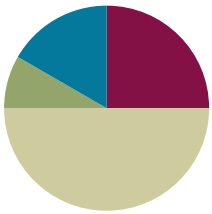
Lesson 1

Objective: Understand area as an attribute of plane figures.

Related Topics: More Lesson Plans for the Common Core Math

Suggested Lesson Structure

Fluency Practice	(15 minutes)
Application Problem	(5 minutes)
Concept Development	(30 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (15 minutes)

- Group Counting **3.OA.1** (4 minutes)
- Identify the Shape **2.G.1** (3 minutes)
- Find the Common Products **3.OA.7** (8 minutes)

Group Counting (4 minutes)

Note: Group counting reviews interpreting multiplication as repeated addition.

Direct students to count forward and backward, occasionally changing the direction of the count.

- Threes to 30
- Sixes to 60
- Sevens to 70
- Eights to 80
- Nines to 90

Identify the Shape (3 minutes)

Materials: (T) Images of polygons (S) Personal white boards

Note: This fluency reviews properties and vocabulary that will be used during today's Concept Development.

T: (Project a triangle.) How many sides does this shape have?
S: 3.
T: Name the shape.
S: Triangle.

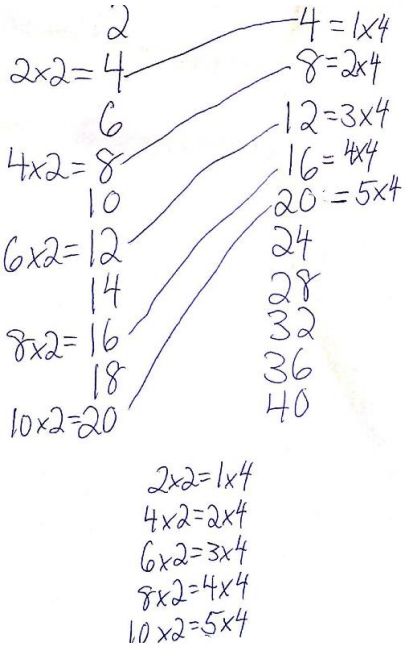
Continue with the following possible sequence: quadrilateral (trapezoid), quadrilateral (rhombus), quadrilateral (square), and quadrilateral (rectangle).

Find the Common Products (8 minutes)

Materials: (S) Blank paper

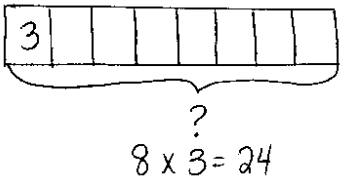
Note: This fluency reviews multiplication patterns from G3–Module 3.

- T: Fold your paper in half vertically.
- T: On the left half, count by twos to 20 down the side of your paper.
- T: On the right half, count by fours to 40 down the side of your paper.
- T: Draw lines to match multiples that appear in both columns.
- S: (Match 4, 8, 12, 16, and 20.)
- T: (Write ___ × 2 = 4, ___ × 2 = 8, etc., next to each corresponding product on the left half of the paper.) Write the complete equations next to their products.
- S: (Write equations and complete unknowns.)
- T: (Write 4 = ____ × 4, 8 = ____ × 4, etc., next to each corresponding product on the right half of the paper.) Write the complete equations next to their products.
- S: (Write equations.)
- T: (Write 2 × 2 = ____ × 4.) Say the equation including all factors.
- S: 2 × 2 = 1 × 4.
- T: (Write 2 × 2 = 1 × 4.) Write the remaining equal facts as equations.
- S: (Write 4 × 2 = 2 × 4, 6 × 2 = 3 × 4, 8 × 2 = 4 × 4, and 10 × 2 = 5 × 4.)
- T: What patterns do you notice in your equations?
- S: Each multiple of 4 is also a multiple of 2.



Application Problem (5 minutes)

Eric makes a shape with 8 trapezoid pattern blocks. Brock makes the same shape using triangle pattern blocks. It takes 3 triangles to make 1 trapezoid. How many triangle pattern blocks does Brock use?



Brock uses 24 triangle pattern blocks.

Note: This problem reviews the G3–Module 3 concept of multiplying using units of 8.

