Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hour: \_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Introduction to Power

Do Now: In each of the following situations determine whether or not work was done:

* An ice skater’s partner lifts her up a distance of 1 m. \_\_\_\_\_\_\_\_\_\_\_
* The ice skater’s partner carries her across the ice a distance of 3 m. \_\_\_\_\_\_\_\_\_\_\_\_
* After practice, the skater lifts her 20-N gym bag up 0.5m. \_\_\_\_\_\_\_\_\_\_\_\_

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

Notes:

* Power is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at which \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is done OR the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ per unit of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Power = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_÷ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Units:
  + Force = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Distance = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Time = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + Work = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Problem: A motor does 6000 J of work in 40 seconds. Determine the amount of power of the motor.
* Recall: Work = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Problem: How much power does a person weighing 750 newtons need if he takes 20 seconds to walk up a staircase 10 meters high?

Two physical science students, Ben and Bonnie, are in the weightlifting room. Bonnie lifts the 50 kg barbell over her head (approximately .60 m) 10 times in one minute; Ben lifts the 50 kg barbell the same distance over his head 10 times in 10 seconds.

Which student does the most work?

Which student delivers the most power?

* Work = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Force = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ÷ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Distance = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ÷ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Power = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ÷ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Work = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_X \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Time = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ÷ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Practice:**

1. Write the equation for each of the following:
   1. Work =
   2. Power =
2. What is the definition of power: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. The SI unit for power is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Using the equations for work and power solve the following problems:

1. A motor does 5,000 joules of work in 20 seconds. What is the power of the motor?
2. A hair dryer uses 72,000 joules of energy in 60 seconds. What is the power of the hair dryer?
3. Suppose a force of 100 N is used to push an object a distance of 5 meters in 15 seconds. Find the work done and the power used in this situation.

Using the various forms of the equation, solve the following problems.

1. If 478 watts of power are used in 14 seconds, how much work was done?
2. How long does it take to do 278 joules of work with 17 watts?
3. A 1000-watt microwave takes 90 seconds to heat a bowl of soup. How many joules of energy does it use?
4. A bulldozer does 30,000 J of work to push another boulder a distance of 20 m. How much force is used to push the boulder?