Grade 4 Mathematics
Geometry: Lesson 4

Read aloud to the students the material that is printed in **boldface type** inside the boxes. Information in regular type inside the boxes and all information outside the boxes should **not** be read to students. Possible student responses are included in parentheses after the questions.

NOTE: The directions read to students may depend on the available materials. Read only those parts of the lesson that apply to the materials you are using.

Any directions that ask you to do something, such as to turn to a page or to hand out materials to students will have an arrow symbol (⇨) by them.

Purpose of Lesson 4:

- In this lesson, the tutor and the students will
  - ✓ understand the concept of symmetry,
  - ✓ determine whether a figure has symmetry,
  - ✓ draw figures with symmetry,
  - ✓ understand the concepts of similarity and congruence, and
  - ✓ determine whether two figures are similar or congruent.

Equipment/Materials Needed:

- Copies of Student Sheets 54 – 57
- 2 pieces of paper per student
- Paper and pencils
- 1 pair of scissors for each student

Preparations before beginning Lesson 4:

- Run off a copy of Student Sheet 54. Cut out the picture and letters.
- Run off 1 copy of Student Sheet 55 and 57 for each student. Cut sheet 57 in half.
- Run off 1 copy of Student Sheet 56.
- Have paper and pencils and scissors available.

Lesson 4: Geometry

⇨ Use the cut out pictures from Student Sheet 54. Fold the computer in half, making the two sides match.

Say:

I just folded this picture in half. The two parts match exactly. This picture has "symmetry." When a picture or figure has symmetry, it can be folded in half so that the two parts match exactly. Where you fold the shape, or the fold line, is called the *line of symmetry*. Do you think the bus has a line of symmetry? Where should I fold the bus to see whether it has symmetry? (between the 2 windows)

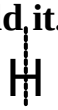
⇨ Give Student Sheet 55 to the students. Pick up your cutout letter "A."

Say:

Can we fold this letter in any way that will give us two parts that match exactly? If you think it can be done, on your sheet draw a line through the "A" where you think you would fold it.) Allow a student to fold the A. **Did anyone do it a different way?** (There is only one way.) **This figure has one line of symmetry.**

⇨ Next, pick up the letter "H."

Say:

Can we fold the letter "H" in any way that will give us two parts that match exactly? If you think so, draw a line through the H on your paper where you think we could fold it. (Response: Some will do and some will do  Both are correct.) Allow a student to fold your letter H. **Did anyone fold it in a different way?** Allow a second student to fold the H. **Did anyone do it a third way?** (There is no other way to fold it.) **This figure has two lines of symmetry.**

⇨ Next show the letter "P."

Say:

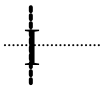
Can we fold the letter "P" in any way that will give us two parts that match exactly? If you think so, draw a line through the "P" on your paper where you think we could fold it. (Pause—allow them to try, but there is no way to do it.) **This letter has no line of symmetry.**

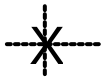
Say:

Look at the letters in problems 1 – 9 of the sheet. Draw the lines of symmetry. Some have 1 line, some have more than one line, and some have no lines of symmetry at all. Encourage discussion.

Answers:

1) 1 line

2) 2lines 

3) 2 lines 

4) No line

5) No line

6) 1 line

7) 1 line

8) L, no line. They may have to cut this one out and try folding.

9) 1 line

⇨ Have the students put that sheet away.

Say:

If someone says to you that you look similar to someone else, what do they mean? (Look alike, almost the same) **In geometry, "similar figures" look alike. They have the same shape, but they may not be the same size. Have you ever used a copy machine? Some machines will enlarge or reduce a picture. Here is an example.**

⇨ Show the top of Student Sheet 56.

Ask:

What do you notice? (The pictures are the same shape, but not the same size. The pictures look alike; but some are larger and some are smaller.) **Did it matter that some of the shapes were turned sideways or upside down?** (No.) **Do they still have the same shape? (**Yes.) **Remember in our last lesson, we turned and flipped figures; but turning and flipping them did not change them. Similar figures can be turned or flipped, but they are still similar.**

⇨ Give the students the top part of Student Sheet 57, problems 1 – 4.
Answers: 1. D 2. No 3. Yes 4. No

Say:

Sometimes figures are the same size and are also the same shape. These figures are "congruent" to one another. Congruent figures can be turned or flipped, but they are still congruent.

⇨ Place the cut out "M's" (from Student Sheet 54) in front of you.

