POLYGONS & ANGLES
WORKSHOP 5: DISCOVERY

Agenda for Two-Hour Workshop

20 minutes ***Workshop Facilitator/Site Leader***
Introduction

Hand out the materials for Workshop 5. Discuss the following questions:
- Why is the study of Polygons & Angles important in the middle school curriculum?
- How can the study of geometry and algebra be integrated?
- What types of manipulatives would be helpful to increase student understanding of Polygons & Angles?

60 minutes ***Whole Group***
View Workshop 5: Polygons & Angles — Discovery

While watching the program, consider the following focus questions:
- How many angles can be found by folding paper?
- How does folding paper help to increase a student's understanding of angles and angle measures?
- Is it possible to draw an angle greater than 180˚ using paper folding? If so, how?
- What kind of written work should students show to support their angle drawings?
- What size angles can be produced by using the hinged mirrors?
- How does using hinged mirrors help to increase a student's understanding of angles and angle measures?
- Samuel, one of the Learner Teachers, comments that using the hinged mirrors will reinforce for students that a complete rotation is 360˚. Is that true? If so, how?
- How many triangles and quadrilaterals should students experiment with before they are able to summarize their findings about the sum of the angles?
- Are there other ways for students to physically see that the sum of the interior angles of a triangle is 180˚?

30 minutes ***Small Groups or with a Partner***
Read, Do and Discuss

Read Lesson 4: Finding the Number of Degrees in Any Polygon.
Do Lesson 4.
Discuss your findings using the following focus questions:
- What is the relationship between the number of sides of a polygon and the sum of the interior angles?
- How many different ways can this relationship be stated?
- How can this relationship be stated in a sentence? In an equation? In a table?
- Is the relationship linear?
- What would the graph of this relationship look like?

BEFORE WATCHING THIS PROGRAM ...

- Make sure to have copies available of Lesson 4: Finding the Number of Degrees in Any Polygon (page 90).
- Have materials for Lesson 4:
  - Pattern blocks (optional).
- Have materials for Lesson 1 for teachers to take home:
  - Plain paper.
- Have materials for Lesson 3 for teachers to take home:
  - Paper shapes
  - Scissors
  - Tape or glue sticks
  - Large paper.

- How were students thinking about the number of degrees in a polygon, if they found the equation $d = 180s – 360$ where d = degrees and s = number of sides?
- One of the students tried to find the number of degrees in a pentagon by tearing angles and placing vertices together. Does this method work for any polygon?
- How can basic computational skills be incorporated into these lessons?
- What are the key math concepts that students should understand with these lessons?

10 minutes ***Workshop Facilitator/Site Leader***

Homework Assignment

- Read and do Lesson 1: Folding Paper Angles.
- Read Lesson 2: Angles and Hinged Mirrors.
- Read and do Lesson 3: Finding the Sum of the Angles in Triangles and Quadrilaterals.
- Review Lesson 4.
- Look at the sample student work for Lesson 4: Finding the Number of Degrees in Any Polygon.

POLYGONS & ANGLES
WORKSHOP 5: DISCOVERY

Agenda for Four-Hour Workshop

20 minutes ***Workshop Facilitator/Site Leader***
Introduction

Hand out the materials for Workshop 5. Discuss the following questions:
- Why is the study of Polygons & Angles important in the middle school curriculum?
- How can the study of geometry and algebra be integrated?
- What types of manipulatives would be helpful to increase student understanding of Polygons & Angles?

15 minutes ***Whole Group***
View Lesson 1: Folding Paper Angles

While watching the program, consider the following focus questions:
- How many angles can be found by folding paper?
- How does folding paper help to increase a student's understanding of angles and angle measures?
- Is it possible to draw an angle greater than 180˚ using paper folding? If so, how?
- What kind of written work should students show to support their angle drawings?
- How can basic computational skills be incorporated into this lesson?

20 minutes ***Small Groups or with a Partner***
Read, Do and Discuss

Read Lesson 1: Folding Paper Angles.
Do Lesson 1.
Discuss findings, focusing on the above questions.

20 minutes ***Whole Group***
Discuss

Discuss findings, focusing on the above questions and the number and types of solutions that teachers found. Keep track of the different angles found and the paper-folding methods used to produce the angles.

