## Wind Velocity

<table>
<thead>
<tr>
<th>Wind Velocity (mph)</th>
<th>Wind Velocity (m/s)</th>
<th>Mass of Air per Second (kg/s)</th>
<th>Power (J/s or W)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>45.0</td>
<td>20.1</td>
<td>28.1</td>
<td>5,700</td>
<td>Gale force wind. Twigs breaking off trees and whole trees in motion</td>
</tr>
<tr>
<td>90.0</td>
<td>40.2</td>
<td>56.3</td>
<td>45,000</td>
<td>Strong Category 1 hurricane, nearly 2. Severe damage to buildings.</td>
</tr>
<tr>
<td>180.0</td>
<td>80.5</td>
<td>113</td>
<td>366,000</td>
<td>Strong Category 5 hurricane. The most destructive storms there are. Hurricane Andrew which hit 5 for awhile, never sustained this wind.</td>
</tr>
<tr>
<td>231</td>
<td>103</td>
<td>144</td>
<td>760,000</td>
<td>Highest wind speed on Mount Washington.</td>
</tr>
</tbody>
</table>

### Points:

1. Notice that when the wind speed doubles (45 to 90), the power goes up by a factor of 8 times. In other words, a Category 1 hurricane has about **8 times** the power of a 45 mph gale force wind.

2. Notice that when the wind speed quadruples (45 to 180), the power goes up by a factor of 64 times. In other words, a Category 5 hurricane has about **8 times** the power of a Category 1 hurricane and **64 times** the power of a 45 mph gale force wind.

3. The highest wind speed on Mount Washington (231 mph) had **133 times** the power of a gale force wind.

### Mass (Air) per Second

\[
\text{Mass (Air) per Second} = V \times A \times D
\]

Where:
- \( V \) = Velocity (m/s)
- \( A \) = Area (m\(^2\))
- \( D \) = Density (kg/m\(^3\))

Estimated area of human body getting struck by wind at 1.0 m\(^2\) (based on the accepted value of body surface area for average human of 1.9 m\(^2\)). Assuming some additional area from pack sides/top.

Density of air estimated at 1.4 kg/m\(^3\) based on accepted values near -30 °F in dry air (based on average temps on Mt. Washington 2/16/15)

\[
\text{Power} = \frac{1}{2} \frac{mv^2}{s}
\]