1. You pull your sled through the snow a distance of 500 m with a horizontal force of 200 N. How much work did you do?

$W = f \times d = 500\ m \cdot 200\ N = 10{,}000\ J$

2. You did 150. J of work lifting a 120.-N backpack. How high did you lift the backpack?

$d = W/f = \frac{150.\ J}{120.\ N} = 1.25\ m$

3. A crane does 625 J of work to lift a boulder a distance of 25.0 m. How much did the boulder weigh? (Hint: The weight of an object is considered to be a force in units of newtons.)

$f = W/d = \frac{625\ J}{25.0\ m} = 25.0\ N$

4. A bulldozer does 30,000. J of work to push another boulder a distance of 20. m. How much force is applied to push the boulder?

$f = W/d = \frac{30{,}000.\ J}{20.\ m} = 1500\ N$

5. A 450.-N gymnast jumps upward a distance of 0.50 m to reach the uneven parallel bars. How much work did she do?

$W = f \times d = 450.N \times 0.50\ m = 230\ J$

6. How much work does a mother do if she lifts each of her twin babies upward 1.0 m? Each baby weighs 90. N.

$\begin{array}{r} 90.N \\ +\ 90.N \\ \hline 180\ N \end{array}$

$W = f \times d = 180N \times 1.0\ m = 180\ J$

7. It took a 500.-N ballerina a force of 250 J to lift herself upward through the air. How high did she jump?

$$d = \frac{W}{f} = \frac{250\ J}{500.\ N} = 0.50\ m$$

8. A book weighing 10. N is lifted 2 m. How much work was done?

$$W = f \times d = 10.\ N \times 2\ m = 20\ J$$

9. A force of 15 N is used to push a box along the floor a distance of 3 meters. How much work was done?

$$W = f \times d = 15\ N \times 3\ m = 50\ J$$

10. It took 50 J to push a chair 5 meters across the floor. With what force was the chair pushed?

$$f = \frac{W}{d} = \frac{50\ J}{5\ m} = 10\ N$$

11. A force of 100 N was necessary to lift a rock. A total of 150 J of work was done. How far was the rock lifted?

$$d = \frac{W}{f} = \frac{150\ J}{100\ N} = 2\ m$$

12. A young man exerted a force of 9,000 N on a stalled car but was unable to move it. How much work was done?

$$W = f \times d = 9{,}000.\ N \times 0\ m = 0\ J$$