Curriculum Outcomes

(SS3) Demonstrate an understanding of similarity of polygons.

(SS4) Draw and interpret scale diagrams of 2-D shapes.

(SS5) Demonstrate an understanding of line and rotation symmetry.

Student Friendly: Reflecting a shape across a line

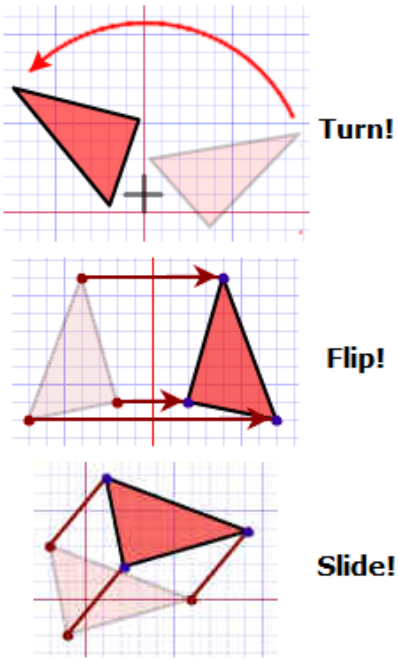
There are three types of transformations:

1. reflections [Line of reflection]
   - Reflect through x-axis
   - Reflect through y-axis

   *oblique two coordinates

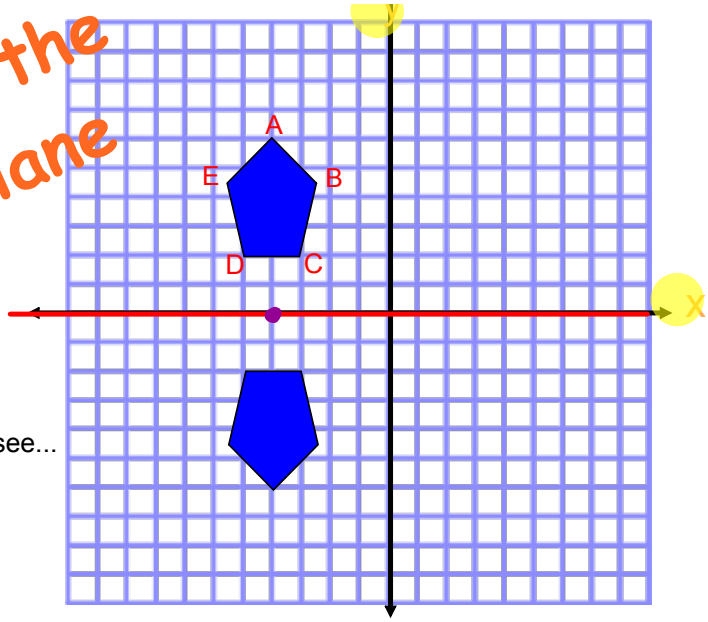
2. rotations
   - order of rotation
   - angle of rotation

3. translations [slide]
   Left 3 up 2 [L3U2]
   right 4 down2 [R4 D2]



Section 7.7

Symmetry on the Cartesian Plane



Describe any symmetry you can see...
be specific!!

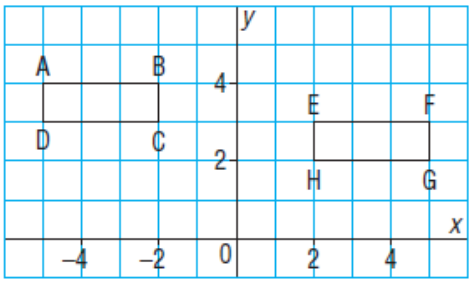
→ reflex sym through the x axis (y = 0)

→ rot sym about the point (-4, 0) of 180°

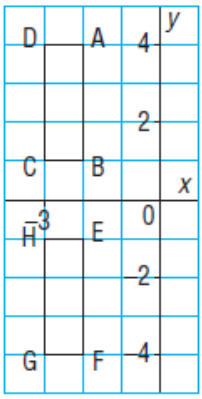
for a
Line of reflection
or
Rotation

For each pair of rectangles ABCD and EFGH, determine whether they are related by symmetry.

