

Knowing Energy: Stair Climb



Energy Revealed
Learner Worksheet
Level 1-2: Grades 3-8
Level 3-4: Grades 9-12

Reminder:

- 2.2 pounds = 1 kilogram
- 9.8m/s^2 = force of gravity

Level 1 Questions/Activities:

1. How many Kilograms do you weigh? (Multiply this number by 9.8 m/s^2)

2. What is the height of the stairs?

3. How many seconds does it take you to run up the stairs? (Must be in seconds)

4. How many Watts do you develop to climb the stairs? (hint: $Watts (W) = \frac{\text{weight } (N) \times \text{height } (m)}{\text{time } (s)}$, remember weight here is in Newtons, where $Newtons (N) = 9.8\text{ m/s}^2 \times \text{your own weight } (kg)$)

Level 2 Questions/Activities:

Note: Complete level 1 questions/activities first if you haven't already done so.

1. Climb the stairs in double the time and see how many Watts you develop.

2. Run the stairs in half the time (if possible, to see how many Watts you develop).

3. Does the number of Watts required change with your time, explain how you can understand this with a real-world example?

Level 3 Questions/Activities:

Note: Complete levels 1-2 questions/activities first if you haven't already done so.

1. If a larger and smaller person runs up the stairs at the same time, who do you think develops the most power? Explain your thinking.

2. If one horsepower = 746 Watts, how much horsepower do you develop climbing the stairs?

Level 4 Questions/Activities:

Note: Complete levels 1-3 questions/activities first if you haven't already done so.

1. Does it require more or less power (W) and energy (kWh) to climb the stairs one at a time or two at a time?

2. If it was possible, would riding a bike allow you to develop more power?

3. **BONUS:** how much faster would a person weighing 100 lbs have to run up the stairs in order to exert the same amount of power as someone weighing 150 lbs given the larger person climbs the stairs in 10 seconds?
