# Work and Energy

*Recap*

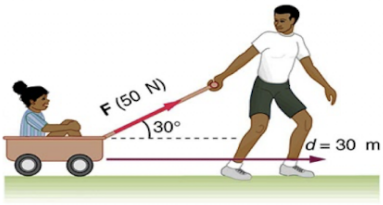
Kinetic energy

Work

Work Energy Theorem

## Practice

How much work is done by the boy pulling his sister 30.0 m in a wagon as shown in the figure? Assume no friction acts on the wagon.




Using energy considerations, calculate the average force a 60.0-kg sprinter exerts backward on the track to accelerate from 2.00 to 8.00 m/s in a distance of 25.0 m, if he encounters a headwind that exerts an average force of 30.0 N against him.

A car's bumper is designed to withstand a 4.0 km/h (1.12-m/s) collision with an immovable object without damage to the body of the car. The bumper cushions the shock by absorbing the force over a distance. Calculate the magnitude of the average force on a bumper that collapses 0.200 m while bringing a 900-kg car to rest from an initial speed of 1.12

Suppose the ski patrol lowers a rescue sled and a victim, having a total mass of 90.0 kg, down a 60.0 ° slope at a constant speed, as shown in the figure. The coefficient of friction between the sled and the snow is 0.100. (a) How much work is done by friction as the sled moves 30.0 m along the hill? (b) How much work is done by the rope on the sled in this distance? (c) What is the work done by the gravitational force on the sled? (d) What is the total work done?