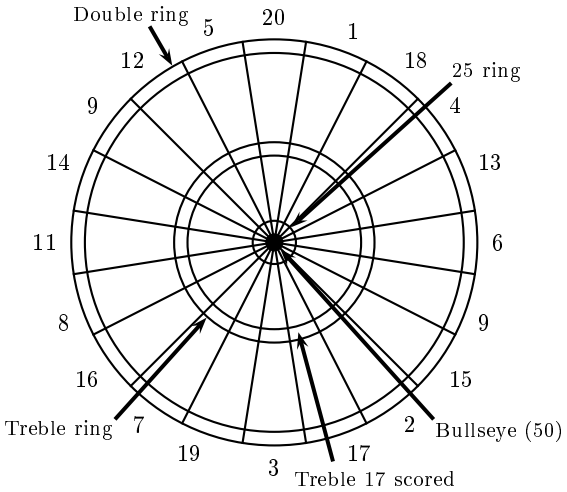
Épreuve de section européenne

Darts

The darts board most commonly found in pubs, clubs and homes is the clock or treble* board (diameter: 33.5 cm). It consists of a circle of 20 sectors numbered from 1 to 20 in a seemingly random fashion. The small black circle at the centre is called the bullseye (diameter: 3.5 cm); the thin red ring that surrounds it is the 25 ring (see diagram). The red treble* ring is about half way to the edge of the board and the red double ring is at the rim of the circle. All the red rings have a width of 1 cm.

If a dart lands, for instance, in the segment marked 17 and is within the treble ring, a treble 17 (that is 51) has been scored.



In the game "501" two players each start with a score of 501 and, taking it in turns, throw 3 darts at the board. The total score is deducted from 501. The winner is the one who reaches a score of exactly zero, with their final dart landing in the "double ring" or the "bullseye".

Note* : treble = triple.

Adapted from CIMT, University of Plymouth website

Questions

1. The darts board has a specific design in which high numbers are usually next to low numbers. Can you guess why they are arranged like that?
2. (a) With just one dart it is possible to score 50 (with the bullseye), or 51 (with a treble 17). What other scores between 50 and 60 are possible with just one dart?
   (b) Find the lowest score it is impossible to obtain with just one dart.
3. With 3 darts, and assuming that every dart scores, what is:
   (a) the highest score possible;
   (b) the lowest score possible?
4. (a) Give a concrete way of winning, in a game of "501", using exactly 9 darts.
   (b) What is the lowest number of darts a player has to throw to complete a game of "501"?
5. Suppose you throw a dart at random, and that your dart hits the board, compute to 2DP the probability that
   (a) it is a bullseye ;
   (b) it is a double.