Physics
Problem 4B-Newton's Second Law

NAME _____ DATE _____
CLASS _____

1. David Purley, a racing driver, survived deceleration from 173 km/h to 0 km/h over a distance of 0.660 m when his car crashed. Assume that Purley's mass is 70.0 kg. What is the average force acting on him during the crash? Compare this force to Purley's weight. (Hint: Calculate the average acceleration first.)

2. A giant crane in Washington, D. C. was tested by lifting a 2.232×10^6 kg load.
a. Find the magnitude of the force needed to lift the load with a net acceleration of 0 m/s^2.
b. If the same force is applied to pull the load up a smooth slope that makes a 30.0° angle with the horizontal, what would be the acceleration?

3. When the click beetle jumps in the air, its acceleration upward can be as large as 400.0 times the acceleration due to gravity. (Acceleration this large would instantly kill any human being.) For a beetle whose mass is 40.00 mg, calculate the magnitude of the force exerted by the beetle on the ground at the beginning of the jump with gravity taken into account. Calculate the magnitude of the force with gravity neglected. Use 9.8 m/s^2 as the value for free-fall acceleration.

4. In 1994, a Bulgarian athlete named Minchev lifted a mass of 157.5 kg. By comparison, his own mass was only 54.0 kg. Calculate the force acting on each of his feet at the moment he was lifting the mass with an upward acceleration of 1.00 m/s^2. Assume that the downward force on each foot is the same.