Name _____ Date _____ Class _____

Math Skills ×÷+

LESSON 1

Solve for Work

Work is the transfer of energy that occurs when a force makes an object move. So, work is the product of the force that is applied to the object and the distance that the object moves. This can be shown by the equation below, where w = work (in joules), F = force (in newtons), and d = distance (in meters).

$$W = Fd$$

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

$$F = \frac{W}{d} \qquad d = \frac{W}{F}$$

A student pushes a box **2.0** m across the floor using a constant force of **15.0** N. How much work does the student do on the box?

Step 1 Identify the variable you will solve for and choose the appropriate equation.
You are solving for w, work.
$W = Fd$

Step 2 Substitute the known values to solve the equation.
$W = \mathbf{15.0}\ \text{N} \times \mathbf{2.0}\ \text{m}$
$W = \mathbf{30}\ \text{J}$

Practice

1. A student pushes a box 5.0 m across the floor using a constant force of 20.0 N. How much work does the student do on the box?

2. Eli lifts his little brother 1.0 m off the ground using a constant force of 15.5 N. How much work does Eli do?

3. Mary applies a constant force of 25 N as she pushes a desk. In total, she does 75 J of work. How far does she push the desk?

4. A student does 120 J of work pushing a box 6 m across the floor. What force did the student apply?

Name _____ Date _____ Class _____

Key Concept Builder

LESSON 1

Work and Power

Key Concept What must happen for work to be done?

Work Equation

Work (in joules) = force (in newtons) × distance (in meters)

$W = Fd$

Directions: *Use the equation to calculate how much work is being done in each example.*

1. Sam lifts a brick weighing 10 N from the ground and places it on a ledge 1.5 m high. How much work has Sam done on the brick? _____

2. Tara pushes a 140-N chair 12 m across the basement floor. How much work has been performed on the chair? _____

3. Erik pulls a sled 25 m through the snow. The sled weighs 200 N. How much work has Erik done on the sled? _____

Directions: *Answer each question on the lines provided.*

4. If a leaf falls from a tree, has work been done on the leaf? Explain.

_____

_____

_____

5. What is the amount of force required to lift an object against the force of gravity equal to?

_____

6. What is the only part of an applied force that performs work on object?

_____

_____

_____