

15 MYSTERY BAGS

Introducing the Problem

Prepare fifteen small brown paper lunch bags by cutting a small piece out of one corner. Each bag should contain one of these sets of cubes:



12 pink, 12 yellow
6 blue, 6 pink, 6 yellow, 6 green
10 orange, 10 green, 4 pink
16 green, 4 purple, 4 orange
12 green, 4 yellow, 4 blue, 4 purple
16 blue, 8 yellow
8 pink, 4 green, 4 orange, 4 yellow, 4 blue
4 pink, 4 yellow, 4 purple, 4 green, 4 blue, 4 orange

8 green, 8 orange, 8 purple
20 orange, 4 pink
12 blue, 6 yellow, 6 purple
8 blue, 8 green, 4 pink, 4 yellow
18 purple, 6 orange
10 purple, 7 yellow, 7 green
5 pink, 5 orange, 14 blue

Twist the top of each bag and tape closed.

Distribute one bag to each pair and say, **Each of you has a mystery bag of 24 cubes. You are going to use probability to make predictions about the colors of the cubes in each of the bags.**

Exploring with Rainbow Cubes

1. Tell the pairs of students that they should shake their bags gently and tip them to show one cube in the hole.
2. Have the students try this several times. Have several pairs report the colors of cubes they observed.

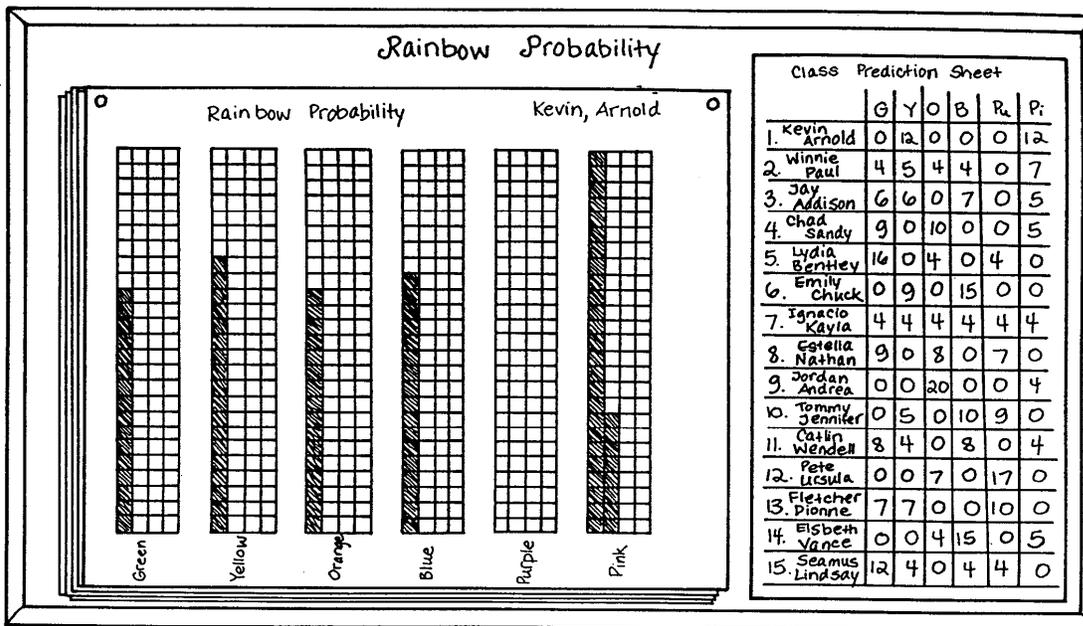
Recording the Connection

1. When students understand how to use the bags to observe the colors of the cubes, tell them to start a new count.
2. They should complete the recording sheet, shading a square each time a color is seen. Tell students to stop after a total of 100 cubes have been recorded.
3. When all pairs have completed their recording sheets, tell the students that they are going to use the graphs to predict the contents of each bag. Remind the students that each bag has a total of 24 cubes.
4. On lined paper, each pair should start their prediction sheet. First, they should write the number of cubes of each color that they think are in their own bag. Then trade graphs among the groups, giving the students several minutes with each graph to make and record a prediction.

[Source: Connections: Linking Manipulatives to Mathematics - Grade 7, ©1991 Creative Publications]

Reporting and Displaying

Let each pair present their graph, reporting the total number for each color. As a class, discuss ways to predict the contents of the bag based on the information in the graph. Let different students tell about their thinking. After you have generated a class prediction for each bag, let the pairs open their bags, comparing the actual contents with the class prediction.



Solutions and Suggestions

There are many ways to predict the contents of the bags based on the graphs. Encourage diversity of thinking by allowing plenty of time for pairs to discuss ideas that can then be discussed as a class.

Many students will use mental arithmetic and estimation to predict the contents. This is a valid strategy. Keep the charts and use later as a data source for teaching a method for computing the probable contents. For example, if 25 trials out of 100 are blue, it is probable that 25% of the cubes are blue – 25% of 24 is 8.

Discuss why the actual contents often vary slightly from the predicted contents. Can a better prediction be made after 50 trials or 100 trials? What would happen after 500 trials?

For additional activity ideas, see *Probability Jobcards: Junior High*, Creative Publications, Catalog Number 10527.

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