Newton's Second Law Problem-Solving

Study from **Lessons 3** of the **Newton's Laws** chapter at **The Physics Classroom**:

http://www.physicsclassroom.com/Class/newtlaws/u2l3c.html
http://www.physicsclassroom.com/Class/newtlaws/u2l3d.html

For the following problems, construct a free-body diagram and show your work clearly.

1. A rightward force of 302 N is applied to a 28.6-kg crate to accelerate it across the floor. The coefficient of friction between the crate and the floor is 0.750. Determine the acceleration of the crate.

2. During a football workout, two linemen are pushing the coach on the sled. The combined mass of the sled and the coach is 300. kg. The coefficient of friction between the sled and the grass is 0.800. The sled accelerates at a rate of 0.580 m/s/s. Determine the force applied to the sled by the lineman.

3. A 405-N rightward force is use to drag a large box across the floor with a constant velocity of 0.678 m/s. The coefficient of friction between the box and the floor is 0.795. Determine the mass of the box.

4. A 6.58×10^3 N upward tension force is exerted on a 521-kg downward-moving freight elevator. Determine the acceleration of the elevator.

© **The Physics Classroom, 2009**

5. A basketball star exerts a force of 3225 N (average value) upon the gym floor in order to accelerate his 76.5-kg body upward. (a) Determine the acceleration of the player. (b) Determine the final speed of the player if the force endures for a time of 0.150 seconds.

6. At the end of the Giant Drop free fall ride, riders experience a large upward normal force to bring their falling bodies to a stop. Determine the normal force value required to accelerate a 52.1-kg physics student with an upward acceleration of 27.4 m/s/s.

7. A hockey player accelerates a puck (m = 0.167 kg) from rest to a velocity of 50 m/s in 0.0121 sec. Determine the acceleration of the puck and the force applied by the hockey stick to the puck. Neglect resistance forces.

8. A falling skydiver is accelerating in the downward direction at 3.29 m/s/s. The mass of the skydiver (including parachute gear) is 67.2 kg. Determine the air resistance force on the skydiver (and accompanying parachute).

9. A 67.2-kg falling skydiver opens his parachute and instantly slows down at a rate of 7.2 m/s/s. Determine the air resistance force on the skydiver (and accompanying parachute).

© **The Physics Classroom, 2009**