Flags

Find all the combinations using all 3 colors of red, blue and white in a vertical stripe pattern to see how many flags can be made this way. Each flag must use all 3 colors, but must be different from the others.

Grade Levels Pre-K-2

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Context

We were studying flags from different countries. In math we were classifying and sorting different attributes of flags. We have also been doing a good deal of work with two and three color patterns. I used the French flag as the model. I could not decide whether to give this problem or a problem that said you could use any combination of colors (you did not have to use all three colors in each flag. You could have all red or red, white, red; red, red, white; white red, red; etc.). At first I thought that the above problem (with only six solutions) would be too easy, so I gave the "any combination" problem to my students. Well, because there are 27 solutions for this problem, I found that the children did not have to think of a strategy - they just started to color flags and most times they got a different combination. Although no one found all 27, many children found at least 24. But again, I was not pleased with the problem when I asked them how they solved it and they could not come up with a strategy except guess and check. I was pleased with the more restricted problem, because I could see and children could explain an organized approach to the problem.

What This Task Accomplishes

The problem has children working with combinations. It makes some children begin to look for patterns in organizing their work.

What the Student Will Do

Some students used the guess and check strategy. They drew a flag and checked to see if that combination was used before. Other students started guess and check and then saw patterns that helped to make other combinations. Other students organized their colors by order. They found all the combinations starting with white, then blue, then red.

Time Required for Task

30 minutes

Interdisciplinary Links

Studying different countries and cultures in social studies.

Teaching Tips

Make a sheet with two rows of four blank flags in the same design as the French flag.

Suggested Materials

- Sheets of printed flags in the French flag design
- Crayons

Possible Solutions

red, white, blue
red, blue, white
white, red, blue
white, blue, red
blue, red, white
blue, white, red

(Three possibilities for the first color, then two possibilities for the second color and one possible third color: 3 x 2 x 1 = 6)

(For the other "any combination" problem described above the solution would be - three possibilities for the first color, three possibilities for the second color and three possibilities for the third color: 3 x 3 x 3 = 27)

Benchmark Descriptors

Novice
Inappropriate concepts are applied (two colors on the same flag). There is no evidence of a strategy or procedure. When asked, the student had no explanation for the drawing. The student does not appear to understand the problem.

Apprentice
The solution is not complete and the student is using a strategy that is only partially useful. There is some evidence of reasoning because they seem to start with a pattern (start with red, then blue, then white), but that breaks down and in fact the student rejects a flag that should be part of the collection.

Practitioner
This student found all six flags. The two flags at the bottom that are crossed out indicate they checked to see if there were any duplicates. When asked if they thought they had found all the flags, the student uses the rejected flags as a reason they were fairly confident that all the flags were found.

Expert

Flags

This student not only found all the flags, but also went about it systematically, first finding all the ways starting with red, then blue, then white. S/he was confident that all the flags were found using this strategy.

Flags