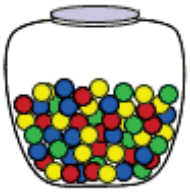
3.3 Dice Probability Game

Session 3



Grade Levels: 3+

Duration: 60 minutes (30 minutes for Activity 1; 30 minutes for Activity 2)

Overview of Activity/Lesson Plan

Activity 1: Dice Probability Game

Probability is the chance that something will happen - how likely it is that some event will happen. In this activity, players randomly place counters on the numbers 2-12 on a number line. They may place multiple counters on some numbers, while leaving others blank, or they may place one counter on each number. Players then roll two dice, add their face value, and remove counters from that value, if a counter is present. A frequency chart of all dice sums is kept, and the game is repeated 3 times. Players then review their frequency charts to see if any recognizable outcome is evident. Based upon their conclusions, players strategize where the optimum locations of the counters should be placed. The game is played for a fourth time, and the player who removes all of his/her counters from the number line first, is declared the winner.

Activity 2: Graphing Activity

Players will use data from their frequency charts to create a bar graph illustrating the frequency distribution of their data.

Learning Goals:

- To provide students with a hands-on and cooperative learning experience in the process of collecting, analyzing, and interpreting data, and to improve decision making skills through the use of probability exploration.
- To investigate probability, practice addition, and develop number sense and use probability terms.

Outcomes to Look For:

- Student engagement and participation in the probability game activities.
- Comments and answers that reflect a developing understanding and confidence in the recognition of patterns and outcomes resulting from experimental data collection.

Adapted from mathwire.com: M&M Probability Game

Background: Sum of two dice

The Dice Probability Game allows players to simulate throwing pairs of dice and observing the results. This is a good introduction to probability, since players will eventually see which combinations are most likely to occur. There are 36 of them in all (6 x 6).

Total on dice	Pairs of dice	Probability
2	1+1	1/36 = 3%
3	1+2, 2+1	2/36 = 6%
4	1+3, 2+2, 3+1	3/36 = 8%
5	1+4, 2+3, 3+2, 4+1	4/36 = 11%
6	1+5, 2+4, 3+3, 4+2, 5+1	5/36 = 14%
7	1+6, 2+5, 3+4, 4+3, 5+2, 6+1	6/36 = 17%
8	2+6, 3+5, 4+4, 5+3, 6+2	5/36 = 14%
9	3+6, 4+5, 5+4, 6+3	4/36 = 11%
10	4+6, 5+5, 6+4	3/36 = 8%
11	5+6, 6+5	2/36 = 6%
12	6+6	1/36 = 3%

It should be emphasized that the “real world” never exactly matches with calculated probability. The players’ results will often closely match the calculated probabilities, but may not exactly match them. Chance is always a factor.

Extension:

- Ask players to define probability (the likelihood or chance that a given event will occur) and if they can give an example of a probability event.
- Name professions that use probability to predict outcomes of events. Some examples are: meteorologists, environmental scientists, financial advisors, health care providers, industrial risk managers, insurance agents, etc.

Instructions

ACTIVITY 1: DICE PROBABILITY GAME **Players: individual**

Materials:

- 2 dice per player
- Frequency Tally Sheet Template, placed in sheet protector (1 per player)
- Counters (11 per player)
- Number line from 2-12 (1 per player)
- Expo Vis a Vis wet erase markers (1 per player)
- Damp paper towel or napkin for erasing frequency chart at the end of play (1 per player)

Procedure:

- Distribute materials to each player.
- Let players place each of their counters on top of any number on the number line. Players may place more than one counter on a number, may leave some numbers uncovered, or may cover all eleven numbers with a counter. All of the counters must be placed on the number line before the game can begin.
- The game begins by each player rolling their dice, and adding the two dice values together.
- Players respectively locate that number on their Frequency Tally Sheet, under the “Round 1” column, and place a “tally mark” next to that number. If a player has placed a counter on that corresponding number on the number line, the player removes the counter from their number line and sets it aside.
- Players continue to roll the dice, tally the sum of the dice on their Frequency Tables and, when possible, remove the counters from the number line until no more counters remain on that number line. The round is not over until all of the players remove all of their counters from the number line and complete the “Round 1” column in the Frequency Table. Round 1 is then officially finished.
- Players continue to play 2 more rounds of the game, exactly as they did in Round 1.
- After Round 3 has been completed, players examine their data in their tally table, then strategize as to where they will place their counters for the fourth round of play, based upon the results of the first three rounds of play.
- Players resume playing Round 4, and continue to fill in the frequency table as they play. The player who is able to remove all his counters from the number line first during round 4, is declared the winner.

ACTIVITY 2: FREQUENCY BAR GRAPH **Players: individual**

Materials:

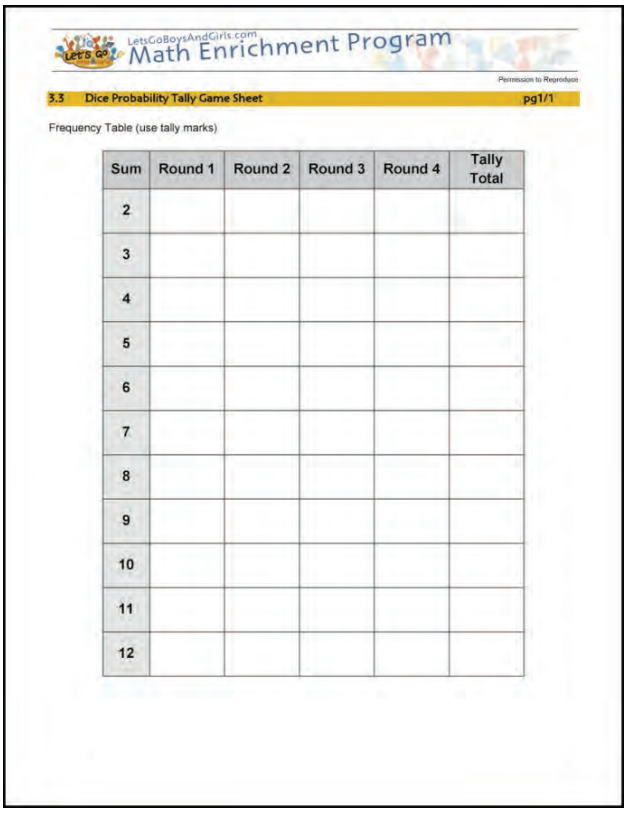
- Expo Vis a Vis wet erase markers (1 per player)
- Damp paper towel or napkin (1 per player)
- Bar Graph Template (1 per player)

Procedure:

- Distribute materials to each player.
- Have players create a bar chart from their frequency data tally sheet in Activity 1 in order to visualize how certain sums appear more frequently than others.
- Discuss the benefits of using a visual representation (bar graph) of results versus the “Tally Table”.
- Ask students to wipe off all templates, and collect materials.

Sample Setup for 3.3 Dice Probability Game

Reproducibles for 3.3 Dice Probability Game



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3.3 Dice Probability Tally Game Sheet pg1/1

Frequency Table (use tally marks)

Sum	Round 1	Round 2	Round 3	Round 4	Tally Total
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12