

Physics 31A Quiz #4 (60pts)
Fall, 2002

1. (12) A barber's chair rests on a hydraulic piston 10cm in diameter. The input side has a piston with a cross-sectional area of 10cm^2 , which is pumped on using a foot pedal. If the chair and the client together have a mass of 200kg, what force must be applied to the input piston?
2. (12) Determine the gauge pressure (in both Pa and psi) at the bottom of the deep ocean trenches that reach depths of about 11km. Assume the density of the sea is constant.
3. (12) How long must a simple pendulum be if it is to have a period of 10.0s?
4. (12) The human thigh bone, the femur, at its narrowest point resembles a hollow cylinder with an outer radius of roughly 1.1cm and an inner radius of just about half of that. Taking the compressive strength of the bone to be 200 MPa, how much force will be required to rupture it?
5. (12) Two kilograms of potatoes are put on a scale that is displaced 2.50cm as a result. What is the elastic spring constant? If the scale is pushed down a little and allowed to oscillate, what will be the frequency of the motion?