

Lesson Plan for Modeling Part-Whole Relationships of Plan Figures & Using Positional Vocabulary

Corresponding State Standards:

0101.1.10 Identify positional words (e.g., inside, outside, beside, between).
0106.4.3 Model part-whole relationships and properties of plane and solid figures by combining two or more shapes to make a larger shape or by breaking apart an object into its smaller shapes.

Summary:

This puzzle activity will help students identify and create simple geometric shapes. It will also improve "positional words" such as left, right, top and bottom.

Main Curriculum Tie:

1st Grade - Mathematics

Standard 3 Objective 1

Identify, describe, and create simple geometric figures.

Materials:

- *Attribute shapes*
- Work mat
- Private office
- Magnetic attribute shapes (for demo)
- Poster board and magnets (for demo)
- *Word Wall Words*

Six Piece Puzzles

- *Six piece puzzle sets*
- Markers
- *The Little Engine That Could*

Additional Resources

Books

- *The little engine that could*, retold by Watty Piper; ISBN 0-7607-0374-4
- *Shapes, shapes, shapes*, by Tana Hoban, ISBN 0-688-14740-2
- *Circus shapes*, by Stuart Murphy, ISBN 0-06-446713-9
- *The greedy triangle*, by Marilyn Burns, ISBN 0-590-48992-5

Attachments

- [attribute_shapes.pdf](#)
- [word_wall.pdf](#)
- [puzzle_sets.pdf](#)

Background For Teachers:

It's important for the children to understand what the positional words mean. Review the words: left, right, top, bottom, middle, between, before, after, above, below, corner. Put these on a word wall and have the

students act them out if necessary. Also, review the words for the four shapes and attributes: triangle, circle, square, rectangle, large, small, red, yellow, blue. Make sure you know the difference between on top of and above before you start the game.

During the puzzle activity, it is important for the teacher to know the solution to each puzzle, so that he/she can use the positional words to help students.

This is a good activity for the first of the school year.

Intended Learning Outcomes:

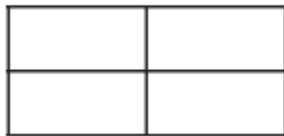
5. Understand and use basic concepts and skills.

Instructional Procedures:

Invitation to Learn

“Everyone stand up, please. Put your right hand on your left shoulder. Put your left hand on your right shoulder. Put your right hand in the middle of your stomach. Put your left hand high above your head. Put your right pointer finger between your eyes. Put your left thumb on top of your nose. Put your right hand on the bottom of your shirt.” Show the math word wall with positional words. The teacher and a student will model a game on the board called *The Communication Game*. The teacher will be the communicator and a student will be the builder, (who can't talk). As the communicator places a magnetic shape on the magnetic mat he/she needs to describe the shape and the position that the shape is placed on the mat. The builder then places that same shape on his/her mat. A poster board is folded between the communicator and builder, so that neither one can see each other's mats. Play continues until each mat has eight pieces on it. They step back to compare and see if the shapes have been placed in a similar fashion. Then they clear the mats and trade roles. The students would then get to play the game with 24 cutout shapes (triangle, square, circle, rectangle) in three colors (red, yellow, blue) and two sizes (large, small). Walk around and discuss why a shape may have been misplaced on the builder's mat. (Each person has a poster board private office, taped in three sections.)

