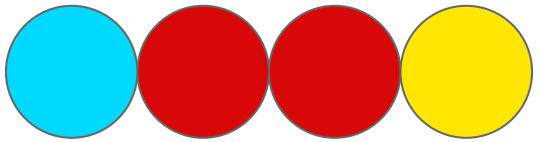
Julia Robinson Mathematics Festival

Color Triangles

Objective:
Predict the color of the bottom dot of a Color Triangle given an initial row of dots.

Rules:

1. Start with a row of colored dots. Below is an example with 4 dots.



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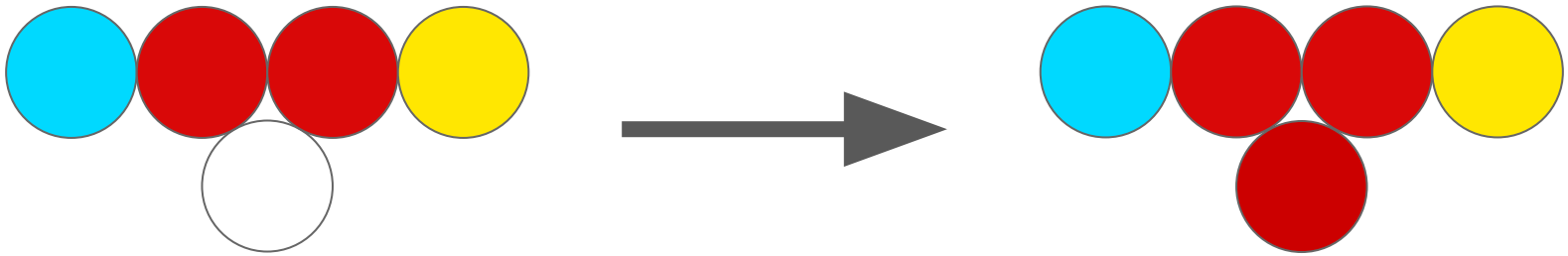
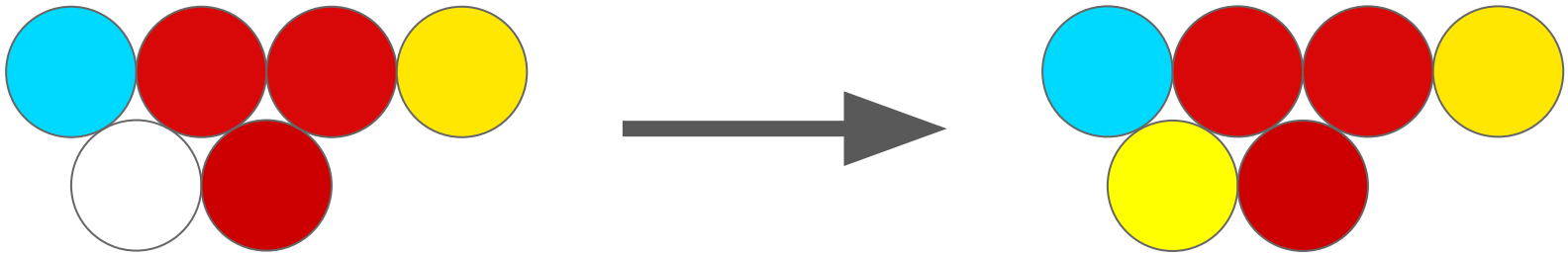
2. If two dots next to each other are the same color, place a dot of the same color below them.



3. If two dots next to each other are different colors, place a dot of the third, different color below them.



Revised on 2020.05.03

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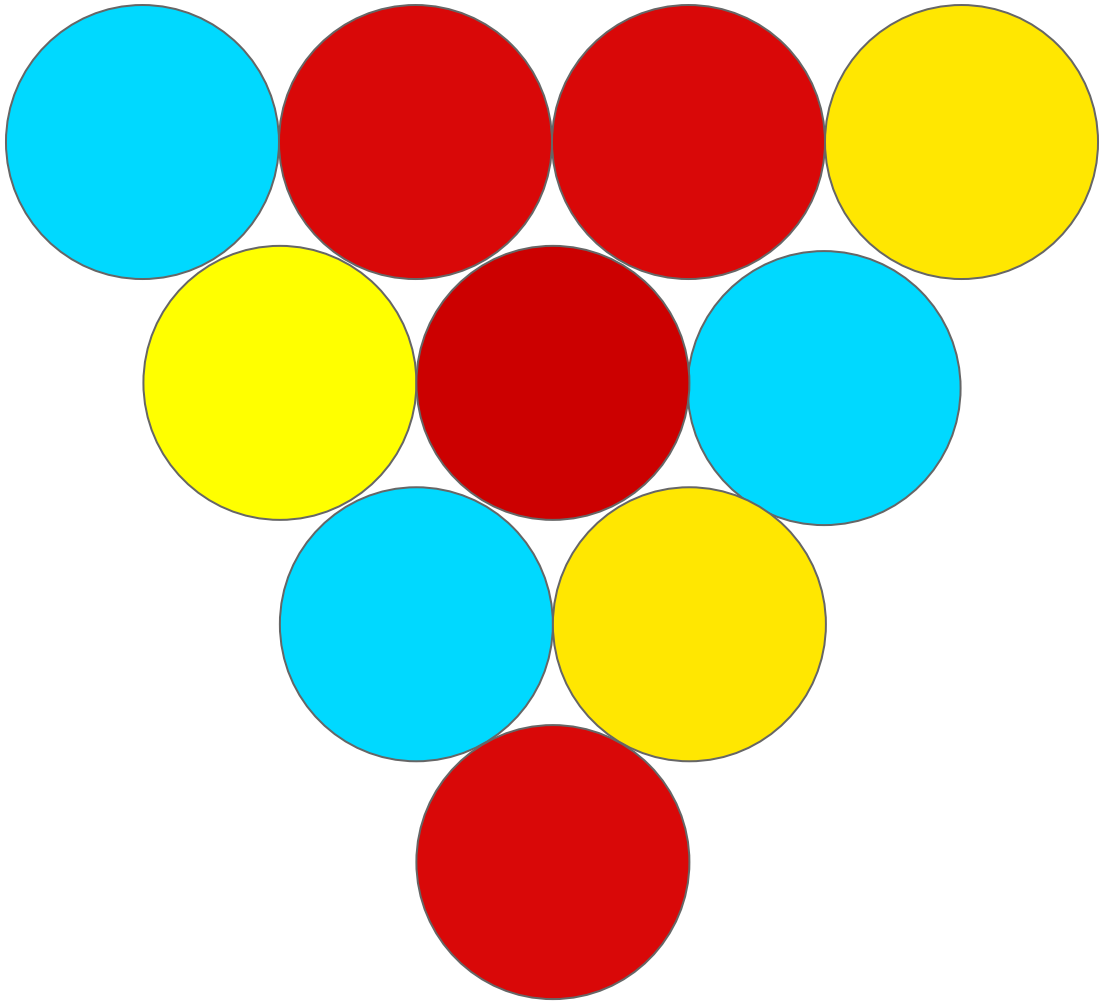
Endgame: Keep going until you end up with a triangle like the one below.



