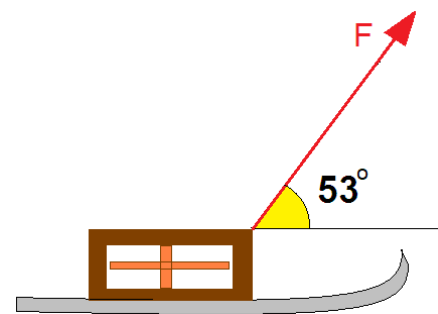


Physics I

Work

Problem 1.- A box whose weight is 40 N is pulled 6.0 m along a 37° inclined plane. What is the work done by the weight of the box?

Problem 2.- A person pulls a sled on an icy surface with a force of 70.0 N at an angle of 53.0° upward from the horizontal. If the sled moves 12.5 m horizontally, what is the work done by the person?



Problem 3.- You lift a book up in the air 1.1 m. The mass of the book is 1.2 kg. What is the work done by the weight of the book?

Problem 4.- A 12 kg mass is moving with a speed of 5.0 m/s. How much work is required to stop the mass?

Problem 5.- A pellet of mass 2 g is shot horizontally into a sandbag, striking the sand with a velocity of 600 m/s. It penetrates 20 cm. What is the average stopping force acting on the pellet?

Problem 6.- What work is required to stretch a spring of constant 40 N/m from $x = 0.20$ m to 0.25 m? Assume the un-stretched position is at $x = 0$.

Problem 7.- A skier pushes off the top of a hill with an initial speed of 4.0 m/s. Neglecting friction, how fast will she be moving after dropping 10.0 m in elevation.

Problem 8.- A roller coaster starts from rest at a point 45 m above the bottom of a dip. Neglecting friction, what will be its speed at the top of the next slope, which is 30 m above the bottom of the dip?

Problem 9.- A pendulum of length 50 cm is pulled 30 cm away from the vertical axis and released from rest. What will be its speed at the bottom of its swing?

Problem 10.- The kinetic friction force between a 10-kg object and a horizontal surface is 50.0 N. If the initial speed of the object is 25.0 m/s, what distance will it slide before stopping?

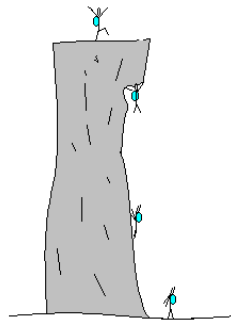
Problem 11.- A box is released from rest at the top of a plane inclined 20° above the horizontal. The coefficient of kinetic friction is 0.20. What will be the speed of the mass after sliding 4.0 m along the plane?

Problem 12.- At what rate is a 60.0 kg girl using energy when she runs up a flight of stairs 10.0 m high in 8.0 s?

Problem 13.- A cyclist does work at 600 W while riding. How much force is applied on the bicycle if its speed is 8.0 m/s?

Problem 14.- A particle moves from $x = 2.0\text{m}$ to $x = 6.0\text{m}$ under the influence of a force $F=1+x+3x^2$. Find the work done by F.

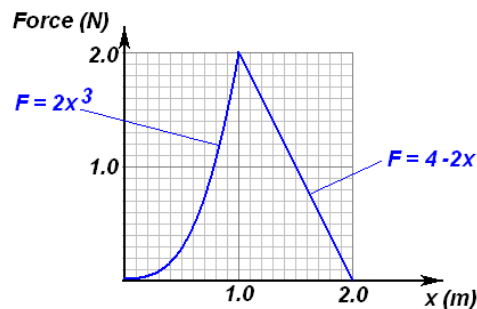
Problem 15.- Calculate the amount of work done by a 65kg-rock climber who starts at base camp (altitude 1,100 m) and gets to the summit (altitude 1,250 m). Consider the mass of the gear she is carrying to be 35kg and calculate for 100% efficiency. Give your answer in Calories.
1 Calorie = 4,184 J



Problem 16.- In building the pyramids of Egypt a theory proposes that 20 people would pull a 2,500 kg block up an incline at a 15° angle. Neglecting friction estimate the force applied by each person.

Problem 17.- An object is moving on a rough, level surface. It has initially 38 J of kinetic energy. The friction force is a constant 2.55 N. How far will it slide?

Problem 18.- Calculate the work done by a force described by the following graph when it accelerates an object from $x=0$ to $x=2\text{m}$:



Problem 19.- A weightlifter bench presses 80kg (approx. 175lbs.) 0.75m straight up. How much work does she do, assuming constant velocity, in one lift (just the 0.75m straight up)?

Problem 20.- An elevator whose total mass is 1,400kg accelerates uniformly from zero to 2m/s upwards in 10 seconds. Calculate the work done in that time.

Problem 21.- A particle is confined to move following the trajectory $y = x^2$. Calculate the work done on the particle by a force $F = (4xy, 9-y)$ when moving from (1, 1) to (3, 9).