

## Two-Inch Square

I need some help. We are planning a special game in our class of 22 students. For the activity each student will need a 2-inch square of paper. How many sheets of 12" x 9" construction paper will be needed to make the squares? Will there be any leftover paper?

Explain your solution with words and pictures.

**Grade Levels 3 - 5**

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### Context

This task was challenging, while at the same time, basic enough for every student to try. Since this is a problem that can easily be set up, students can explore it in several ways. Some students drew the diagram, while others actually placed two inch squares on a 12" x 9" piece of paper.

### What This Task Accomplishes

The task encourages students to organize the information given into a concise diagram. What I liked about this task was how easy it was for students that had difficulty at first, to draw the diagram. Once they used the manipulatives, they were successful.

### What the Student Will Do

Some students will use a diagram. Others may actually place squares on a piece of paper. A few may be able to do the problem without a diagram or using squares by dividing the length and width by two and determining how many squares will fit on a piece of paper. Whatever the strategy, students will most likely decide that only one piece of 12" x 9" paper is necessary. They may, however, multiply 12" x 9" and assume that 108 squares can fit.

### Time Required for Task

20 - 30 minutes

Although, some children may take longer. Those who solve the problem using an algorithm will finish very quickly.

### Interdisciplinary Links

This problem can be used with a science unit on measurement.

### Teaching Tips

#### Two-Inch Square

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# Exemplars

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I allowed students to approach this problem in whatever style was comfortable for them. Students who would otherwise become frustrated and feel unsuccessful immediately used the two-inch squares and 12" x 9" paper that was available. Once they actually handled the problem, they felt more confident to draw the diagram.

## Suggested Materials

- Paper
- Pencil
- 2-inch squares
- 12" x 9" construction paper

## Possible Solutions

One sheet of paper is needed. Students will know that some paper is left over.

## Benchmark Descriptors

### Novice

Novice One and Novice Two did not appear to understand what was required to solve the problem. They did not employ strategies or procedures that could lead to a solution. Their drawings did not relate to the problem. The explanation does not show their thinking.

### Apprentice

The Apprentice students knew what was being asked and drew the 12" x 9" paper. However, their strategies and procedures could not lead them to a successful solution. They did not place the squares in the entire area of the paper and/or did not allow for 2-inch squares. Apprentice One multiplied  $12 \times 9$  to arrive at 108 squares. Apprentice Two added  $12 + 12 + 9 + 9 = 42$ .

### Practitioner

The Practitioner had a broad understanding of the problem. The strategy of using a diagram is appropriate. The squares in the diagram are sized appropriately, leading to the correct solution. The explanation is clear.

### Expert

The Expert has a deep understanding of the problem. The diagram is accurate and shows how much paper is left over after the 22 squares are identified. The explanation is clear and effective and the mathematical terminology (rectangle) used is appropriate.