15 minutes ***Whole Group***
View Lesson 2: Angles and Hinged Mirrors

While watching the program, consider the following focus questions:
- What size angles can be produced by using the hinged mirrors?
- How does using hinged mirrors help to increase a student's understanding of angles and angle measures?
- Samuel, one of the Learner Teachers, comments that using the hinged mirrors will reinforce for students that a complete rotation is 360˚. Is that true? If so, how?
- What are the key math concepts that students should understand with this lesson?

BEFORE WATCHING THIS PROGRAM ...

- Make sure to have copies available of all the lessons in this workshop.
- Have materials for Lesson 1:
  - Plain paper.
- Have materials for Lesson 2:
  - Hinged mirrors (1 per participant)
  - Colored paper (optional)
  - Calculators
  - Pattern blocks
  - Straight edge or ruler
  - White paper.
- Have materials for Lesson 3:
  - Paper shapes
  - Scissors
  - Tape or glue sticks
  - Large paper.
- Have materials for Lesson 4:
  - Pattern blocks (optional).

20 minutes ***Small Groups or with a Partner***
Read, Do and Discuss

Read Lesson 2: Angles and Hinged Mirrors.
Do Lesson 2.
Discuss findings, focusing on the above questions.

20 minutes ***Whole Group***
Discuss

Discuss findings, focusing on the above questions and the number and types of solutions that teachers found. Keep track of the different angles found. Discuss what work you would like students to show as evidence of their learning.

15 minutes ***Whole Group***
View Lesson 3: Finding the Sum of the Angles in Triangles and Quadrilaterals

While watching the program, consider the following focus questions:
- How many triangles and quadrilaterals should students do before they are able to summarize their findings?
- Are there other ways for students to physically see that the sum of the interior angles of a triangle is 180˚?
- Can this method of tearing vertices be used to determine the sum of the interior angles of other polygons?

20 minutes ***Small Groups or with a Partner***
Read, Do and Discuss

Read Lesson 3: Finding the Sum of the Angles in Triangles and Quadrilaterals.
Do Lesson 3.
Discuss findings, focusing on the above questions.

15 minutes ***Whole Group***
Discuss

Discuss findings, focusing on the above questions.

15 minutes ***Whole Group***
View Lesson 4: Finding the Number of Degrees in Any Polygon

While watching the program, consider the following focus questions:
- What is the relationship between the number of sides of a polygon and the sum of the interior angles?
- How many different ways can this relationship be stated?
- How can this relationship be stated in a sentence? In an equation? In a table?
- Is the relationship linear?
- What would the graph of this relationship look like?
- How were students thinking about the number of degrees in a polygon, if they found the equation $d = 180s - 360$ where d = degrees and s = number of sides?
- One of the students tried to find the number of degrees in a pentagon by tearing angles and placing vertices together. Does this method work for any polygon?

20 minutes ***Small Groups or with a Partner***
Read, Do and Discuss

Read Lesson 4: Finding the Number of Degrees in Any Polygon.
Do Lesson 4.
Discuss findings, focusing on the above questions.

15 minutes ***Whole Group***
Discuss

Discuss findings, focusing on the above questions. Make sure ample time is given for each group to share its findings.

10 minutes ***Workshop Facilitator/Site Leader***
Homework Assignment

- Review the sample student work from Lesson 4 (page 100).
- Review the Launch-Explore-Summarize Teaching Model (page 152).
- Review the Why This Topic Matters section (page 110).
- Use your journal to reflect on the focus questions from this workshop. Describe how these lessons deepened your content knowledge about Polygons & Angles. What did you learn? What else do you need to learn?

POLYGONS & ANGLES
WORKSHOP 5: DISCOVERY

■ Lesson 1: Folding Paper Angles

A. The Big Ideas

Purpose of This Lesson

This lesson helps students construct angles of various sizes without the use of a protractor. Students also make connections between angles and their measures to more accurately estimate angle sizes.

Mathematical and Problem-Solving Goals

- Understand that the measure of an angle is the size of the opening or turn between its sides.
- Understand that a full turn is 360˚, a half-turn is 180˚ and a quarter-turn is 90˚.

Connections to NCTM Standards

- Be proficient in estimating angle measures.
- Build new mathematical knowledge through work with problems.
- Express mathematical ideas coherently and clearly to peers, teachers and others.
- Apply a wide variety of strategies to solve problems, and adapt the strategies to new situations.

B. The Lesson

Recommended Mathematical Background

- None

Materials

- Plain paper

Time

- 40 minutes

Lesson Overview

In this first lesson, students build an understanding of angles by folding paper to construct angles between 0˚ and 360˚. The focus is on developing students' estimation skills with angle measures, so there is no need for real precision. Students' estimation skills improve by comparing angles to well-known benchmarks of 90˚ and 180˚.