Concept Development (30 minutes)

Materials: (S) Pattern blocks, Problem Set

Part 1: Using pattern blocks to understand area.

T: Look at Problem 1 on your Problem Set. Discuss with a partner whether you think Shape A or Shape B takes up more space. Be prepared to explain your answer. (After students discuss, facilitate a whole class discussion.)

S: Shape A, because it's longer than Shape B. → Shape B, because it's taller than Shape A.

T: Use green triangle pattern blocks to cover Shape A and Shape B. Be sure the triangles do not have gaps between them, they don't overlap, and they don't go outside the sides of the shapes. (Allow time for students to work.) What did you notice about the number of green triangles it takes to cover Shape A and Shape B?

S: It takes 6 green triangles to cover each shape!

T: Answer Problem 1 on your Problem Set. (Allow time for students to write answers.) Do all the green triangles take up the same amount of space?

S: Yes, because they're all the same size.

T: What does that mean about the amount of space Shape A and Shape B take up?

S: They're the same. → It took 6 triangles to cover each shape, which means the shapes take up the same amount of space. → The amount of space that Shape A takes up is equal to the amount of space Shape B takes up.

T: The amount of flat space a shape takes up is called its **area**. Since Shapes A and B take up the same amount of space, their areas are equal.

Repeat the process of using pattern blocks to cover Shapes A and B with the blue rhombus and the red trapezoid pattern blocks. Students record their work on Problems 2 and 3 in the Problem Set.

T: What is the relationship between the size of the pattern blocks and the number of pattern blocks it takes to cover Shapes A and B?

S: The bigger the pattern block, the smaller the number of pattern blocks it takes to cover these shapes. → The bigger pattern blocks, like the trapezoid, cover more area than the triangles. That means it takes fewer trapezoids to cover the same area as the triangles.

T: Answer Problem 4 on your Problem Set.

NOTES ON MULTIPLE MEANS OF ACTION AND EXPRESSION:

Manipulating pattern blocks may be a challenge for some learners. Try the following tips:

- Partner students so they can work together to cover the shapes.
- Encourage students to hold the pattern blocks in place with one hand, while they place the remaining blocks.
- Instead of using pattern blocks, provide paper shapes that can be glued, so they won't move around unnecessarily.
- Offer the computer as a resource to create and move shapes.

Part 2: Measuring area using square units.

T: Use orange square pattern blocks to cover the rectangle in Problem 5. Be sure the squares don't have gaps between them, they don't overlap, and they don't go outside the sides of the rectangle. (Allow students time to work.) How many squares did it take to cover the rectangle?

S: 6!

T: Answer Problem 5 on your Problem Set. (Allow time for students to write answers.) The area of Shape C is 6 square units. Why do you think we call them square units?

S: Because they're squares! → The units used to measure are squares, so they're square units!

T: Yes! The units used to measure the area of the rectangle are squares.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Students working above grade level can be encouraged to find other square units in the classroom that they can either use to make rectangles or that already form rectangles. Such items might include sticky notes, desktops, floor tiles, and linking cubes. Students can create a poster to share with the class that shows the areas of the rectangles made with these other square units.

T: Use red trapezoid pattern blocks to cover the rectangle in Problem 5. Be sure the trapezoids don't have gaps between them, they don't overlap, and they don't go outside the sides of the rectangle. (Allow students time to work.) What did you notice?

S: It's not possible! → The red trapezoids can't cover this shape without having gaps.

T: Use this information to help you answer Problem 6 on your Problem Set. (Allow time for students to write answers.) I'm going to say an area in square units, and you're going to make a rectangle with your pattern blocks that has that area. Which pattern blocks will you use?

S: The squares because the units for area that you're telling us are square units!

T: Here we go! Four square units.

S: (Make rectangles.)

Continue with the following possible suggestions: 12 square units, 9 square units, and 8 square units. Invite students to compare their rectangles to a partner's rectangles. How are they the same? How are they different? If time allows, students can work with a partner to create rectangles that have the same areas, but look different.