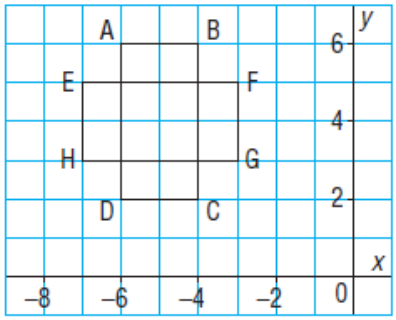
a)



b)



c)



Be specific when you describe the symmetry.

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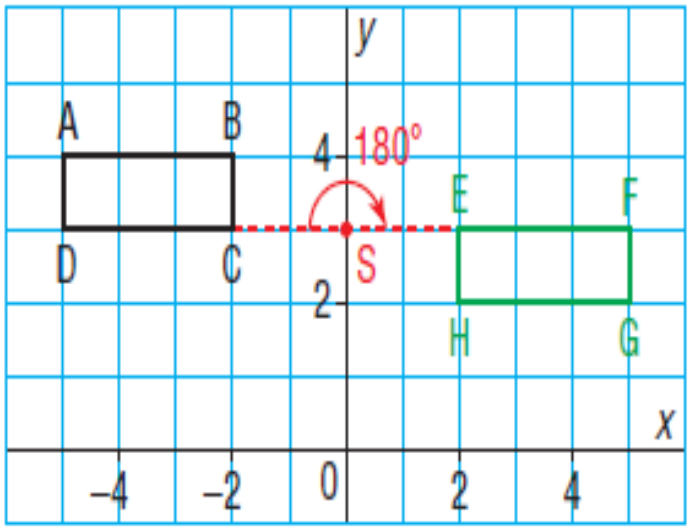
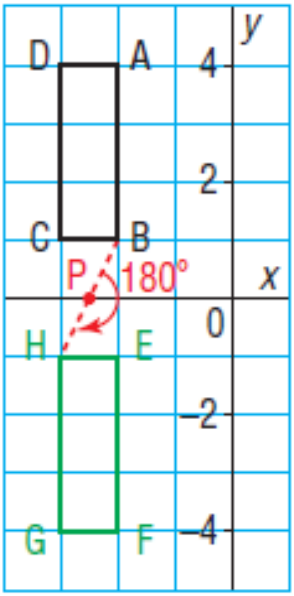


y

rotation of 180° about (0, 3)

translation R 7 D 1



rotation about point (-2.5,0)

Flip about the x axis

translation D 5

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HE.
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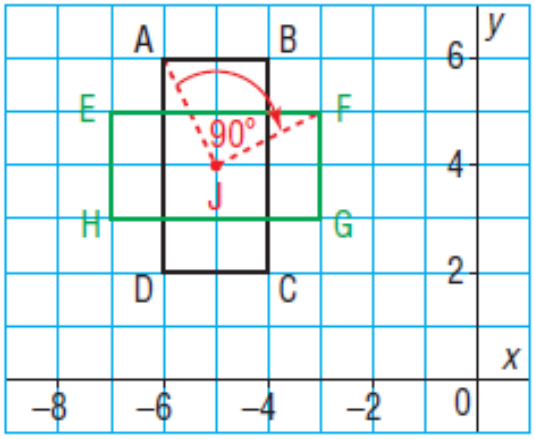
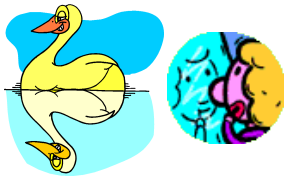


Rotational angle of 90° about the point (-5, 4)

Rotational Symmetry of 4

Reflection



What do you need?

Translation

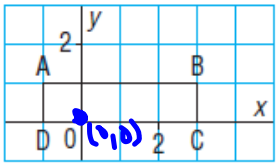
What do you need?

