

Hot Potato



There is a werewolf hiding in a red hood and 11 children sitting around a campfire. Katrina, who is sitting opposite the werewolf, plucks a hot potato out of the campfire and, because it's too hot to hold, starts tossing it around the circle.



Everyone must toss the potato the same direction and the same number of people as Katrina. Is it possible that Katrina can toss the potato so that the werewolf never gets it? If so, how far should she throw it?

Extensions:

- Six more people squeeze into the circle just to the left of Katrina. Is it possible that Katrina can toss the potato so that the werewolf never gets it? If so, how far should she throw it?
- Is there a circle that you can find - in which all of Katrina's throws end up with the potato going to the werewolf?



- If everyone is equally spaced around the circle, what shapes are possible by tracing the path of the tossed potato:
 - if there are 12 in the circle?
 - if there are 13 in the circle?
 - if there are 14 in the circle?
 - if there are 15 in the circle?
 - if there are 16 in the circle?
- In which circles is it possible to trace a triangle? a square? a pentagon? a 5-pointed star? a 6-pointed star? a 7-pointed star? an 8-pointed star? (One of these shapes is impossible to make no matter how many people are in the circle.)
- Roll a dice. Let X be equal to the number on the dice. In the 12-person campfire circle, imagine that Katrina starts by tossing the potato X people away in a clockwise direction. If everyone (including Katrina) who tosses the hot potato must then run to the lake to cool their hot hands, where can she sit in the circle so that the werewolf will be left holding the hot potato with no one to pass to?

The Math in This Problem:

This investigation introduces students to the fundamental principles of modular arithmetic. Working with a system of mathematical operations, including addition and subtraction, along with division and remainders, this math puzzle allows students to gain an understanding of how combining arithmetic operations can solve various problems.