Picturing Probabilities of Number Cube Sums

Math Concepts

- whole numbers
- angle measure
- fractions
- circles
- decimals
- perimeter
- ratio
- area
- proportion
- sample space
- multiplication
- probability

Materials

- TI-15 Explorer™
- **Picturing Probabilities of Number Cube Sums** recording sheets
- data from **Analyzing Number Cube Sums**
- number cubes
- rulers
- linking cubes
- large paper
- protractors
- pencils

Overview

Students will use ideas of ratio and proportion to investigate various ways to make a circle graph. The graph will display the probabilities of the different sums that can be generated with two number cubes.

Introduction

The **Analyzing Number Cube Sums** activity on page 119 should be completed before beginning this activity.

1. Show some examples of circle graphs from newspapers and magazines, and discuss them with students.

   Examples:
   Talk about what the sections represent, comparisons of sizes, the visual impressions they give that are different from bar graphs, and so on.

2. Have students use the probabilities they found in **Analyzing Number Cube Sums** on page 119.

3. Have students represent the 11 different sums (2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12) in their data with different colors of linking cubes.

   Note: Linking cubes usually come in ten colors. You can place a sticky dot on one of the colors to distinguish it as the eleventh color. Students will need 36 cubes to represent the 36 possible outcomes of tossing the two number cubes.

Picturing Probabilities of Number Cube Sums

(continued)

Introduction (continued)

Example:
Students will need one red cube to represent the one way to get a sum of 2, two blue cubes to represent the two ways to get a sum of 3, three green cubes to represent the three ways to get a sum of 4, and so on.

4. Have students join all the linking cubes, keeping the same colors together, into a long bar. Then have them join the ends of the bar into a "circle" and place the "circle" on a large sheet of paper.

   Note: Students may have to lay the bar on a table, allowing a few breaks in the bar to get it to form a circle. Or, the linking cubes with the hole through them can be strung on a string.

5. Have students sketch a "circle" around the inside of the linking cubes, estimate the center of the circle, and mark sections of the circle by drawing lines from the center to the circumference to show the number of cubes of each color. Remind the students to label each section. Discuss with students what these sections represent.

6. Review with students the angle measure of a circle (360 degrees), and have them work together in small groups to predict the angle measures for each section in the circle graph. Then give the groups protractors so that they can evaluate their predictions and sketch their results on the recording sheet.

   Example:

Number Cube Sum	Probability	Angle Measure
2	*1/36*	*10°*
3	*2/36*	*20°*
4	*3/36*	*30°*

Picturing Probabilities of Number Cube Sums

(continued)

Collecting and Organizing Data

While students are constructing their circle graphs and exploring with the calculator, ask questions such as:

- What does each linking cube represent?
- What part of the circle does each linking cube represent?
- How are you estimating the sizes of each section of the circle?
- How can you use linking cubes to predict the angle measure of each section?
- How can you use the fractions to help you predict the angle measure of each section?
- What should be true about the sum of the angle measures of all the sections?

How did you use the calculator to help you find the angle measures?

How can you use the calculator to help you determine whether your predictions of angle measures are reasonable?

Analyzing Data and Drawing Conclusions

After students have made and evaluated their predictions, have them discuss their strategies as a whole group. Ask questions such as:

- How did you use the linking cubes to make your predictions of angle measures?
- How did you use the fractions to make your predictions of angle measures?
- What other strategies did you use?
- What strategies did you use to determine whether your predictions were reasonable?
- What does the circle in the circle graph represent?
- What does each section in the circle graph represent?
- What advantages are there in presenting data in a circle graph?
- What disadvantages are there in presenting data in a circle graph?

How did you use the calculator to help you in this problem?

Were you able to stop using the calculator? Why or why not?

Describe a similar type of problem for which you might need the calculator more.
Example: Suppose that there had been 35 pieces of data instead of 36.

When are calculators most useful?

When are calculators not as useful?

Picturing Probabilities of Number Cube Sums

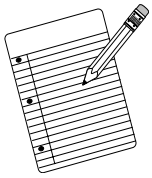
(continued)

Continuing the Investigation

Have students:

- Estimate the areas of the sections using centimeter grid paper, record the areas as fractions of the whole circle's area, and compare the area fractions with the probabilities of the sums.
- Design a plan for making a circle graph from any set of given information.

Name:



Picturing Probabilities of Number Cube Sums

Recording Sheet

Collecting and Organizing Data

Sketch your circle graph to represent the number cube sums.

Analyzing Data and Drawing Conclusions

Number Cube Sum	Probability	Angle Measure

We found the angle measure of each section by (write on the back of this page):