# Post Office Display

Last week I brought the stamps my class made down to the post office to hang up. Karen, the postmaster, said she had other things to display and wanted to know how much space was needed to hang up all the stamps.

If the stamps are 8 1/2" x 11" and there are 17 of them, what would you tell her? How did you come to this solution?

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**Suggested Grade Span**

3-5

## Task

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## Alternate Versions of Task

**More Accessible Version:**

A fourth-grade class designed their own postage stamps. The teacher thought it would be nice to display the stamps in the local post office. The designs are 8" x 10". There are 16 designs. There should be 1" of space between each stamp. The stamps will be lined in a row.

How long of a row is needed to display the stamp designs?

**More Challenging Version:**

A fourth-grade class designed their own postage stamps. The teacher thought it would be nice to display the stamps in the local post office. The postmaster wanted to know how much space was needed to hang up all the stamp designs. The designs are 8 1/2" x 11" and there are 17 of them. When they are displayed, they should exhibit rotational and bilateral symmetry.

Show how they should be displayed, and the amount of space the display would take up. Also show how your design reflects both rotational and bilateral symmetry.

## Context

The school I work in is in a rural area. The post office is very small and simple. The postmaster asked me if I would have my kids participate in a stamp contest and allow her to hang the stamps they made in the post office for people to see. The children created stamps on 8 1/2" x 11" paper.

## What This Task Accomplishes

This task was a much bigger problem for the children than I expected it to be. They had a tough time with scaling down the size of the stamps, with the concept of giving dimensions, and with the reality that when you hang things up you want them to look nice and usually have spaces between them. The fact that there were fractions involved as well as an odd number of stamps also added difficulty to the task. Although the children knew there were many ways to solve this, most only solved it one way because of the time factor. The task allows the children to become engaged in solving a real-life problem that involves many different math concepts such as measurement, fractions, geometry and more.

## What the Student Will Do

A surprising number of students actually put 17, 8 1/2" x 11" pieces of paper down on the floor and measured, (or attempted to measure), them. I had thought more children would have drawn a diagram using some introductory concepts about scale. In my class, this was not the case.

About half of my third and fourth graders arranged the papers in a way they thought would look good and the other half of the students did it the simplest way they could think of ... 17 pieces of paper in one row.

## Time Required for Task

4 - 5 hours

## Interdisciplinary Links

A problem of this type could easily fit into many units or activities. A practical application for it would be for hanging student work in the classroom. It could also fit into units on map skills, measurement, building or art.

## Teaching Tips

As I stated earlier, I expected this to be a straightforward task. It was not. I would suggest a couple of things to be aware of depending on what your objectives are. Depending on the skill level of your students you may want to use "friendlier" numbers such as 18 pieces of paper that are 8" x 11". The odd number of papers and the fractions caused problems for some kids. You should make sure your students have a concept of scale before doing this task or simplify the task and use it as an instructional piece to teach about the importance of scale. Children also need to know measurement skills including how to measure things that are larger than their measuring tool.

## Suggested Materials

- Graph paper of various sizes
- Construction paper
- Scissors
- Rulers
- Yard/meter sticks
- Markers
- Calculators (optional)

## Possible Solutions

Solutions will vary depending on how the student sets up the stamps.

Things to keep in mind:

- Did the student give dimensions for the space needed or just the perimeter or area?
- Did the student include spaces between the stamps? Is this important to you?
- Is the student aware that there is more than one solution?
- Did the student measure, add and/or multiply correctly?

**More Accessible Version Solution:**

If the student chooses to display the designs with the 10 inch side horizontally:

16 designs x 10 inches = 160 inches, + 15 one-inch spaces between = 175 inches or 14.583 feet.

If the student chooses to display the designs with the 18 inch side horizontally:

16 designs x 8 inches = 128 inches, + 15 one-inch spaces between = 143 inches or 11.917 feet.

**More Challenging Version Solution:**

See the solution to the original version, and assess the lines of symmetry in the student's design.

