PSSC 101
Practice Problem Set III

Note: Neglect all frictional forces in all exercises.

1. A force of 200 N is needed to push a table across a level classroom floor for a distance of 3 m. How much work was done on the table?
2. An 880 N box is pushed across a level floor for a distance of 5.0 m with a force of 440 N. How much work was done on the box?
3. How much work is done in raising a 10.0 kg backpack from the floor to a shelf 1.5 m above the floor?
4. If 5,000 J of work is used to raise a 102 kg crate to a shelf in a warehouse, how high was the crate raised?
5. A 60.0 kg student runs up a 5.00 meter high stairway in a time of 3.92 seconds. (a) How many watts of power did she develop?
6. What is the kinetic energy of a 2,000 kg car moving at 72 km/hr?
7. How much work is needed to stop a 1,000.0 kg car that is moving straight down the highway at 54.0 km/hr?
8. A 1,000 kg car stops on top of a 51.02 m hill. (a) How much energy was used in climbing the hill? (b) How much potential energy does the car have?
9. What is the velocity of water that falls 100.0 m through the penstock of a hydroelectric dam?
10. (a) How much work is done in moving a 2.0 kg book to a shelf 2.00 m high? (b) What is the potential energy of the book as a result? (c) How much kinetic energy will the book have as it hits the ground as it falls?
11. A 150 g baseball has a velocity of 30.0 m/s. What is its kinetic energy in Joules?
12. (a) What is the kinetic energy of a 1,000.0 kg car that is traveling at 90.0 km/hr? (b) How much work was done to give the car this kinetic energy? (c) How much work must be done to now stop the car?
13. A 60.0 kg jogger moving at 2.0 m/s decides to double the jogging speed. How did this change in speed change the kinetic energy?
14. A bicycle and rider have a combined mass of 70.0 kg and are moving at 6.00 m/s. A 70.0 kg person is now given a ride on the bicycle. (Total mass is 140.0 kg.) How did the addition of the new rider change the kinetic energy at the same speed?
15. What is the velocity of a 1,000.0 kg car if its kinetic energy is 200 kJ?
16. An electric hoist is used to lift a 250.0 kg load to a height of 80.0 m in 39.2 s. (a) What is the power of the hoist motor in kW?

Answers

1. 600 J
2. 2200 J
3. 150 J
4. 5 m
5. 750 W
6. 4×10^5 J
7. 1.13×10^5 J
8. 500 kJ
9. 44 m/s
10. (a) 39 J (b) 39 J (c) 39 J
11. 68 J
12. (a) 313 kJ (b) 313 kJ (c) 313 kJ
13. (a) initial KE = 120 J (b)final KE = 480 J
14. (a) initial KE = 1260 J (b)final KE = 2520 J
15. 20 m/s
16. 5.0 kW