Launch

Begin this lesson by having students address four issues (see handout, page 83). Give individuals time to answer these in their math notebooks or on paper. Then have them share their answers with a partner before discussing as a whole class (think-pair-share).

Next, instruct students to take a sheet of paper and have them identify the measure of the angle formed by the corner (90˚). Have them trace and

TEACHING TOOLS

- As you discuss and use this lesson, make sure to take advantage of the Teacher Planning Tools (pages 151-157):
  - Planning a Math Unit: Launch-Explore-Summarize Teaching Model
  - Lesson Planner Template
  - Questions to Stimulate Student Thinking
  - Guidelines for Grouping.
- Refer to Why This Topic Matters (page 110) to help make this topic relevant to your students.
- Check out our Web site (www.learner.org/channel/workshops/missinglink) for additional tools and resources — and to join The Missing Link online discussion forum.

label this angle on another (preferably blank) sheet of paper. Then demonstrate folding this angle in half and ask the measure of the new angle. Students also should trace and record this new angle. Now ask students to find as many different angles as possible simply by folding paper. Tell them to be as creative as possible and summarize next to each angle how it was achieved.

Explore

Circle the room and be prepared to ask questions like the following: What size angles are you finding? How many new angles can you find by combining different folds? Can you make angles of 30˚? Be prepared for students just to keep folding the paper in half (180˚ to 90˚ to 45˚, etc.). Push them with questions, such as "Can you find a whole angle between 50˚ and 80˚?" Make sure students can document their findings mathematically; if they fold a 45˚ angle in half, ask them to show how they came up with 22.5˚ as the answer. Encourage them to do the computations in their heads and in writing. If an angle was found by a combination of folding and refolding, make sure students record their process.

Summarize

Have students show and explain their work. Make sure they understand the following core concepts from this lesson:

- Angles occur as rotations, wedges and sides with a common vertex.
- Angles are measured in degrees; and angle measures range from 0˚ to 360˚.

As students share, record the angles found on a class chart for future reference.

Part of the purpose of the Summarize is to allow you to assess how well your students are progressing toward the goals of the lesson. Use the discussion to help you determine whether additional teaching and/or additional exploration by students is needed before they go on to Lesson 2.

FOLDING PAPER

1) Give examples where angles occur as:
   - wedges
   - turns
   - sides with a common vertex

2) Explain what a degree is and how it is used to describe the size of an angle.

3) A "benchmark" is something that is easy to recognize. What would you use as benchmark angles? Where would you find benchmark angles?

4) Name at least two situations in which angles must be precise.

Source: *Connected Mathematics Project — Shapes and Designs*

■ Lesson 2: Angles and Hinged Mirrors

A. The Big Ideas

Purpose of This Lesson

This lesson focuses on understanding what a degree is and how it is used to describe the size of an angle. Students also relate a full-circle rotation to an angle of 360˚.

Mathematical and Problem-Solving Goals

- Investigate angles and their measures as rotations.
- Understand that the measure of an angle is the size of the opening or turn between its sides.
- Understand that a full turn is 360˚, a half-turn is 180˚ and a quarter-turn is 90˚.
- Estimate the size of any angle by comparing it to well-known benchmark angles, such as right angles (90˚) and straight angles (180˚).

Connections to NCTM Standards

- Be proficient in measuring angles in plane figures.
- Organize and consolidate mathematical thinking to communicate with others.
- Build new mathematical knowledge through work with problems.
- Express mathematical ideas coherently and clearly to peers, teachers and others.
- Apply a wide variety of strategies to solve problems and adapt the strategies to new situations.

B. The Lesson

Recommended Mathematical Background

- Knowing that the number of degrees in a complete rotation is 360˚

Materials

- Hinged mirrors (1 per student)
- Colored paper (optional)
- Calculators
- Pattern blocks
- Straight edge or ruler
- White paper

Time

- 60 minutes

Lesson Overview

This exploration continues Lesson 1, as students find as many different angle measures as possible, using a hinged mirror (two mirrors taped together along one edge).

TEACHING TOOLS

- As you discuss and use this lesson, make sure to take advantage of the Teacher Planning Tools (pages 151-157):
  - Planning a Math Unit: Launch-Explore-Summarize Teaching Model
  - Lesson Planner Template
  - Questions to Stimulate Student Thinking
  - Guidelines for Grouping.
- Refer to Why This Topic Matters (page 110) to help make this topic relevant to your students.
- Check out our Web site (www.learner.org/channel/workshops/missinglink) for additional tools and resources — and to join The Missing Link online discussion forum.

