Favorite Activities From Marilyn Burns

to Try in Your Classroom

Probability is an area of mathematics that often doesn't get its fair share of attention in elementary classrooms. Here are some activities to get you started that involve students in thinking about probability ideas while also providing practice with mental addition, experience with strategic thinking, and the opportunity to relate multiplication and geometry. All activities are adapted from Marilyn Burns's *About Teaching Mathematics* (Math Solutions Publications, 1992).

The Game of Pig (Grades 3–8)

Math concepts: This game for two or more players gives students practice with mental addition and experience with thinking strategically.

The object: to be the first to score 100 points or more.

How to play: Players take turns rolling two dice and following these rules:

1. On a turn, a player may roll the dice as many times as he or she wants, mentally keeping a running total of the sums that come up. When the player stops rolling, he or she records the total and adds it to the scores from previous rounds.

2. But, if a 1 comes up on one of the dice before the player decides to stop rolling, the player scores 0 for that round and it's the next player's turn.

3. Even worse, if a 1 comes up on both dice, not only does the turn end, but the player's entire accumulated total returns to 0.

After students have had the chance to play the game for several days, have a class discussion about the strategies they used. You may want to list their ideas and have them test different strategies against each other to try and determine the best way to play.

Two-Dice Sums (Grades 1–8)

Math concepts: Students of all ages can play this game, as long as they're able to add the numbers that come up on two dice. While younger children benefit from the practice of adding, older students have the opportunity to think about the probability of the sums from rolling two dice.

The object: to remove all the counters in the fewest rolls possible.

How to play: Two or more players can play. Each player needs 11 counters, a game strip that lists the numbers from 2 to 12 spaced far enough apart so the counters can fit on top of each number, and a recording sheet. Here are the rules for playing:

1. Each player arranges 11 counters on the game strip and records the arrangement.

2. Once the counters are arranged, players take turns rolling the dice.

3. For each roll, all players can remove one counter if it is on the sum rolled. Players keep track of the number of rolls of the dice it takes to clear their game board.

After students have had the chance to play the game for several days or so, have a class discussion about the different ways they arranged the counters and the number of rolls it took. Have them write about the arrangements that are best for removing the counters in the fewest number of rolls. For an extension, try Which Number Wins?

Which Number Wins? (Grades 1–8)

Math concepts: In this individual activity, students roll two dice and record the results. Make a recording sheet that is an 11 x 12 block grid with the numbers 2 through 12 across the top. While young children gain practice with addition facts, older children can examine the data, compare results with other classmates, and think about why some sums are more likely than others. To do the activity, students need two dice and a recording sheet.

The object: to roll the dice and record the number fact in the correct column, stopping when one number gets to the finish line.

How to play: Post a class chart that lists the numbers from 2 to 12 and have students make a tally mark to show the winning sum. Have each child do the experiment at least twice.

After you've collected the data, discuss with the class why it seems that some sums "win" more than others. Young children may not be able to explain it, but older students often figure out that there is only one way to get the sums of 2 and 12, and six ways to get a sum of 7.

After discussing the data, return to the game of Two-Dice Sums and see if students revise their strategies. You may want to ask students to write about the game and the likelihood of two-dice sums.

How Long? How Many? (Grades 3–5)

Math skills: This two-person game involves probability and strategy, and gives children experience with multiplication in a geometric context.

The object: to make rectangular arrays with Cuisenaire Rods and place them on 10-by-10-centimeter grids until no more space is available. The game encourages students to think strategically as they consider where to place their rectangles to avoid being blocked.

How to play: students need Cuisenaire Rods, one die, and a grid sheet for each (Make a 10cm x 10cm grid. Also leave space for students to record how many of their squares are covered and uncovered.) The rules are:

1. On his or her turn, a player rolls the die twice to determine which Cuisenaire Rods to take. The first roll tells "how long" a rod to use. The second roll tells "how many" rods to take.

2. Players arrange their rods into a rectangle, place it on their grid, and trace it. They write the multiplication sentence inside.

3. The game is over when one player can't place a rectangle because there's no room on the grid. Then players figure out how many of their squares are covered and how many are uncovered and check each other's answers.

After students have had experience playing the game, talk with them about strategies for placing rectangles and figuring out their final scores.