

energy - practice problems

1. A student pushes a cart with an 18 N horizontal force while the cart moves 5 m forward across the lab floor. The cart squeaks, but the force and displacement are in the same direction. How much work does the student do on the cart?

2. A box is pulled 250 cm across a smooth floor with a 40 N horizontal force. How much work is done by the pull?

3. A rope pulls a sled with a 60 N force at 30 degrees above the horizontal. The sled moves 4 m horizontally. How much work does the rope do?

4. A sled slides 6 m forward while friction pushes backward with a 12 N force. How much work does friction do on the sled?

5. A person carries a 30 N bag horizontally across a room for 8 m while walking at a steady pace. The upward force from the person's hand is 30 N. How much work does the hand do on the bag?

6. A 1500 g toy car rolls across the floor at 4 m/s after leaving a plastic ramp. What is its kinetic energy?

7. A 60 kg skateboarder is moving at 3 m/s. What is the skateboarder's kinetic energy?

8. A 2 kg cart moves at 18 km/h. What is its kinetic energy?

9. A person pushes a box with a 50 N force while the box moves 3.0 m. How much work is done by the push?

10. A 4 kg cart has 50 J of kinetic energy. How fast is it moving?

11. A moving object has 72 J of kinetic energy and a speed of 6 m/s. What is its mass?

12. A 2 kg book is lifted from the floor to a shelf 1.5 m high. How much gravitational potential energy does it gain?

13. A 750 g water bottle is lifted 1.2 m onto a table. How much gravitational potential energy does it gain?

14. A 10 kg box gains 196 J of gravitational potential energy. How much higher was it lifted?

15. An 80 kg rider goes from the top of a 2.5 m ramp to the bottom. How much gravitational potential energy is lost?

16. A 20 kg crate is moved onto a platform 1.2 m above the floor. One path is a short steep ramp, and another path is a long gentle ramp. How much gravitational potential energy does the crate gain either way?

17. A spring has a spring constant of 180 N/m and is stretched 0.20 m from equilibrium. What force does the spring apply?

18. A spring pulls back with a 12 N force when it is stretched 0.30 m. What is the spring constant?

19. A 200 N/m spring is stretched 15 cm. How much elastic potential energy is stored?

20. A 50 N/m spring is compressed 0.40 m. How much elastic potential energy is stored?

21. A spring stores 4.0 J of energy when stretched. If its spring constant is 200 N/m, how far is it stretched?

22. A spring launcher does 20 J of work on a 0.50 kg ball. The launcher is 18 cm long, but assume that all of that work becomes kinetic energy. How fast does the ball leave the launcher?