## Task Specific Assessment Notes

**Novice**
It is unclear what this student has done. There is no explanation, no solution and no evidence of a strategy.

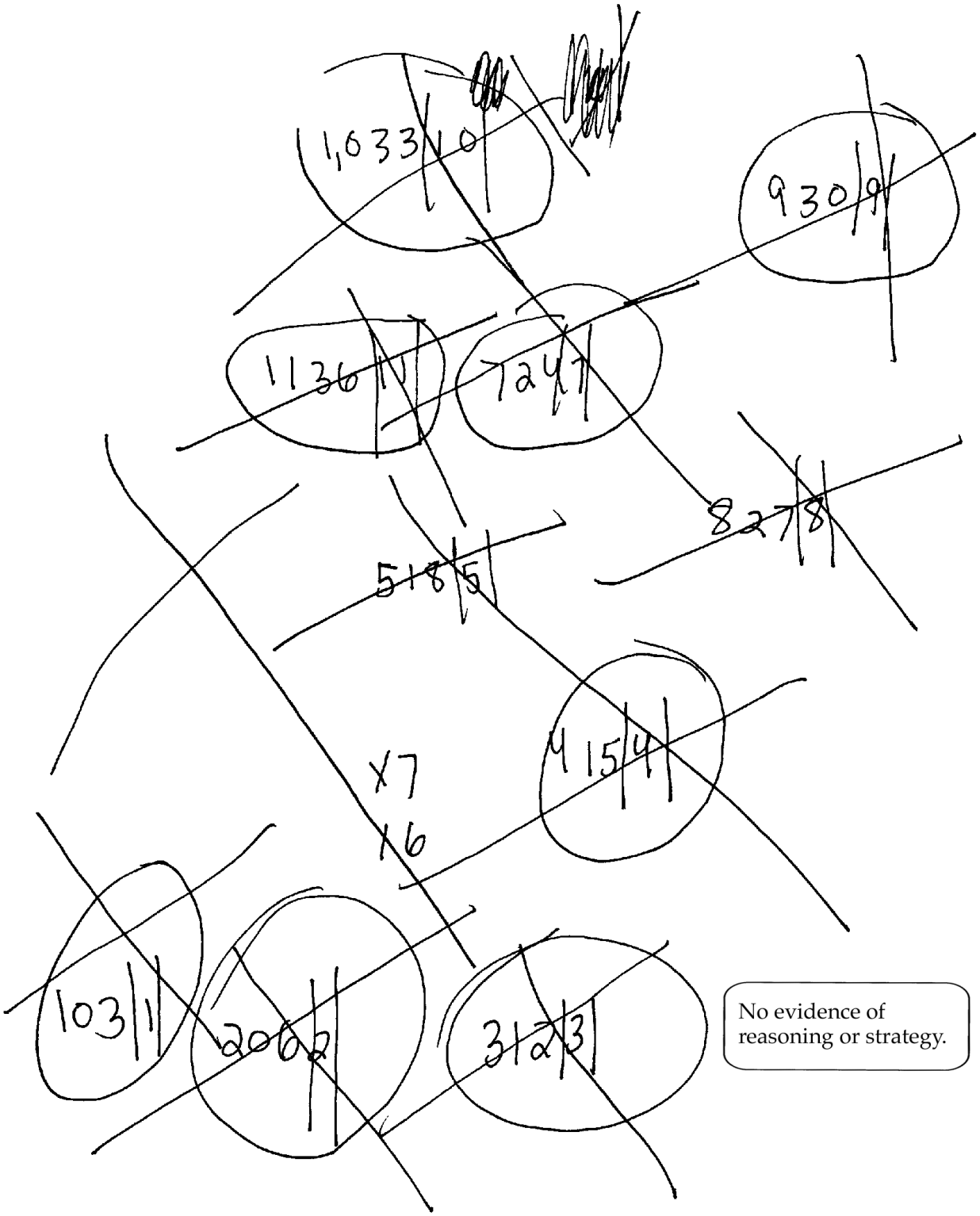
**Apprentice**
This student uses a strategy that is partially useful, which is marking off on graph paper where the stamps are. S/he then has a problem finding the dimensions for a six-sided figure. The

student also seems to understand that the sides of the stamps need to be added together, but uses the dimensions of 8" x 11" instead of 8 1/2" x 11". There is some evidence of reasoning and an attempt at using math language and representation.

**Practitioner**
This student shows a broad understanding of the problem and the major concepts needed to solve it. S/he uses effective reasoning by giving the dimensions for a rectangle with extra spaces in it. There is a clear explanation and mathematical procedures are used appropriately.

**Expert**
This student shows a good understanding of the task and verifies his/her solution. S/he acknowledges the fact that there is more than one solution to this task. This fourth grader gives a clear explanation of how the problem was solved and applies mathematical procedures correctly.

