

Power

A. What is meant by the term "work?"

B. What is power?

C. What are the units of power?

Calculations

1. What is the power of a person that can do 5000 J of work in 4 seconds?
2. A force does 500 J of work in 1 minute. What is the power of the force?
3. How much energy is used by a 75 W light bulb in 2 minutes?
4. How much energy does a 4500 W generator produce if it is running for 6 hours?
5. How long would it take a 40 W engine to do 5000 J of work?
6. How long would take something producing 250 W to do 1,000 J of work? How about 10,000 J?
7. How much power does it take to lift 20 kg to a height of 15 meters in only 5 seconds?

Power

8. How long would it take a 5,000 W crane to lift 150 kg to a height of 30 meters?

9. Every year, there is a race at the Empire State Building, from the ground floor to the 86th floor observation deck. The participants climb 1576 stairs for a total height of 320 meters.
 - a. The record for this event is a time of 9 minutes and 33 seconds. If that person had a mass of 70 kg, what was the power needed?

 - b. Using your power output from the Power Lab, how long would it take you to complete this task? Do you think that is a realistic estimate of how long it might take you to do this?

10. Which is more powerful: doing 1000 J of work in 50 seconds or doing 500 J of work in 25 seconds?

Answers:

- 1) 1250 W 2) 8.3 W 3) 9000 J 4) 97,200,000 J 5) 125 s 6) 4 s; 40 s
7) 600 W 8) 9 s 9. a) 391 W b) ---- 10) same, both 20 W