The Trailblazer
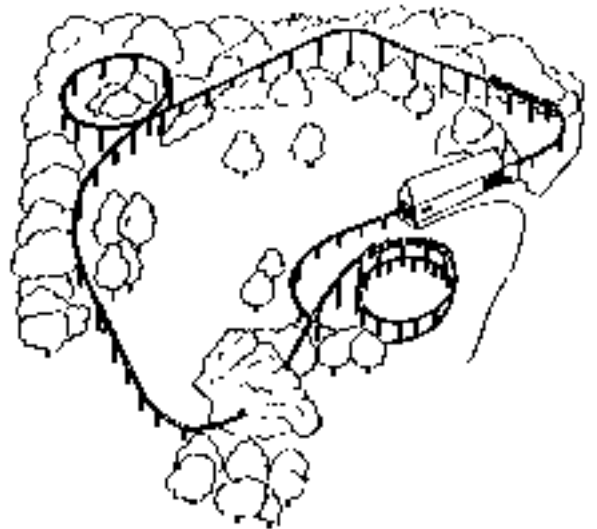
Question: What is the radius of curvature of the final horizontal loop of this coaster ride?

Prediction: Take a look at the final loop and estimate its radius.

Radius = _____ meters

Try It !!: To answer this Question you'll need to take measurements both on <u>and</u> off the ride. We're going to use the centripetal acceleration equation to find the radius.

(I) From the ground, determine the speed of the coaster as it moves around the final horizontal loop. To do this, pick a point on the loop and measure how long it takes for the full length of the coaster to pass that point. Then, calculate the speed.

t = _____ s   v = length of the train / time = _____ m/s

(II) Next, use the vertical accelerometer, holding it perpendicular to the safety bar with the bottom of the tube pointing to the floor, to measure the centripetal acceleration, a_c, of the coaster while you are in the final loop.

a_c = _____ g's • 9.8 m/s² = _____ m/s²

(III) The radius of the loop, r, can then be found by

r = v² / a_c = _____ meters

Observations/Conclusions: How close was your prediction to the measured value? Which one do you think is right?

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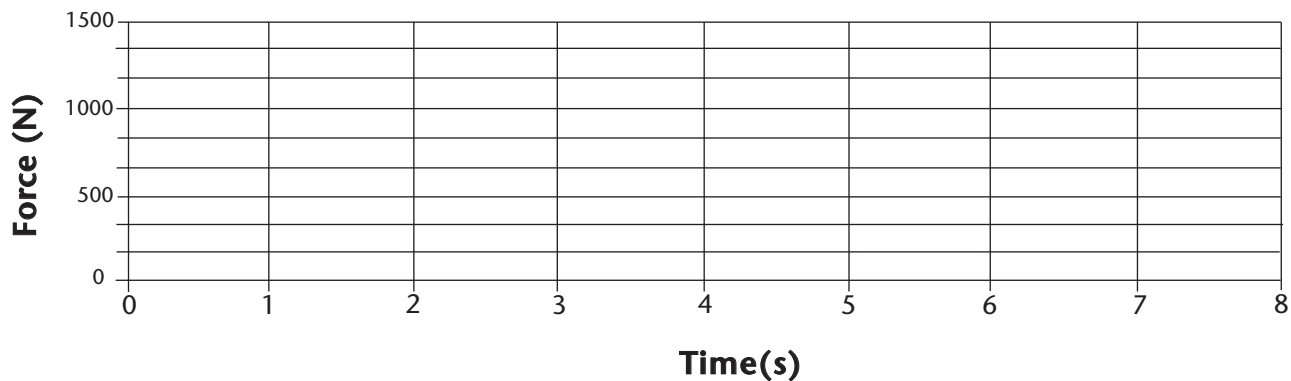
Graph It !!: Sketch the graph of the Force on your seat against the Time you are in the horizontal loop at the end of the ride.

FORCE ON THE TRAILBLAZER

Engineering Specifications:

Length of the coaster = 14.6 meters