

Mathematics Public Lesson Grade 5 Mathematics Instruction Plan

Classroom: Tsukuba Fuzoku Elementary School, Grade 5, Section 4
 Teacher: Hosomizu, Yasuhiro, Tsukuba Fuzoku Elementary School

Research Theme:

Examining instruction that will promote the enjoyment of discovering the dependency relationship between the diameter and circumference of circles, and appreciate the beauty of the fact that the ratio of circumference to the diameter is constant.

1. Title Circles

2. About Research Theme

In a typical lesson to discover the ratio of circumference, the lesson often starts with questions like, “Let’s determine the relationship between the diameter and the circumference,” or “Let’s investigate the values of Circumference \div Diameter.”

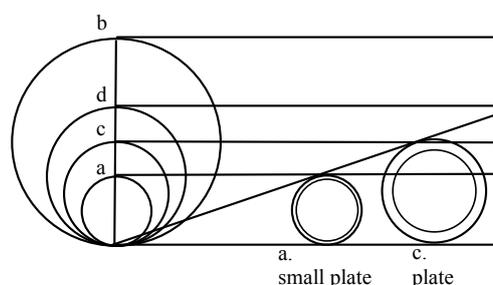
However, these questions are telling students that there is a relationship between the diameter and the circumference from the beginning. Thus, it is not quite clear what it is that children should gain from such study. Moreover, children cannot develop their ability to investigate a relationship. In particular, if the lesson starts with, “Let’s investigate the values of Circumference \div Diameter,” it can be legitimately criticized as a lesson that is only about practicing computation or the use of calculators.

As students discover that the circumference depends on the diameter and the ratio of the circumference to the diameter is constant, their ability to observe and think algebraically will be fostered. Therefore, in planning today’s lesson, the following perspectives were taken so that the lesson may indeed develop in such a manner that students will make these discoveries on their own.

(1) Help students realize that the circumference depends on the diameter

Roll various circular objects on the ledge of the classroom blackboard and have them predict how far they will go. By alternating large and small objects, the relationship between the circumference and the diameter become more visible.

Furthermore, to make the relationship more easily observable, organize the results in a diagram as shown on the right. The diagram will make it easier for some students to capture the relationship between the circumference and the diameter more visually.



(2) Help students realize that the ratio of the circumference to the diameter is constant

In this lesson, the focus is not just have students remember the value of the ratio of circumference is approximately 3.14. Rather, by rotating familiar circular objects and measuring their diameters and circumferences, they will experience the process of gradually approaching the approximate value of 3.14.

3. Instruction plan: Ratio of circumference and area of circles (8 lessons total)

Section 1: Ratio of circumference 4 lessons [today’s lesson is the first of 4]

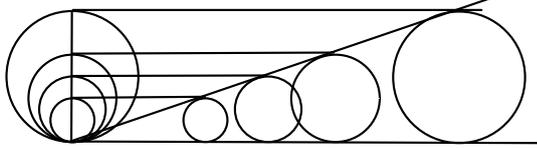
Section 2: Area of circles ... 4 lessons

4. Instruction in this lesson

(1) Goals

- Students will notice that there is a relationship between the circumference and the diameter through the activity of rolling circular objects.

(2) Flow of the lesson

Instructional Activity	Points of Considerations
<p>1. Predict the length around a 1-yen coin.</p>  <p>3 cm 4 cm 5 cm 6 cm</p> <p>2. Explore how far various circular objects will roll along the ledge of blackboard.</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>When these objects are rotated once, how far will they go?</p> </div>    <ul style="list-style-type: none"> • When the diameter is fixed, the length around the circle is also fixed. • The larger the diameter, the further an object will roll. • The length around the object appears to be about 3 times of the diameter. 	<ul style="list-style-type: none"> • It is anticipated that most children will predict 3 or 4 cm. Acknowledge the surprise they feel when they find out that the length exceeds 6 cm and their desire to actually roll the coin to verify this fact. • Have students predict how far each object will roll first. • Use familiar objects such as trays, plates, and cans. • To help them recognize the dependency relationship more easily, alternate large and small objects. After each object, have students record what they noticed in their notebook. • After several objects are rolled, affirm that there is a relationship between the circumference and the diameter. • During the class discussion, use different colored chalks to identify clearly what have been discovered. • Present the formal term, “circumference” for the length around a circle. • Acknowledge the disposition to further investigate the relationship between the circumference and the diameter.

Blackboard writing plan

Date: _____ How far will they roll?

a. small plate Depending on the size of circle

b. large tray diameter the distance of roll is different

c. plate (radius) circumference

d. lid

between a & b

between b & c

Can see a slanted line ⇒ There may be a relationship between circumference and diameter