Launch

For this activity, students must know there are 360˚ in a complete rotation. Pass out a large sheet of blank paper, a ruler and a hinged mirror to each student. Have students draw a line approximately 6" long about 3" to 4" from the top of the paper. Next, students are to place a hinged mirror so that the sides cross the straight line. Ask students to report what they see in the mirrors. Depending on how far apart the mirrors are spread, students will see different polygons. Have them adjust their mirrors until they see a square. Ask: "How many sides do you see?" (4) "How many angles come together in the center of the square?" (4) "If a complete rotation around a point is 360˚, how can we find the measure of the angle formed by the mirrors?" (Divide 360˚ by 4.) Have the students trace the 90˚ angle formed by the mirrors, record how they calculated its measure and label it. Instruct them to find as many angles as possible. With each new angle, students should draw a new line on their paper so that each angle has a different vertex.

Draw a line and a dot below the line.	Place the hinged mirror so that it crosses the line and segment of the of the line and the dot is reflected in the mirror. 360˚ divided by the number of dots or sides that appear will equal the measure of the angle created by the mirror. Students then can trace the angle formed by the mirror and label it with its measure.

As students move the sides of the hinged mirrors closer together, the reflection creates a polygon with a greater number of sides. If the sides of the mirror are pulled farther apart, the polygon will have fewer sides.

Explore

Be prepared for students to be surprised when they first see the line and dot reflections in the hinged mirrors. During the Explore, students should work independently, creating angles with the hinged mirrors and recording their results. This does not mean that students need to work silently. They still should be encouraged to discuss and share their findings with a partner as they work. Have questions and extension activities ready for students who need an additional challenge, such as: "How could the hinged mirrors be used to find the measures of the angles of a pattern-block shape?" Or, "Could hinged mirrors be used to find the measure of any angle drawn on a piece of paper?" A good rule of thumb is to be prepared with three plans in mind: What questions could be asked to help students who are having difficulty? What is the plan for the majority of the students? What extension questions or activities are appropriate for students who are ready to move on?

Summarize

As students report their findings, you may want to think of a way to display or at least record the different angle measures that were created. What was the range of angle sizes? Were students able to find angles with fractional degrees? How accurate were the angles created with the mirrors? You may want to have students measure some of their angles with protractors or angle rulers and compare results.

After this investigation, students should have a better understanding of angles as turns and rotations. Make sure students understand the core concepts of this lesson:

- a complete rotation around a point is 360˚
- benchmark angles such as 90˚ and 180˚ help to make accurate estimates

To ensure they do, have students draw several angles, estimate the angle measures and then measure with a protractor or angle ruler to check the accuracy of the estimates.

Part of the purpose of the Summarize is to allow you to assess how well your students are progressing toward the goals of the lesson. Use the discussion to help you determine whether additional teaching and/or additional exploration by students is needed before they go on to Lesson 3.

■ Lesson 3: Finding the Sum of the Angles in Triangles and Quadrilaterals

A. The Big Ideas

Purpose of This Lesson

This lesson moves students from shape recognition and classification to the analysis of the properties of triangles and quadrilaterals, specifically the angles in these polygons. The overall development progresses from tactile and visual experiences to more general and abstract reasoning.

Mathematical and Problem-Solving Goals

- Discover that the interior angles of all triangles have a sum of 180˚.
- Discover that the interior angles of all quadrilaterals have a sum of 360˚.

Connections to NCTM Standards

- Precisely describe, classify and compare types of plane and solid figures (e.g., angles, triangles, quadrilaterals, cylinders, cones) according to their main features.
- Create and critique inductive and deductive arguments concerning geometric ideas and relationships.
- Be proficient in measuring angles in plane figures.
- Build new mathematical knowledge through work with problems.

B. The Lesson

Recommended Mathematical Background

- None

Materials

- Paper shapes
- Scissors
- Tape or glue sticks
- Large paper

Time

- 40 minutes

Lesson Overview

This lesson builds directly on the previous lesson. Using the hinged mirrors, students explore the equilateral triangle in a pattern-block set. As they determine that each angle is 60˚, the problem becomes: "Does the shape of the triangle affect the total number of degrees in the triangle?" and "Does the sum of the angles of a quadrilateral change with its shape?"

