Indecisive Director Puzzle

Once there was an indecisive casting director. He would narrow down his choice for a role to twelve actors, and then be stuck. So, he made a habit of arranging the actors in a circle and going around in a circle, saying "Maybe you, not you, maybe you, not you, ..." and so on. After each "not you," that person left the circle, so it would shrink until there was just a single person left, who would get the role.

1. A clever actress decided she would get the role. There were 10 people in her circle. Where must she stand to be the last one in the circle?

2. An actor auditioning for a different part was faced with 20 in his circle. Where should he stand?

3. Find a pattern that tells you where to stand no matter how many people are in the circle. Why does it work?

Variations

4. What if the director says "maybe you, maybe you, not you," and eliminates every third person. Where should you stand in the circle with 10 people? What's the pattern with any number?

5. What if the director eliminates every mth person? Where should you stand in a circle of n?

6. What about "in, in, out, out," leaving two in and then kicking two out?

7. What other variations can you come up with? Try them... can you solve your own variations?

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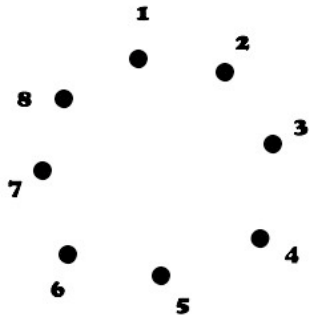
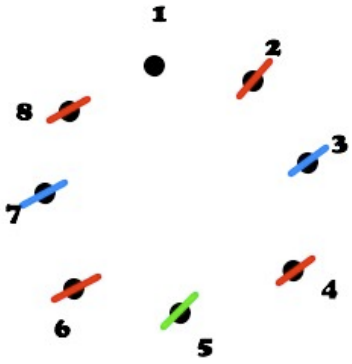
Activity Leader Notes

This is a problem that is fun to do by actually drawing the students in and having them act it out. Circular tables make it easy. You can also help students with a convenient drawing, though most will figure it out on their own.



With eight people, for example, you'll lost the even numbers on round one, 3 and 7 on round two, and 5 on round three, making 1 the winner.

The best way to approach this problem in my opinion is to keep track of who wins starting with only one person in the circle and work your way up. A pattern starts to emerge. An argument might as well.



Here's one version of it: Cross out the first person (person 2). At this point, there's one fewer people in the circle, and we're beginning at person three instead of person 1. So your answer for n people should be the same as for n-1, except the people are relabeled with a number 2 greater. In other words, if for the nth circle you stands in position p, for the n +1st circle you stand in position p +2. However, this number may be larger than n+1, so we have to reduce it mod n+1 if necessary.

It's possible to get a formula for this, and that's a nice challenge for kids who are ready for it. But for most, just elucidating the pattern will be enough. The variations are similar.

For 10 people, position 5 is the best. For 20, it's position 9.