

Name \_\_\_\_\_

## Energy

Use PhET Energy Skate Park simulation,  
<http://phet.colorado.edu/en/simulation/energy-skate-park>.

A skater rides the skate track roller coaster shown. The skater is attached to the track and cannot come off. There is no friction between the track and the skater, its an awesome ride! The track is essentially a plot of gravitational potential energy versus position. Let the skater's mass be 100 kg, and let  $g = 10 \text{ m/s}^2$ . Note the vertical scale on the left.

1. If the skater begins in the specified well, what value must his mechanical energy,  $E$ , not exceed if he is to be
  - a. trapped in the first potential well from the left?
  - b. trapped in the second potential well from the left?
  - c. trapped in the third potential well from the left?
2. If the skater starts on the left most ramp at a height of 6 m, initially at rest, where will his speed be the greatest?
3. If the skater starts on the left most ramp at a height of 8m, initially at rest, on which hill will the magnitude of his centripetal acceleration be the greatest? (Assume that the radius of curvature of the hills are the same.)
4. If the skater starts on the left most ramp at a height of 6 m, what minimum speed would he need to have in order to make it over the second hill?