

#2 Energy: Conservation of Energy and Springs

Equations: $KE=1/2mv^2$ $PE=mgh$ $(KE+PE)_I = (KE+PE)_f$ $PE_{(s)}=1/2 kx^2$ $F=kx$

- 1) What force would it take to compress a spring 32.3cm if the spring constant is 36.2N/m?
- 2) What is the energy contained in a spring that has a spring constant of 128N/m and has been compressed 8.62cm?
- 3) What is the spring constant if it took 386N to compress the spring 26.3cm? What potential energy does the spring have?
- 4) What would the final velocity of a 568g cart be if it is pushed by a spring that had a spring constant of 80.3N/m and had been compressed 4.62cm?
- 5) How high would a 52g object go if it was fired with a kinetic energy of 256J?
- 6) What velocity would a 75kg object have just before hitting the ground if it was dropped from a height of 10.3m (assuming no air resistance)?
- 7) How high vertically would a 2.5kg mass on a pendulum have to be raised in order to hit a 565g cart hard enough to give it a velocity of 3.8m/s?
- 8) A 525kg rollercoaster starts at a height of 75m. What will its speed be at the top of the next hill if that hill is 55m assuming no friction?
- 9) A 500kg boulder is rolling at a speed of 3.2m/s over the crest of a hill that is 55m above the valley floor. What will its speed be when it reaches the valley floor?

Answers

- 1) 11.7 N
- 2) 0.476 J
- 3) 1470N/m, 50.5J
- 4) 0.55 m/s
- 5) 492m
- 6) 14.3m/s
- 7) 0.163m
- 8) 20.0m/s
- 9) 33.3m/s