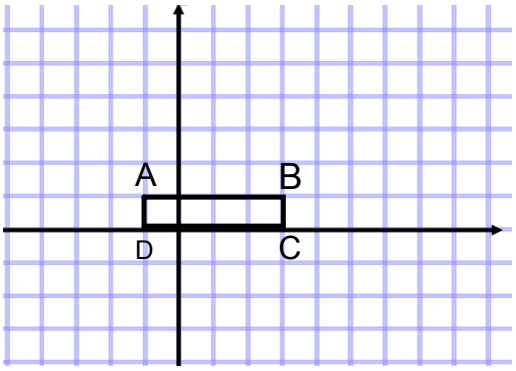
Rotation

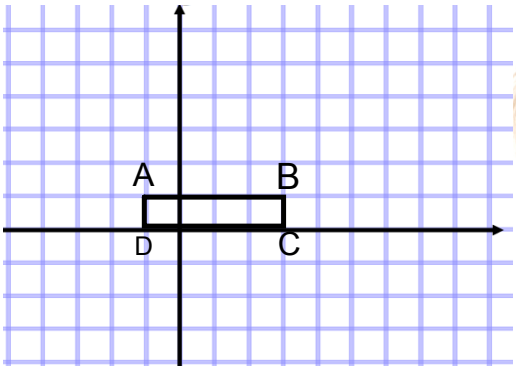
What do you need?

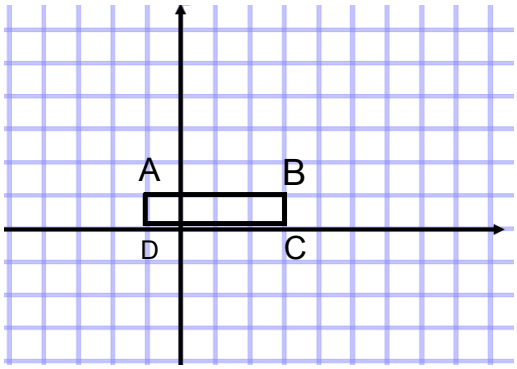
Draw the image of rectangle ABCD after each transformation.
Write the coordinates of each vertex and its image.
Identify and describe the type of symmetry that results.

a) a rotation of 180° about the origin
b) a reflection in the x-axis
c) a translation 4 units right and 1 unit down



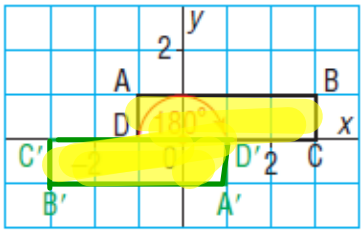






a) Use tracing paper to rotate ABCD 180° about the origin.

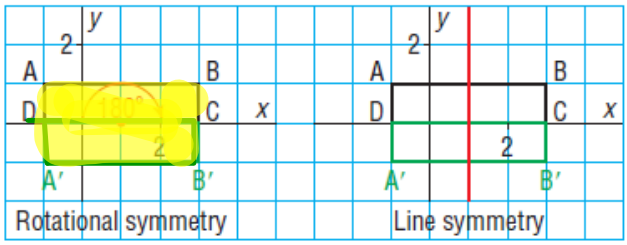
Point	Image
A(−1, 1)	A′(1, −1)
B(3, 1)	B′(−3, −1)
C(3, 0)	C′(−3, 0)
D(−1, 0)	D′(1, 0)



The octagon ABCD′A′B′C′D, formed by both rectangles together, has rotational symmetry of order 2 about the origin, and no line symmetry.

Reflect ABCD in the x-axis.

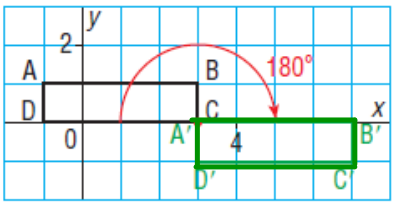
Point	Image
A(−1, 1)	A′(−1, −1)
B(3, 1)	B′(3, −1)
C(3, 0)	C(3, 0)
D(−1, 0)	D(−1, 0)



The rectangle ABB′A′, formed by both rectangles, has rotational symmetry of order 2 about the point (1, 0). It also has 2 lines of symmetry: the x-axis and the vertical line through 1 on the x-axis.

- Translate ABCD 4 units right and 1 unit down.

