

Important Concepts . . .

# Preview Review



**Mathematics   Grade 8   TEACHER KEY**  
**W3 - Lesson 5: Congruence of Polygons**

## Important Concepts of Grade 8 Mathematics

W1 - Lesson 1 .....	Perfect Squares and Square Roots
W1 - Lesson 2 .....	Working with Ratios and Rates
W1 - Lesson 3 .....	Multiplying and Dividing Fractions
W1 - Lesson 4 .....	Multiplying and Dividing Integers
W1 - Lesson 5 .....	Working with Percents
W1 - Review	
W1 - Quiz	
W2 - Lesson 1 .....	Modelling and Solving Linear Equations Using Algebra Tiles
W2 - Lesson 2 .....	Solving Linear Equations
W2 - Lesson 3 .....	Graphing and Analyzing Linear Relations
W2 - Lesson 4 .....	Critiquing the Representation of Data
W2 - Lesson 5 .....	Probability of Independent Events
W2 - Review	
W2 - Quiz	
W3 - Lesson 1 .....	Pythagorean Theorem
W3 - Lesson 2 .....	Calculating Surface Area
W3 - Lesson 3 .....	Calculating Volume
W3 - Lesson 4 .....	Drawing 3-D Objects
W3 - Lesson 5 .....	Congruence of Polygons
W3 - Review	
W3 - Quiz	

## Materials Required

Protractor  
Ruler  
Calculator

**No Textbook  
Required**

**This is a stand-  
alone course.**

### Mathematics Grade 8

Version 6

Preview/Review W3 - L5

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# Preview/Review Concepts for Grade Eight Mathematics

Teacher Key



*W3 - Lesson 5:*

*Congruence of Polygons*

# OBJECTIVES

By the end of this lesson, you will be able to:

- Determine the coordinates of the vertices of an image following a given combination of transformations of the original figure.
- Draw the original figure and determine the coordinates of its vertices, given the coordinates of the image's vertices and a description of the transformation (translation, rotation, reflection).

## GLOSSARY

**Tessellation** – a design that consists of congruent copies of a shape with no overlaps or gaps; a tessellation can consist of one shape or a combination of shapes.

**Transformations** – the act of moving a shape from one location to another location on the coordinate plane without changing its size or shape.

**Translation** – a move in a straight line to another position on the same flat surface

**Reflection** – a shape and its image in a line of reflection.

**Rotation** – a shape turned about a fixed point

## W3 – Lesson 5: Congruence of Polygons

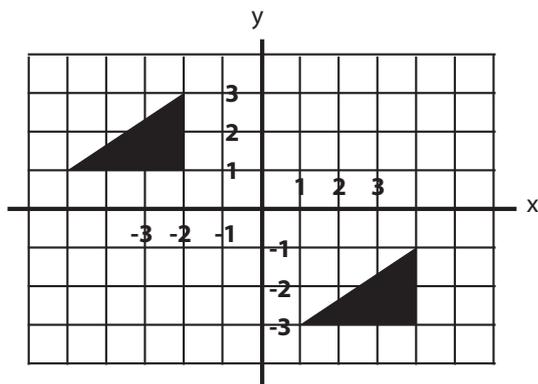
### Materials required:

- Paper, Pencil, Calculator, Square dot paper, Grid paper

### Congruence of Polygons

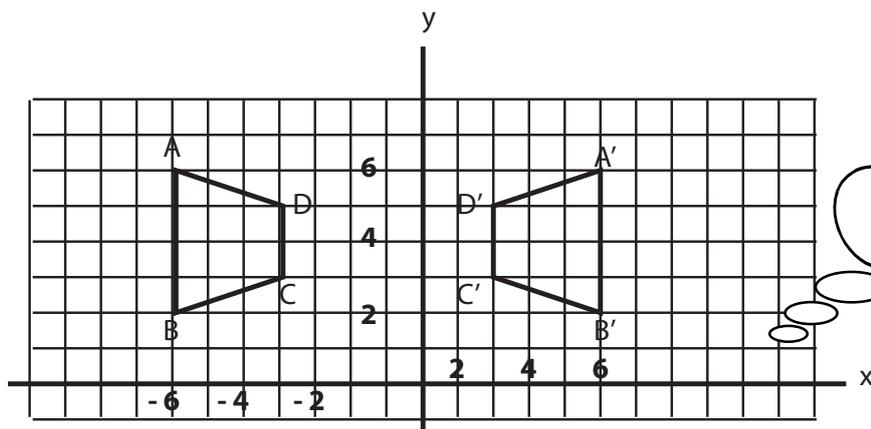
A transformation is the act of moving a shape from one location to another location on the coordinate plane without changing its size or shape.