Say:

If I place the other "M" on top of this "M," the letter will match exactly. They are the same size and shape, so they are congruent to one another. When you make a copy of a picture on a copy machine, you are making a congruent picture.

⇨ Show the bottom half of Sheet 56.

Say:

These figures are all congruent. What do you notice about them. They are all the same size and shape. Some have been turned, but they are still

⇨ Give the bottom part of Student Sheet 57, problems 5-10. Answers:

5) B 6) C 7) no 8) no 9) yes

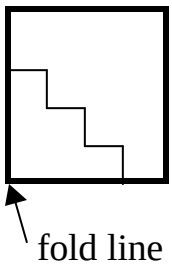
10) Yes, in #8, the figures are similar.

Extension:

⇨ Give the students 2 sheets of paper.

Say:

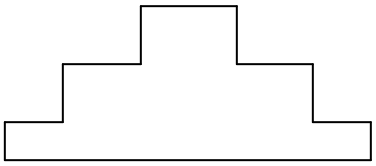
Sometimes we can tell the whole figure if we are given just half of it and if we are told that the figure is symmetric. Fold 1 sheet of paper in half. It does not matter which way you fold it. Draw a figure like the one I am drawing now next to the fold line. (Hold up your sample.)



⇨ Draw the figure to demonstrate.

Say:

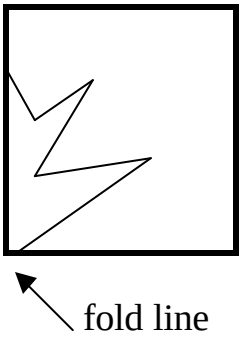
If we cut out the figure and opened it up, what do you think it would look like? Pause. Give them time to draw; then have them cut out the figure and open it up. They should **not** cut on the fold line.



Say:

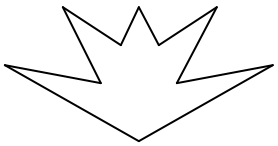
Fold the second sheet of paper in half. Draw this figure.

⇨ Draw a figure like the one below on the material that you have available.



Say:

If we cut out the figure and opened it up, what do you think it would look like? Draw your picture. Once you have drawn the picture, cut out the figure and open it up.

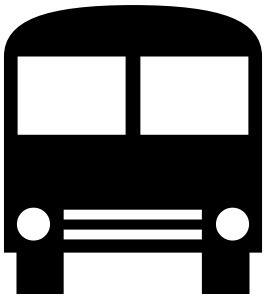


Say:

Symmetry is a part of our everyday lives. When you sew from a pattern, you often lay the pattern piece on a fold line and cut the pattern out. Both sides will match exactly.

Have one student summarize today's lesson.

Student Sheet 54 (Geometry: Lesson 4)



