

## Typical Objects

Determine the typical color of the object you choose. Make a bar graph showing your results.

Then...

Choose another way in which to describe your object.

And...

Look at the recorded data and explain what you notice about the results.

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# Exemplars

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## Grade Levels Pre-K-2

### Typical Objects

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### Context

We have done class graphs several times this year. We have graphed what we had for breakfast, how we got to school, how we felt on the first day of school, how we felt on the 29th day of school (Open House) and our pets. Each time we make a graph, we analyze the data as a group by noticing which categories have more, less or the same number. We notice the difference and sum of results in each category. Last month, the children had the experience of taking class results and recording them on a graph that had the numbers and categories in place. We have done small group work organizing materials and recording results.

### What This Task Accomplishes

This task incorporates identifying, classifying, counting and recording results as well as making a graph that shows numbers and categories and noticing relationships between results.

### What the Student Will Do

Students will use the graph paper and colored markers to record the data without categories or numbers. Students will make their two different graphs on one page and compare them when analyzing the data. The Y-axis will be on either the right or the left side. Students will record all materials by color in a horizontal line. They will rearrange in different orders to show different ways of recording results (least to most, random, dark color to light color, etc.). Students will choose symbols that may or may not relate to the results. Students will find other unique characteristics to make a second graph (dirty or clean paint brushes, number of pages in the books, size, shape, amount of dots on dominoes, rounded or pointed tips of scissors, length, etc.). Students will make a graph and record their new results. Students will choose unrelated colors to show results. Students will reverse the order of numbers on the graph so that information is not immediately apparent. Finally students will accurately make a color graph, a graph based on another characteristic and make accurate statements about the results.

### Time Required for Task

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20 - 30 minutes

## Interdisciplinary Links

Science Process Skills - Organizing, sorting, classifying, observing (noticing), recording and communicating

The second part of this problem practices taking initiative and trusting one's own ideas when each student is asked to find a second characteristic of their own choice.

## Teaching Tips

Each student is given a tub of classroom materials that have four different colors and another feature/characteristic by which students could classify them. Every student's collection had the same number of four colors (six red, four blue, three black and one white or six pink, four turquoise, three yellow and one orange). I had 10 different items so that only two students had the same materials. Here are the items I chose and a possible second characteristic for the second part of the task: Legos® (shape), wooden beads (shape), multi-colored non-standard pattern blocks (shape), math jewels (length), Sunshine books with stickers to show the level of difficulty (number of pages), tiles (texture), dominoes (numbers), colored pencils (size), scissors (tip) and paint brushes (type).

I gave every student different materials so that they would have the same experience of organizing by color, but they would have to use their own idea for the second part. Even when I have only half my class for problem solving, I find that kids will listen to others communicating their solutions for ideas. I wanted to be sure that the second graph came from their own minds.

## Suggested Materials

- Legos®, dominos, paintbrushes, math jewels, tiles, books, wooden beads, scissors, multi-colored pattern blocks and colored pencils. (Any classroom materials that have four colors and at least one additional feature.)
- Other considerations would be junk boxes, blocks, plastic figures, rubber bands, etc.

## Possible Solutions

The color results will be the same in number results, but different in colors and presentation. Students will decide on their own order (dark to light, random, order they were counted, most to least, least to most, etc.)

The second graphs and the data analysis will vary greatly.

## Benchmark Descriptors

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## **Novice**

This student did not make a graph. Instead, s/he used a strategy that did not help to solve the problem that was presented. S/he did not understand what was meant by the term "bar graph". S/he counted the number of objects, recorded them with a colored mark and wrote the number. When I asked what s/he noticed about the "graph", s/he focused on his/her mistakes. When I asked again, s/he stated that there were 14 beads, which was true. The explanation is unrelated to the problem. S/he did not understand the whole problem and was unable to do the second part.

## **Apprentice**

This student understood part of the problem. S/he was able to use appropriate mathematical representation with a graph to show the number of books that have each of the colored stickers. S/he recorded one of the categories twice using orange and red. S/he chose to keep the orange and cross out the red even though the three orange triangles did not match up with the numbers on the Y-axis. Because the graph is sloppily drawn, it fails to accurately show the number that goes with the amount recorded on the graph for blue and orange. This student could not completely carry out the mathematical procedure of finding another way to categorize the books. S/he was not able to explain what s/he noticed about the results.

## **Practitioner**

This student used a strategy that led to a solution of the problem. His/her solution shows a broad understanding of the problem and the major concepts necessary for a solution. His/her explanation of the relationships between the results included effective use of mathematical terminology. Initially, s/he thought that organizing the color graph in a different way would be a solution for the second part. (S/he reversed the order of most to least in a second graph). Before s/he completed his/her second color graph, s/he realized that s/he had not chosen a different category/feature. S/he proceeded to make a third graph showing the different types of scissors, which s/he referred to as "shape". The handles were round with green rubber, oval with purple and blue handles and the third were round and silver. S/he used appropriate mathematical procedures and an accurate mathematical representation.

## **Expert**

This student showed his/her deep understanding of the problem by choosing to explain how and why s/he made a graph. His/her graph was well organized and his/her explanation was very clear. This student's refined and complex reasoning was revealed in his/her second graph and explanation; s/he chose to add up the dots on the dominos and to record the highest total in each color. S/he applied procedures accurately to correctly solve the problem and verify the results. All the steps are included in the explanation. Mathematical representation and terminology were used appropriately in the graph and in the explanation.

## **Typical Objects**