Launch

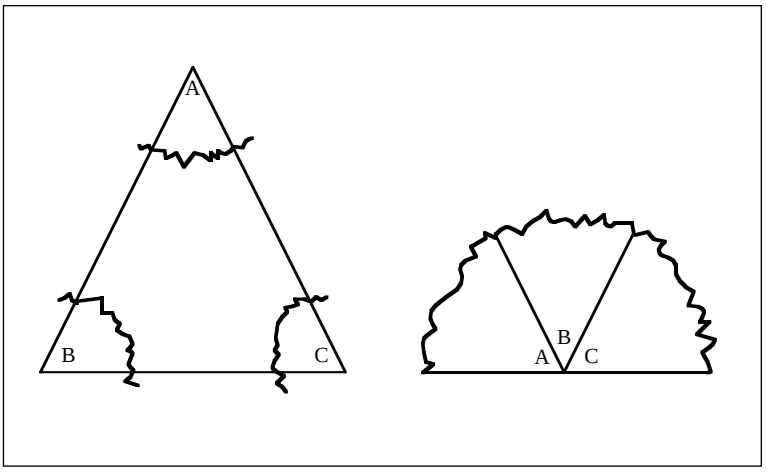
The purpose of this Launch is to have students "prove" that the sum of the interior angles of an equilateral triangle is 180˚. Have students place a green equilateral triangle from a pattern-block set in the corner of the hinged mirrors. Students should see a hexagon reflected in the mirrors. Using the same strategy from the previous lesson, students calculate one angle of the pattern block to be 60˚. Since all the angles are equal, the sum of the angles in the equilateral triangle is 180˚. Now pose the problem: Will changing the shape of the triangle affect the sum of the interior angles?

TEACHING TOOLS

- As you discuss and use this lesson, make sure to take advantage of the Teacher Planning Tools (pages 151-157):
  - Planning a Math Unit: Launch-Explore-Summarize Teaching Model
  - Lesson Planner Template
  - Questions to Stimulate Student Thinking
  - Guidelines for Grouping.
- Refer to Why This Topic Matters (page 110) to help make this topic relevant to your students.
- Check out our Web site (www.learner.org/channel/workshops/missinglink) for additional tools and resources — and to join The Missing Link online discussion forum.

Explore

For this investigation, give pairs of students several paper triangles and quadilaterals (see handouts, page 88). By tearing off the vertex (angle) and gluing the vertices together at a common point, students can explore the sum of the angles. Make sure the students tear the vertices rather than cutting them with scissors. This way, students will be able to tell which corner is the vertex of the triangle.



After trying several different triangles, students can predict the sum of the interior angles of quadilaterals and test those in the same way. Have students summarize their findings.

