

Practice 6.0 - Work and Energy

Work: $W = Fs$

144 J	1. How much work does Fred do exerting 45.0 N to lift a box 3.20 m?
60.0 J	2. How much work does Adair lifting a 12.0 N box up 5.00 m?
138 m	3. An alkaline AA battery contains 9360 J of energy. If it takes 68.0 N of force to drag a heavy box across the floor, how far could the energy in a AA battery drag the box?
1.56 m	4. What vertical distance will 64.0 J of work lift a box that weighs 41.0 N
0.694 N	5. Katherine moves a box 7.20 m doing 5.00 J of work. What is the frictional force?
28.5 N	6. What force exerted for 4.10 m does 117 J of work?

Potential Energy: $PE = mgh$

636 J	7. What is the potential energy of a 5.40 Kg shot put that is 12.0 m in the air?
21.3 J	8. What is the potential energy of a 3.20 kg clock weight that has been wound up to a height of 0.680 m?
162 Kg	9. What is the mass of a pile driver if it has 13,200 J of PE when it is 8.30 m in the air?
68.0 kg	10. What mass has a PE of 140. J when it is at an elevation of 0.210 m?
13.3 m (43.5 feet)	11. An alkaline AA battery contains 9360 J of energy. If I connected it to a 100% efficient winch, how high could it lift a 72.0 kg person?
19.0 m	12. To what height must a 0.145 Kg baseball rise to get a potential energy of 27.0 J?

Kinetic energy: $KE = \frac{1}{2}mv^2$

116 J	13. What is the kinetic energy of a 0.145 Kg baseball going 40.0 m/s? (about 90 mph)
2634 J	14. What is the kinetic energy of a 4.20 g (0.0042 kg) bullet going 1120 m/s?
359 m/s (mach 1.05)	15. An alkaline AA battery contains 9360 J of energy. If I connected it to a 100% efficient pitching machine, how fast could it pitch a 0.145 kg baseball?
15.9 m/s	16. What speed must a 0.450 Kg hammer have to have a kinetic energy of 57.0. J?
172 kg	17. A pile driver must develop 14,500 J of kinetic energy when it is going 13.0 m/s. What does its mass have to be?
0.00689 Kg (6.89 g)	18. A bullet with a speed of 892 m/s has a kinetic energy of 2740 J. What is its mass?

Springs: $F = kx$

4.06 N	19. What force do you need to stretch a 31.2 N/m spring 13.0 cm?
42.8 N/m	20. You hang a 200. gram mass on a spring, and it stretches 4.58 cm. What is its spring constant in N/m? ($F = mg$, 1000 g = 1 kg, 100 cm = 1 m)
31.9 cm	21. If you exert 15.0 N on a spring with a constant of 47.0 N/m how many centimeters will it stretch?

Springs: $PE = \frac{1}{2}kx^2$

83.3 J	22. What is the energy stored in a bow with a constant of 371 N/m if you stretch it 67.0 cm?
944 N/m	23. A spring has a potential energy of 6.80 J when it is stretched 12.0 cm. What must be the spring constant?
0.620 m or 62.0 cm	24. What distance must you compress a 78.0 N/m spring to store 15.0 J of energy?