A translation is a move in a straight or diagonal line to another position on the same flat surface.

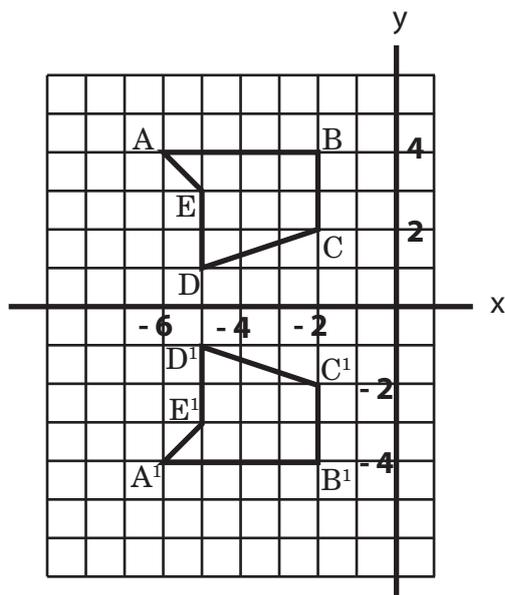


A x-coordinate will have a constant difference and so will the y-coordinates.

A reflection shows a shape and its image in a line of reflection. The reflection can be a vertical reflection or a horizontal reflection.



A horizontal reflection, the x-coordinates stay the same and the y-coordinates change to the opposite values.



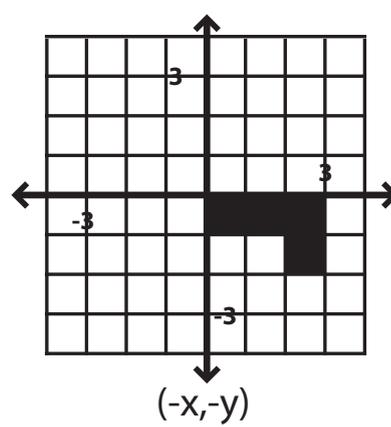
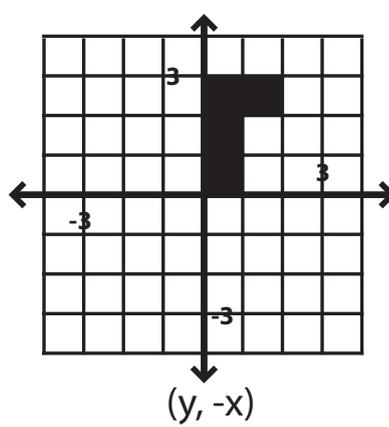
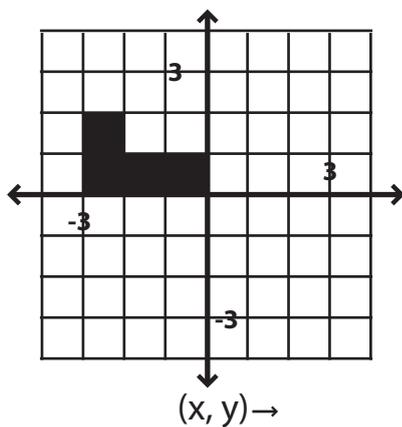
A vertical reflection, the y-coordinates stay the same and the x-coordinates change to the opposite values.

A rotation is a shape turned about a fixed point. The rotation can happen in a clockwise direction or the counterclockwise direction.

