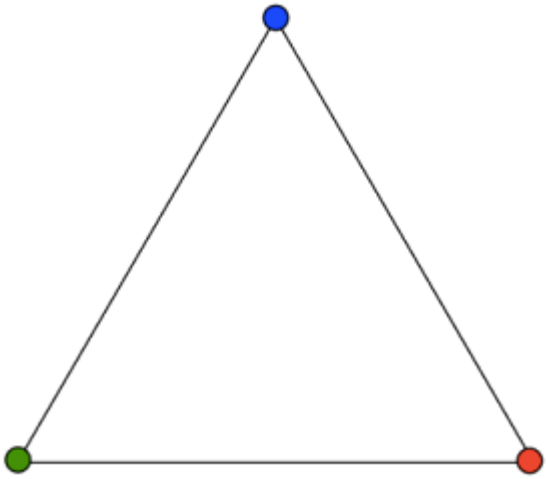
The Recreational Mathematics Club

Session 37, Saturday, 6-Mar-21

Today, we take a break from the usual problem sets, and instead play a game! We call this game Criss-Cross!

In this two-player game, the **objective** is to try and win by making the last legal move.



Rules

- Start with the triangle on the right. Now draw up to seven more dots inside the triangle. (You can play multiple games with different numbers of dots inside).
- Players take turns drawing lines between any two dots (including the dots on the triangle).
- Lines do not have to be straight.
- Lines cannot cross each other.
- Two dots can have at most one line connecting them.

Can you come up with a winning strategy for this game? Does the first player or second player always win this game?

Mathematicians have given names to the three important parts of this game:

- Vertex - one of your starting dots
- Edge - a line connecting two vertices
- Face - an area surrounded by edges

Play this game a few times. At the end of each game, count the number of vertices, edges, and faces. Do you notice any patterns? Can you use these patterns to predict who will win the game before you even start playing?

Try playing the same game, but start with the square on the right instead of a triangle. Do any of your earlier answers change now that you are playing on a square?

What if you start with a pentagon instead? How about a hexagon? A decagon? Any n-sided polygon?