



## Using Dice in Classrooms to Promote Math and Probability Skills

### Lesson Plans

*Recommended Grade Levels:* 2<sup>nd</sup> grade and up

*Subjects Enhanced by Play:* Math

*Applicable Concepts, Skills and Strategies:* Familiarity working with monetary amounts, probability skills, multiplication of single digits, identifying fractions, cooperative teamwork and self-confidence

*Objectives:*

Students will use the numbers indicated by dice to hone important math skills.

*Components:*

- Classroom lessons
- Worksheets

*Materials needed:*

- Dice with pips
- Sale flyers from a grocery store
- Scratch paper and pencils

Warm up:

Familiarize students with the dice. Tell them what pips are (the dots on each side of the dice) and ask them to observe the numbers the pips represent (count them). Each die has six sides with numbers one through six on the sides. Let them roll the dice and see how different numbers come up each time. Ask if they ever play with dice or if they have any games with dice as components. Talk about the roll dice plays in games. Do they indicate to players how many spaces to move? Are they used for adding up and scoring points? Have students seen dice that look different from these, such as colored dice or numbered dice? Point out how dice are fun in games and fun to roll, even fun to stack. And point out how dice can help us learn and think. If they play a game rolling dice and have to decide which way to move on a path, count out their spaces or rack up points, that is all math and logical thinking. Are they surprised that dice are associated with math and learning?

Activities:

### 1. Multi-play-cation

Create groups of about 5 students and give each group two dice. Also give each group the Worksheet from below. Remind your students about the Times Table and point out that this one ends at sixes because the numbers on dice only go up to 6. Make sure each group has a pencil to write on the sheet. Ask the students, when you say go, to take turns rolling the two dice. With each roll, they are to multiply the two numbers and write the answer on the sheet in the correct square of the grid. They should work together as a group, and may only fill in squares of dice they roll. If they roll a set of dice they have already filled in the sheet, they can try again. They keep going until a group gets their grid completely filled in and raises their hand. Check the sheet, and if the group has filled it in correctly, they win! You may want to offer a prize of some sort to the winner.

## 2. Show Me the Money

Collect several sales flyers from your local grocery store. Break students up into small groups and give each group a sales flyer, three dice and a copy of the worksheet below, and be sure they have pencils to use. Explain that they will be shopping for one item at a time. First, they roll their three dice and put them in monetary form. For example, if they roll 2, 4 and 5, they can make that \$2.45, \$4.25, \$2.54, etc. They write down the amount on the worksheet. Then, they look through the sales ad to find an item that they could afford to buy with that amount and write that item on the worksheet, along with its price. They then do the subtraction off to the side and write the amount of change they would have in the space on the worksheet. So, if they have \$2.45 and want to buy chocolate milk for \$1.99, they do the math and find they have \$.46 in change. They can decide as a team how to arrange the dice numbers for an amount, and what to buy, but they should take turns figuring out their change. Once everyone has filled out their worksheets, ask them what they bought at the store. If you want, you may ask them to add their change from all five purchases and see who came out on top!

## 3. $\frac{1}{2}$ Fun, $\frac{1}{2}$ Educational

Give each student two dice (or break students into small groups and give each group two dice). Each student or group should also have paper and a pencil. Ask them to roll the dice one at a time. The first die rolled will represent a numerator, and the second die rolled will be the denominator. Remind students that the numerator is the top number and the denominator is the bottom number. Ask them to write the fraction on a piece of paper and then draw it. You may ask them to specifically use a circle each time, and draw and shade in sections, or you may leave it up to them which shape or image to draw. Have them do this multiple times. If in groups, perhaps try it enough so each student has a turn.

## 4a. Probability Play

Give each student one die and a copy of the worksheet below. Be sure they have a pencil to work with. Ask them to roll the die 40 times and mark a tally under that number on their sheet each time it is rolled. After the 40 rolls, ask them to add the tallies and discuss which number was rolled the most. Why do they think those numbers showed up the most? Discuss probability and why each number has an equal likelihood of being rolled.

#### 4b. Probability Expanded

Continue using the same worksheet as above, and ask students to roll their die nine times and record their numbers in the first row on the sheet, as they roll. Then, in the second row, put those same numbers in numerical order. Ask them to figure out the Median, Mode and Range for the numbers. The worksheet has the definitions of those terms if students forget.

#### 5. Creativity

Ask students if they can make a game out of the dice. Encourage them to think about how they would play the game, and what rules there would be. Ask them to jot down their rules. You may ask students to try this individually, or have them work in groups to promote teamwork and collaboration. Each week, one student or group can demonstrate their game to the class and students can try playing the game. The student or group that developed the game may see problems to fix or improvements to make once everyone has tried playing. Talk about the process and how problem-solving is a part of life. How did they identify any problems or improvements needed? What did they do to make it better? Why did they want to make it better? Talk about taking pride in their work and the desire to do the best work possible.

#### 6. At Home

If you like, you may give each student a set of dice to take home. Encourage them to play games at home with their family and friends and tell you about the games they play. Ask them if math now seems a bit more fun!

Worksheet to accompany activity #1.

	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

Answer Key to #1

	1	2	3	4	5	6
1	1	2	3	4	5	6
2	2	4	6	8	10	12
3	3	6	9	12	15	18
4	4	8	12	16	20	24
5	5	10	15	20	25	30
6	6	12	18	24	30	36

Worksheet to accompany activity #2.

1. Amount rolled with dice \_\_\_\_\_

Item to purchase \_\_\_\_\_

Price of item \_\_\_\_\_

Change after purchase \_\_\_\_\_

2. Amount rolled with dice \_\_\_\_\_

Item to purchase \_\_\_\_\_

Price of item \_\_\_\_\_

Change after purchase \_\_\_\_\_

3. Amount rolled with dice \_\_\_\_\_

Item to purchase \_\_\_\_\_

Price of item \_\_\_\_\_

Change after purchase \_\_\_\_\_

4. Amount rolled with dice \_\_\_\_\_

Item to purchase \_\_\_\_\_

Price of item \_\_\_\_\_

Change after purchase \_\_\_\_\_

5. Amount rolled with dice \_\_\_\_\_

Item to purchase \_\_\_\_\_

Price of item \_\_\_\_\_

Change after purchase \_\_\_\_\_

Worksheet to accompany activity #4a and 4b.

Name \_\_\_\_\_

4a.

Number	1	2	3	4	5	6
Tally						
Total	=	=	=	=	=	=

4b.

Numbers rolled									
Numerical order									

Mean =

Median =

Mode =

Range =

The **mean** is the average of the numbers (add them up and divide by how many numbers there are). The **median** is the middle value. The **mode** is the number that is repeated more often than any other. The **range** is the highest to lowest number.