Summarize

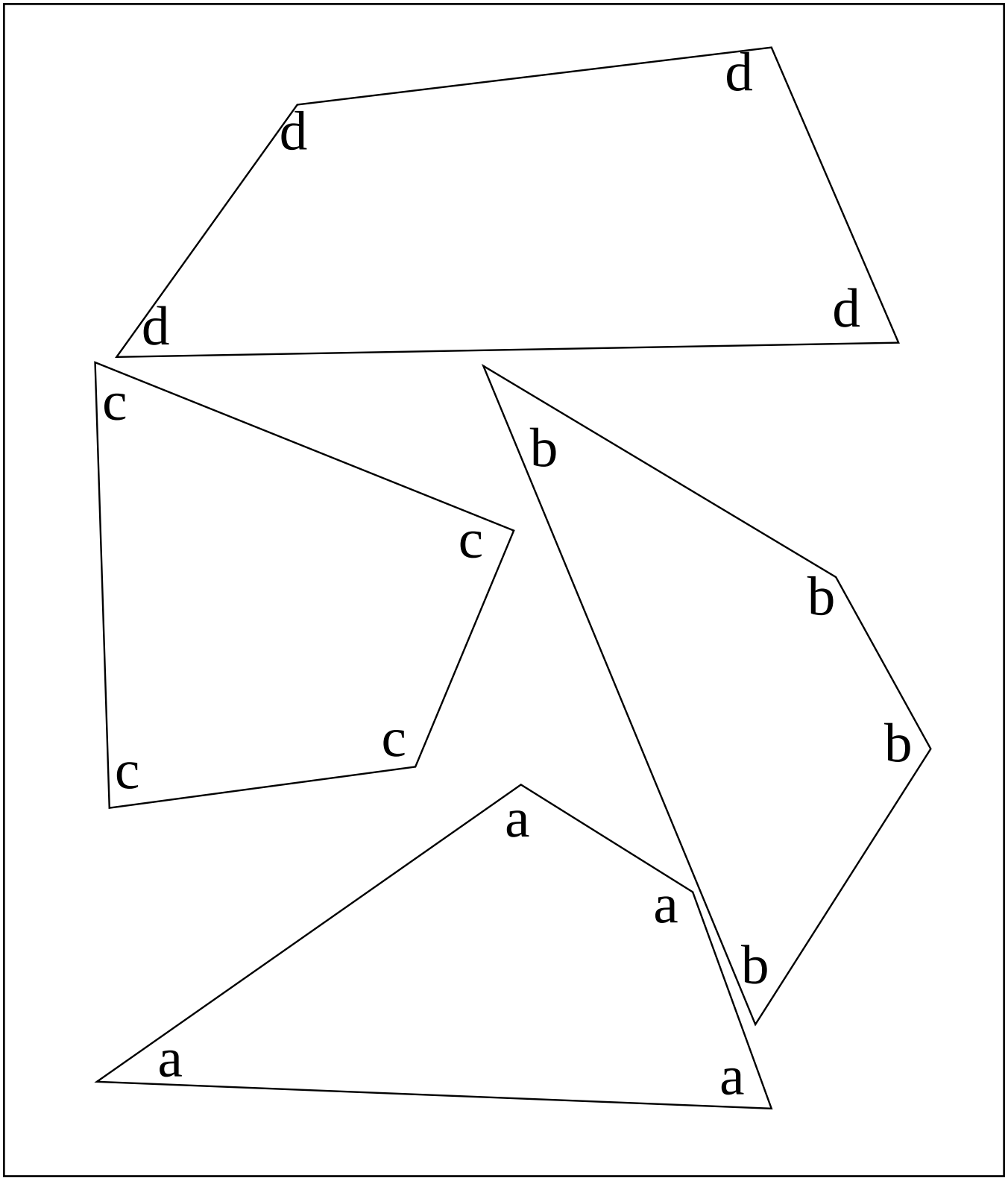
Have students present their findings. Make sure they understand the core concepts of this lesson:

- The sum of the interior angles of a triangle is always 180˚.
- The sum of the interior angles of a quadrilateral is always 360˚.

Part of the purpose of the Summarize is to allow you to assess how well your students are progressing toward the goals of the lesson. Use the discussion to help you determine whether additional teaching and/or additional exploration by students is needed before they go on to Lesson 4.