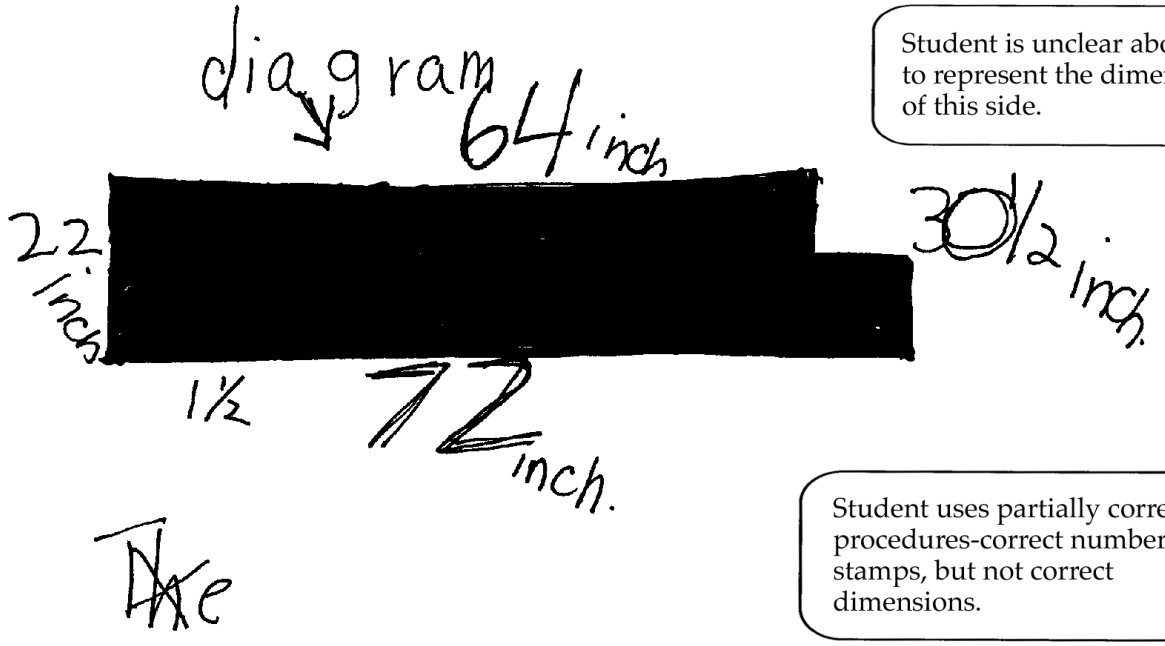
## Novice




No evidence of reasoning or strategy.

**Post Office Display**

## Apprentice




Student is unclear about how to represent the dimensions of this side.

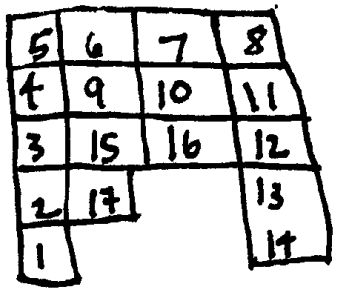
Student uses partially correct procedures-correct number of stamps, but not correct dimensions.

The bottom lower part is 72 inches The top long part is 64 inches. On the left side its 22 inches on the right side its 30 1/2 inches.

**Practitioner**

POST OFFICE DISPLAYS

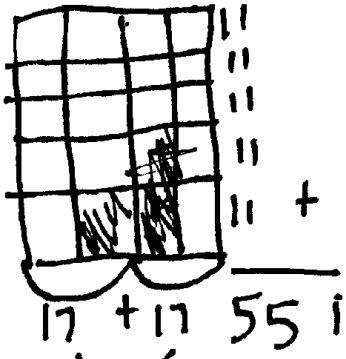
First I was going to cut out all 17 sheets out of graph paper smaller of course and evrey square equeles an inch but I thought that would bee to hard. So I took 17 sheets and spread them and measured one other side and the so on. I started to sides together but remembered that I the post offis lady I drew a new design rectangle with blank told her I needed space.




diagrahm I

(full size) out like this side and the other side and add all the then I needed to give a dimension. that was a spaces and that much

= blank




17 + 17 55 in

34 in

34 inches X 55 inches

Math procedures used appropriately to get dimensions. Note: This student did not leave spaces between stamps.

Clear explanation shows understanding of task.

## Expert

### STAMP PROBLEM

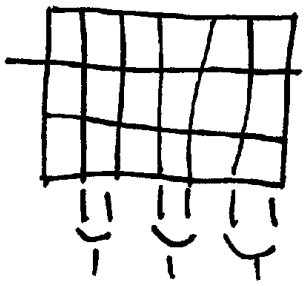
I set this problem up by cutting out representations of stamps. In order to get an even amont of papers I added a title page. This was so that i could have an easy quadrilaterl to work with. Then I just counted the boxes on the paper to get my anser.

I checked my answer by multiplyiining and adding to make sure I was right.

I chose this way because it work but there are more ways.
There is half an inch of space between the stamps horizontaily and 1 inch verticly in my solution.

1 = space

Clear explanation.



3 x 11 = 33 inches verticly + 2 inches of spaces

6 x 8 = 48 + 3 = 51 + 3

$\frac{1}{2}+\frac{1}{2}$ + $\frac{1}{2}+\frac{1}{2}$ + $\frac{1}{2}+\frac{1}{2}$

35" down

54" across

Verification of solution is efficient and sophisticated for a fourth grader.

slution = 54 by 35 inches

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## Expert


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