

Algebra/Geometry Institute Summer 2004



Lesson Plan 1

Faculty Name: Janice Walker

School: Greenville-Weston, Greenville, MS

Grade Level: Geometry 9 – 10

1 Teaching objective(s):

Students will identify, create, describe, and compare images and objects obtained by applying reflections.

2 Instructional Activities:

Warm-Up

Have the warm-up problem on the board. Students will copy the pattern and draw the next two designs in the pattern. (Allow about 10 minutes). If the majority of the students correctly draw the next designs in the pattern, have one of them to demonstrate and explain. If no one gets it, tell them to keep their paper and think about it throughout the class period. Be sure to answer it before class is over.

Lesson Introduction

- Ask students what they see when they look in the mirror?
- Where else might they see a reflection? Discuss responses.

The Lesson

Introduce and define new vocabulary terms: (reflection, line of reflection, line of symmetry) Tape pictures of duck, butterfly, castle, lake, rocket & decorative strip to the wall. Let a ruler be the line of symmetry. Ask someone to come place the ruler on the 1st picture so that it represents a line of symmetry. Do each remaining picture the same way. Ask if they see things in the classroom that reflect symmetry.

On the coordinate plane transparency, label a point $A(5,7)$. Let the y-axis be a line of symmetry and ask someone to label a point A' in quadrant II that would be a reflection of $(5,7)$. Next let the x-axis be a line of symmetry and ask someone to label a point A'' in quadrant IV that would be a reflection of $A(5,7)$.

Pass out Activity 1 Sheet, ruler, and 2 sheets of graph paper to each student. List arbitrary points from each quadrant on the board.

$D(6,2)$, $R(-8,7)$, $A(-5,-6)$, $W(3,-4)$,

Students will draw and label each point and its reflection as directed. (Allow about 15 minutes).

Upon completion have a classroom discussion about each question on Activity 1 Sheet.

Pass out Activity 2 Sheet and let each student begin working alone. As they finish, place them in groups to compare answers and correct any mistakes.

Call on different groups to answer questions 7 – 10.

Give each group the opportunity to share at least one thing from their list in question 11.

For homework

1. Have students to review each letter of the alphabet. Ask them which ones have lines of symmetry when written upper case manuscript. Give “A” for sample.
2. Find and describe at least two things at their home which has a line of symmetry or possibly more than one line of symmetry. Description may include a sketch of the object.

If the warm-up exercise was not answered, answer it now.

3 Materials and Resources

Textbook: Geometry An Integrated Approach, D.C. Heath, copyright 1995.

Overhead projector and coordinate plane transparency, graph paper, rulers, pictures showing symmetry (duck, castle, lake, butterfly, rocket and decorative strip),

Microsoft Word Clipart

4 Assessment

*student response-note how certain students will answer probing questions orally

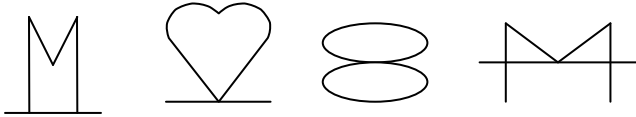
*observation-walk around the room and read students responses on the activity sheets

*peer help & self assessment-students in groups will help each other and find their own mistakes

*homework-students will have the opportunity to draw and describe their homework on the board tomorrow

Warm-Up

Have this activity on the board when students enter the classroom.

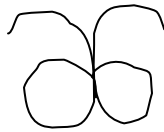
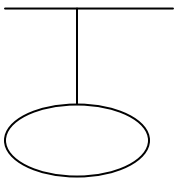


What's next?
Draw the next two designs
In the pattern

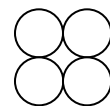
If the warm-up is answered at the beginning of the class, explain to students that each figure represents a reflection and that's what we will study today.

If the warm-up is answered at the end of class, ask students to apply what they learned today to figure out the pattern. Go over the answer.

Answer: Take a piece of paper or your finger and cover half of each design vertically. You should see the numbers 1, 2, 3, 4. The next two designs would represent 5 & 6 and so forth.



Five	six	seven
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Source: Unknown

eight

Name _____ Date _____

Activity 1

Use your ruler to draw the x and y axis on your paper. Draw and label each point listed on the board along with its reflection about the x -axis and then about the y -axis. Answer each question below.

1. As you label each point and its reflection, what do you notice about the coordinates when they are:
 - a. reflected about the x -axis?

 - b. reflected about the y -axis?

2. Can you draw a reflection of the point $(0,0)$?

3. Label any point on the x -axis. Can you reflect this point about the x -axis?

Can you reflect this point about the y -axis?
If so, draw and label its reflection.

4. Label any point on the y -axis. Can you reflect this point about the y -axis?

Can you reflect this point about the x -axis?
If so, draw and label its reflection.

