Name Answer Key Date _____

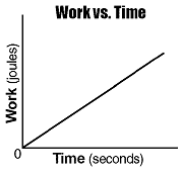
Honors Physics Energy WS #2H

Period _____ Mrs. Nadworny

Power

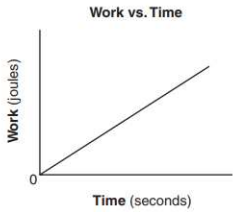
Directions: Read online textbook pages 187 – 188. Solve the following problems using the GUESS method and proper significant figures. Be sure to show ALL work.

1. The graph below represents the relationship between work done by a student running up a flight of stairs and the time of ascent. What does the slope of the given graph represent?



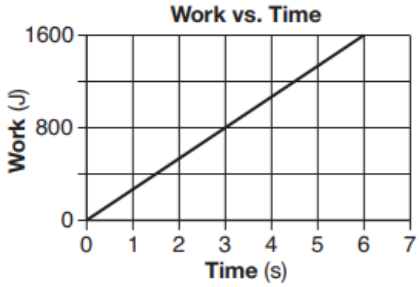
(A) impulse (B) speed (C) power (D) momentum

2. The graph below shows the relationship between the work done by a student and the time of ascent as the student runs up a flight of stairs. The slope of the graph would have units of



(A) joules (B) watts (C) seconds (D) newtons

3. The graph below represents the work done against gravity by a student as she walks up a flight of stairs at constant speed. Compared to the power generated by the student after 2.0 seconds, the power generated by the student after 4.0 seconds is



(A) the same (B) half as great (C) twice as great (D) four times as great

4. An electric motor has a rating of 4.0×10^2 watts. How much time will it take for this motor to lift a 50.-kilogram mass a vertical distance of 8.0 meters? [Assume 100% efficiency.]

(A) 0.98 s (B) 98 s (C) 9.8 s (D) 980 s

5. What is the rate at which work is done in lifting a 35-kilogram object vertically at a constant speed of 5.0 meters per second?

(A) 1700 W (B) 180 W (C) 340 W (D) 7.0 W

Continued on next page

6. Powerful Pete uses a 350. N force to move an object 525 m in 20.0 seconds while Wally Weakling uses a 100. N force to move the object 525 m in 60.0 seconds. Calculate the power of each.

Pete $P = \frac{Fd}{t} = \frac{350.N(525m)}{20.0s} = 9190Watts$

Wally $P = \frac{Fd}{t} = \frac{100N(525m)}{60.0s} = 875Watts$

7. A 4.50 kilowatt machine does 1.80 x 10^7 Joules of work. Calculate how long was the machine running.

$$t = \frac{W}{P} = \frac{1.80\times10^{7}J}{4.50\times10^{3}W} = 4.00\times10^{3}s$$

8. An engine does work at a rate of 7300 watts while exerting a force of 500. N on a vehicle. What is the speed of the vehicle?

$$v = \frac{P}{F} = \frac{7300W}{500.N} = 15\frac{m}{s}$$

9. Claire deTabel starts to wait tables after school for some extra cash. She figures she lifts her tray an average of one hundred times in one night. The tray is on average 6.3 kg and she lifts it approximately 1.0 meter every time. Each time it takes her 1.5 seconds to lift the tray.
   a. How much work does she do to her tray each time? How much work does she do to her tray in a night?

$$W_{onelift} = Fd = mgd = 6.3kg(9.81\frac{m}{s^2})(1.0m) = +62J$$

$$W_{night} = W_{onelift}\times100 = +6200J$$

   b. How much power does she develop each time she lifts her tray? How much power does she develop in one night when she lifts her tray?

$$P_{onelift} = \frac{W}{t} = \frac{62J}{1.5s} = 41Watts$$

$$P_{night} = P_{onelift}\times100 = 4100Watts$$

Answers in size order: 15, 41, 62, 875, 4.00 x 10^3, 4100, 6200, 9190