

Gravitational and Elastic Potential Energy

Name: _____ Period: _____ Date: _____

1. The highest-caliber cannon ever built (though never used) is located in Moscow, Russia. The diameter of the cannon's barrel is about 89 cm, and the cannon's mass is 3.6×10^4 kg. Suppose this cannon were lifted by airplane. If the potential energy associated with this cannon were 8.88×10^8 J, what would be its height above sea level? Assume that constant free-fall acceleration at this altitude is the same as at sea level.
2. The force constant of the spring in a child's toy car is 550 N/m. How much elastic potential energy is stored in the spring if the spring is compressed a distance of 1.2 cm?
3. With an elevation of 5334 m above sea level, the village of Aucanquilca, Chile, is the highest inhabited town in the world. What would be the gravitational potential energy associated with a 64.0 kg person in Aucanquilca? Assume that the free-fall acceleration at Aucanquilca is equal to that at sea level.
4. An arresting cable helps to slow jet planes as they land on an aircraft carrier. This is accomplished by two springs, each of which is attached to one end of the cable. Suppose the total elastic potential energy stored in the springs combined while a jet is landing is 5.78×10^7 J. If each spring is stretched 102m, what is the force constant of the spring?
5. A pogo stick contains a spring with a force constant of 1.5×10^4 N/m. Suppose the elastic potential energy stored in the spring as the pogo stick is pushed downward is 120 J. How far is the spring compressed?
6. An automobile to be transported by ship is raised 7.0 m above the dock. If its gravitational potential energy is 6.6×10^4 J, what is the automobile's mass?