

# Math 5 - Act. 26: Dice Sums

## Summary

The activities in this lesson focus the children on investigating the probabilities of the sums that come up when two dice are tossed.

## Materials

- Two six-sided dice (per pair of students)
- Counters or markers, 11 per student (pennies, beans, etc.)
- 2-12 number line
- Dice Sums recording sheet

## Additional Resources

*A Collection of Math Lessons From Grades 3-6* by Marilyn Burns

## Background for Teachers

Providing experience with probability for your students is an opportunity to enrich their mathematics learning. Concepts in probability are basic to a well-rounded education in mathematics and contribute to developing students' critical thinking skills. Probability activities push children to devise ways to deal with uncertainty and provide opportunities for them to formulate and test ideas. In addition, experiments in probability provide contexts in which students apply the arithmetic they are learning. Children's initial experiences with probability need to come from problem situations in which their intuition is developed. Once they sense what "should happen" in a situation, children can be challenged to test the validity of their ideas.

This lesson uses dice to model an experience with probability that is appropriate for children in the elementary grades. It builds on children's informal experience with dice. Students are taught to play a game with two dice and then are asked to devise a winning strategy for it. The activities in this lesson focus the children on investigating the probabilities of the sums that come up when two dice are tossed.

## Intended Learning Outcomes

- 3. Reason mathematically.
- 6. Represent mathematical situations.

## Instructional Procedures

### Invitation to Learn

Hold up two dice. Ask students what they know about them. Say, "If I roll two dice and figured the sum of the dots that come up, what is the smallest sum I could get?" Write 2 on the board. Ask, "What is the largest sum I could get?" Leave a space and write 12 on the board. Then ask, "What about 3? Is a sum of 3 possible? How could you get it?"

Continue in this fashion for 4, 5, 6, and the rest of the numbers up to 12. Say, "Let's see how many possible sums there are." Together count the numbers from 2 to 12 that you have written on the chalkboard to see that there are eleven sums possible from rolling two dice.

### Instructional Procedures

Tell students you are going to teach them a game to play with two dice called Dice Sums.

- Students play with a partner.

- Partners will need 11 counters and a 2-to-12 number line.

- Have students arrange their counters on their number line. They can do this in any way they wish: one counter per number, all counters stacked on one number, or counters grouped in any

way they would like.

Once all teams have placed their counters on the number line, the teacher rolls the dice and calls out the sum of the dice.

If they have a counter on that number, they remove it. For example: If you roll an 8 and they have a counter on 8, they remove the counter from the number line. If they have more than one counter on 8, they only remove one counter per roll.

The idea is to be the first team to remove all their counters. Encourage students to talk with their partner about how they would like to arrange their counters to be the first team to have them all removed.

Students are not allowed to re-arrange their counters once the game begins.

As the game is played, ask students what numbers they are waiting to be rolled. Discussion should take place during the game about numbers that were “good” ones and numbers that did not come up as quickly.

Play the game again and this time have students record where they placed their counters so you can discuss which sums seem to be coming up more often than others. When you get a winner, ask winners to report their winning arrangement.

Hand out additional number lines and two dice to each pair of students so they can play the game with each other. Encourage them to discuss their arrangements to see what they can learn.

### Curriculum Integration

Math/Science—Dice Shakers: Students can create their own dice shaker to use during this unit.

Collect empty paper towel or toilet paper tubes. Cut the paper towel tube to the appropriate size. Have students cut circles from construction paper large enough to cover the bottom of the tube. Tape construction paper circles to the bottom of the tube before covering the sides of the tube. Have students use construction paper to cover the outside of the tube, and then decorate the tube with drawings, constructions paper cutouts, etc. Students now have their own personalized shaker to use when playing dice games

Read *Jumanji* by Chris Van Allsburg. The story begins when Judy and Peter find a board game in the park. They take it home, hoping to alleviate their boredom. One live lion, an erupting volcano, and a dozen destructive monkeys later, the children are no longer bored. Their jungle adventure game has come to life! Readers will tremble along with Judy and Peter, urging them to roll the dice that will plunge them from one perilous predicament into another.

### Extensions

#### Possible Extension/Adaptation

After students have played for a while, have them try a different, but related activity. Give each student the Dice Sums worksheet. Have them roll the dice and record the sum with an X in the proper column. Model this for students. Explain to students that they will continue to roll the dice and record an X in the proper column until one sum reaches the bottom of the column. Then record which sum reached the finish line first on the class chart. Students may complete more than one Dice Sums sheet while waiting for others to finish.

When most students have had time to extend the game with the tally sheet, call class together to discuss results.

Possible discussion questions:

Which number comes up most often? Why do you think this is so?

Lead students to discuss how many ways there are to arrive at each sum. For example: There is only one way to get 12: a six and a six. There are several ways to get 7: a three and a four, a five and a two, a six and a one, etc.

Ask students to think about how they would now arrange the counters to try to win the game. Leave

materials out for as long as there is interest in the game. This will give students a chance to solidify their strategies for winning the game; hopefully understanding that some numbers come up more often than others for very good reasons.

#### Homework & Family Connections

Teach the game to someone at home. Have that person write a description of what they have learned and their thoughts about the game. Share their writing with the class the next day.

#### Assessment Plan

Students write a description of the arrangement they would use explaining why they made their choice.

Have students write what they have learned from playing the game.

#### Authors

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