Additional Notes

- Encourage students to be precise with their mathematical language. For instance, if they say "angles form a circle," have them be more exact: "Four angles of a quadrilateral, when put together, complete a 360˚ rotation (or turn), which forms a circle." But before correcting students in front of the class for something like this, first ask their permission to improve their statements; help them feel safe to speak up even if their answer was not quite right. Mistakes are learning opportunities for all.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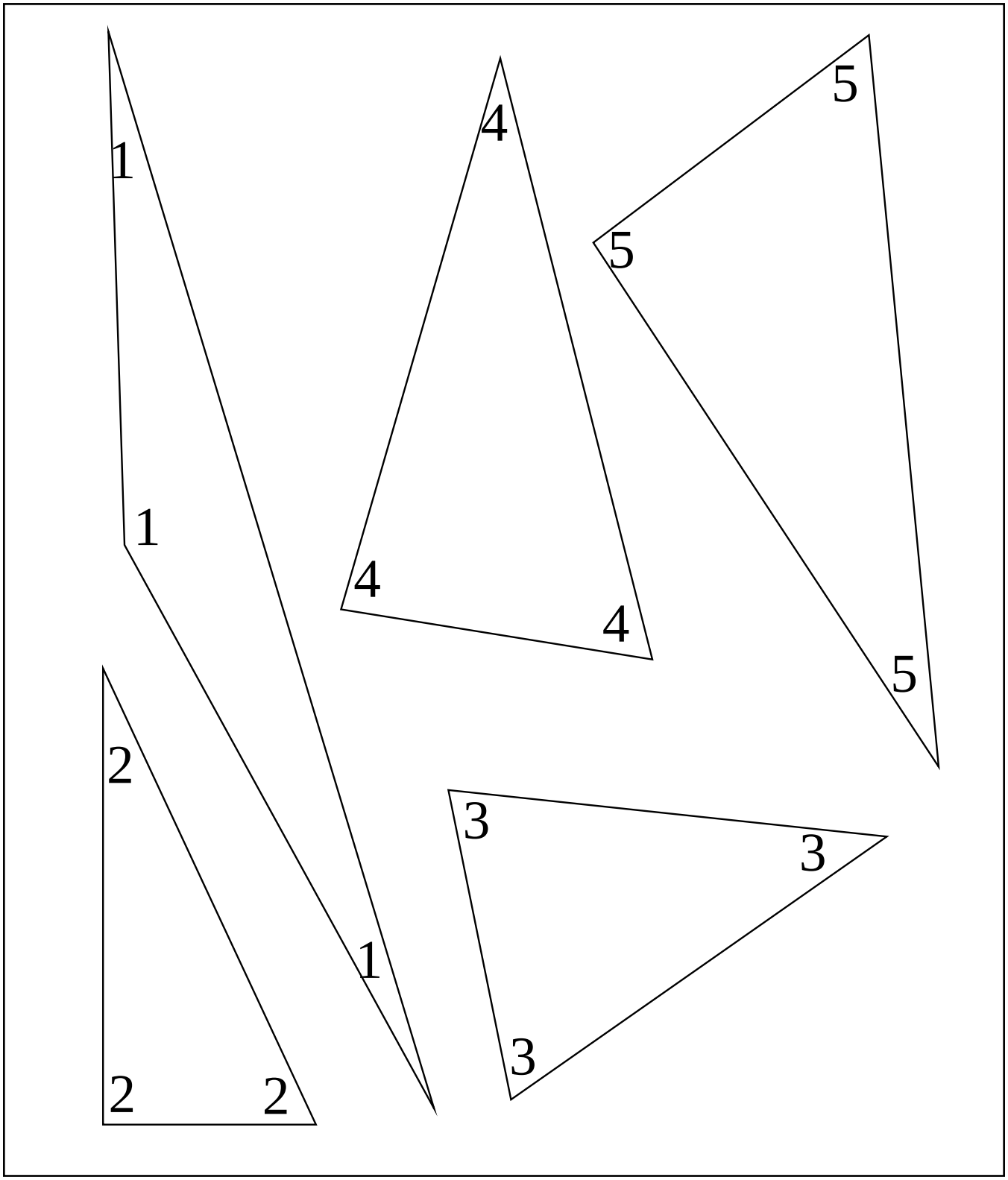
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■ Lesson 4: Finding the Number of Degrees in Any Polygon

A. The Big Ideas

Purpose of This Lesson

Building on what students know from the previous lessons about triangles and quadrilaterals, you now want them to be able to generalize a rule for figuring out the number of degrees in any multisided figure (pentagons, hexagons, etc.). This lesson pulls together all the representations (chart, table, equation).

Mathematical and Problem-Solving Goals

- Find the sum of the interior angles of any polygon.
- Use tables and patterns to generalize a rule for finding the number of degrees in a polygon.
- Discover that the interior angles of all polygons fit the following pattern: 180(n - 2) where n = the number of sides in the polygon.

Connections to NCTM Standards

- Use patterns to solve mathematical and applied problems.
- Build new mathematical knowledge through work with problems.
- Recognize reasoning and proof as essential and powerful parts of mathematics.
- Understand how mathematical ideas build on one another to produce a coherent whole.
- Represent a variety of relations and functions with tables, graphs, verbal rules and, when possible, symbolic rules.
- Use the language of mathematics as a precise means of mathematical expression.

B. The Lesson

Recommended Mathematical Background

- Organizing data in a table
- Recognizing patterns in a table

Materials

- Pattern blocks (optional)

Time

- 60 minutes

Lesson Overview

The goal of this lesson is to have students form pentagons, hexagons, heptagons and other polygons by combining triangles and quadrilaterals. They then find the sum of the interior angles of each polygon by adding the total number of degrees found in the interior angles in all of the quadrilaterals and triangles used to build the new polygon.

Displaying the discoveries in a table, students will conjecture about a rule to predict what happens to the angle sum as the number of sides increases. The rules are refined using algebraic expressions. Students also apply the

TEACHING TOOLS

- As you discuss and use this lesson, make sure to take advantage of the Teacher Planning Tools (pages 151-157):
  - Planning a Math Unit: Launch-Explore-Summarize Teaching Model
  - Lesson Planner Template
  - Questions to Stimulate Student Thinking
  - Guidelines for Grouping.
- Refer to Why This Topic Matters (page 110) to help make this topic relevant to your students.
- Check out our Web site (www.learner.org/channel/workshops/missinglink) for additional tools and resources — and to join The Missing Link online discussion forum.

rules in reverse — by knowing the measure of angles in a regular polygon, they should be able to tell how many sides it has.

