Warm-Up: Mario Kart

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Problem 1:
A standard Mario Kart cup consists of 12 players and four races.
Each race is scored as follows:

- 15 points are awarded for first place;
- 12 for second;
- and $(13 - \text{place})$ otherwise.

In any one race, no players may tie.
A player's score at the end of a cup is the sum of their scores for each of the four races.

An n-way tie occurs when the top n players have the same score at the end of a round.
What is the largest possible n, and how is it achieved?