

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

## Work, Power, and Energy

Show your work and box your answers.

### Work:

1. Lee pushes horizontally with an 80 N force on a 20 kg mass 10 m across a floor. Calculate the amount of work Lee did.
2. The third floor of a house is 8 m above street level. How much work is needed to move a 150 kg refrigerator to the third floor?
3. Stan does 176 J of work lifting himself 0.3 m. What is Stan's weight?
4. What is Stan's mass (in problem 3 above)?
5. Mike pulls a sled across level snow with a force of 225 N along a rope that is  $35^\circ$  above the horizontal. If the sled moved a distance of 65.3 m, how much work did Mike do?
6. Chris carried a carton of milk that weighs 10 N, along a level hall to the kitchen, a distance of 3.5 m. How much work did Chris do?
7. A student librarian picks up a 22 N book from the floor to a height of 1.25 m. He carries the book 8 m to the stacks and places the book on a shelf that is 0.35 m high. How much work does he do on the book?
8. A 4200 N piano is slid up a 3.5 m frictionless plank that makes an angle of  $30^\circ$  with the horizontal. Calculate the work done in sliding the piano up the plank.
9. While moving a heavy crate across the room, man exerts a horizontal force of 50 N for 6 m then he exerts a horizontal force of 75 N for 3 m and a horizontal force of 100 N for 2 m. How much work did he do against friction? (Assume all work done was against friction and the box moved at a constant speed.)

### Power:

10. An engine moves a boat through the water at a constant speed of 15 m/s. The engine must exert a force of 6000 N to balance the force that water exerts against the hull. What power does the engine develop?
11. A 188 W motor will lift a load at the rate (speed) of 6.5 cm/s. How great a load can the motor lift at this speed?

### Kinetic and Potential Energy:

12. Sally has a mass of 45 kg and is moving with a speed of 10 m/s. What is Sally's kinetic energy? Sally's speed changes to 5 m/s, what is her new kinetic energy?
13. Shawn and his bike have a total mass of 45 kg. Shawn rides his bike 1.8 km in 10 minutes at a constant velocity. What is Shawn's kinetic energy?
14. Sally and Lisa each have a mass of 45 kg and they are moving together with a speed of 10 m/s. What is their combined kinetic energy?