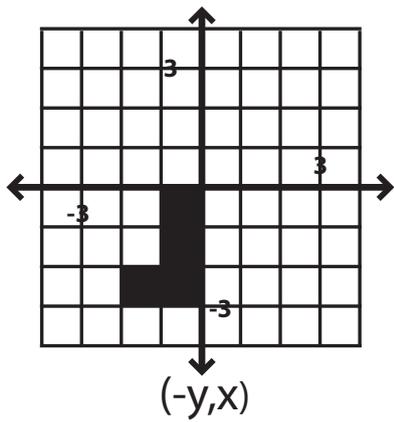
Original position

90° rotation clockwise

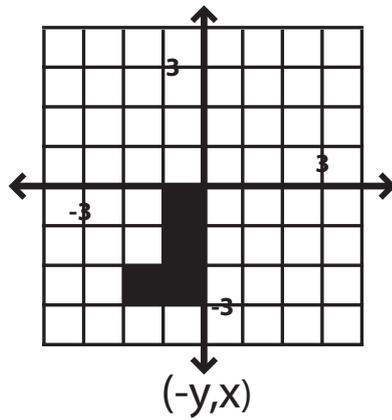
180° rotation clockwise



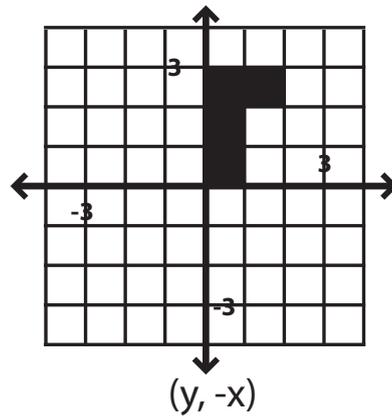
270° rotation clockwise



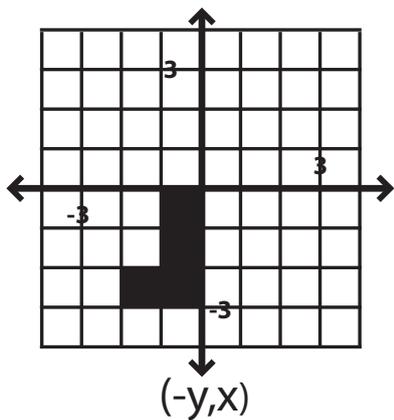
90° rotation  
counterclockwise



180° rotation  
counterclockwise

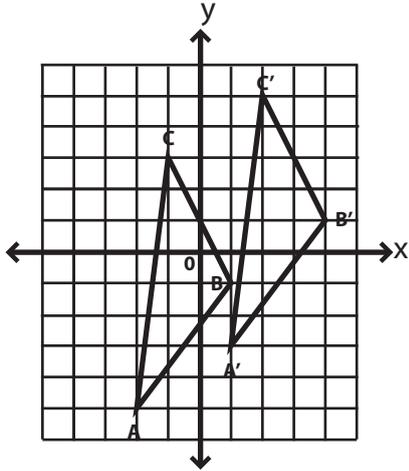


270° rotation  
counterclockwise



**Example 1**

Identify the transformation illustrated in the following diagram.



Step 1: Determine the coordinates of the original shape.

**A(-2, -5), B(1, -1), C(-1, 3)**

Step 2: Determine the coordinates of the image.

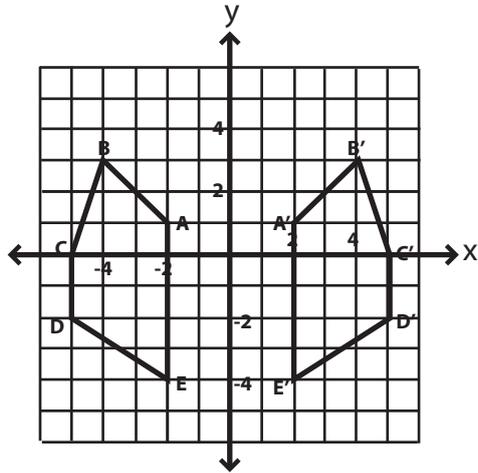
**A'(1, -3), B'(4, 1), C(2, 5)**

Step 3: Determine the transformation.

**The shape has moved 3 units to the left and 2 units up. This diagram illustrates a translation.**

## Example 2

Identify the transformation illustrated in the following diagram.



Step 1: Determine the coordinates of the original shape.

