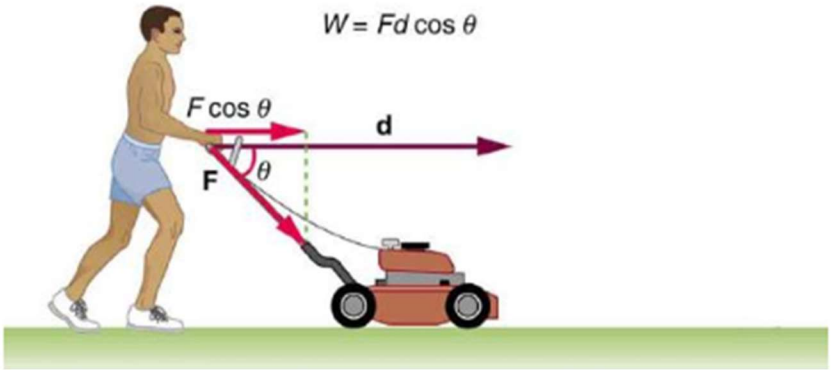
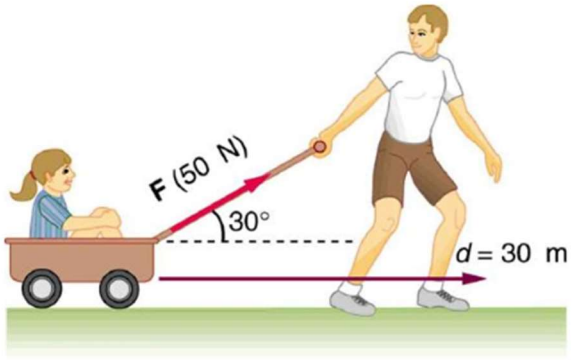
Problems ın Work and Energy

1) The person in the figure does work on the lawn mower. If the force exerted by him to the lawn mower is $60N$ and he pushes the mower with an angle of 30° below the horizon
   a) Find the work done by him to the mower for a distance of$50m$.
   b) Find the work done by him if friction does $600j$ work on the mower over the same distance?



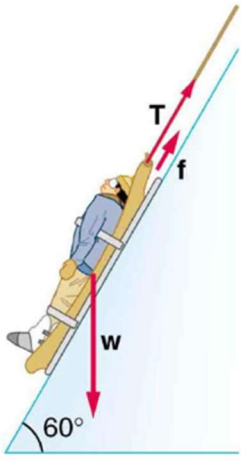
2) A $75kg$ person climbs stairs, gaining $2.50m$ in height. Find the work done to accomplish this task?

3) How much work is done by the boy pulling his sister $30m$ in a wagon as shown? Assume no friction acts on the wagon.



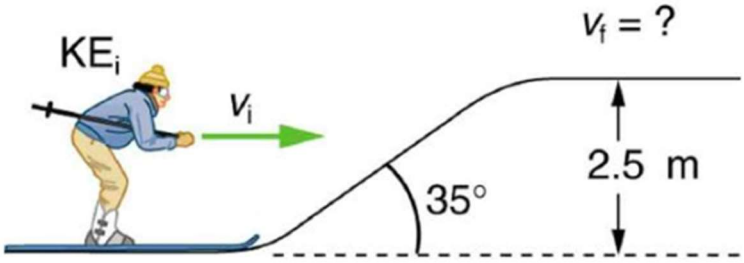
4) Shopper pushes a grocery cart $20m$ at constant speed on ground level, against a $35N$ frictional force. He pushes in a direction 25° below the horizontal.
   a) What is the work done on the cart by friction?
   b) What is the work done on the cart by gravitational force?
   c) What is the work done on the cart by shopper?
   d) Find the force the shopper exerts, using energy consideration?
   e) What is the total work done on the cart?

5) Suppose the ski patrol lowers a rescue sled and victim, having a total mass of $90kg$, down a 60° slope at constant speed, as shown. The coefficient of friction between the sled and the snow is 0.1
   a) How much work is done by friction as the sled moves $30m$ 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 gravitational force on the sled?
   d) What is the total work done?



A rescue sled and victim are lowered down a steep slope.

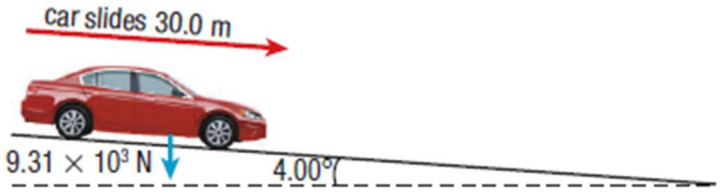
6) A $60kg$ skier with an initial speed of $12\,{}^{m}/_{s}$ coasts up a $2.5m$ high rise as shown. Find her final speed at the top, given the coefficient of friction between her skis and the snow is 0.08?



The skier's initial kinetic energy is partially used in coasting to the top of a rise.

Answer $9.46\,{}^{m}/_{s}$

7) A car is parked on a hill. The gravitational force on the car is $9.31 \times 10^3 N$ straight downward, and the angle of the hill is 4° from the horizontal. The car's brakes fail, and the car slides $30m$ downhill.
   a) Calculate the component of the gravitational force that acts parallel to the car's motion?
   b) Calculate the work done on the car by gravity as the car slides?



8) A snowboarder with a mass of $57kg$ starts from rest at the top of a frictionless slop at a height of$45m$. She follows the frictionless path shown in figure. Calculate her speed at the second peak?