

SAMPLE HONORS ASSIGNMENT

Example: If students are randomly chosen from a group of 11 boys and 9 girls, what is the probability of choosing 2 boys and 2 girls?

$$\binom{11}{2} \cdot \binom{9}{2} \longrightarrow$$

$$\frac{11!}{9! 2!} \cdot \frac{9!}{7! 2!}$$

$$\frac{11 \cdot 10}{2} \cdot \frac{9 \cdot 8}{2}$$

$$11 \cdot 5 \cdot 9 \cdot 4 = 1980$$

$$\binom{20}{4}$$

→ This is the total number of ways the group of 4 can be chosen from a pool of 20. Again, I don't want repeats, so it's a combo.

$$\frac{20!}{16! 4!}$$

$$\frac{20 \cdot 19 \cdot 18 \cdot 17}{4 \cdot 3 \cdot 2}$$

$$\frac{5 \cdot 19 \cdot 6 \cdot 17}{2} = 4845$$

This calculates the number of ways 2 boys and (multiplication) 2 girls can be chosen. I used a combination because there is a number of options, but I want to select 2 without repeats.

Since the problem is asking for a "probability" I need a fraction that represents: $\frac{\text{desired outcome}}{\text{total possibilities}}$
 Desired outcome: specifically 2 boys & 2 girls
 Total possibilities: 4 people, no matter the gender

$$\frac{1980}{4845} = \frac{132}{323}$$