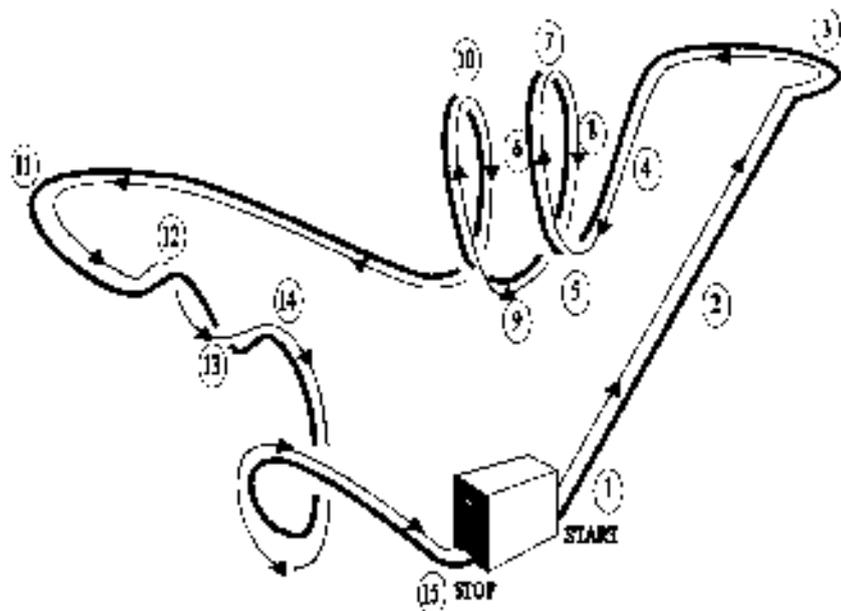


# DEMON



1. Describe the sensations you experience while riding over and down the "hills." At which point(s) do you experience a sensation of weightlessness.
2. Why do the heights of successive "hills" and loops decrease as you move from the beginning to the end of the ride?
3. When do you think you have the greatest speed during the ride?
4. When is your speed the least during the entire ride?
5. List the forms of energy that are utilized by the Demon.
6. Why is a roller coaster, such as the Demon, like a simple pendulum?
7. Why isn't it necessary to carefully monitor the mass of the passengers that board the Demon?
8. What is the height of the initial high rise?
9. What is your speed at the bottom of the high rise, assuming not friction?
10. What would be your speed if you were to fall "freely" from the top to the bottom of the high rise?
11. How much work does the track do for one complete ride? (Assume no friction.)
12. What is your acceleration down the first incline (the high rise)? Express your answer as a fraction of "g."
13. Where is your potential energy  $1/4$ ,  $1/2$ , and  $3/4$  of the maximum potential energy at the top of the high rise? Calculate these potential energy values ( $1/4$ ,  $1/2$ ,  $3/4$  of maximum potential energy) in joules.

# DEMON

14. Produce a graph of kinetic energy, potential energy and total mechanical energy as a function of the height of the high rise. Assume no frictional forces.
15. Estimate the minimum horsepower required to lift a train of roller coaster cars and passengers to the top of the high rise.
16. Why are the Demon's vertical loops tear drop-shaped? How does this type of loop, known as Klothoid loop, differ from a circular loop?
17. Some roller coaster enthusiasts claim the first roller coaster car offers the most thrilling ride; others insist that the last car provides the biggest thrills. Discuss the merits and disadvantages of both positions. Be sure to explain your answers thoroughly based on the physics involved.
18. Use the diagram on the previous page and record the location of the following:

<input type="checkbox"/> Maximum speed	<input type="checkbox"/> Maximum kinetic energy
<input type="checkbox"/> Minimum speed	<input type="checkbox"/> Minimum kinetic energy
<input type="checkbox"/> Maximum potential energy	<input type="checkbox"/> Weightless sensation
<input type="checkbox"/> Minimum potential energy	<input type="checkbox"/> Heavy sensation