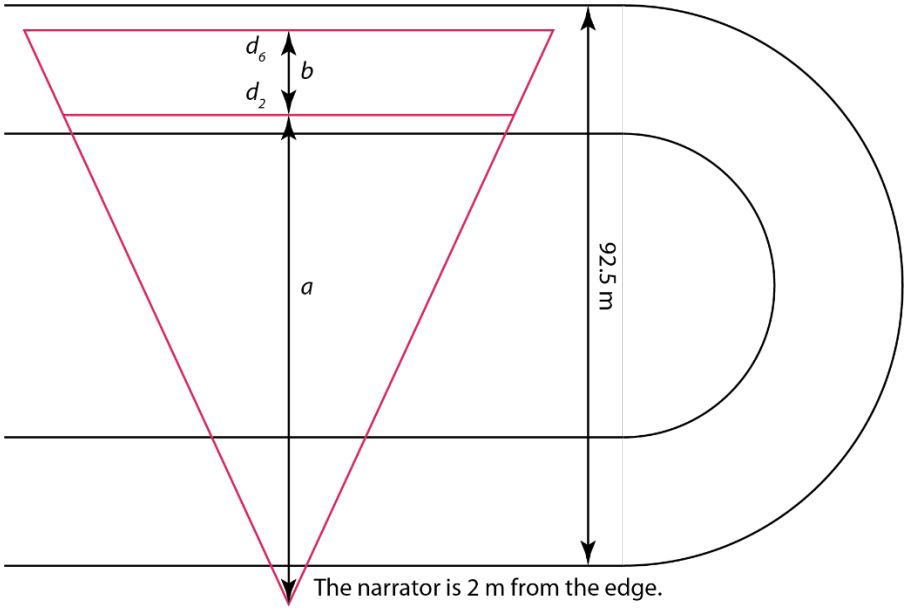
Invisible Runner

The Challenge Zone—Answers



1. This is a straightforward similar triangle problem that requires a little research. The width of a standard 400 m track is shown in the diagram. A lane is 1.22 m wide.

   Lane 2 is 6 lanes in from the edge of the track, so $a = 2 + 92.5 - 6(1.22) = 87.18$ m.

   Lanes 2 and 6 are 4 lanes apart, so $b = 4(1.22) = 4.88$ m.

   Write a proportion: $\frac{d_6}{d_2} = \frac{87.18 + 4.88}{87.18} = 1.056$.

   I purposely did not define what "faster" meant. It is up to the students to interpret this. Although we can't tell anyone's absolute speed, we know that Celeste is running 5.6% faster than her opponent in lane 2.

2. There are lots of ways to reason through this answer. You should be able to have a good discussion in which students share their techniques.

   The ratio of Celeste's speed to her opponent's speed is 1.056. Since time relates inversely to speed, the ratio of the opponent's time to Celeste's time will also be 1.056. Let's say that Celeste ran a good high school girls' time, which is 66-69 seconds. The opponent's time will therefore be 69.70-72.86 s. Celeste beat her opponent by 3.7-3.9 s.