5. What would be the coordinates of the point (x, y) when reflected about the x -axis?

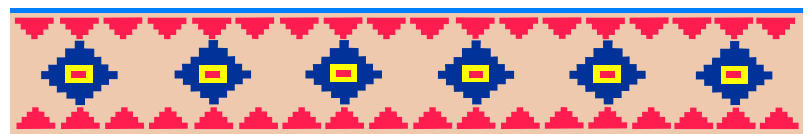
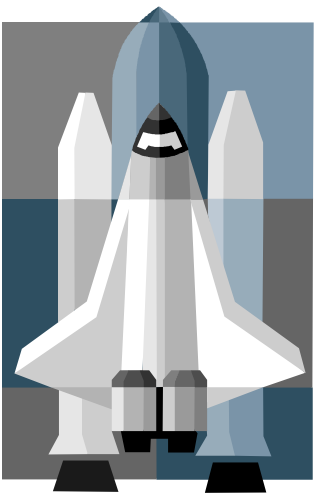
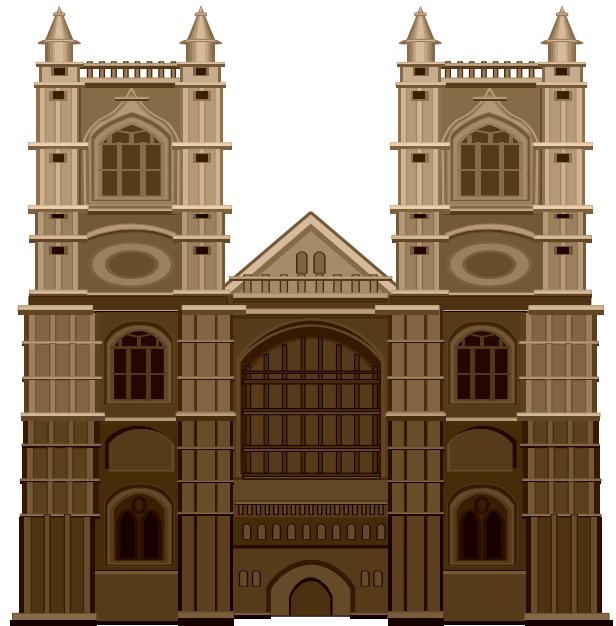
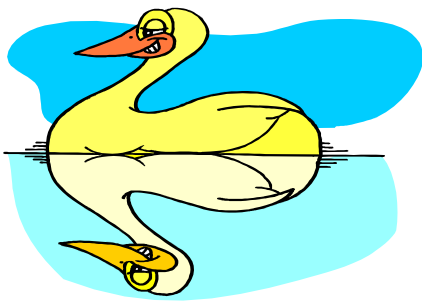
when reflected about the y -axis?

Name _____ Date _____

Activity 2

On the second sheet of graph paper

1. Draw a line segment with endpoints $(6,12)$, $(2,6)$. Reflect this segment about the y-axis.
2. Draw a quadrilateral with vertices $(-4,2)$, $(-7,2)$, $(-8,3)$, $(-7,5)$. Reflect this about the y-axis.
3. Draw point $(6,3)$. Reflect this about the y-axis.
4. Draw a line segment with endpoints $(-2,0)$, $(0,2)$. Reflect this about the origin.
5. Draw a line segment with endpoints $(-2,0)$, $(0,-2)$. Reflect this about the origin.
6. Draw a quadrilateral with vertices $(-5,0)$, $(-8,0)$, $(-5,-7)$, $(-3,-9)$. Reflect this about the y-axis.
7. a. Use your ruler to measure the line segment and its reflection in exercise 1.
b. What do you notice about their lengths?
8. Look at the quadrilateral and its reflection from exercise 2. What do you notice about the way the reflection is oriented? Compare it to the orientation of the original image.
9. Look at each of the four angles in the quadrilateral from exercises 6. Compare each angle with its reflected angle. What do you notice?
10. Do you see a picture on your paper?
11. List at least three important things you know about reflections.



Answers for Activities

Activity Sheet 1

1. a. x stays the same but y becomes the opposite of the original y
b. y stays the same but x becomes the opposite of the original x
2. no
3. no
4. no, yes, various answers
5. $(x, -y)$, $(-x, y)$

Activity sheet 2

1 – 6 students draw and reflect

7. a. about 3.5 cm or 1.5 in.
b. they are the same
8. it is flipped vertically
9. they are the same
10. yes, a face
11. answers may include
 - * the lengths do not change
 - * the angle measures do not change
 - * the shape does not change
 - * the shape is flipped vertically when reflected about the y-axis
 - * the shape is flipped horizontally when reflected about the x-axis
 - * x coordinates change when reflected about the y-axis
 - * y coordinates change when reflected about the x-axis