

## Lesson 4: How Close Is Our Estimate?

**Lesson Topic** \_\_\_\_\_ **Grade** \_\_\_\_\_

Estimation and measurement

5

**Lesson Length** \_\_\_\_\_

50 minutes

**NCTM Standard(s) Addressed** \_\_\_\_\_

- Understand measurable attributes of objects and the units, systems, and processes of measurement:
- Understand such attributes as length, area, and volume.
- Understand the need to measure with standard units
- Develop strategies for estimating the perimeters, areas, and volume

**PA Standard(s) Addressed** \_\_\_\_\_

- Select and use appropriate instruments and units for measuring quantities (e.g. perimeter, area, volume).
- Estimate, refine and verify specified measurements of objects.
- Add and subtract measurements.

**Student Objectives** \_\_\_\_\_

Students will:

- estimate perimeter, area, and volume.
- measure perimeter and area using nonstandard units of measurement.
- add and subtract nonstandard units of measurement.

**Grouping for Instruction** \_\_\_\_\_

- Individually
- Groups of 3 or 4

## Overview of Lesson

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Students use nonstandard units to explore the concepts of perimeter, area, and volume. Students estimate measures of perimeter, area, and volume of their classroom. Students add and subtract units of measurement.

## Background Information

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Students should be able to add mixed numbers and simplify the sum.

## Materials and Equipment

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- Box of tennis balls.
- Pieces of rope that are 5-tennis-balls long
- Grids with measurements that are 5-tennis-balls by 5-tennis-balls
- Estimation sheets (1 for each student)
- Chalk or masking tape for marking regions on the floor.

## Lesson 4 Procedure

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### A. Motivation and introduction

1. Say: “Today I am going to have you investigate the dimensions of our classroom. But first I’m going to let you estimate the dimensions, to see how close you can come.”
2. Give each student a questionnaire (see Worksheet A: How Big Is Our Classroom?). Tell students they have 2 minutes to complete the questionnaire.
3. After 2 minutes, collect the questionnaires.
4. Explain that today’s lesson involves an investigation of distance around (perimeter), region covered (area), and space filled (volume).

### B. Development (including discussion points and feedback)

1. Divide the class into heterogeneous groups of 3 or 4 students, and number the groups 1, 2, 3, etc.
2. Explain that each group should:
  - Estimate the number of tennis balls it will take to go around the classroom, to cover the floor, and to fill the classroom
  - Use the tennis balls to measure
3. Give each group a questionnaire (see Worksheet B: How Big Is Our Classroom?).
4. Tell the students they have 5 minutes to complete the questionnaire and that every student in your group should be involved in the process.
5. Observe the students as they work. Note students’ interaction and reasoning.

6. After five minutes collect the questionnaires.
7. Explain: “Now that we have thought about this and made an estimate, we are going to figure out a way to measure the class using tennis balls.”
8. Give a set of 3 tennis balls to half of the groups (the odd-numbered groups). Give ropes that are 5 tennis balls long to the other half of the groups (even-numbered groups).
9. Assign groups 1 and 2 the task of measuring the front wall, groups 3 and 4 the task of measuring the back wall, etc. Instruct the students with tennis balls to measure to the nearest half of a ball and those with ropes to measure to the nearest fifth of a rope.
10. After all sides are measured, compile the results from the class.
11. Discuss the methods used to measure. Discover what efficient methods can be used and how accurate the measurements are.
12. Have the groups that measured with tennis balls use the ropes and the groups with the ropes use the tennis balls.
13. Having previously divided the classroom into sections, assign the groups the task of measuring the area of a section of the classroom in tennis balls or in 5-tennis-ball-by-5-tennis-ball grids.
14. Once all measurements are taken, compile the results.
15. Discuss the methods of finding the area of sections. Ask: “How many tennis balls are in one of the grids? How many tennis balls would be in a 12-ball by 12-ball grid?”

### C. Summary and closure

“Today we measured the perimeter and area of the floor of our classroom with non-standard units of measurement. If you were going to buy carpet for our classroom, would you give the salesman the measurements in tennis balls? What kinds of measurement would you give the salesman? How exact would these measurements have to be?”

### D. Assignment

“Describe how you would determine the number of tennis balls it would take to fill our classroom. You must write at least 4 sentences telling the procedures.”

### Assessment

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Most of the assessment for this lesson is embedded in the activities. Each student has individually filled out a questionnaire. Each group has completed a questionnaire. Each student can now be asked to answer the questions: “How would you estimate the perimeter of our classroom in feet? How would you estimate the area of our room in square yards?”

## Worksheet A

Name \_\_\_\_\_

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### HOW BIG IS OUR CLASSROOM?

You have 2 minutes to **estimate** different measurements in our classroom. You are to work by yourself and put down your best guess.

1. How many tennis balls would it take to go around our classroom? \_\_\_\_\_  
(The balls are lined up around the edges of our classroom; each ball touches the next ball.)
  
  2. How many tennis balls would it take to cover the floor of our classroom? \_\_\_\_\_  
(The balls touch each other.)
  
  3. How many tennis balls would it take to fill our classroom? \_\_\_\_\_
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## Worksheet B

NAMES of Group Members:

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### HOW BIG IS OUR CLASSROOM?

You have 3 minutes to **estimate** different measurements in our classroom. You are to work as a group to determine the best estimate.

1. How many tennis balls would it take to go around our classroom? \_\_\_\_\_  
(The balls are lined up around the edges of our classroom; each ball touches the next ball.)
  
  2. How many tennis balls would it take to cover the floor of our classroom? \_\_\_\_\_  
(The balls touch each other.)
  
  3. How many tennis balls would it take to fill our classroom? \_\_\_\_\_
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1. Explain how your group decided on the best estimates. Your explanation should contain at least two sentences.
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