PHY 166 Recitation 4

Chapters 9, 10, and 11.

May 5, 2019

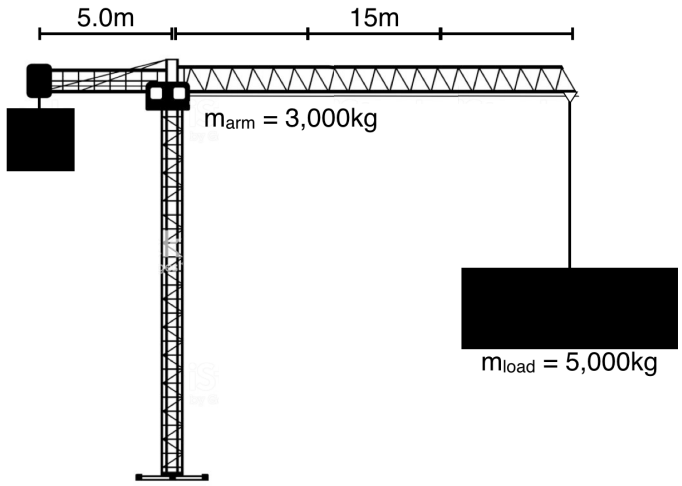

Figure 1: Figure for problem 1.

1.) A large crane consists of a 20 m, 3,000 kg arm that extends horizontally on top of a vertical tower. The arm extends 15 m towards the lifting end and 5 m towards the counterweight. If the crane is to lift a 5,000 kg load, what must the weight of the counterweight be in order to maintain static equilibrium?

2.) A piece of lead (specific gravity of lead is 11.3) weights 80 N in air. What is its apparent weight when it is submerged in alcohol (specific gravity of alcohol is 0.79)? This piece of lead floats when it is placed in a tub of mercury (specific gravity of mercury is 13.6). What percent of its volume is outside the mercury?

3.) A spring stretches 0.2 m when a 0.5 kg mass is hung from it. The spring, with the mass, are then placed on a frictionless horizontal surface. The mass is then pulled 0.12 m away from its equilibrium position and released. Determine:
(a.) The spring constant.
(b.) Amplitude of oscillation.
(c.) Total energy of the system.
(d.) Maximum velocity where it occurs.
(e.) Maximum acceleration and where it occurs.
(f.) Speed when the mass is 0.5 m away from the equilibrium position.
(g.) Period of Oscillation.