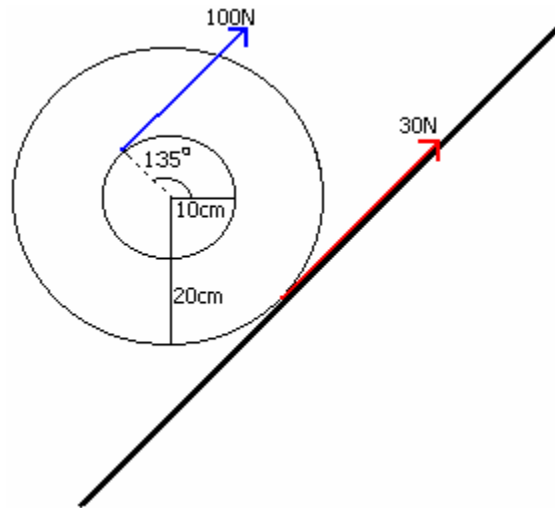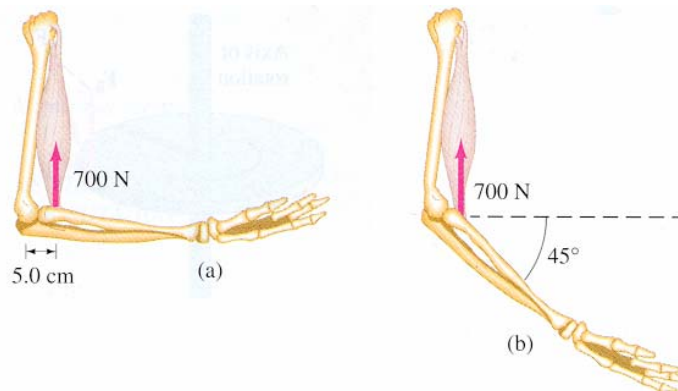# UNIT 6 EXERCISES

1) Consider a car on a hill. A force of 100N is applied to the axel by the motor in order to move the wheel. The frictional force between the wheel and the street is 30N, as shown in the diagram below. Will the car move up the hill? Show your work.

2) The biceps muscle exerts a vertical force on the lower arm as shown in the diagram below.
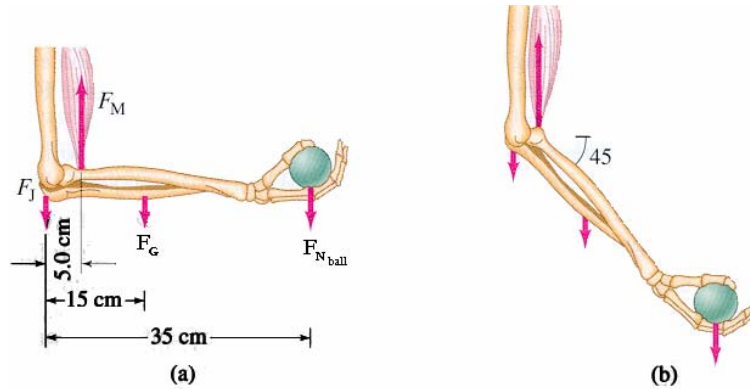

(from *Physics Forth Edition*, Douglas C. Giancoli, Prentice hall, New Jersey,1995)

a) For case (a) calculate the torque about the axis of rotation through the elbow joint due to the weight of the lower arm and hand. Assume the muscle is attached 5.0cm from the elbow. Show your work.

b) For case (b) calculate the torque about the axis of rotation through the elbow joint due to the weight of the lower arm and hand. Assume the muscle is attached 5.0cm from the elbow. Show your work.

3) Consider the diagram below. The forces acting on the forearm include the upward force F_M exerted by the muscle and a force F_J exerted at the joint by the bone in the upper arm, both assumed to act vertically.

(from *Physics Forth Edition*, Douglas C. Giancoli, Prentice hall, New Jersey,1995)

a) How much force must the biceps muscle exert when a 5.0kg ball is held in the hand with the arm horizontal as in picture a? Assume that the mass of the forearm and hand together is 2.0kg. Show your work.

b) How much force must the biceps muscle exert when a 5.0kg ball is held in the hand with the arm is at a 45° angle as in picture b? Assume that the mass of the forearm and hand together is 2.0kg. Show your work.