

NAME _____ DATE _____ PERIOD _____

WORK AND POWER PROBLEMS

$$\text{Work} = \text{Force} \times \text{distance} \qquad \text{Power} = \text{Work} / \text{time}$$

1. Mrs. Spalla exerts a force of 25 N in order to push a cart through the hallway. How much work is done when she pushes the cart 40 m between classes?
2. If it takes Mrs. Spalla 45 seconds to push her cart to the next class, how much power does she generate?
3. How much power is needed to run a ceiling fan that does 1.2kJ of work for 60 minutes?
4. You must exert a force of 4.5 N on a book to slide it across a table. You move it 0.5 meters. How much work have you done?
5. Your roller blade brakes apply 5.6 N of frictional force as you travel 2 meters. How much work have the brakes done?
6. A car has run out of gas. Fortunately, there is a gas station nearby. You must exert a force of 715 N on the car in order to move it. By the time you reach the station, you have done 2.72×10^4 J of work. How far have you pushed the car?

7. A certain crane is able to lift 2.20×10^6 kg. If the crane is able to raise this mass a distance of 20.0 m by doing 4.32×10^8 J of work in 35.0 s, how much power has the crane provided?
8. What requires more work? Lifting a 50 kg sack a vertical distance of 2 m or lifting a 25 kg sack a vertical distance of 4 m?
9. One horsepower (1 hp) is the unit of power based on the work that a horse can do in 1 s. This is defined, in English units, as a force of 550 lb that can move an object 1 ft in 1 s. In SI, 1 hp equals 745.7 W. Suppose you have a horse that has a power output of 750 W. How much work does this horse do in 0.50 s?
10. A race car with a 255 hp (1.90×10^5 W) engine is able to accelerate from rest to its top speed in 9.00 s. How much work does the car's engine do in this interval of time?
11. A child pulls a sled up a snow-covered hill. In the process, the child does 405 J of work on the sled. If she walks a distance of 15 m up the hill, how large a force does she exert on the sled?