

## Math Circle Explorations: Session 3

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### Problem 1.

1. Suppose  $n$  points are arranged in a circle, in a circular order, each the same distance from the previous one. A frog sitting on one of these points makes a jump of distance  $d$  every minute. The direction in which the frog jumps and the distance  $d$  are constant. You get to make one guess every minute where the frog is (knowing neither  $d$ , the direction, or the initial position), and you win if you can guess correctly. Can you give a strategy so that you eventually win?
2. Instead of  $n$  points in a circle, suppose there are infinite points arranged uniformly in order (think about integers on the number line). Can you still devise such a strategy?  
What if we have points with integer co-ordinates in the whole plane or the whilespace (our naive frog still jumps same distance every minute, and in the same direction)?
3. What if we begin with the the rational numbers instead of integers on the number line? What if we have all the points on the real line?