

Building Mathematical Thinkers: Mini-Activities

Pattern Block Angles

Objective : 4th grade Measurement – Angle Measures

IMPORTANT NOTE – Before completing this activity, students should already understand that a triangle's interior angles have a sum of 180

Theoretical Foundation: Students use hands-on problem solving strategies to determine the measures of the angles of each pattern block. They engage in discussion which allows them to verbalize their own strategies and listen to those of others. Discussion and exploration are the key elements in developing mathematical reasoning.

Estimated Time: 30 minutes

Materials: One set of pattern blocks for each student (one each: square, triangle, trapezoid, hexagon, blue parallelogram, tan parallelogram), *Pattern Block Angles Sheet* for each student

Description:

1. This activity is designed as an exploration. It works best if the students receive very little direction at the beginning.
2. Distribute the materials to students and ask them to find the measures of each angle of each pattern block.
3. Allow time for students to explore the pattern blocks
4. After 5-10 minutes, when the students have made some progress, but before they completely “get it,” ask the class to stop working
5. Invite the students to share their thinking so far.
At this point, hopefully several students have realized that the triangle is equilateral and, therefore, each angle is 60 degrees. Some may even recognize that the triangle can be used to find the other angle measures
6. After this discussion, allow students to go back to working on the measures of the pattern block angles.
7. As they work students should record their thinking on the *Pattern Block Angles sheet*
8. The tan parallelogram is especially tricky. As you circulate encourage students to find relationships among all of the pattern blocks to make their measurements. If many students are struggling with the tan parallelogram, you may want to stop the class for another strategy discussion.
9. As most students are finishing, ask the class to stop working and invite them to share their results and the strategies they used
10. Lead the class in discussion as using the probing questions below.

Differentiation Suggestions:

- For early finishers challenge them to create a design using the pattern blocks. They should, then, trace the design and determine the measures of each of it's interior angles without using a protractor.
- Struggling students may work best with a partner who has similar struggles so that they can

theorize together.

- For struggling students try working with one shape at a time. Have all of the students work in this order: square, triangle, hexagon, trapezoid, blue parallelogram, tan parallelogram.

Probing Questions:

- Look at the blue and tan parallelograms. What do you notice about the angle measures? Do these conjectures apply to all quadrilaterals? All parallelograms? [*Opposite angles are congruent & angles “next to each other” have a sum of 180 degrees*]
- Look at the trapezoid. What do you notice about how the angle measures are related? Does this apply to all trapezoids?
- Examine the quadrilaterals. What do they all have in common? [*sum of the angles is 360 degrees*]
- Examine the quadrilaterals. What relationships can you find between parallel sides and the interior angles?

Assessment:

- Are students able to devise multiple strategies for determining the angle measures?
- Are students able to explain their strategies?
- Are students able to use the ideas of their classmates?
- Can students successfully make conjectures about angle measures and parallelism?

Name _____

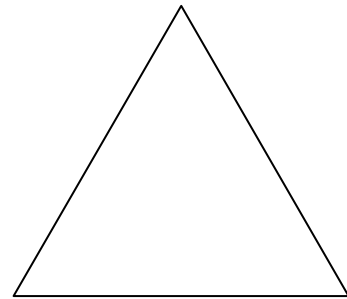
Pattern Block Angles

Directions: Use what you know about angles and shapes to figure out the measures of the interior angles of each of the pattern blocks. Be sure to explain your reasoning.

Triangle

Label each angle of the triangle with its measurement:

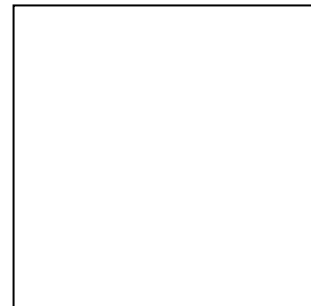
How did you determine these measurements?



Square

Label each angle of the square with its measurement:

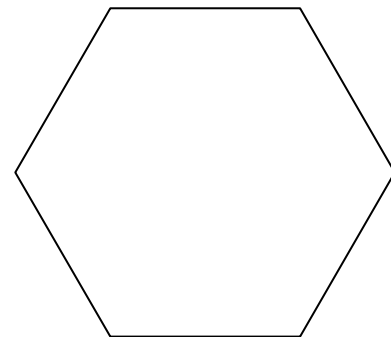
How did you determine these measurements?



Hexagon

Label each angle of the hexagon with its measurement:

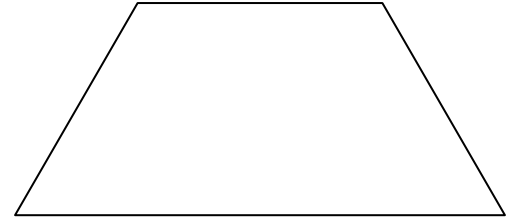
How did you determine these measurements?



Trapezoid

Label each angle of the trapezoid with its measurement:

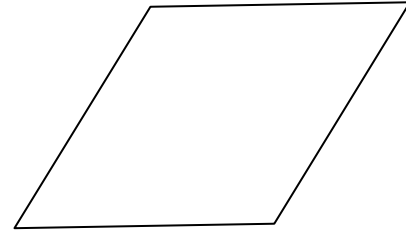
How did you determine these measurements?



Blue Rhombus

Label each angle of the rhombus with its measurement:

How did you determine these measurements?



Tan Rhombus

Label each angle of the rhombus with its measurement:

How did you determine these measurements?