Student Debrief (10 minutes)

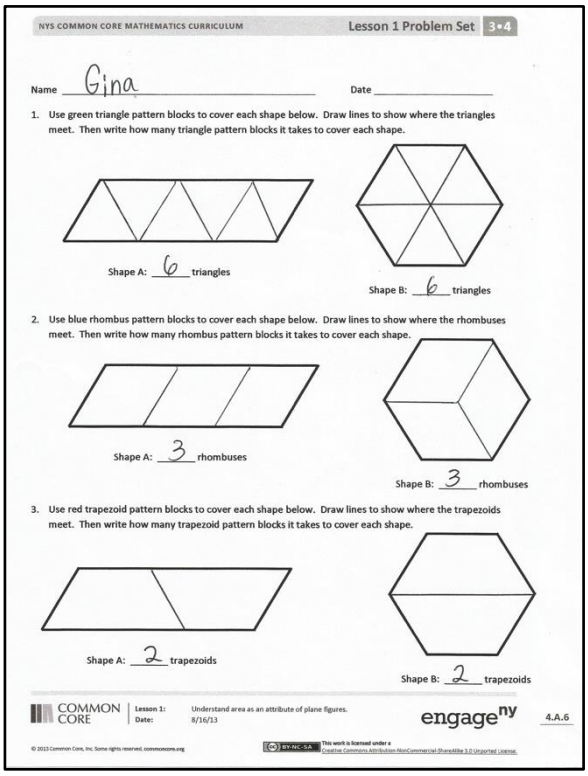
Lesson Objective: Understand area as an attribute of plane figures.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- Talk to a partner. Do you think you can use orange square pattern blocks to cover Shapes A and B in Problem 1? Explain your answer.
- How many green triangle pattern blocks does it take to cover a blue rhombus pattern block? Use that information to say a division fact that relates the number of triangles it takes to cover Shape A to the number of rhombuses it takes to cover the same shape. (6 ÷ 2 = 3.)
- Explain to a partner how you used orange square pattern blocks to find the area of the rectangle in Problem 5.
- What new math vocabulary did we use today to communicate precisely about the amount of space a shape takes up? (**Area**.) Which units did we use to measure area?
- How did the Application Problem connect to today's lesson?



NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 1 Problem Set 3•4

Name Gina Date

1. Use green triangle pattern blocks to cover each shape below. Draw lines to show where the triangles meet. Then write how many triangle pattern blocks it takes to cover each shape.

Shape A: 6 triangles

Shape B: 6 triangles

2. Use blue rhombus pattern blocks to cover each shape below. Draw lines to show where the rhombuses meet. Then write how many rhombus pattern blocks it takes to cover each shape.

Shape A: 3 rhombuses

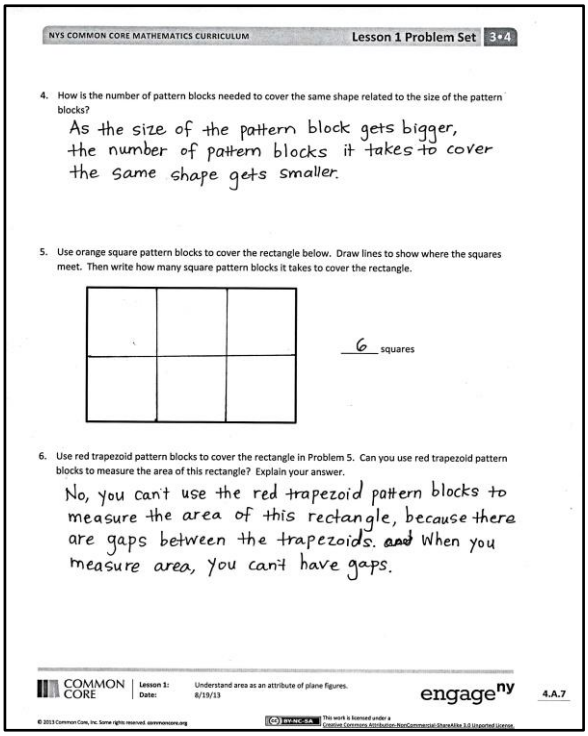
Shape B: 3 rhombuses

3. Use red trapezoid pattern blocks to cover each shape below. Draw lines to show where the trapezoids meet. Then write how many trapezoid pattern blocks it takes to cover each shape.

