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## Net Force Particle Model: Newton's Second Law Review Problems

1. An 80 kg water skier is being pulled by a boat with a force of 220 N causing the skier to accelerate at $1.8 \mathrm{~m} / \mathrm{s}^{2}$. Find the drag force on the skier.
2. A 2000 kg car is slowed down uniformly from $20 \mathrm{~m} / \mathrm{s}$ to $5 \mathrm{~m} / \mathrm{s}$ in 4 seconds. Determine the average net force on the car during this time, and how far the car traveled while slowing down.
3. Some baseball pitchers are capable of throwing a fastball at $100 \mathrm{mi} / \mathrm{hr}$. The pitcher achieves this speed by moving his arm through a distance of 1.5 m . Determine the average net force that must be exerted on the 0.15 kg ball during the pitch. ( 1 mile $=1600$ meters $)$
4. After falling from rest at a height of $30 \mathrm{~m}, ~ a ~ 0.50 \mathrm{~kg}$ ball bounces upward, reaching a height of 20 m . The contact between the ball and ground lasted 20 milliseconds. Find the average force exerted on the ball by the ground. (Break the problem into pieces. Do a bunch of kinematics first, then apply Newton's 2nd law.)
5. In the diagram below, the cord makes a $25^{\circ}$ angle with the horizontal, the mass of the sled and occupants is 100 kg . The tension in the cord is 120 N and the friction force is 15 N . Find the acceleration of the sled.

6. The 60 kg skier shown below is skiing down a $35^{\circ}$ incline with a coefficient of friction is 0.08 . Determine the acceleration of the skier.

