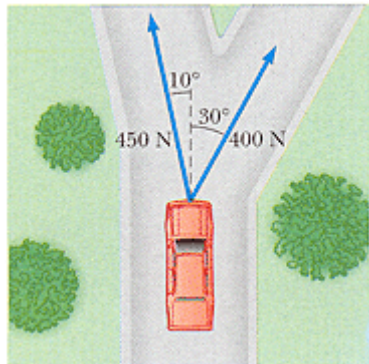


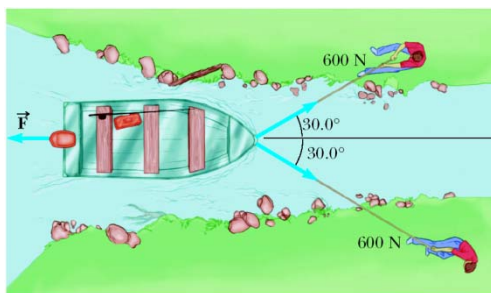
2D Combined Force Problems

Solve the following problems

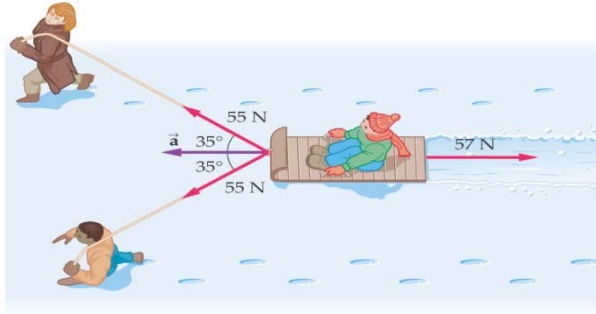
1. (Serway, p.146, #22) Two forces are applied to a car in an effort to accelerate it as show below. If the car has a mass of 3200kg, what is the acceleration of the car? (Remember to put your vectors into polar coordinate angles.



2. (Serway, College ed., ch 4, #20) Two people are pulling a boat through the water as in figure below. Each exerts a force of 600 N directed at a 30.0° angle relative to the forward motion of the boat. If the boat moves with constant velocity, find the resistive force exerted by the water on the boat. (This resistive force puts the boat into equilibrium)



3. (Walker, p. 133, #23) To give a 19-kg child a ride, two teenagers pull on a 3.7-kg sled with ropes, as indicated in the Figure below. Both teenagers pull with a force of 55 N at an angle of 35° relative to the forward direction, which is the direction of motion. In addition, the snow exerts a retarding force on the sled that points opposite to the direction of motion, and has a magnitude of 57 N. Find the acceleration of the sled and child? If one of the children changed their angle to 50° , what would the final acceleration be?



4. (Walker, p. 133, # 22) Two crewmen pull a boat through a lock, as shown in figure below. One crewman pulls with a force of $F_1 = 130$ N at an angle of $\theta = 37^\circ$ relative to the forward direction of the raft. The second crewman, on the opposite side of the lock, pulls at an angle of 45° . With what force F_2 should the second crewman pull so that the net force of the two crewmen is in the forward direction? (Note: This means that the vertical (y-components) must cancel out). If the boat is 250 kg, what is the acceleration of the boat?

