

# 2<sup>nd</sup> Grade Mathematics Lesson Plan

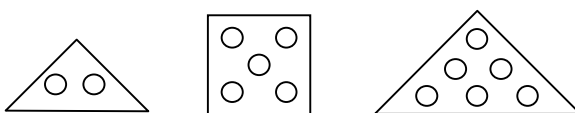
Place: Tsukuba University Attached Elementary School  
 Students: 2<sup>nd</sup> grade, 40 students  
 Instructor: Takao Moriyama

Research Theme	Thinking about a lesson that helps foster students' mathematical thinking by connecting numbers and geometry
----------------	--

## 1. Title: Placing Plates (Unit: triangles and quadrilaterals)

## 2. About the research theme and the learning materials

There are candies placed on small plates that are shaped like triangles and a quadrilateral, just like those shown below:



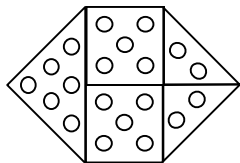
One of the tasks of this lesson is to make a large hexagonal plate by fitting together small plates like those shown above. Rules for making a large plate are as follows:

You must fit together the small plates and make a shape that matches the large plate exactly.

Below are some examples. After you complete the task, count the number of candies.

①

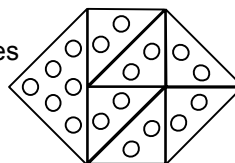
20 candies



$$\left[ \begin{array}{l} 5 \times 2 = 10 \quad 2 \times 2 = 4 \\ 10 + 6 + 4 = 20 \end{array} \right]$$

②

18 candies

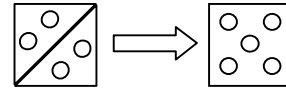


$$\left[ \begin{array}{l} 2 \times 6 = 12 \quad 12 + 6 = 18 \end{array} \right]$$

Students will notice the difference between the number of candies on the various small plates by using multiplication which the students learned before to find out the number of candies. After students present various solutions to this problem, I would like to expand the lesson by paying attention to students' awareness of the problems involved.

- Organize the total number of candies → e.g., 16, 17, 18, 20, 21 candies → "I wonder if we can make a large plate that has 19 candies." "I wonder if we can make a large plate that has more than 21 candies." → exploration activity

- Another point that I would like my students to think about is how to make a large plate that has 19 candies. For example, if you think about increasing 1 candy from the case of 18 candies, you can think about replacing two small triangular plates each containing 2 candies with a small square plate that contains 5 candies. (4 candies  $\rightarrow$  5 candies.)



There are two objectives for this lesson. The first one is to foster students' geometric sense through composition of geometric shapes. And the second one is to foster students' ability to think logically and understand mathematical expressions by asking them to think about the composition of geometric shapes and their matching mathematical expressions.

### 3. Goals of the Unit

- To foster student understanding of triangles and quadrilaterals through concrete manipulative activities.
- To enrich the basic learning experiences of students by composing and drawing triangles and quadrilaterals.

### 4. Instructional Plan (Total: 6 periods)

Phase 1: Meaning of triangles and quadrilaterals ----- 2 periods

Phase 2: Composition and construction of triangles and quadrilaterals ----- 2 periods

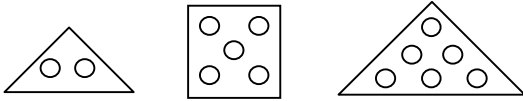
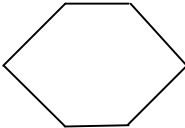
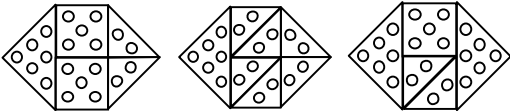


Phase 3: Summary and practice ----- 1 period

### 5. Instruction of This Lesson

(1) Goals:

- To foster students' geometric sense through composition of geometric shapes
- To foster students' ability to logically think and understand mathematical expressions by asking them to think about the composition of geometric shapes and their matching mathematical expressions.

(2) Process of the lesson

Main Learning Activity	Important Points for Instruction
<p>1. Understanding the problem situation</p> <p>◇ There are candies on the plates</p>  <p>2. Posing the problem</p> <p>◇ Let's fit together the small plates to make a large plate that matches the shape of a large plate.</p>  <p>3. Presentation</p> <p>e.g., 20 candies      18 candies      21 candies</p>  <p>4. Try to organize the total number of candies</p> <p>e.g., 16→17→18→20</p> <p>○ "Oh no, we don't have 19."</p> <p>○ "I wonder if we can find an arrangement of small plates that gives us a total of 19 candies."</p> <p>○ "I wonder what is the largest number of candies and how can we arrange the small plates?"</p> <p>5. (e.g.) Let's think about the case of 19 candies!</p> <p>◇ "I wonder if we can use the case of 18 candies as a hint to think about this?"</p> <p>○ "If we can see it like  → </p> <p>what's shown on the right, the number of candies increases by 1,</p>	<ul style="list-style-type: none"> <li>◆ Confirming the shapes of the plates and the numbers of candies on those plates.</li> <li>◆ Pass out multiple copies of small plates for each shape.</li> <li>◆ Pass out a worksheet that has a hexagonal shape of the large plate on it</li> <li>◆ Ask the students to record their arrangement of the small plates</li> <li>◆ Count the total number of candies on the large plates that are presented by the students and write down the mathematical expressions the board.</li> <li>◆ Depending on how the student presentation unfolds, the teacher will ask the students why the total number of candies increased or decreased by 1.</li> <li>◆ Record the different arrangements of small plates by drawing on paper and pasting them on the blackboard. → Make it easier to rearrange the small plates.</li> <li>◆ Pay attention to what students have noticed when the total numbers of candies were organized.</li> <li>◆ If I can, I would like to set up the question indicated in number 5 (on the left) based on students' questions.</li> </ul>