

**Purpose:**

Gain an understanding of power, work, and force by measuring your personal power output.

**Procedure:**

1. Place all values in the table on the next page.
2. Determine and record the vertical displacement of your run in meters.
3. Calculate and record your weight in newtons.

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4. Calculate your work to climb the stairs.

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5. Climb one stair at a time. Have your lab partner record the number of seconds it takes for you to complete the ascent.
6. Calculate and record your power output.

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7. Calculate and record your power output in units of horsepower.

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8. Convert your power output from watts to kilowatts.

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**Data Table:**

	Your Data	Partner One Name:	Partner Two Name:	Partner Three Name:
Height Climbed (m)				
Weight (N)				
Work (J)				
Time (s)				
Power Output (W)				
Power Output (kW)				
Power Output (hp)				

questions continued on next page

Unit 4I\_How Powerful Are You Lab

**Questions to consider:**

1. Did the student in your group who climbed the stairs in the shortest time also use the most power? Explain.

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2. When James Watt was trying to sell his modern steam engine in the late 1700s, he was repeatedly asked how the power of his engine compared to the power of a horse. He estimated the amount of work that an average horse could do in one second and defined this value as one horsepower. In this lab, you determined your work output in units of horsepower.

a. How does your work output compare to that of an average horse?

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b. An average horse can maintain its work output for over half an hour. Do you think you can do the same? Explain.

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3. How are force, work, and power related? Describe how the formulas we have been using in class relate to one another.

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4. How does your power output compare to that of a 100 W light bulb?

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