

Reading:

HRW Chapter 7 (work and kinetic energy)

New material on energy for this week will be in Chapter 8 potential energy and, possibly, the beginning of Chapter 9.

Problems:

Due in class Friday, October 11.

- (1) In February this year a meteor zipped through, burned and exploded in the atmosphere above Chelyabinsk, Russia. It's speed was 18.6 km/s, a mass of about 10^4 tons (1 ton is 1016 kg), and size of about 20 m. How much kinetic energy did it have?
- (2) HRW Chapter 7 Problem 24
- (3) HRW Chapter 7 Problem 62
- (4) HRW Chapter 8 Problem 2
- (5) HRW Chapter 8 Problem 6
- (6) HRW Chapter 8 Problem 9
- (7) HRW Chapter 8 Problem 21
- (8) A 42.0 kg crate is pushed a distance 5.1 m along a level floor at a constant speed by a force that pushes downward at an angle of 30.0 degrees from the horizontal. The coefficient of kinetic friction between crate and floor is 0.25.
 - (a) What is the work done on the crate by this force?
 - (b) How much work is done on the crate by the frictional force?
 - (c) How much work is done by gravity? The normal force?
- (9) When bungee jumping folks, attached to a length of rope and a stretchy cord, leap off a high place such as a bridge. The goal is to fall and then bounce back safely, i.e. without hitting the ground. A bungee jumper, with mass 66-kg, jumps from a bridge. She is tied to a bungee cord that has an un-stressed length of 12 m. By the end of the fall it stretches a total of 36 m.
 - (a) Calculate the spring constant k of the bungee cord, assuming Hooke's law ($F_s = -kx$) applies.
 - (b) What is the maximum acceleration she experiences? Express your result in m/s^2 and in a multiple of g .
 - (c) What is the total amount of potential energy stored in the cord when she comes to rest at the bottom?