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7th Grade Math

Ratios and Proportions: An unnoticed tool

Ratios and proportions are two different mathematical expressions that have been around for thousands of years. Archimedes used ratios to find his estimation of pi, which he estimated to be $\frac{22}{7}$. Pi is the ratio of a circle's circumference to its diameter. Ratios and proportions are crucial to math, and so many other fields as well. A ratio is a tool that compares two numbers, comparing either a part to a part, a rate, or a part to a whole. A proportion compares two equivalent ratios. These expressions are things people use constantly, but most of the time people don't notice it because it feels normal, or because they don't recognize the mathematical aspect of their thoughts. To some people, the math aspect seems daunting, yet they use the expressions everyday. For example, comparing two prices is using ratios and proportions. Ratios and proportions definitely have a prominent place in many aspects of our lives, some of which people don't even notice.

People use ratios and proportions everyday. Any sports fan who talks about stats uses ratios. Tipping people requires ratios, as does shopping, and design. Three bananas for a dollar? That's a ratio. Ratios and proportions aren't only used by mathematicians or people in a professional environment, they're used by normal people everyday. Although this is true, ratios and proportions are used in work environments. For example, a doctor could give a ratio for a diet or a ratio of medication you need to take, which is important to people's health. Cooking is

an example that goes both ways. Employed chefs and your average home brownie maker both need to be able to scale things up and down. As Sherry Yard said, “In baking, cooks need to understand ingredient ratios.” To put this in context, imagine somebody is making a cake that needs three eggs to feed twelve people. If you wanted to have enough cake for forty eight people, you would scale the recipe up, meaning you would need twelve eggs. Ratios and proportions definitely have a role in people’s lives, whether in a work environment or not.

Prototypes, a commonly used tool by architects and engineers, is built around ratios and proportions. Prototypes also use scale factor; scale factor relies on ratios and proportions. The whole concept of prototypes is based on ratios and proportions and how they can be used to scale things up. People make prototypes to perfect and portray their ideas before scaling them up by using ratios and proportions. I used this process recently in Steamfest. I made a new delivery that uses line following robots, and scale factor was very important. It helped me to spot problems, make changes, and I did all this without wasting resources. Architects and engineers use the same process, and ratios and proportions allow people to do this.

Ratios are also used as a research method. Robert J. Shiller said “Manufacturers of food try to get the optimal ratio to tap into your impulsivity. They don't care about your health.” This is an example of companies using ratios. Researchers try to figure out who uses their product with ratios such as men to women, which allows them to target certain people and figure out what commercials to have.

For my interest driven problem I decided to do work on one of my passions: baseball. Most baseball stats use ratios and proportions; batting average is hits divided by at bats. If I had 25 hits in 100 at bats, I would have a .250 batting average. I wasn’t satisfied with batting

average, so I did something scouts do constantly, which is create a new stat. I wanted to find a stat to judge hitters, and I used On Base Percentage (OBP) and Home Run Average (HRA) to do so. First, I compiled data for all eight starters (I used designated hitters for the American League) and used google sheets for the calculations. Once I had each player's HRA, I averaged out each HRA and OBP to find my new stat, called the overall hitting average (OHA). Once I had my new stat, I decided to keep going to figure out who was the best hitter in 2017. I found the top ten in HRA, OBP and OHA and decided to average out leaderboards to standing. In other words, I divided the amount of categories each player was in by the sum of their place in each category. What I found was that Mike Trout and Joey Votto tied for first, Aaron Judge in third, Giancarlo Stanton in fourth, and Bryce Harper and Domingo Santiago tied for fifth place. This problem is an example of what scouts and statistical analysts do for baseball teams everyday. Statistical analysis is a big part of the sports industry, and although I'd rather be a player getting analyzed, being a scout or an analyst is still a very cool job because they are involved in deciding and impacting who is on their team.

In conclusion, this project has really shed some light on the power, importance, and relevance of ratios and proportions. I found that ratios and proportions play a critical role in everyone's lives, and that most of the time it slips by unnoticed. Ratios and proportions can be found in work environments and in everyday encounters, but they are there all the same. For example, my interest driven problem shows how scouts and analysts in sports use ratios and proportions, but comparing prices uses ratios and proportions too. Whether you're a rocket scientist, a scout, a researcher, or your friendly neighborhood brownie maker, you use ratios and proportions in your everyday life.