

# UW Math Circle

## Homework

1. Radagast the Brown's Ice Cream Shack offers 5 different flavors of ice cream.
  - (a) In how many ways can you make a sundae with 3 scoops of ice cream if you want three different flavors?
  - (b) In how many ways can you make a sundae with 3 scoops of ice cream if you're allowed to order multiple scoops of the same flavor?
2. Because of his skills as an ice cream maker, Radagast decides to expand his line of frozen treats to offer 7 different flavors of ice cream. In how many ways can you make a sundae with three different scoops of ice cream now?



3. Is there a connection between the number of 3-scoop sundaes with 5 possible flavors (with possible repeats of flavors) and the number of 3-scoop sundaes with 7 possible flavors (with no repeats of flavors)?
4. What is the sum

$$\binom{n}{0} + \binom{n-1}{1} + \binom{n-2}{2} + \binom{n-3}{3} + \cdots,$$

where you will stop adding when the binomial coefficients don't make sense any more. For example, when  $n = 9$ , this will be the sum:

$$\binom{9}{0} + \binom{8}{1} + \binom{7}{2} + \binom{6}{3} + \binom{5}{4},$$

but the next term,  $\binom{4}{5}$  doesn't make sense because we can't choose 5 numbers from 4 possibilities.