

## M&M's<sup>®</sup> Activity – Class Handout

Clifford stands at the edge of a mud pit, facing the edge and holding a bag containing  $n$  red and  $n$  green M&M's. He draws out the candies one at a time and eats them. If he draws a red one, he takes a step back. If he draws a green one, he takes a step forward. All steps have the same size.

1. How many different arrangements of  $n$  red and  $n$  green M&M's are there?

Call a sequence of  $n$  red and  $n$  green M&M's *safe* if it leads to Clifford remaining at the edge of the mud pit. For example, when  $n = 4$ , the sequence  $RRRGGGRG$  is safe, but  $RGGRRRGG$  is not.

2. For each of the specific cases  $n = 1, 2, 3$ , list all safe sequences.
3. For each of the specific cases  $n = 1, 2, 3$ , calculate the probability that Clifford does **not** go over the edge. *Note that the probability a sequence is safe is  $\frac{\# \text{ safe sequences}}{\text{total } \# \text{ sequences}}$ .*
4. Based on these cases, develop a conjecture for the probability that he stays safe in the general case.
5. Use your conjecture from (4) and your answer to (1) to develop a conjecture for the number of safe sequences in the general case.