

Math Exhibition Essay

Ratios and proportions are extremely useful and relevant with any everyday topic or subject. A ratio is simply a comparison of two quantities. For example, in a recipe it might call for $\frac{3}{4}$ of a cup of flour, and that is a ratio. It is comparing the amount of flour needed in the recipe to a full cup of flour. That is a part to whole ratio, or a fraction, as opposed to a part to part ratio. A proportion is the comparative relationship between different quantities. Ratios and proportions can be applied to cooking, sports, music, theater, shopping and more. Anything that is a comparison of two numbers is a ratio.

One example of a ratio that is used in basketball is the ratio of attempts to baskets. One might have a rate of three baskets for every ten shots made, and if they were making twenty shots, then one would assume that six of them would go into the basket. That is one of many ratios that can be made with sports.

Shadows are another great example of ratios in real situations. If there is a pole next to a person, and they are both casting a shadow, then their shadows would be proportional to each other. For example, there might be a pole that is ten feet tall, and it is casting a shadow that is twenty feet long. The person standing next to it might be five feet tall, and their shadow would be ten feet long. That is the ratio of the length of an upright object to its shadow. Using two objects that are different heights is a way to confirm that an object and its shadow are proportional to each other.

I decided to construct a problem about one of my biggest interests, which is theater, and one of my biggest passions, which is women's equality. I wanted to figure out what the ratio of men to women in the theater as directors, cast, writers, and audience members was. I was trying to figure out if the majority gender of the audience

is proportional to the majority gender of the people working on the show. I took the top ten Broadway musicals right now and found the genders of the directors, writers, and roles in the shows. I then averaged all of that information and compared it to general statistics about the genders of those positions.

My information and the general information on genders of directors were exactly the same, 20% female, and 80% male. The percentages on the genders of the roles were very near each other, but not exactly the same. According to general information, 66.6% of roles are male, and 33.3% are female. According to my information, 60.85% of roles are male, and 39.15% are female. Therefore, my information and the general information were only 5.85% away from each other. According to general information, 88.4% of writers are male, and 12.6% are female. 76.19% of the writers of the ten shows that I researched were male, and 23.81% were female. My information and the general information were 11.21% away from each other. That gave support to my answer that the general audience percentage (66% female and 34% male) is not proportional to the cast and behind the scenes working on Broadway shows.

I decided to figure out which roles of the shows that I researched were closest proportionally to the genders of the audience. *On Your Feet* was exactly proportional to the audience, as there are four women's roles and two men's roles, therefore $\frac{2}{3}$ of the cast is female, and $\frac{2}{3}$ of audiences are generally female. *School of Rock*, *Wicked* and *An American in Paris* are all also fairly close to being proportional to the audience. I took all of the musicals on Broadway at the moment and recorded the gender of the director and writer. Only 15.38% of directors of Broadway musicals are female at the moment. The amount of female directors would need to increase by 50.62% in order for the

genders of directors to be proportional to genders of audience members. As for the writers of Broadway musicals, 16.18% are female, therefore that number would need to increase by 49.82% in order for the genders of writers to be proportional to the genders of audience members.

Now that I have learned and explored how ratios and proportions can be used in real situations, I think that I will be able to see how they can be applied to anything in the future, and that will be incredibly helpful and interesting. Lately, because I love theater and I go to see plays and musicals often, I have been unintentionally counting the amount of women and men in the production.