

Practical Applications of Fractions, Percents, and Decimals

SIOP Lesson Plan

This plan was created by Ivonne Govea as a part of the Two-Way SIOP (TWI SIOP) project conducted at CAL and was later adapted for SIOP by Sandra Gutierrez of CAL.

Background

Theme: Relating fractions, percents, and decimals as a part of a whole

Lesson Topic: Practical applications of fractions, percents, and decimals: Designing my school's playground

Background to Lesson: The students have studied the common use of fractions, decimals, and percents, and their meanings. Students also explored the equivalence between fractions, decimals, and percents, using 10x10 grids.

English proficiency levels: intermediate

Grade: 5

Standards: State Mathematics Standards of Learning, Grade 5

5.2 The student will recognize and name commonly used fractions (halves, fourths, fifths, eighths, and tenths) in their equivalent decimal form and vice versa.

Preparation

Content Objectives: The students will be able to

- represent common fractions ($\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{8}$, $\frac{1}{10}$) on 10x10 grids.
- make connections about the relationship between fractions, percents, and decimals.
- apply their knowledge of fractions, percents, and decimals to the real-life task of designing a playground.

Language Objectives: The students will be able to

- discuss their playground design in small groups.
- use key vocabulary to describe relative size and express the same amount in fractions, decimals, and percents.
- explain their playground designs to the class, both orally and in writing.

Key Vocabulary

- One half, one third, one fourth, one fifth, one sixth, one eighth, one tenth
- Percent
- Fraction
- 10x10 grid
- Equivalent fraction
- Proportion
- Design
- Portion

Materials

Teacher Materials

- Large chart paper with the title “My school’s ideal playground”
- Posters of equivalent fractions and percents
- 10x10 grid papers illustrating different sizes of fractions
- Sample drawings of school playgrounds
- Sample design of school playground on a 10X10 grid
- Sample playground design key

Student Materials

- Large 10x10 paper grids
- Crayons and colored pencils
- Scratch paper
- Calculators
- “My Ideal Playground Design” table

Motivation

- Ask students to name the different areas and equipment in their school playground and in other playgrounds they have visited. For students who have come from other areas of the country or the world, ask them how playgrounds in those regions compare to those where they now live. Possible answers may include: sandbox, swing area, hopscotch area, monkey bars, bridges, play house, slides, climbing walls, run around area, jungle gym, benches, area to run around, etc. Discuss and illustrate on the board any playground vocabulary that is unfamiliar to most students.
- Ask the students to imagine that they are architects who are responsible for designing a new playground for their school. Hang on the board a large chart paper titled “My school’s ideal playground” and ask students to brainstorm areas they would like to include in the design. Write their ideas on the chart paper.
- Read and discuss the lesson objectives with students.

Presentation

- Show the students drawings of several school playgrounds. Then, show them a 10X10 grid that contains the design of a playground (this could be a design that was created by the teacher or a design that was created by students in previous years). Point out the whole area of the playground and its division into different fractions. For example, say, “The swing area is one fifth or 20 percent or 0.20 of the whole playground area.”
- Discuss with the students the relative importance of the areas and requirements for size and separation of older and younger students.
- Explain that they will design their ideal playground in groups using their knowledge of common fractions, decimals, and percents.
- Briefly review how to represent common fractions in a 10x10 grid (One half, one third, one fourth, one fifth, one sixth, one eighth, one tenth). Using the posters of equivalent fractions and percents, point out that equivalent decimals and percents can also be represented in the 10x10 grid. Remind students what resources they can use to help them calculate the equivalent decimal or percent for a fraction (posters, calculators, etc.)

Practice/Application

- Consider students’ English language proficiency to divide them into heterogeneous teams of three. Distribute the student materials needed for the activity.
- Explain that they will design their ideal playground in small groups on a 10X10 grid. Emphasize that students should be sure to use the whole 10x10 grid for their designs. Explain that all have to collaborate to create the design, but that each of them will turn in an individual report. Also, explain that all team members will participate in their team’s oral presentation.
- Write and explain activity steps using teacher’s 10X10 for visual support:
 - Discuss the areas that could be included in their ideal playground.
 - Decide which areas to include.
 - Determine the appropriate size of each area.
 - Block each area in the grid using crayons or color pencils.
- As teams work on their design, monitor that students are collaborating and following directions. Also, monitor and encourage students’ use of key content vocabulary. Provide feedback as needed.
- Once groups are finished designing their playground, model how to write their report using the table “My Ideal Playground Design” by filling out one row based on the playground design (10X10 grid) used to introduce the activity.

- Students make the necessary conversions from fractions to percents and decimals based on their design on scratch paper. Then, using the table provided, students prepare their written reports detailing the areas in their playground; the size of each area in fractions, decimals, and percents; the purpose and audience for each area; and their justifications for the size of each area. (See table below)
- When teams finish, share and review playground design presentation rubric (See Review/Assessment section). Then provide students time to practice presenting their written reports and playground designs orally. Model if needed.

Review/Assessment

- As each team presents their design to the class, assess and have another team of the students assess the presentation using the following project rubric.

Playground Design Presentation Rubric

Content	Very much	Somewhat	A little bit	Not at all
<ul style="list-style-type: none"> • Did students come up with a realistic and interesting design? 				
<ul style="list-style-type: none"> • Are fractions correctly converted to decimals and percents? 				
<ul style="list-style-type: none"> • Does the visual representation on the 10x10 grid accurately reflect the fraction indicated in the written report? 				
Language				
<ul style="list-style-type: none"> • Do students clearly explain the purpose, audience, and rationale for the size of each area? 				
Team Work				
<ul style="list-style-type: none"> • Did all team members help orally present their playground design? 				

- After all teams (or all teams presenting that day) have concluded, collect individual written reports and review the objectives together, determining if each was met.

Extension

Take students out to their own playground and ask them to estimate the proportions of each area. Discuss how the size of each area affects the way students use the playground. Ask students to consider the relative size of other environments, such as areas within the rooms of their home, and how that affects their use.

My Ideal Playground Design Report

Playground Area	Size of Area in fractions, decimals, and percents	Purpose of the Area Why is the area needed? How will it be used?	Audience for the Area Who will play in this area? Who will use this area?	Justifications for the Size of the Area Why is the area this big?

Note: Use additional tables if needed.

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