

Math Skills \times
 \div **LESSON 1****Solve for Power**

Power is the rate at which work is done. Power is calculated by dividing the work done by the time needed to do the work. This can be shown by the equation below, where P = power (in watts), W = work (in joules), and t = time (in seconds). The symbol for work, W , is usually italicized. However the abbreviation for watt, W , is not italicized.

$$P = \frac{W}{t}$$

You can rearrange the equation to solve for either of the other variables.

$$W = Pt \quad t = \frac{W}{P}$$

A student does **24 J** of work in **3** seconds as she pushes a box across the floor. How much power does the student use on the box?

Step 1 Identify the variable you will solve for and choose the appropriate equation.

You are solving for P , power.

$$P = \frac{W}{t}$$

Step 2 Substitute the known values to solve the equation.

$$P = \frac{24 \text{ J}}{3 \text{ s}}$$

$$P = 8 \text{ W}$$

The student used **8 W** of power.

Practice

- Joel does 12 J of work in 2 seconds as he lifts a box off of the floor. How much power does Joel use on the box?
- Sasha does 15 J of work in 4 seconds as she lifts a chair off the floor. How much power does Sasha use on the chair?
- A student pushes a box across the floor, using 9 W of power in 6 seconds. How much work does the student do?
- Yusef pushes a chair across the room, using 9 W of power to do 45 J of work. How much time does it take him to push the chair?

Name _____ Date _____ Class _____

Key Concept Builder

LESSON 1

Work and Power

Key Concept How are work and power related?

Power Equation

$$\text{Power (in watts)} = \frac{\text{work (in joules)}}{\text{time (in seconds)}}$$

$$P = \frac{W}{t}$$

Directions: Use the equation to answer each question.

1. A task lasted 40 seconds and required 2,000 J of work to complete. How much power was used?
2. How much power is required to do 1,500 J of work in 60 seconds?
3. How much power is expended doing 1,800 J of work in 1 minute?

Directions: On each line, write the term that correctly completes each sentence.

4. Power is the rate at which _____ is done.
5. Power is also considered to be the rate at which _____ is transferred to an object.