Launch

The Launch of this lesson is the Summarize of Lesson 3. Students will have concluded that the sum of the interior angles of any triangle is 180˚ and any quadilateral is 360˚. Students then are asked to conjecture about pentagons, hexagons, etc.

- How many degrees are in the interior angles of each polygon?
- Is there a relationship between the number of sides and the sum of the interior angles of any polygon?
- Can that relationship be described in writing, with symbols, in a table or as a graph?
- Is there more than one way to describe the relationship?

Explore

Working in groups or pairs, students build different polygons by using manipulatives or by drawing them. The polygons are recorded on paper, and students must show how they determined the number of degrees in the total figure. Possible methods include dividing shapes into triangles and quadilaterals and adding the degrees, cutting out the polygons and placing torn vertices together to determine the total number of rotations the angles make, or drawing polygons and measuring the angles. Another way to reason about the angle sum in a polygon is to *triangulate* the polygon: Start at any vertex, and draw all the possible diagonals from that vertex. Triangulating a square gives two triangles, triangulating a pentagon gives three triangles, triangulating a hexagon gives four triangles and so on. Each time the number of sides increases by one, the number of triangles increases by one. So the total number of degrees can be found by counting the number of triangles and mulitplying by 180.

As students discover the number of degrees in different polygons, they record their findings in a table and analyze the results to state the relationship between the number of sides of a polygon and the sum of the interior angles. Encourage students to state the relationships they find in words and in symbols. For example, if students found the number of degrees by the triangulation method, they might write in words, “The number of triangles drawn is always two less than the number of sides.” In symbols, if n represents the number of sides in a polygon, then 180(n - 2) would represent the sum of the interior angles of the polygon.

Suppose students found the number of degrees in their polygons by connecting vertices to a point in the center of the polygon, finding the total degrees in all the triangles formed and then subtracting 360˚, since the angles formed in the center of the figure are not interior angles of the polygon. The rule would then be 180n - 360.

Keep in mind that the rules that students define may be equivalent expressions. There is no need at this time to force students to any one rule, and equivalent expressions do not need to be simplified.

After trying several different triangles, students can predict the sum of the interior angles of quadilaterals and test those in the same way. Have students summarize their findings in writing.

Summarize

Try to plan the Summarize of this lesson so that all the groups can be heard. Students can approach this problem in many different ways. It is important that all strategies are heard, explained and discussed. Make sure students can explain the rule they wrote with respect to the geometric figures they drew and the strategy they used to determine the total number of degrees in the polygon.

Make sure students understand the core concepts of this lesson:

- The sum of the interior angles of any polygon can be discovered through exploration.
- Recording information in a table helps clarify the relationship between sides and angles of polygons.
- The relationship between the number of sides and the sum of the interior angles is linear.
- The relationship can be stated as d = 180(n - 2) where d = degrees and n = number of sides.

Part of the purpose of the Summarize is to allow you to assess how well your students are progressing toward the goals of the lesson. Use the discussion to help you determine whether additional teaching and/or additional exploration by students is needed before they go on to the next topic.

Additional Notes

- Help students see how this geometry lesson ties directly to patterns and functions and algebraic equations. Students can write equations that describe the patterns they find even if they have not had any formal introduction to linear functions. When students start with a contextual situation, the equations they write will make sense because these equations will be based on their own understanding of the situation.
- Note that the Learner Teachers tried to erase a mistake. Encourage your students not to erase. Mistakes are learning experiences; students shouldn't be expected to get everything right the first time. The goal is to learn from mistakes, not try to cover them up.
- You may want students to draw a graph of their data. This relationship produces a line with a negative y-intercept. Have students try to interpret certain points in the context of the problem. For example, (4, 360) means a four-sided figure has 360˚. But what does the point (2, 0˚) mean? or (1, -180˚)? Do these points make sense?

FINDING THE NUMBER OF DEGREES

- How many degrees are in the interior angles of each polygon?
- What is the relationship between the number of sides and the sum of the interior angles of any polygon?
- Can this relationship be described in writing, using symbols, in a table or as a graph?
- Is there more than one way to describe the relationship?