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Why Learn Math Competition Final

The Math Behind the Money-Monopoly

The money is dealt. The pieces are distributed. With a flick of the wrist, the dice are sent rolling onto the board, determining the fate of the lucky player up first. The game has begun. I find myself in a tight battle for the win against my opponent. The game might not always appear to be a close one, but a cunning investment or a glance in a wayward direction may put the game to an end. You must always be on watch. I'm constantly calculating the odds in my head. In the end it's the player who has the best strategy that steals the win. Luck is a minor contributing factor. If you want to win at the game of Monopoly, you simply must be good at math. In fact, in order to just *play* the game of Monopoly you have to be able to do basic grade school math. So, how *does* being math "savvy" assist you in this fast paced, intense, nail-biting game? To answer this question, you must travel back into the bowels of your logical left brain.

Being capable of doing basic math calculations in your head is essential to Monopoly, as is true of the real-estate marketplace in real life. Except in Monopoly, there is no Excel spreadsheet. Instead you are required to be on top of the math so if someone cheats you out- you will be able to know instantly. For example, the Banker in Monopoly is the player that deals with the most basic computation. The Banker continuously deals with the exchange of money (mainly calculating change using subtraction). However, the Banker isn't the only player that deals with basic math in Monopoly. The regular players perhaps deal with the same level of basic math as the Banker (maybe a little less frequently), but also have to handle even harder math such as trading, mortgaging, income tax, rent, buying, and selling. With these operations, you are expected to know how much to pay, and who to pay. All of these aspects of math go back to being able to make change. Say that you demand that a player pays you $18 for landing on your property-Kentucky Avenue (with no houses or hotels). Your opponent can only lend you a $20. In order for the exchange to be fair, you must give your opponent $2 back. In most cases, the change is more complicated than that. Multiplication and division come into play when simply dividing money among multiple people, or when you land on a utility and must pay either 4 or 10 times the amount shown on the dice depending on it the owner owns both utilities. When configuring income tax, the space on the board asks that you pay $200 straight, or 10% of your total amount of money. If you take the 10% route, multiplication is necessary. As a general rule you can say that if you have over $2000, you should pay $200 (because $200 becomes a smaller percent of a larger sum of money), and if you have under $2000, you should pay 10%. (If you have $10, would you rather pay $1, or go into debt with $200?) Obviously, whether you are a math major, or a 5^{th} grader, you can play Monopoly, as long as you have basic math nailed.

Another component of math in Monopoly is probability and risk taking. Unlike simple computation, probability deals with a more complex idea. The solution isn't always a black or white answer-it is in fact often a grey one. As a player, many questions will arise throughout the game concerning probability such as: Do I buy this property? How high should I bid during this auction? Do I accept this deal with my opponent? What are my chances of rolling doubles in order to get out of jail without paying? Let's take the property question for instance. Several factors contribute to your choice in buying a property such as whether or not the property is landed on frequently, how expensive it is to build on, when you will want it during the game, and how much money you will actually accumulate from it. Using probability we can see that the dark purple monopoly of Baltic and Mediterranean are one of the least landed on, are inexpensive to build, and you will only start to redeem your money from them once they have a considerable amount of property on them. With no buildings on the dark purples, you will receive 5 cents (%) on average per rent for every dollar put in to buying the property. Although with hotels, you will receive 56.5 cents (%) under the same circumstances. With hotels then, you would start making money off of the property on the second rent. It's all about the relationship between the cost of the property and the rent, similar to a basic system of equations. Using the probability of getting a certain roll on the dice with the added factor of where you are on the board determines how often a player will land on property. The dark purples aren't landed on much because many chance and community chest cards instruct a player to go directly to "GO" and since the dark purple properties are 1 and 3 spaces away from "GO", the odds of rolling a 3 are about 6% and it's impossible to roll a 1. Consequently, probability is the reason why Monopoly is so challenging. It influences our decision making abilities and will determine the winner of the game.

The more that I play Monopoly, the more I realize that the statistics about it don't lie. I can see the truth in the numbers. Most importantly, I see Monopoly as a way to enjoy math and to practice it in a creative and challenging way-which is why Monopoly has stood the test of time to become one of the most classic and popular games.

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Citations

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