**A(-2, 1), B(-4, 3), C(-5, 0), D(-5, -2), E(-2, -4)**

Step 2: Determine the coordinates of the image.

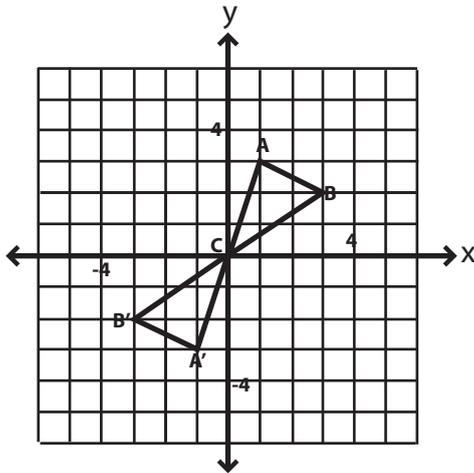
**A'(2, 1), B'(4, 3), C'(5, 0), D'(5, -2), E'(2, -4)**

Step 3: Determine the transformation.

**The second shape is a mirror image of the original shape. The y-coordinates are the same and the x-values have changed to their opposite values. This diagram illustrates a reflection about the y-axis.**

## Practice Questions

1. Identify the transformation illustrated in the following diagram.



Answer:

Step 1: Determine the coordinates of the original shape.

$A(1, 3), B(3, 2), C(0, 0)$

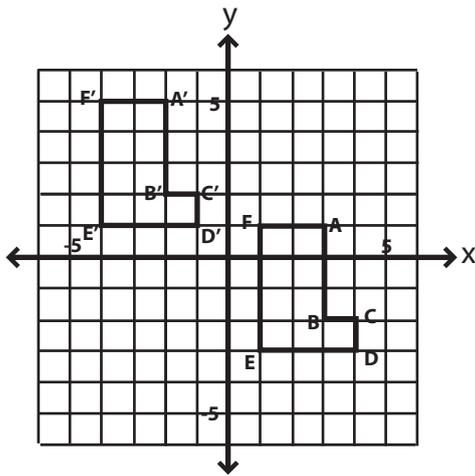
Step 2: Determine the coordinates of the image.

$A'(-1, -3), B'(-3, -2), C'(0, 0)$

Step 3: Determine the transformation

***The coordinates of the image are opposite in value to the coordinates of the original shape. This diagram illustrates a rotation  $180^\circ$  rotation clockwise or counterclockwise.***

2. Identify the transformation illustrated in the following diagram.



Answer:

Step 1: Determine the coordinates of the original shape.

$A(3, 1), B(3, -2), C(4, -2), D(4, -3), E(1, -3), F(1, 1)$

Step 2: Determine the coordinates of the image.

$A'(-2, +5), B'(-2, +2), C'(-1, 2), D'(-1, +1), E'(-4, 1), F'(-4, 5)$

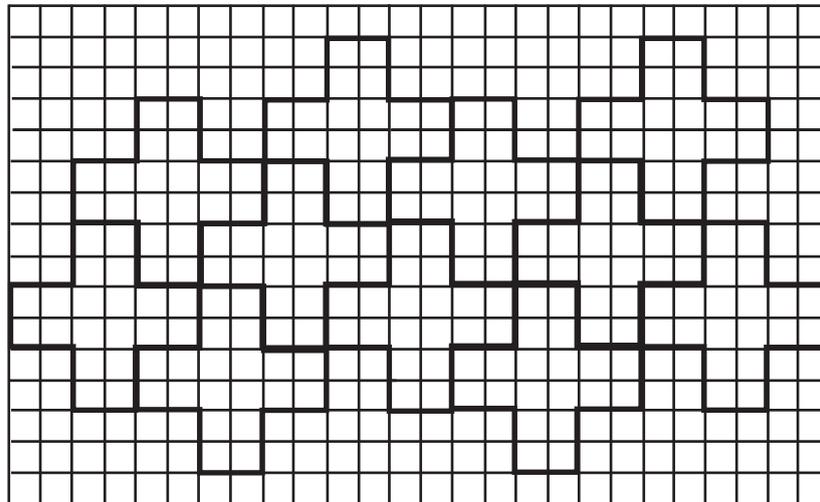
Step 3: Determine the transformation.

