.

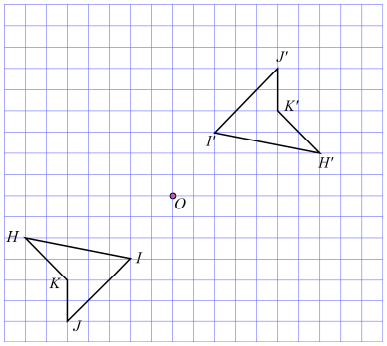


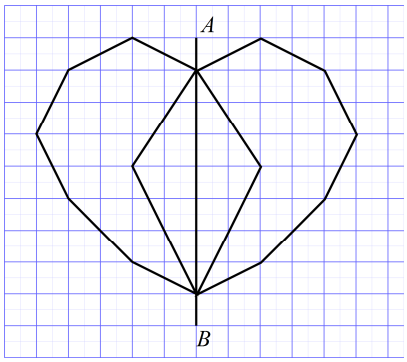
6. Clockwise rotation through 90^{o}.

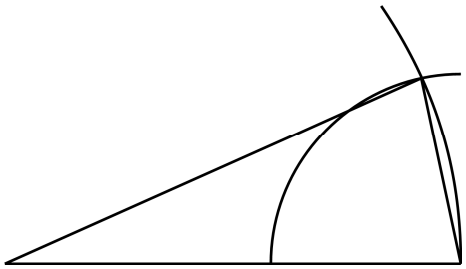
7.



8.



9.	
10.	Reflection in Line 4.
11.	Side EF matches with side YZ . Angle C matches with angle W.

12.	
13.	The 2nd one.
14.	Reflection.
15.	Reflection and Translation.

Calculator Allowed Section

1.	The 2nd one.
2.	Triangle E.
3.	Anticlockwise rotation through 180^o
4.	B (-8, -8)
5.	Triangle D
6.	Triangle 1 and Triangle 4
7.	All the triangles are congruent.
8.	$SS' \perp AB$.
9.	Rectangle C.
10.	Point C
11.	$AD \mid\mid A'D'$
12.	60^o
13.	SAS
14.	RHS
15.	RHS

Calculator Allowed Longer Answer Section		
1.	In ΔLOM and ΔNOM. $LO=ON$ (Given) $\angle LOM = \angle MON$ (Given) MO is common. $\Delta LOM \equiv \Delta NOM$ (SAS)	3 for correct answer. 2 if one or two mistakes made in correct process. 1 mark if a correct line with reason is given.
2.	In ΔPTS and ΔRTQ $\angle PTS = \angle RTQ$ (Vertically Opposite angles.) $\angle SPT = \angle TRQ$ (Alternate angles on || lines.) $SP = RQ$ (Opposite angles of Parallelogram are equal) $\therefore \Delta PTS \equiv \Delta RTQ$ (*AAS*) Hence $PT = TR$ (corresponding sides of congruent triangles) $\therefore$ QS bisects PR at T.	3 for correct answer. 2 if one or two mistakes made in correct process. 1 mark if a correct line with reason is given.