Math 6 - Act. 09: The Shape Shifter

Summary

Students will discuss new mathematical concepts, terms, and relationships connected to exploring and folding circles.

Materials

Scissors
Handouts (for teacher)
Pencil
Pictures of circular objects
Diagrams of geometric concepts created from folding

Additional Resource

:

- *The Amazing Circle*
  (AIMS Education Foundation)

Background for Teachers

This activity provides students with the opportunity to explore a surprising number of geometric concepts through folding and unfolding a circular piece of paper. Each student will need a circle in order to participate fully in the activity as the teacher guides the students through a variety of folds. The activity is presented as a set of instructions for making the folds and is accompanied by a set of questions that the teacher directs the students to explore along with each fold. The activity is presented here in a direct-instruction format but can easily be adapted for small group or individualized learning. Asking meaningful questions is a key strategy in this particular activity. This activity can be used in a variety of ways within a geometry unit. It is presented here as an opening activity to a geometry unit. Used in this way, it invites students to engage in geometric thinking and helps the teacher to determine what students might already know about geometry. Alternatively, this activity could serve as a fun way to review concepts studied in a geometry unit. It is important to keep in mind that students must be given adequate time to explore and make connections between models, concepts, and the related terminology.

Intended Learning Outcomes

3. Reason mathematically.
4. Communicate mathematically.

Instructional Procedures

Invitation to Learn

:

Prepare a set of pictures of objects that are circular or bring in actual objects (such as coins, clock, Frisbee, etc.). Present them one at a time and ask students to find an attribute that the objects have in common.

Instructional Procedures:

Students should easily identify the circle shape as being the common attribute among the displayed objects. Let the students know that they will be working with circles to explore a lot of geometry.
Distribute paper circles and scissors to all students.
Have students cut out their circle so that the dark line is saved.

Guide students through an exploration of geometric concepts by modeling a sequence of folds, posing questions, encouraging participants to make and test conjectures, and relating the concepts to the real world (see suggested folds and questions handout to guide this exploration).
After the folding, questioning, conjecturing, and reasoning has been completed, have students get with a partner or small group of 3-4 to recall and write down as many of the geometry concepts as they can recall that were generated through the folding activity. Give only about 90 seconds for this task.
Have small groups read off and share how many terms they found.
Point out that geometry is an area of mathematics that has quite a few terms and symbols. They will be learning more about many of these terms.
Closing: Pull out sketches/diagrams of a variety of geometric concepts that students explored through the paper folding. Upon seeing the picture, see if the students can identify the concept.

Curriculum Integration
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Math / Real World / Art -- Have students go on a "shape hunt" to identify and find examples of geometric shapes in the real world. Students could make a three-column table in which they write the name of the geometric concept in the first column, put a sketch of the real world object in the second column, and write the name of the object in the third column.
Students could observe geometry in art through looking at art prints that are available in many schools.
Students could begin creating their own geometry glossary that includes names of concepts, diagrams/examples of concepts, and symbols related to concepts.

Strategies for Diverse Learners

Adaptations
:
Although this activity is presented as one complete activity, the teacher may decide to take only a few steps at a time in order to thoroughly discuss the new mathematical concepts, terms, and relationships connected to each fold. In presenting the activity this way, the teacher may want to prepare a handout with circles on it so that students could sketch the concepts they folded.
Another variation the teacher might want to consider is to still present all of the folds in their entirety with only initial questions the first time around in order to show the broad scope of geometry concepts. The teacher then could follow with more specific questions related to each fold at later times.
Most students should be able to handle the folding. One modification a teacher might make, though, is to have each student check with a partner after each fold is made to make sure they agree with each other.

Extensions

Have the students explore with their circles on their own to see what new shapes they can find.

Homework & Family Connections

Have students take the shape hunt activity home and invite their family members to participate in the search.

Assessment Plan

Observation and listening as students explore and provide reasons to support their conjectures. Identification of terms at the closure could be done as a paper-and-pencil check. The shape hunt could also serve as a written assessment. A geometry journal could serve as an ongoing place to

record responses to teacher prompts, questions, or student inquiries related to geometry.

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