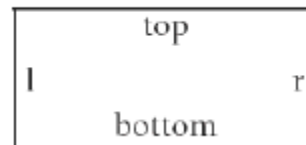
poster board in fourths



private office



mat



Six Piece Puzzles

1. Read *The Little Engine That Could* to the class. Discuss how the Little Blue Engine did something challenging, but he didn't give up. “We are going to do some challenging puzzles, but everyone will be successful. Be positive with yourself and say, I think I can, instead of, it's too hard.”
2. Show the six large base shapes: triangle, square, rectangle, arrow, parallelogram, and trapezoid. Each one can be made using the same six puzzle pieces. Students need to fit the puzzle pieces into the large base shapes with no gaps or pieces that poke out of the edge. When a puzzle is solved, students can raise their hand and the teacher will come and check it. Then the student may put the puzzle pieces and base shape into its bag and put it in the tote tray labeled with the base shape. The student then writes his/her name on the board under the base shape to create a graph. The student then gets to choose another puzzle to solve.
3. The teacher will walk around and monitor the students as they solve puzzles. The teacher can check off the puzzle on a class list to see who has been successful and who has not solved a puzzle. After 10 or 15 minutes, the teacher can give hints to some students, who have not yet solved a puzzle. The hints should include positional words. (e.g. “Slide that triangle to the left bottom corner. Leave that square right in the middle. Try again with the other pieces.”)
4. Usually in 45 minutes, everyone in the class has been able to solve three to six puzzles. After they carefully put the puzzles away, we look at the graph on the board. “The puzzle with the fewest names under it is probably the hardest. Which is the easiest? How many more solved the square than the triangle?”

Graph-6 piecePuzzle Pros



Attachments

- [poster.gif](#)
- [pros.gif](#)

Extensions:

Curriculum Extensions/Adaptations/ Integration

- Brainstorm about why we need to learn about puzzles and spatial relationships. What are some everyday activities in which we use our spatial sense?
- Use the same attribute shapes for the Communication Game, but use the other side of the mat that is labeled with the compass directions-N, E, S, W, so that the students can practice using the directional words to play the game.
- Use two identical sets of three-dimensional objects for the Communication Game: blocks, lids, etc.
- Pair up students with communication disorders with those students who are patient and who express themselves well.

Family Connections

- Send home two sets of paper attribute shapes to play the Communication Game at home.
- Send home a cardstock blackline of the square with the six puzzle pieces to cut out. Ask the students to show their parents how to solve some of the puzzles for homework.
- Send home a seven-piece tangram puzzle to compare and contrast the six-piece puzzle.

Assessment Plan:

- Pre-assess the students' knowledge of the words on The Word Wall by having them act the words out. They can stand *between* two others. Hold up your *left* hand *above* your head. They can also check to see if all of their shapes are in a set by holding up the large yellow circle and then the small yellow circle, etc.
- The teacher can watch and listen to the students do the *Communication Game* and ask specific questions about misplaced shapes to see if they understand the positional words.
- The teacher can keep track of each puzzle solved, by using a class list on a clipboard as the students raise their hands to signal a solved puzzle.

Bibliography:

Research Basis

Burger, W.F., Shaughnessy, J.M. (1986). Characterizing the van Heile levels of development in geometry. *Journal for Research in Mathematics Education*, Volume 17 (Issue 1), Page 31-48.

Pierre van Heile states that sometimes students fail to reach the descriptive level of geometry in part because they are not offered geometric problems in their early years.

Swindal, Donna Norton. (2000). Learning geometry and a new language. *Teaching Children Mathematics*, Volume 7 (Issue 4), Pages 246-250.

This article states that students need time and opportunity to develop spatial sense and investigate shapes in a setting that encourages inquiry and immerses students in the experience, language, and conceptual understanding of geometry.

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This lesson plan was taken from the site: www.uen.org/Lessonplan/preview?Pid=16245

I was unable to include the attachments. You can go to the website and download them, or you can make your own. The first attachment for attributes/shapes includes 2 of each of the following: small triangles, rectangles, circles, & squares; then 2 large triangles, rectangles, circles, & squares. The second attachment for word wall words includes the following words: corner, top, above, before, between, after, closer, middle, below, left, bottom, right, and farther. The third attachment for puzzle sets shows the following large base shapes: triangle, rectangle, trapezoid, parallelogram, and arrow. It also includes a shape answer key that shows how to divide each shape. The poster attachment shows the poster board divided into fourths, the private office divided into thirds, and the mat labeled top and bottom (which is already illustrated on the second page of the lesson plan). The attachment pros just shows the graph 6 puzzle piece pros that is included on page three of this lesson plan.