Point	Image
A(−1, 1)	A′(3, 0)
B(3, 1)	B′(7, 0)
C(3, 0)	C′(7, −1)
D(−1, 0)	D′(3, −1)



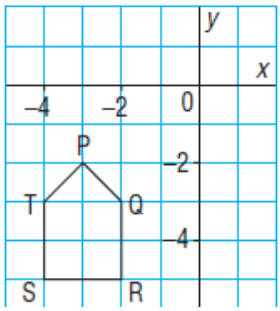
The two rectangles do not form a shape; but they have a common vertex at C (or A′).
The two rectangles are related by rotational symmetry of order 2 about the point C(3, 0).
There is no line of symmetry relating the rectangles.

Draw the image of pentagon PQRST
after each translation below.
Label the vertices of the pentagon and its image,
and list their coordinates.
If each diagram has symmetry, describe it.
If each diagram does not have symmetry,
explain how you know.

a) a translation L2

b) a translation L2, D3

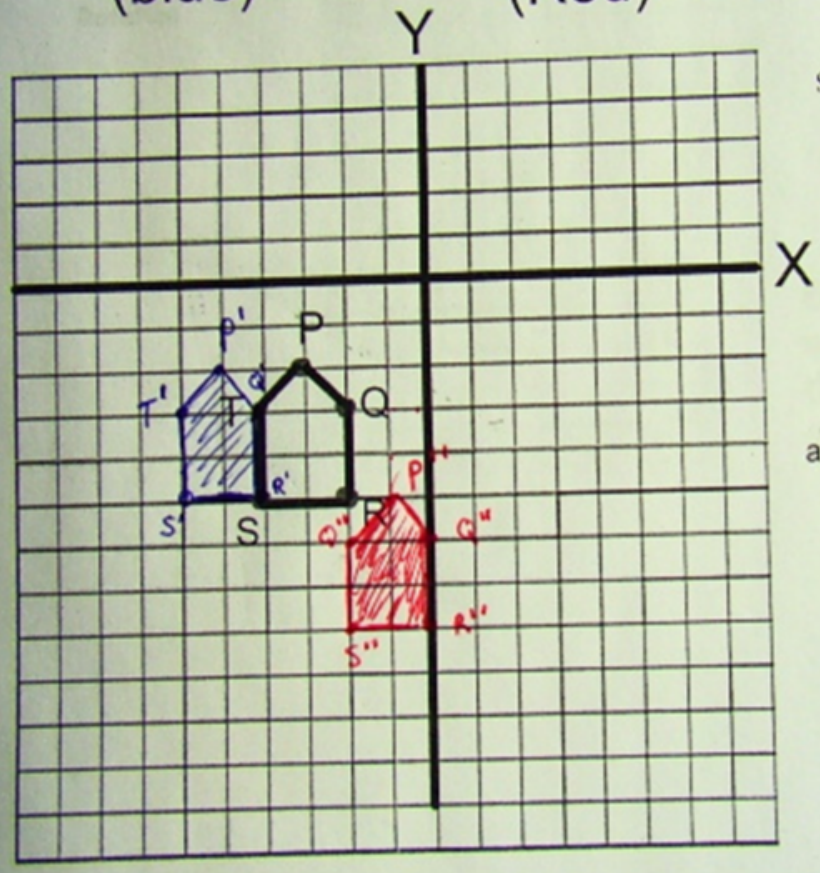
Left 2 units



Solutions on the next page

a) a translation L2

(blue) (Red)



Solutions on the next page

P (-3, -2)
Q (-2, -3)
R (-2, -5)
S (-4, -5)
T (-4, -3)

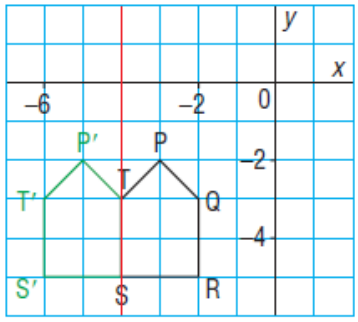
a) P' (-5, -2)
Q' (-4, -3)
R' (-4, -5)
S' (-6, -4)
T' (-6, -3)

b) P'' (-1, -5)
Q''(0, -6)
R''(0, -8)
S''(-2, -8)
T'' (-2, -6)

Extend Page

Translate each vertex of pentagon PQRST 2 units left.

