

Treats in a Basket Teacher Worksheet

Introduction and Learning Goals

Treats in a Basket is designed to encourage students to experiment with probability. It will motivate students to learn about the subject in order to win the most treats. It should be played by students who are already comfortable with fractions. Students should also be familiar with calculating probabilities. This game can be played at multiple levels and will be appropriate both for students beginning to grasp probability and those who are comfortable with the topic. Treats in a Basket falls into the NCTM standard grade 6-8 category.

Set Up

The teacher must supply:

1. One game piece per player (*best if the pieces are small baskets/buckets*)
2. One die per group
3. One copy of the game board per group
4. At least three treats per player **

**The treats belonging to each player should be distinguishable from the treats belonging to the other players in their group. Colored pebbles/paper bits or small pieces of foods for each player are options. We recommend that students play in groups of two or three.

Pre-game lesson suggestions:

Before playing discuss the following topics as needed:

1. Numerator and denominator
2. Fraction addition
3. Definition of probability (fraction consisting of the number of cases with a specific outcome divided by the total number of cases)
4. (*Optional*) You may also want to students to practice calculating probability by doing an activity involving flipping coins. For example, find the probability of getting two heads in a row, or 10 heads in a row.

During the Game

Student should play in groups of 3-4.

After students play the game a few times, tell them to answer questions 1-4 on the worksheet.

Discuss the answers to the questions as a class. At this point, students may have developed some intuitive understandings that some board squares get landed on more than others so placing treats on those squares yield a higher probability of getting the treat.

Show the table worksheet and explain that students will complete it to show the probability of landing on each of the board squares after 1 roll, after two rolls, and for an optional challenge, after three rolls. Students may need some support to complete this table, depending on their ability and experience with counting outcomes and compound probabilities. You may want to have students create a table to show all the possible two roll combinations:

+	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

The optional third roll column is challenging because students need to visualize two cases – one in which it takes three rolls to get to a particular number without looping past twelve, and one case in which the three rolls to get to a particular number involves looping (going around past 12). For example, there are 9 ways to get to the number 4 square using three rolls. You can have rolls of (1, 1, 2), (1, 2, 1), (2, 1, 1), which are the only three ways to get to square 4 without looping. Note that each of these sets of dice rolls add up to 4. These outcomes are highlighted in the above table in yellow (all the 2 roll outcomes that can take a 3rd roll to get to square #4). There are 6 ways to get square 4 that involve looping. A few examples are (4, 6, 6) and (5, 5, 6). Notice that all of these would add up to 16. On the table above, these outcomes are highlighted in green (all the 2 roll outcomes that can take a 3rd roll to get to square #4 by looping).

Wrap up

Discuss what the students have learned about probability. Was knowledge of probability useful for winning this game? Why or why not?

Treats in a Basket Rule Sheet

Welcome to Treat Land!!!

- Each group gets a game board and one die
- Every player gets a game piece and 3 treats.
- Everyone places their game piece at GO and chooses three different squares on the board to place their treats. Going around the circle, each player rolls the dice and moves their game piece forward the number of spaces given. If you land on a square that contains one of your treats, pick it up and put it in your basket!
- Whenever you pass GO, you have the chance to rearrange your treats on the board. If you choose to place a treat on the square you just landed on, you can't collect the treat. Whoever collects all of their treats first wins!!!

Hint: Try to choose the squares that you that you will land on with higher probability



Treats in a
Basket

GO!

Directions:

For each square on the game board, calculate the probability that you would land on the square after rolling your dice once, twice, and (optionally) a third time. Then sum up your values across the row to get a total value of the probability of landing in a space given 3 chances to roll.

Treat Position	1st Roll	2nd Roll	3rd Roll (optional)	Total
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Treats in a Basket Worksheet (**Answers**)

Questions:

- 6) On which squares did you originally place your treats? Why did you choose those squares?

Answers will vary

- 7) Did you move your treats over the course of the game? Where were the best squares to have your treats? Why do you think that is?

Answers will vary

- 8) If you only have one roll, where would you place your treats? Why?

Any position between 1 and 6 would work since they are all $1/6$ probability

- 9) If you only have two rolls, where would you place your treats? Why?

Positions 6, 5, and 4 have the highest probabilities (in that order).

Treats in a basket is a game of probability. Probability is the likelihood that something will happen. You can increase the likelihood that you will collect a lot of treats by placing your treats on squares with a high probability of being landed on.

- 10) Fill out the chart on the attached sheet. What conclusions can you draw from the chart about where to place the treats?

Positions 6, 5, and 4 are the best places to put your treats!

Directions:

For each square on the game board, calculate the probability that you would land on the square after rolling your dice once, twice, and (optionally) a third time. Then sum up your values across the row to get a total value of the probability of landing in a space given 3 chances to roll.

Treat Position	1st Roll	2nd Roll	3rd Roll (optional)	Total
1	$1/6$	$0/36$	$21/216$	.26
2	$1/6$	$1/36$	$15/216$	.26
3	$1/6$	$2/36$	$11/216$	.27
4	$1/6$	$3/36$	$9/216$	.29
5	$1/6$	$4/36$	$9/216$	.32
6	$1/6$	$5/36$	$11/216$	.36
7	$0/6$	$6/36$	$15/216$	.24
8	$0/6$	$5/36$	$21/216$	.24
9	$0/6$	$4/36$	$25/216$	.23
10	$0/6$	$3/36$	$27/216$	.21
11	$0/6$	$2/36$	$27/216$	.18
12	$0/6$	$1/36$	$25/216$	.14