

Work, Power, Energy WS #1 Solutions

1. How much work will you do if you push a block of concrete 4.3 m along a floor with a steady force of 25 N? **110 J**
2. If your mass is 70.0 kg, how much work will you do climbing a flight of stairs 25.0 m high, moving at a steady pace? **$1.72 \times 10^4 \text{ J}$**
3. Your car is stuck in the mud. You push on it with a force of 300.0 N for 10.0 s, but it will not budge. How much work have you done in 10.0 s? **0 J**
4. How much work is done by the Earth's gravitational field on a 10.0 kg mass when the mass drops a distance of 5.0 m? **$4.9 \times 10^2 \text{ J}$**
5. A girl uses a 3.0 m long ramp to push her 110 kg motorbike up to a trailer, the floor of which is 1.2 m above the ground. How much work is done on the motorbike? **$1.3 \times 10^3 \text{ J}$**
6. A force was used to push a box along the floor for a distance of 8.0 m. If 160.0 J of work was done, what net force was applied? **20 N**
7. A force of 50.0 N is used to do 480.0 J of work to move an object. What distance was the object moved? **9.6 m**
8. A 2.0 kg puck accelerated at 5.0 m/s^2 for 0.50 m across a frictionless air hockey table. How much work was done on the puck? **F must be calculated first, $F = 10 \text{ N}$ then calculate work $W = 5.0 \text{ J}$**
9. A bulldozer pushed a large rock with a force of 5000 N at 2.0 m/s for 20 s. How much work was done? **Find distance = 40. m then $W = 2.0 \times 10^5 \text{ J}$**
10. How much work is required to lift a 50 kg object straight up 10. m? **$W = 4.9 \times 10^3 \text{ J}$**
11. How much power does a crane develop doing 60 000 J of work in 5.00 minutes? **200 W**
12. How long does it take a 2.5 kW electric motor to do 75 000 J of work? **30. s**
13. How much work can a 500 W electric mixer do in 2.5 minutes? **75 000 J**
14. A crane lifts a 1500 kg car 20 m straight up.
 - (a) How much potential energy does the car gain? **294 000 J**
 - (b) How much potential energy does the crane transfer to the car? **294 000 J**
 - (c) How much work does the crane do? **294 000 J**
15. A 4.00 kg rubber ball drops from a height of 5.00 m to the ground and bounces back to a height of 3.00 m.
 - (a) How much potential energy does the ball lose on the trip down? **196 J**
 - (b) How much potential energy does the ball regain on the trip back up? **117.6 J**
 - (c) What is the net loss of potential energy during the bounce? **78.4 J**

16. What is the kinetic energy of a 0.500 kg ball thrown at 30.0 m/s? **225 J**
17. What is the mass of an object traveling at 20 m/s with kinetic energy of 4000 J? **20. kg**
18. A 0.50 kg rubber ball is thrown into the air. At a height of 20 m above the ground, it is traveling at 15.0 m/s.
- (a) What is the ball's kinetic energy? **56.3 J**
 - (b) What is its gravitational potential energy relative to the ground? **98 J**
 - (c) How much work was done by someone at ground level throwing the ball into the air? **154.3 J**