

Probability

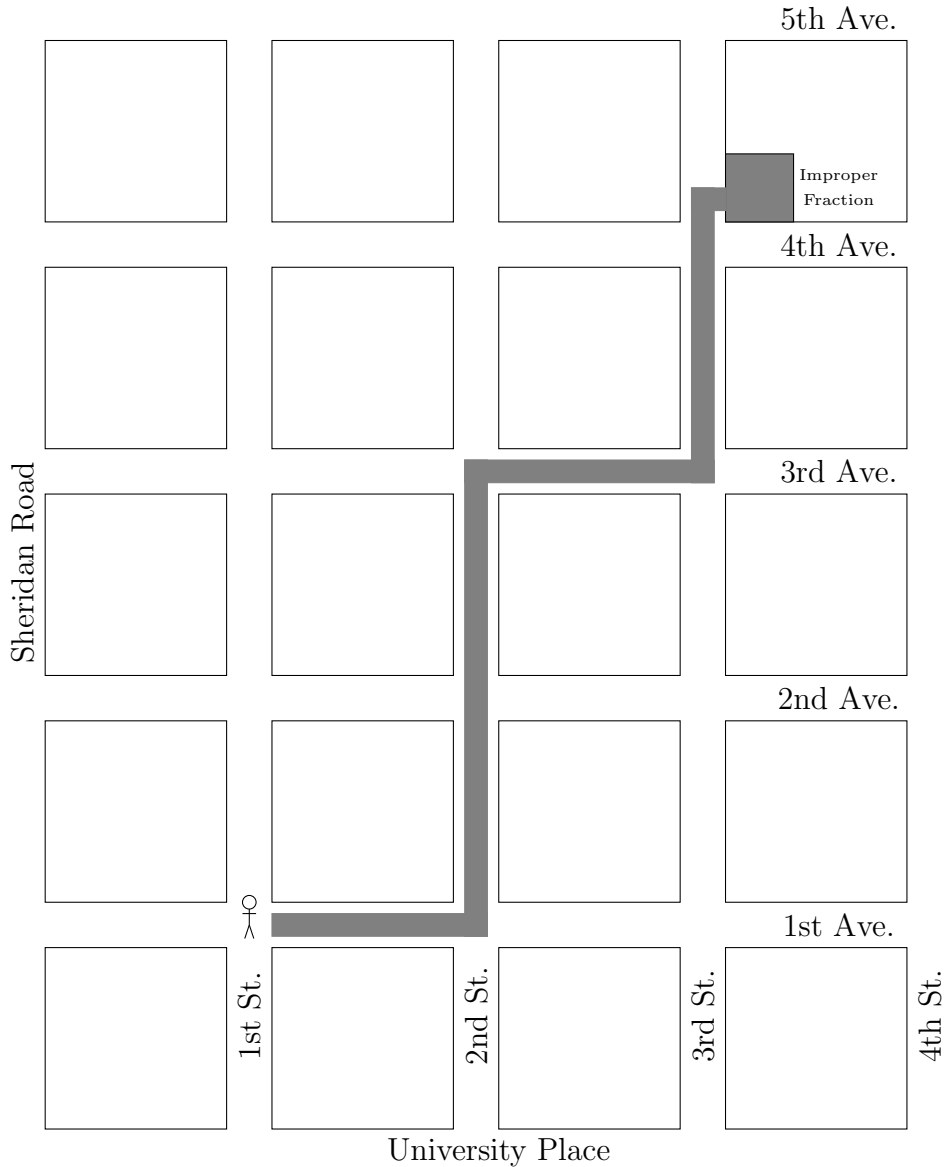
Activity 1b - General Counting Principle, Permutations and Combinations

- (Group 2) - Write out all sequences of heads and tails on five coin flips that contain two heads.
- (Group 3) - Write out all of the terms in the expansion of $(x + y)^5$ that simplify to x^2y^3 . These are sequences of x and y that have five letters.
- Pair the two lists up so that you can translate between the two lists.
 - In the case $n = 6$, what sequence of heads and tails corresponds to the expansion $xyyxyx$?
 - In the case $n = 7$, what expansion corresponds to the coin flip sequence $HHHTHHT$?
- (Group 4) - Write out all of the subsets of size 2, chosen from the set $\{A, B, C, D, E\}$
- Find a correspondence from the subsets to the coin flips.
 - Find a correspondence from the expansions of $(x + y)^5$ to the subsets.
 - In the case $n = 6$, $k = 4$, what sequence of heads and tails corresponds to the subset $\{A, C, E, F\}$?
 - In the case $n = 7$, $k = 5$ what subset corresponds to the coin flip sequence $HHHTHHT$?
- Find a correspondence between the subsets of size 2, chosen from the set $\{A, B, C, D, E, F\}$ and the subsets of size 4, also chosen from the set $\{A, B, C, D, E, F\}$.
(Hint: This question is really asking why Pascal's Triangle should be symmetric. Why are the rows of Pascal's Triangle the same, whether read from left to right or from right to left? What is the connection between choosing two things and choosing all but two things?)
- (Group 1) - How can you use the 4th row of Pascal's Triangle to get the 5th row of Pascal's Triangle?
- Describe how to use subsets of size 1 and 2 chosen from the set $\{A, B, C, D\}$ to find the subsets of size 2, chosen from the set $\{A, B, C, D, E\}$
 - Describe how to use the expansion of $(x + y)^4$ to find the coefficient on x^2y^3 in the expansion of $(x + y)^5$
 - Describe how to use the sequences of four coin flips that contain 1 and 2 heads to find the sequences of five coin flips that contain 2 heads.

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9. You are currently at the intersection of 1st Ave. and 1st St., heading northeast to the math-themed restaurant, *The Improper Fraction* at 4th Ave. and 3rd St. Find a correspondence between walking paths and sequences of coin flips.



- (a) Which sequence of coin flips corresponds to the walking path above?
(b) Which subset corresponds to the walking path above?