AMPH

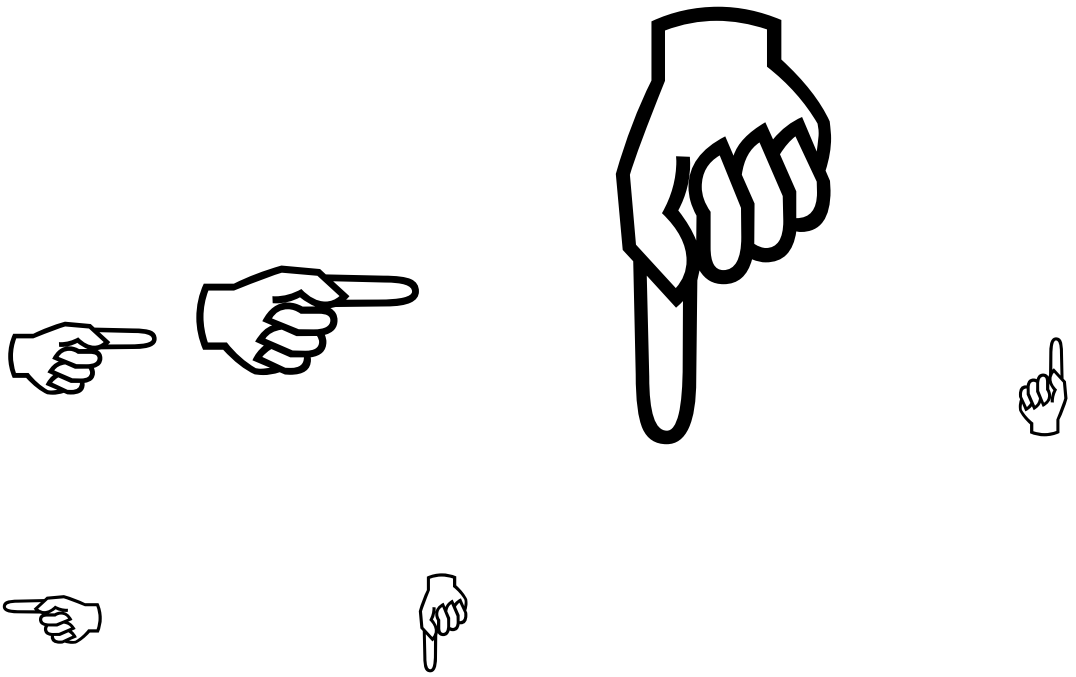
AMPH

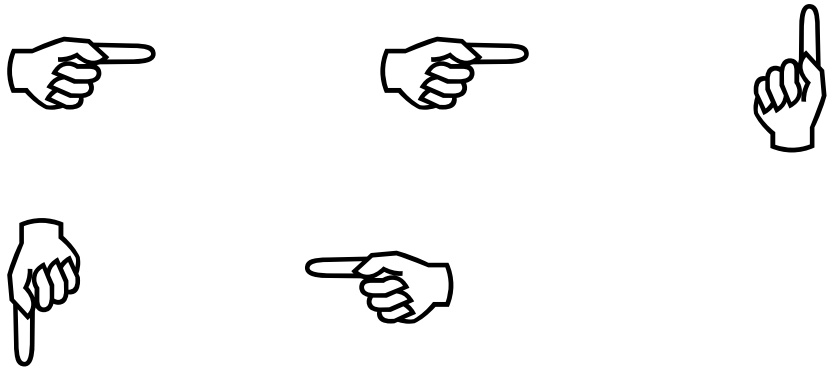
Student Sheet 55 (Geometry: Lesson 4)

A H P M

1. W
2. I
3. X
4. F
5. S
6. V
7. D
8. L
9. B

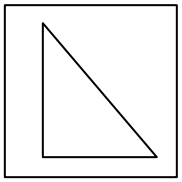
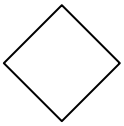
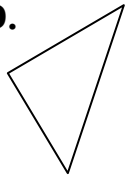
Student Sheet 56 (Geometry: Lesson 4)



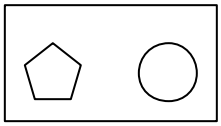


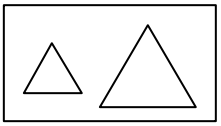
Student Sheet 57 (Geometry: Lesson 4)

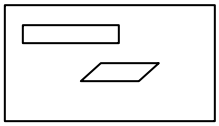
Look at the figure in the box. Which figure in the row is similar to the figure in the box?

1.  **A.**  **B.** **C.** **D.** 

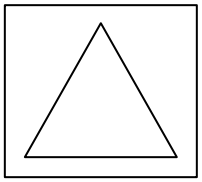
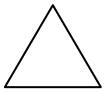
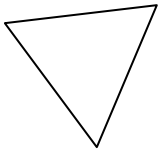
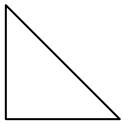
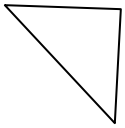
In each pair of figures below, are the figures similar. Circle yes or no.

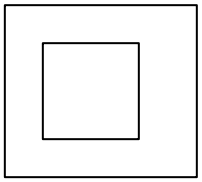
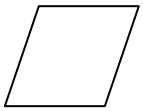
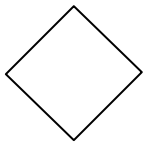
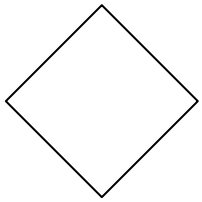
2. YES / NO 

3. YES / NO 

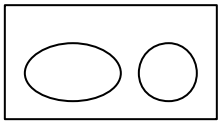
4. YES / NO 

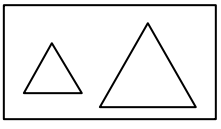
Look at the figure in the box. Which figure in the row is congruent to the figure in the box?

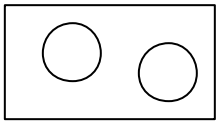
5.  **A.**  **B.**  **C.**  **D.** 

6.  **A.** **B.**  **C.**  **D.** 

Do the figures in each box appear to be congruent? Circle yes or no.

7. YES / NO 

8. YES / NO 

9. YES / No 

10. If you wrote *no* on any of the pairs of figures in 7 – 9, are any of the figures similar? Explain your answer.