

Two questions regarding cyclists in velodromes

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The curved ends of cycling velodrome are about 25 metres in length; see the figures below, found at [1, 2]:

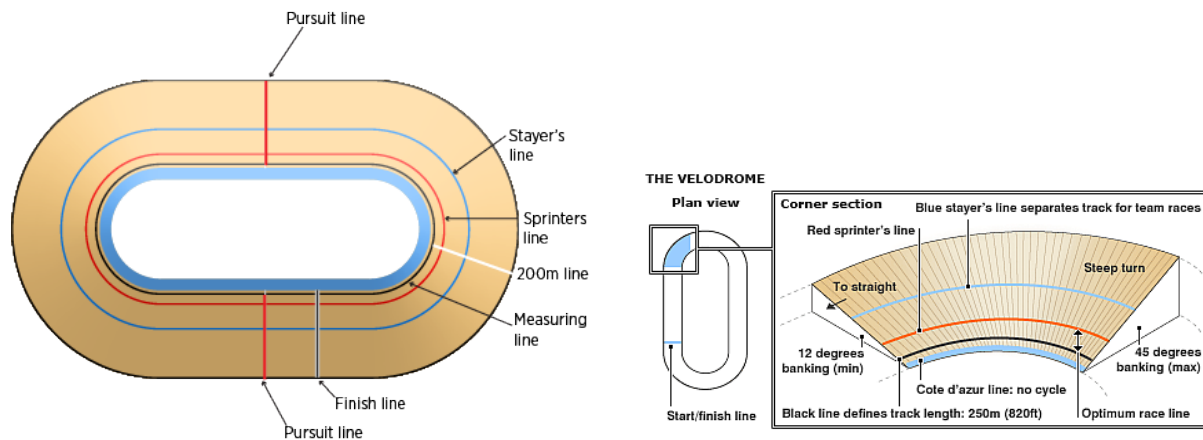


Figure 1: Velodrome dimensions

The specific dimensions of the velodrome at the Darebin International Sports Centre are found at [3]: the banking is 42.6 degrees at the curved ends and 12.8 degrees on the straights.

It is generally considered that a minimum speed of 28 to 30 kph is required to stay upright on the track's curves, say above the black line and below the blue line, though it is possible for expert athletes to go slower than that.

A standard drill is a paceline - a group of cyclists in a single line doing laps at a constant speed, taking turns at the front. Often, heavier cyclists "slip" - back wheel slides down - if the line travels too slowly.

Two questions are:

- If a 95kg cyclist and a 55kg cyclist are travelling at the same slow speed with same skill level at say 23kph - all other factors such as tyre pressure etc. being equal - is the 95kg cyclist at greater risk of slipping than the 55kg cyclist, particularly on the curved ends of the velodrome?
- What is the basic science behind this issue? Is there an explanation capable of being understood by a layperson?

Are you able to answer either of these questions? If so, then feel free to submit your answers to parabola@maths.unsw.edu.au. The best solutions will be published in the next issue of *Parabola*.

¹Terry Richards is a licensed recreational track cyclist riding with Hawthorn Cycling Club, Victoria.

References

- [1] Department of Local Government, Sport and Cultural Industries, Government of Western Australia, *Sports dimensions guide – Cycling*,
<https://www.dlgsc.wa.gov.au/sport-and-recreation/sports-dimensions-guide/cycling>,
last accessed on 2021-01-30.
- [2] BBC, *Velodrome guide*,
http://news.bbc.co.uk/sport2/hi/other_sports/cycling/4763420.stm,
last accessed on 2021-01-30.
- [3] Cycling Victoria, *Track at DISC*, <https://cycling.org.au/vic/DISCm>,
last accessed on 2021-01-30.