GALLOP ROUND RULES

1. The Gallop Round will consist of 24 questions to be solved in 60 minutes.
2. The questions will be divided into 8 sets of 3 questions each, and you ***must submit the answers to one set*** before accessing the problems for the next. This means you must strategize when to submit each set (incomplete or not) to ensure you get access to as many questions as possible.
3. Once you submit the answer form for one of the sets, the password for the next set will be on the form submission screen, so make sure you note it down, otherwise you may waste valuable time getting the password from us!
4. The problems will get progressively more difficult, and later problems will be worth more points.
5. Submissions will be scored immediately and a live score of all participating teams will be available during the competition. Prepare for the adrenaline rush!

GALLOP SET 8

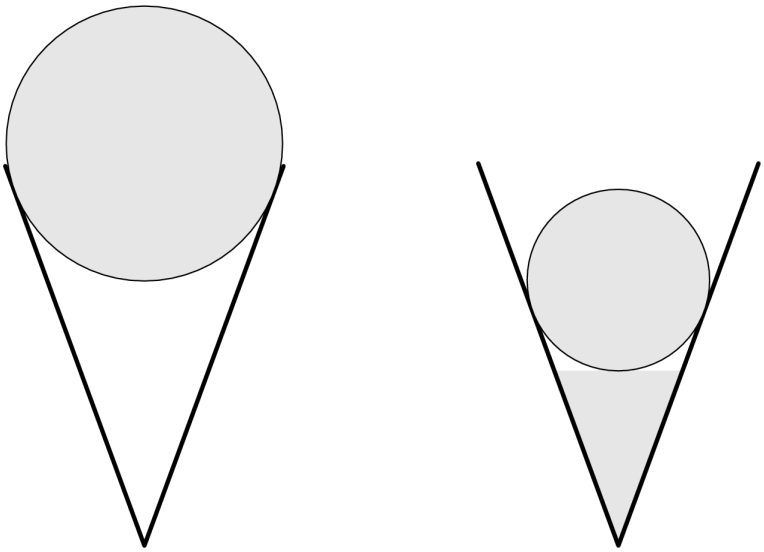
24 points per question

Gallop Set 8 Answer Submission Form

Gallop Live Scores

22. Five children Alice, Bob, Charlie, Dylan, and Evan sit in a circle in that order. 5 candies are to be distributed among them. A child is jealous if either of their neighbors has 3 or more candies more than the child. How many ways are there to distribute the candies so that no child is jealous?

23. Minty Mustang just bought a cone of mint ice cream. As shown in the left diagram below, the spherical ice cream scoop sits within a right circular cone with diameter and slant height equal to the diameter of the sphere. Unfortunately for Minty, it is a hot summer day and their ice cream has begun to melt. After some time, exactly enough ice cream has melted so that the bottom of the scoop reaches the level of the melted ice cream (as depicted in the right diagram below). If R is the ratio of the melted ice cream height to the height of the cone, find R^6.



(Diagrams not to scale)

24. Gabe makes a sorted list in increasing order of all 11-digit base-2 palindromes (so the least such palindrome will be in position 1 of Gabe's list). Let a be the positive difference between the number in position n and position $n+1$ of Gabe's list and b be the positive difference between the number in position $n+1$ and $n+2$ of Gabe's list, such that the positive difference between b and a equals 20. Find the sum of all possible values of n.