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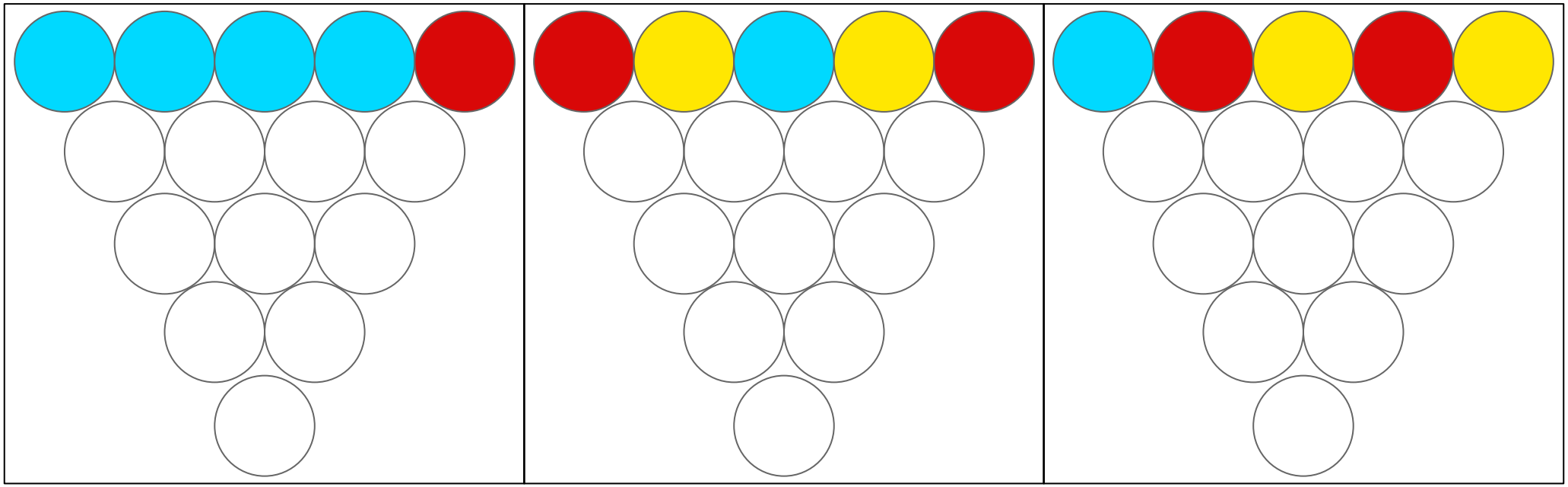
Practice building triangles with some of the patterns below. What patterns do you notice? Can you predict the color of the final dot? Do any of the patterns surprise you?



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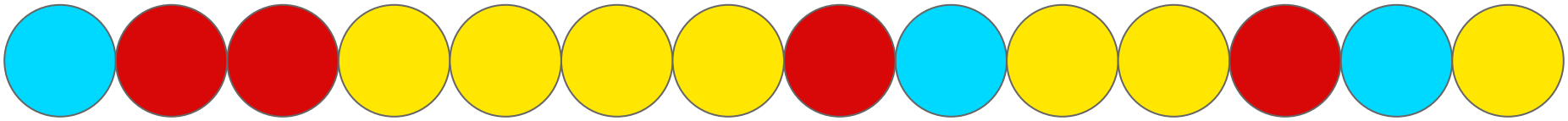
Questions:

1. Make a row of three dots. Can you predict the color of the final dot if you know the colors of the top three dots? Is there a pattern or shortcut? Figure out all the possibilities for three dots.
2. Do the same thing for four, five, or more dots. Can you find a pattern or shortcut that will help you predict the final dot no matter how many dots you start with?
3. Use your pattern to help you predict the final dot color of this 14-dot row.



4. Now, we want to include a fourth color into our Color Triangles. We'll need new rules for making a 4-color Color Triangle. What do you think they should be? Using your rules, can you find a pattern that will help you predict the color of the bottom dot?

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5. We made a 3-color Color Hexagon below. Can you figure what rules we used to make it? Then, make some of your own Color Hexagons. Can you find a pattern that will help you predict the colors of the dots in the last row given the first row?