

Work & Energy Word Problems Calculating Work

Work has a special meaning in science. It is the product of the force applied to an object and the distance the object moves. The unit of work is the Joule (J)

Work = Force x Distance

$W = F \times d$ Work = joules (J) Force = newtons (N) Distance = meters (m)

1. A book weighing 1.0 newton is lifted 2 meters. How much work was done?
2. A force of 15 newtons is used to push a box along the floor a distance of 3 meters. How much work was done?
3. It took 50 joules to push a chair 5 meters across the floor. With what force was the chair pushed?
4. A force of 100 newtons was necessary to lift a rock. A total of 150 joules of work was done. How far was the rock lifted?
5. It took 500 newtons of force to push a car 4 meters. How much work was done?
6. A young man exerted a force of 9,000 N on a stalled car but was unable to move it. How much work was done?

Calculating Power

Power is the amount of work done per unit of time. The unit for power, joules/second, is the watt. Power = work/time work = joules time = seconds

1. A set of pulleys is used to lift a piano weighing 1,000 newtons. The piano is lifted 3 meters in 60 seconds . How much power is used?
2. How much power is used if a force of 35 newtons is used to push a box a distance of 10 meters in 5 seconds?
3. What is the power of a kitchen blender if it can perform 3,750 joules of work in 15 seconds?
4. How much work is done using a 500-watt microwave oven for 5 minutes.
5. How much work is done using a 60-watt light bulb for 1 hour?

Calculating Efficiency

The amount of work obtained from a machine is always less than the amount of work put into it. This is because some of the work is lost due to friction. The efficiency of a machine can be calculated using the following formula

percent efficiency = work output / work input x 100

1. A man expends 100 J of work to move a box up an inclined plane. The amount of work produced is 80J.
2. A box weighing 1 newtons is pushed up an inclined plane that is 5 meters long. It takes a force of 75 newtons to push it to the top, which has a height of 3 meters.
3. Using a lever, a person applies 60 newtons of force and moves the lever 1 meter. This moves a 200 newton rock of the other end by 0.2 meters.
4. A person in a wheelchair exerts a force of 25 newtons to go up a ramp that is 10 meters long. The weight of the person and wheelchair is 60 newtons and the height of the ramp is 3 meters.
5. A boy pushes a lever down 2 meters with a force of 78 newtons, The box at the other end with a weight of 50 newtons moves up 2.5 meters.
6. A pulley system operates with 40% efficiency. If the work put in is 200 joules, how much useful work is produced?