The purpose of this review is to refresh your memory. Physics is a cumulative subject, so make it sure you understand basic concepts and typical problem solving techniques in previous chapters before moving on to a new chapter!

A. Rigid Bodies in Equilibrium
A uniform ladder is 5 m long and weighs 200 N. The ladder leans against a vertical, frictionless wall at height 4 m. A horizontal force $F$ is applied to the ladder at distance $d = 1$ m from the base. The base slips to the right if the force is larger than or equal to 250 N. Find the coefficient of static friction.

B. Elasticity
A horizontal aluminum rod 5 cm in diameter projects 10 cm from a wall. A 1000 kg object is suspended from the end of the rod. The shear modulus of aluminum is $3 \times 10^{10}$ N/m². Neglecting the mass of the rod, find the vertical deflection of the rod.
Working on this problem set is optional, but it is strongly recommended. It is quite possible that some of these problems will appear in the exams. Do it on a weekly basis. Cramming is tiring and sometimes it ends up in a disaster.

1. A picture can be hung on a wall with string in three different ways, as shown. The magnitude of the tension force of the string is: (Translational Equilibrium)  
   a. least in I  
   b. greatest in I  
   c. greatest in II  
   d. least in III  
   e. greatest in III

2. For an object in equilibrium the net torque acting on it vanishes only if each torque is calculated about: (Rotational Equilibrium)  
   a. the center of mass  
   b. the center of gravity  
   c. the geometrical center  
   d. the point of application of the force  
   e. the same point

3. Two supports, made of the same material and initially of equal length, are 2.0 m apart. A stiff board with a length of 4.0 m and a mass of 10 kg is placed on the supports, with one support at the left end and the other at the midpoint. A block is placed on the board a distance of 0.50 m from the left end. As a result the board is horizontal. The mass of the block is: (Rigid Body in Equilibrium-1D)  
   a. zero  
   b. 2.3 kg  
   c. 6.6 kg  
   d. 10 kg  
   e. 20 kg

4. An 800-N man stands halfway up a 5.0-m long ladder of negligible weight. The base of the ladder is 3.0 m from the wall as shown. Assuming that the wall-ladder contact is frictionless, the wall pushes against the ladder with a force of magnitude: (Rigid Body in Equilibrium-2D)  
   a. 150 N  
   b. 300 N  
   c. 400 N  
   d. 600 N  
   e. 800 N

5. A force of 5000 N is applied outwardly to each end of a 5.0-m long rod with a radius of 34.0 cm and a Young’s modulus of 1.25×10^8 N/m^2. The elongation of the rod is: (Tensile Strain)  
   a. 0.0020 mm  
   b. 0.0040 mm  
   c. 0.14 mm  
   d. 0.55 mm  
   e. 1.42 mm

6. A cube with edges exactly 2 cm long is made of material with a bulk modulus of 3.5×10^9 N/m^2. When it is subjected to a pressure of 3.0×10^5 Pa its volume is: (Hydraulic Strain)  
   a. 7.31 cm^3  
   b. 7.99931 cm^3  
   c. 8.00069 cm^3  
   d. 8.69 cm^3  
   e. None of the above

7. A shearing force of 50 N is applied to an aluminum rod with a length of 10 m, a cross-sectional area of 1.0×10^-5 m, and a shear modulus of 2.5×10^10 N/m^2. As a result the rod is sheared through a distance of: (Shear Strain)  
   a. zero  
   b. 1.9 mm  
   c. 1.9 cm  
   d. 19 cm  
   e. 1.9 m

Answers: 1-e  2-d  3-e  4-b  5-d  6-b  7-b