

## AFTERSCHOOL TRAINING TOOLKIT

### Math Games

#### What's the Chance?

Have you ever wondered if games are fair? Here is a chance to play a game based on probability, and learn how to determine your chances of winning the game.

**What's the Chance?** is a game based on probability. Play this game with a partner. In order to play, you will need to use a game board that looks like this, a marker, and an even-sided number cube or die:



How to Play:

- Begin by placing the marker on the center box, labeled 1 Start Here.
- Player 1 begins by rolling the die. If an even number is rolled, the marker is moved one space to the right; if an odd number is rolled, the marker is moved one space to the left.
- Each player's turn consist of three rolls of the die and the corresponding marker moves.
- **At the end of a turn** (three rolls of the die), a point is scored by one of the players. If the marker ends on an orange box, Player 1 receives a point. If the marker ends on a blue box, Player 2 receives a point.
- At the end of each turn, return the marker to the 1 – Start Here box.
- Players alternate turns.

A game consists of 5 turns for each player. The player with the most points is the winner.

**Before you begin**, think about whether the game appears to be fair. Why do you think so? Who do you predict will win?

You might want to use a table like the one below and tally marks to keep track of points. Play at least 10 games to see if any patterns emerge. Your Game 1 row might look something like this, where Player 1 is the winner:

	Player 1	Player 2
Game 1		

	Player 1	Player 2
Game 1		
Game 2		
Game 3		
Game 4		
Game 5		
Game 6		
Game 7		
Game 8		
Game 9		
Game10		

**Questions:**

1. Based on your experimental data, do you think the game is fair? Why or why not? If you think the game is unfair, how could you modify the game to make it a fair game?
2. Create a list of all the different possible outcomes for Players 1 and 2. For example, EVEN, EVEN, ODD is one possible outcome, and Player 2 would win.
3. What is the theoretical probability of Player 1 winning a game? How about Player 2 winning a game? Use a list or tree diagram to help you decide.
4. How does the theoretical probability compare to the experimental probability (your results from actually playing the game)? Explain why the experimental results might be different than the theoretical probability.

## Extension Activities

**Part 1.** Add one square on either end of the game board, so that it looks like this:

2	1	1	2	1 Start Here	2	1	1	2
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Play the game as described above. However, each turn consists of 4 rolls of the die. A game is still 5 turns for each player. Players alternate turns. If the marker lands on an orange box, Player 1 scores a point. If the marker lands on a blue box, Player 2 scores a point. At the end of the game, the player with the most points is the winner.

Before you play the game, predict who you think will win the most games. Why do you think so?

Play 10 games, and record your results.

Questions:

1. Based on your experimental data, do you think the game is fair? Why or why not? If you think the game is unfair, how could you modify the game to make it a fair game?
2. Create a list of all the different possible outcomes for Players 1 and 2. For example, EVEN, EVEN, ODD, EVEN is one possible outcome, and Player 1 would win.
3. What is the theoretical probability of Player 1 winning a game? How about Player 2 winning a game? Use a list or tree diagram to help you decide.
4. How does the theoretical probability compare to the experimental probability (your results from actually playing the game)? Explain why the experimental results might be different than the theoretical probability.

**Part 2.** Create your own game, based on ideas similar to *What's the Chance?*