Shape A: 2 trapezoids

Shape B: 2 trapezoids

COMMON CORE | Lesson 1: Date: 8/16/13 Understand area as an attribute of plane figures. engage^ny 4.A.6



NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 1 Problem Set 3•4

4. How is the number of pattern blocks needed to cover the same shape related to the size of the pattern blocks?

As the size of the pattern block gets bigger, the number of pattern blocks it takes to cover the same shape gets smaller.

5. Use orange square pattern blocks to cover the rectangle below. Draw lines to show where the squares meet. Then write how many square pattern blocks it takes to cover the rectangle.

6 squares

6. Use red trapezoid pattern blocks to cover the rectangle in Problem 5. Can you use red trapezoid pattern blocks to measure the area of this rectangle? Explain your answer.

No, you can't use the red trapezoid pattern blocks to measure the area of this rectangle, because there are gaps between the trapezoids. ~~and~~ When you measure area, you can't have gaps.

COMMON CORE | Lesson 1: Date: 8/19/13 Understand area as an attribute of plane figures. engage^ny 4.A.7

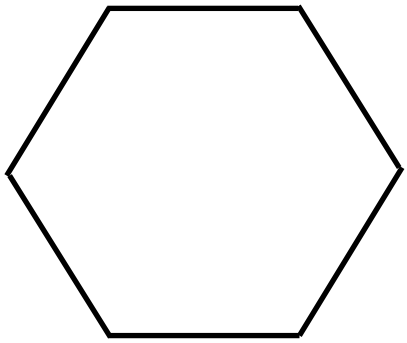
Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

Name _____ Date _____

1. Use green triangle pattern blocks to cover each shape below. Draw lines to show where the triangles meet. Then write how many triangle pattern blocks it takes to cover each shape.

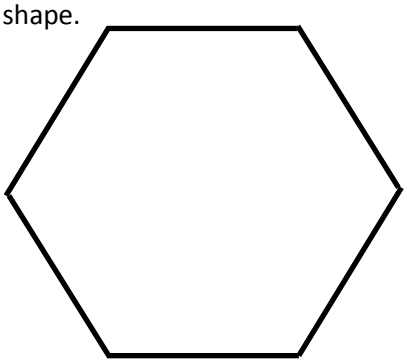
Shape A: _____ triangles



Shape B: _____ triangles

2. Use blue rhombus pattern blocks to cover each shape below. Draw lines to show where the rhombuses meet. Then write how many rhombus pattern blocks it takes to cover each shape.

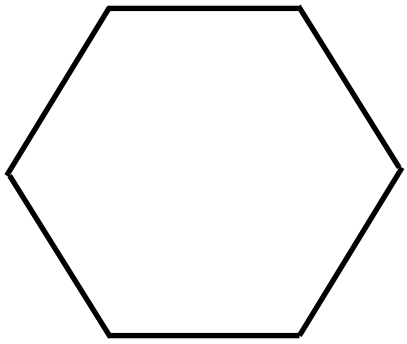
Shape A: _____ rhombuses



Shape B: _____ rhombuses

3. Use red trapezoid pattern blocks to cover each shape below. Draw lines to show where the trapezoids meet. Then write how many trapezoid pattern blocks it takes to cover each shape.

Shape A: _____ trapezoids



Shape B: _____ trapezoids

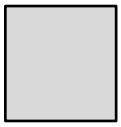
4. How is the number of pattern blocks needed to cover the same shape related to the size of the pattern blocks?

5. Use orange square pattern blocks to cover the rectangle below. Draw lines to show where the squares meet. Then write how many square pattern blocks it takes to cover the rectangle.

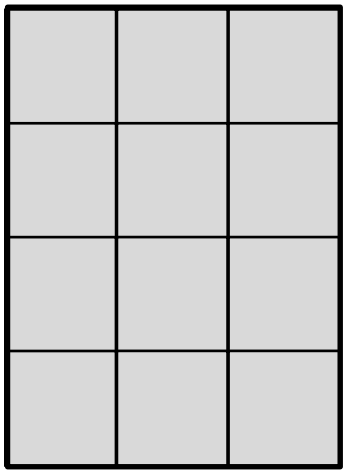
_____ squares

6. Use red trapezoid pattern blocks to cover the rectangle in Problem 5. Can you use red trapezoid pattern blocks to measure the area of this rectangle? Explain your answer.