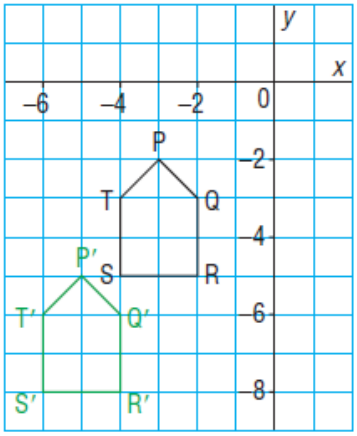
Point	Image
P(−3, −2)	P′(−5, −2)
Q(−2, −3)	T(−4, −3)
R(−2, −5)	S(−4, −5)
S(−4, −5)	S′(−6, −5)
T(−4, −3)	T′(−6, −3)



The diagram has line symmetry because the vertical line through ST is a line of reflection.
The diagram does not have rotational symmetry because there is no point about which it can be rotated so that it coincides with itself.

Translate each vertex of pentagon PQRST 2 units left and 3 units down.

Point	Image
P(−3, −2)	P′(−5, −5)
Q(−2, −3)	Q′(−4, −6)
R(−2, −5)	R′(−4, −8)
S(−4, −5)	S′(−6, −8)
T(−4, −3)	T′(−6, −6)



The diagram does not have line symmetry because there is no line on which a mirror can be placed so that one pentagon is the reflection image of the other. The diagram does not have rotational symmetry because there is no point about which it can be rotated so that it coincides with itself.

Homework Questions??

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Booklet (See attachment)

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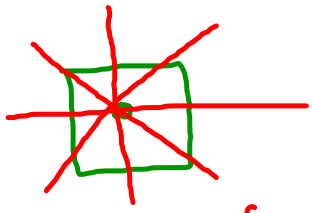
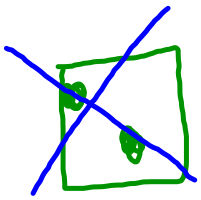