***There is a difference of 5 units in the x-coordinates and 4 units in the y-coordinates. The shape has moved 5 units to the left and 4 units up. This diagram illustrates a translation.***

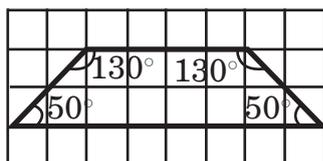
## Constructing Tessellations

A tessellation is a design that consists of congruent copies of a shape with no overlaps or gaps. A tessellation can consist of one shape or a combination of shapes.

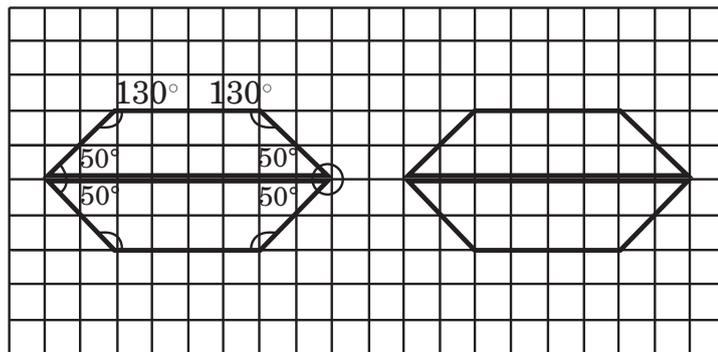
To make a tessellation, take the original shape and apply a series of translations, reflections, and rotations to it.



In order for a shape to tessellate, the point where the vertices of the original shape meet, the sum of the angles must be  $360^\circ$ .



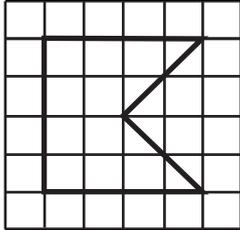
tessellate



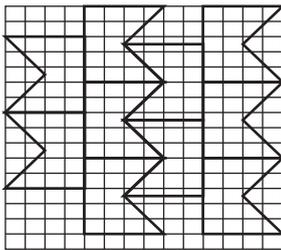
$$50^\circ + 50^\circ + 130^\circ + 130^\circ = 360^\circ$$

## Practice Questions

1. Tessellate the following shape.

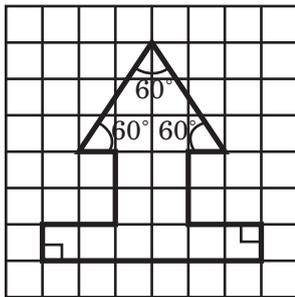


Answer:



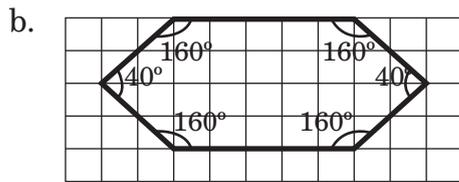
2. Determine if the following shapes will tessellate:

a.



Answer:

***No this shape will not tessellate because no matter how you arrange the shapes, the point of tessellation will never be  $360^\circ$ .***



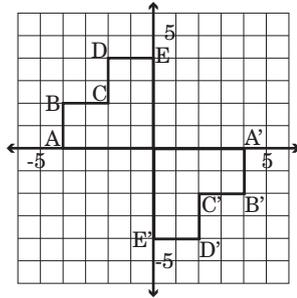
Answer:

***Yes this shape will tessellate because when you arrange the shapes beside each other, the point of tessellation is  $360^\circ$ .***

### Lesson 5: Assignment

1. Identify the following transformations.

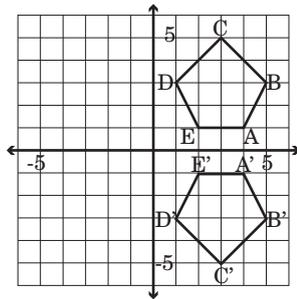
a.



Answer:

***Rotation 180° clockwise or counterclockwise***

b.

