

## 12 Work and Power

Worksheet

Name \_\_\_\_\_

Inquiry Physics

*In the space to the left, write the answer that best completes each statement.*

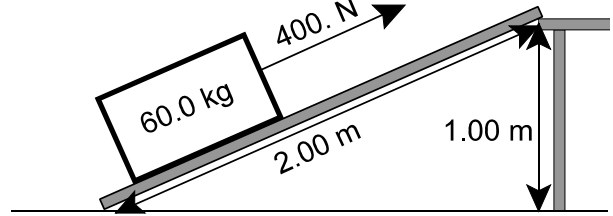
- \_\_\_\_\_ 1. When a force is exerted through a distance, \_\_\_\_\_ is done.
- \_\_\_\_\_ 2. To compute work, multiply force by \_\_\_\_\_ .
- \_\_\_\_\_ 3. In the metric system, the unit of work is the \_\_\_\_\_ .
- \_\_\_\_\_ 4. If a force acts at an angle of \_\_\_\_\_ degrees to the direction of the motion, NO work is done.
- \_\_\_\_\_ 5. Power is the \_\_\_\_\_ at which work is done.
- \_\_\_\_\_ 6. In the metric system, power is measured in \_\_\_\_\_ .
- \_\_\_\_\_ 7. You push against a car stuck in the mud. You will do \_\_\_\_\_ work unless you are successful in moving the car.
- \_\_\_\_\_ 8. A job is done slowly and an identical job is done quickly. Both jobs required the same total amount of \_\_\_\_\_ but required different amounts of time and \_\_\_\_\_ .
- \_\_\_\_\_ 9. In using a machine, the input energy is always \_\_\_\_\_ than the work the machine does. This is usually because of the effects of \_\_\_\_\_ .

*In the space to the left, write the letter of the best answer to each question.*

- \_\_\_\_\_ 10. A crate is pushed to the top of a frictionless inclined plane 15 m long with a force of 25 N. If the crate weighs 125 N, how high is the inclined plane?  
a) 0.50 m                      b) 1.0 m                      c) 3.0 m                      d) 5.0 m
- \_\_\_\_\_ 11. A person prevents a 7500 N car with its brakes released from rolling down a hill by pushing on the car with a force of 250 N. How much work has the person done?  
a) 0 J                      b)  $5.0 \times 10^3$  J                      c) 150,000 J                      d)  $3.0 \times 10^5$  J
- \_\_\_\_\_ 12. Electric bills are paid on the basis of kilowatt•hours of electricity used. Notice that it is multiplying kilowatts and hours. Think about what is measured in kilowatts and what is measured in hours: if you analyze "kilowatt•hour" you will realize it must be a unit of...  
a) force                      b) work                      c) power                      d) time

Show your work (☺) on all problems, including equations and units. Some answers are given in *italics*.

13. A 60.0 kg crate is slid up an inclined board 2.00 m long onto a platform 1.00 m above floor level. A 400 N force is needed to slide the crate up the board.
- a) How much work is done in sliding the crate up the board? *800. J*



- b) How much work would be done if the crate were simply lifted straight up from the floor to the platform?
- c) Compare answers **a** and **b**. Explain why one is larger than the other.
14. A car is driven at a steady speed of 21.0 m/s down a road. The car's engine delivers 48.0 kilowatts of power. Calculate the average force of friction that is resisting the motion of the car.
15. A student with a mass of 80.0 kg runs up three flights of stairs in 12.0 s. The student has gone a vertical distance of 8.00 m. What is the student's power? *523 W*
16. It took a force of 250 N to pull a crate weighing 765 N across the floor. The work done was 3,500 J. How far was the crate moved? *14.0 m*
17. An 80.0 kg person carries a 25.0 N package up a flight of stairs. The vertical height of the stairs is 10.0 m. How much work is done by the person in lifting him or herself plus the package?
18. A 9,000 W motor lifts a 3,500 kg elevator to a height of 9.50 m. How long does it take?