

## Brownies

### Description

Students use paper folding to partition a pan of brownies (a sheet of rectangular paper) into equal portions (first four, then eight, then ten) through a simple storyline told by the teacher.



### Mathematics

Partitioning to make equal-sized areas is a fundamental skill students need to build their understanding of fractions and area models. In this task, rather than use a ruler, students must find other ways to determine equal partitions and may discover paper folding is a key strategy. The ability to fold and consider both the number of folds as well as the regions created involves spatial reasoning and making predictions – both of which help students better understand fractions, proportions and how to equally partition area models.

### Curriculum Connections

Students will:

- develop understanding of fractions by sharing a pan of brownies with friends, where the whole is the pan of brownies and the fractional amounts are equal-sized regions of the whole;
- develop understanding that the number of shares affects the size of the portions – i.e., a larger number of shares results in a larger digit in the denominator which corresponds with a smaller equal-sized region.

### Instructional Sequence

1. Explain to students: “Here is your pan of brownies (outline of brownie pan on chart paper) and here is your brownie (show construction paper rectangle). You need to share the pan of brownies among yourself and three other friends (four people all together).”
2. Give students time to paper fold, or partition the brownie into four equal portions. Ask students to describe how they folded the paper to get four equal portions.
3. Ask the group to pause: “Oh no! The doorbell rang and now four more friends have shown up. They want some brownie too. Use the same size pan of brownies and share equally among eight people.” Let them know that there are extra brownie sheets if the students wish to start fresh.
4. Give students time to paper fold or partition the brownie into eight equal portions. Then ask the group to share how they partitioned the pan of brownies to get eight equal portions.
5. State the next scenario: “Oh no! Two more friends arrived, now you need to partition the pan of brownies into ten equal portions.” Remind the students that there are extra brownie sheets if they wish to start fresh. Allow them to paper fold or partition the brownies into ten equal portions. Students may need to attempt several different strategies before arriving at an appropriate solution.
6. To consolidate, ask students “What fraction of the whole pan does each person get?” and discuss how this can be counted (e.g., 1 one-tenth, 2 one-tenths, 3 one-tenths, etc. arriving at 10 one-tenths).

### Highlights of Student Thinking

Students may:

- use a range of paper folding strategies (horizontal, vertical, diagonal folds or a combination of these);
- double-check to be sure the regions are equal-sized areas;
- want to ‘start fresh’ each time they have to partition the pan of brownies;
- begin to predict what the next number might be, such as sixteenths;
- discover a halving strategy to get eighths from fourths;
- persist with developing the partitions for tenths by further partitioning the eighths;
- use creative strategies for sharing portions which may include cutting off and redistributing regions.

### Key Questions

1. How did you partition your brownies?
2. How do you know everyone got the same amount?
3. What fraction of the whole pan does each person get? What happens to the size of the brownie portions as more people arrive at the party?

### Materials

Chart paper with pan outlined same size as construction paper

Construction paper rectangles

(no rulers)

May have scissors available