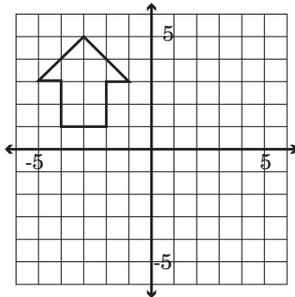


Answer:

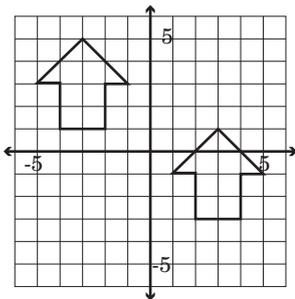
***Reflection***

2. Transform the following shapes.

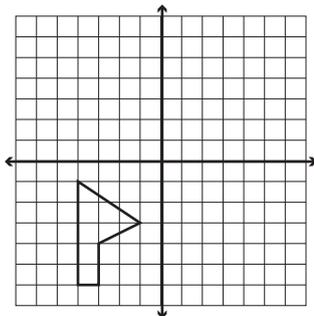
a. Translate the following shape 6 units right and 4 units down.



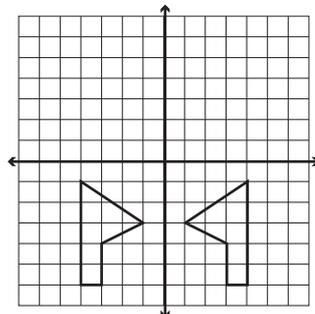
Answer:



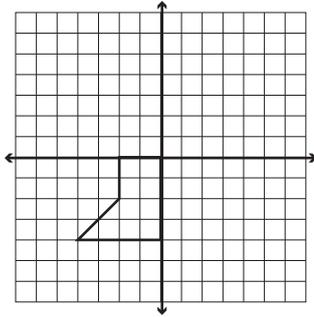
b. Reflect the following shape across the y-axis.



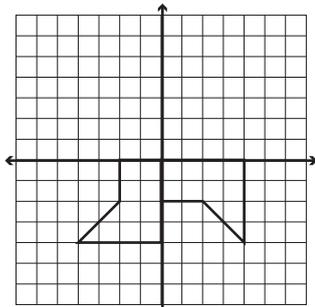
Answer:



c. Reflect the following shape 270° clockwise.

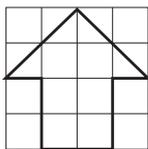


Answer:

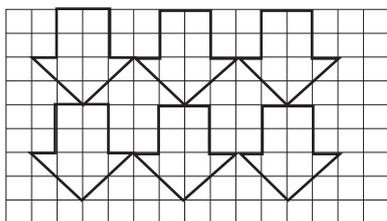


3. Tessellate the following shapes.

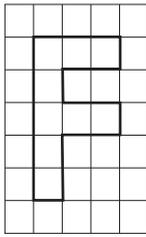
a.



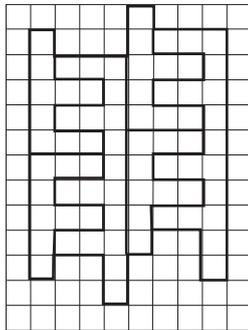
Answer:



b.

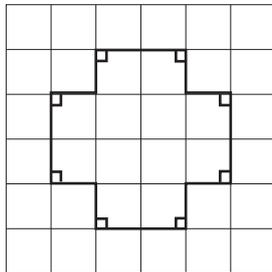


Answer:



4. Determine if the following shapes will tessellate.

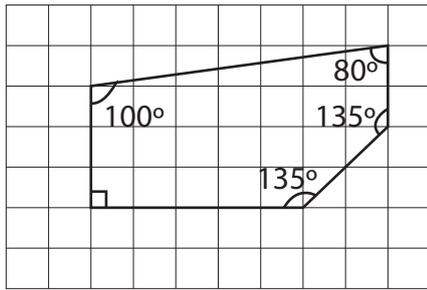
a.



Answer:

***Yes, this shape will tessellate because when you arrange the shapes beside each other, the point of tessellation will be  $360^\circ$ .***

b.



Answer:

***No this shape will not tessellate because no matter how you arrange the shapes, the point of tessellation will never be  $360^\circ$ .***