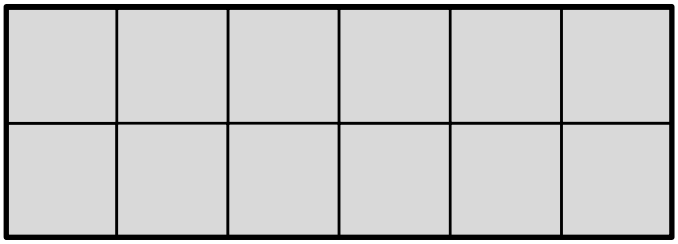
Name _____ Date _____

1. Each  is 1 square unit. Do both rectangles have the same area? Explain how you know.

a.



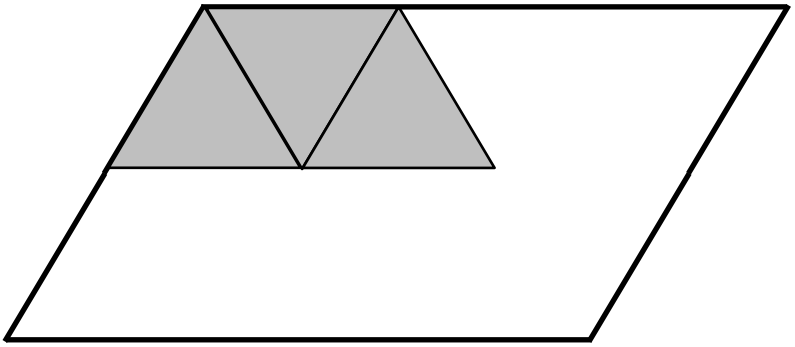
b.



Name _____ Date _____

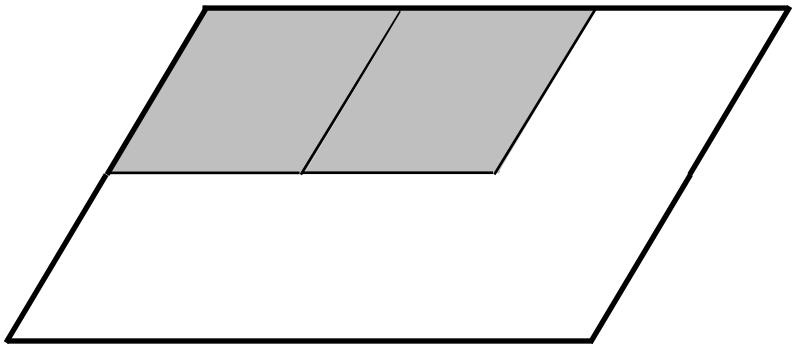
1. Magnus covers the same shape with triangles, rhombuses, and trapezoids

   a. How many triangles will it take to cover the shape?



_____ triangles

   b. How many rhombuses will it take to cover the shape?

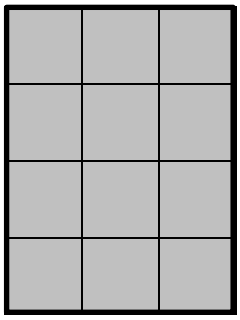


_____ rhombuses

   c. Magnus notices that 3 triangles from Part (a) cover 1 trapezoid. How many trapezoids will it take to cover the shape below? Explain your answer.

_____ trapezoids

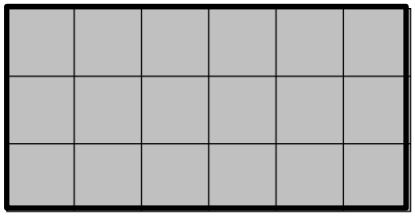
2. Angela uses squares to find the area of a rectangle. Her work is shown below.
   a. How many squares did she use to cover the rectangle?



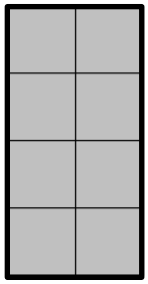
_____ squares

   b. What is the area of the rectangle in square units? Explain how you found your answer.

3. Each  is 1 square unit. Which rectangle has the biggest area? How do you know?



Rectangle A



Rectangle B

Rectangle C