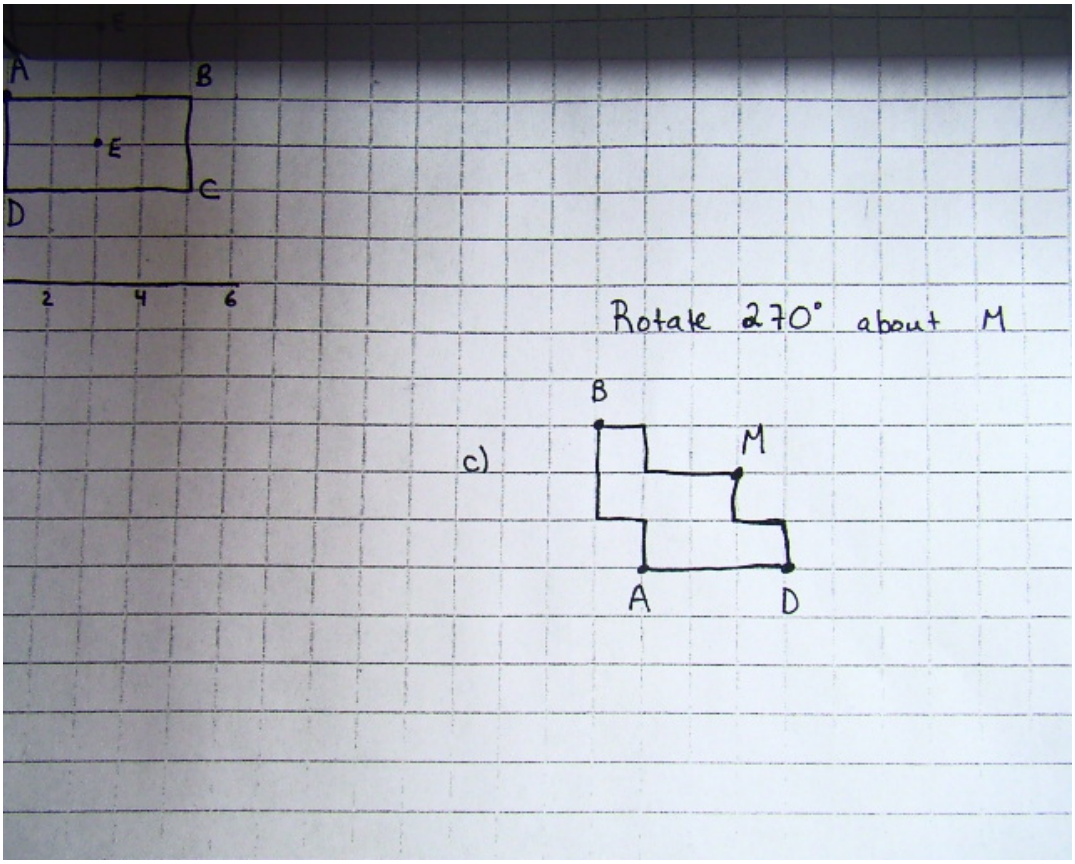
4 line of symmetry

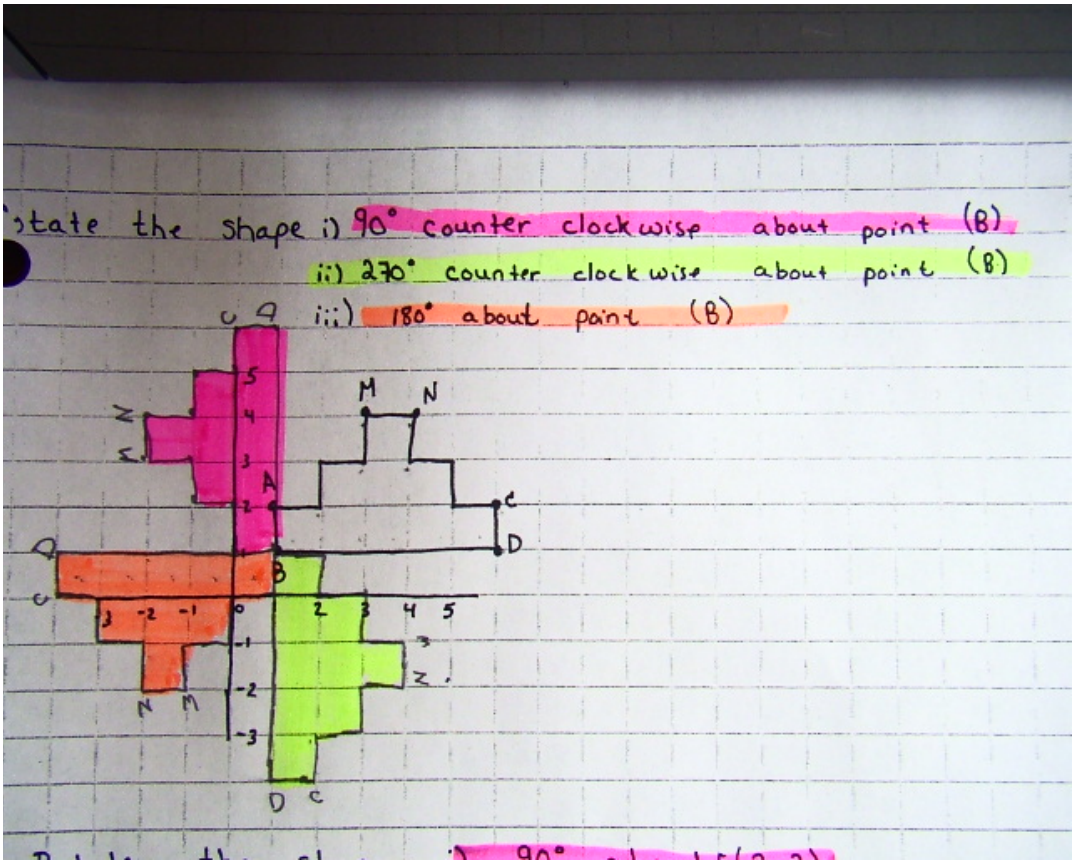
Rotation about center dot (90°)



2 lines of symmetry

Rotate 180° about center


A
B
E
C
D
2
4
6
Rotate 270° about M
c)
B
M
A
D


State the shape i) 90° counter clockwise about point (B)
ii) 270° counter clockwise about point (B)
iii) 180° about point (B)
M
N
A
B
C
D
N
M
D
C