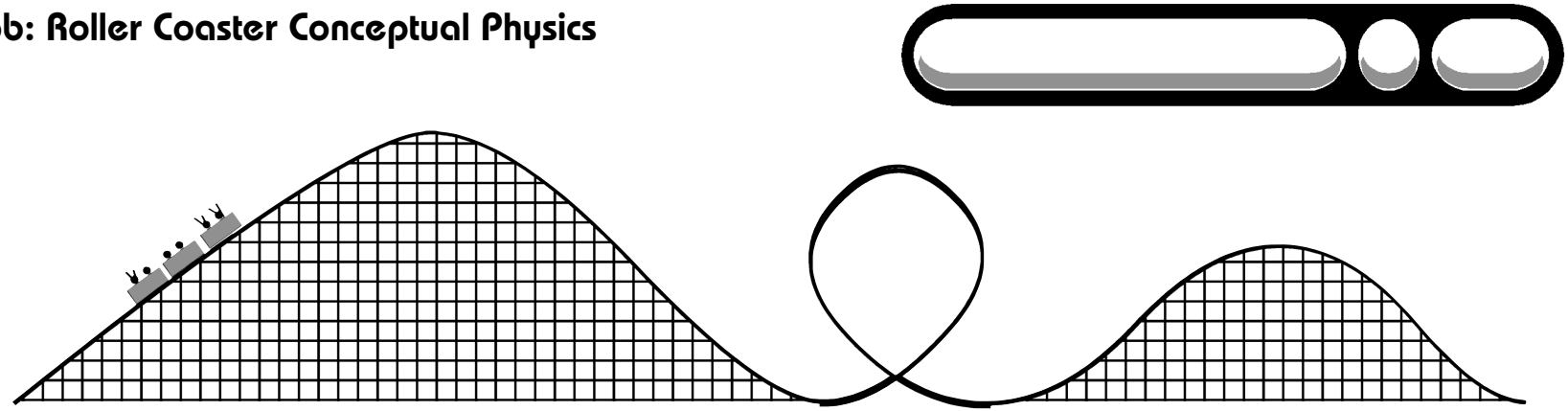
PhyzJob: Roller Coaster Conceptual Physics



a. What energy transfer/transformation occurs while the coaster is transported to the top of the first hill? (What kind of energy does the coaster acquire and how does it get that energy?)

b. The coaster is pulled to the top of the hill by means of a motor that provides a constant force. What difference would a more powerful motor make?

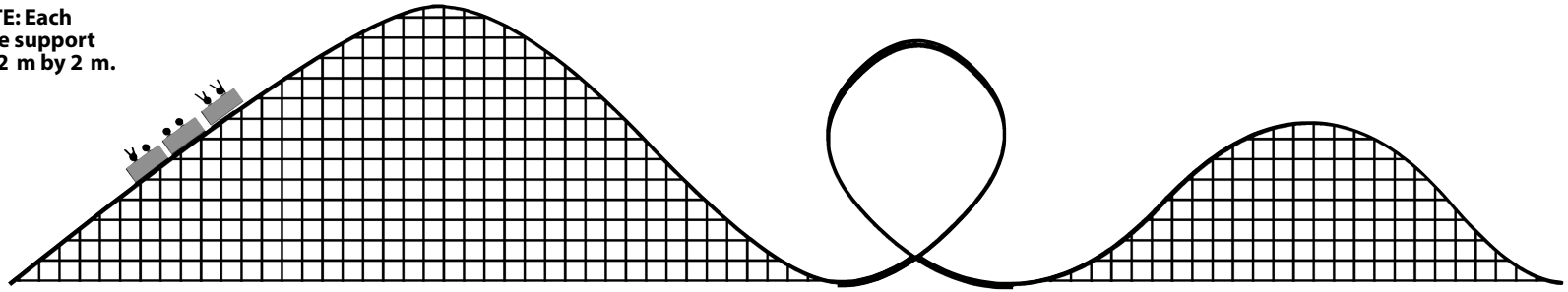
c. What transfer/transformation of energy occurs as the coaster speeds to the bottom of the first hill?

d. The potential energy of the coaster is changing all the time, and the coaster's kinetic energy increases and decreases throughout the ride. Ideally, what quantity remains the same?

e. Successive high points along the coaster's path are lower and lower. (The second hill is always lower than the first, etc.). Why is this?

PhyzJob: Conservation of Energy at the Amusement Park

PLEASE NOTE: Each square in the support structure is 2 m by 2 m.



A 3-car roller-coaster has a fully loaded mass of 6240 kg.

a. How much work does the drive motor do to lift it to the top of the first hill?

b. How much force did the motor have to exert to do this? *Hints: 1. Definition of work, 2. Cons. of E, 3.* d*: Pythagoras.*

c. If the journey took 24 s to complete, what is the power of the drive motor? (Express in watts; convert to horsepower.)

d. If the roller-coaster just barely makes it over the first hill, how fast is it going at the bottom? In mph?

e. When it passes through the top of the loop, how much of the coaster's energy is potential and how much is kinetic?

f. How fast is the roller-coaster going at the top of the second hill? In mph?

a. 1.71 MJ b. 34 kN c. 71 kW = 95 hp d. 23 m/s = 52 mph e. PE = 1.47 MJ, KE = 0.24 MJ f. 15 m/s

db