Spring Potential Energy

1. A 6.00kg frictionless cart is traveling at 8.00m/s on level ground. The cart then runs into a spring with k=1.00x103N/m. How far is the spring compressed when the car is slowed to 2.00m/s?

2. A 275g mass is placed on top of a spring with k=65N/m. The mass is then pressed downward until the spring is compressed by 25cm, and then released. What maximum height does the mass reach (assuming it flies straight up)?

3. A 12 000kg fighter jet lands on the deck of an aircraft carrier. The plane lands at 110m/s and is brought to rest in 130m by a combination of friction (brakes) and an arrester cable, which for the sake of this worksheet we will pretend is a giant elastic band. The brakes produce 2.6x106J of heat, what is the spring constant of the arrester cable?

4\*. A 5.00kg bowling ball is dropped from 1.0m above a vertical spring. The spring has a constant of 450N/m. How far is spring compressed in bringing the mass to rest? \***the ball falls more than 1.0m!**

5. Two frictionless carts careen toward one another on level ground. Cart A has a mass of 1.00kg and is travelling at 10.0m/s to the right. Cart B has a mass of 2.00kg and is travelling at 4.00m/s to the left. The two carts then simultaneously strike a spring between them. The spring is fixed in place and brings the two carts to rest simultaneously after compressing 45cm. What is the spring constant of the spring?

6. Two carts are at rest with a compressed spring between them, and are held in place by a thin rope. The rope is then cut, the spring extends and the two carts shoot apart. The spring has a rest length of 30.0cm, a compressed length of 12.0cm and a constant of 480N/m. Cart 1 moves away at 2.0m/s and cart 2 travels away at 4.0m/s, in the opposite direction. Find the mass of each cart.

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