1. Suppose a body of mass 0.7 kg slides down a track of radius R=1.2m, like that in Fig 1, it starts from rest at point 1 and has a speed of 4 $m.s^{-1}$ at point 2. What was the work of the frictional force acting on the body?

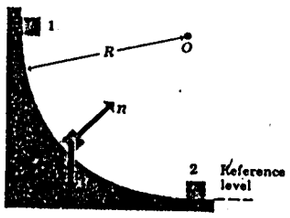

Fig 1.

2. The driveshaft of an automobile rotates at 3500 rpm and transmits 70 hp from the engine to the rear wheels. Compute the torque developed by the engine. (1 hp = 760 w)

3. A block of brass has a mass of 0.8 kg and a density of $8.0 \times 10^3 kg.m^{-3}$. It is suspended from a string. Find the tension in the string (a) if the block is in air, and (b) if it is completely immersed in water. Neglect the bougant force of air.

4. A copper cup of mass 0.05 kg, initially at 20°C, is filled with 0.2 kg of coffee initially at 80°C. What is the final temperature after the coffee and cup attain thermal equilibrium? (C_{cu}=390J.$kg^{-1}C^{-1}$, C_{H_2O}=4180 J $kg^{-1}C^{-1}$)

5. A copper conductor of square cross section 2 mm on a side carries a constant current of 20A. The density of free electrons is 8×10^{28} electrons per cubic meter. Find (a) the current density and (b) the drift velocity.

6. The space between two metallic coaxial cylinders of radii r_a and r_b is filled with a material of resistivity ρ. What is the resistance between the cylinders?

7. A dc motor with its rotor and field coils connected in series has an internal resistance of 3.0Ω. When running at full load on a 120-V line, it draws a current of 5.0A.
   (a) What is the emf in the rotor?
   (b) What is the rate of dissipation of energy in the motor?