**Virtual Lecture Notes – Heat Index**

Sweating helps prevent overheating because the water in perspiration carries heat away from the body. But when the [relative humidity](http://science.howstuffworks.com/question651.htm) is high it can “feel” hotter than it is because evaporation rate is reduced and less heat is removed. The Heat Index (also called the apparent temperature) is a way to calculate how hot it feels on days when there is also high humidity. If the temperature is less than 80° Fahrenheit or the humidity is less than 40%, there is no different between actual and apparent temperature (until the wind chill factor comes into play). The following table clearly indicates the risk imposed by high temperatures and high humidity.

**Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Temperature (F)** | | | | | | | | | | | | | | | |
|  |  | 80 | 82 | 84 | 86 | 88 | 90 | 92 | 94 | 96 | 98 | 100 | 102 | 104 | 106 | 108 | 110 |
| **H U M I**  **D I T Y**  % | 40 | 80 | 81 | 83 | 85 | 88 | 91 | 94 | 97 | 101 | 105 | 109 | 114 | 119 | 124 | 130 | 136 |
| 45 | 80 | 82 | 84 | 87 | 89 | 93 | 96 | 100 | 104 | 109 | 114 | 119 | 124 | 130 | 137 |  |
| 50 | 81 | 83 | 85 | 88 | 91 | 95 | 99 | 103 | 108 | 113 | 118 | 124 | 130 | 137 |  |  |
| 55 | 81 | 84 | 86 | 89 | 93 | 97 | 101 | 106 | 112 | 117 | 124 | 130 | 137 |  |  |  |
| 60 | 82 | 84 | 88 | 91 | 95 | 100 | 105 | 110 | 116 | 123 | 129 | 137 |  |  |  |  |
| 65 | 82 | 85 | 89 | 93 | 98 | 103 | 108 | 114 | 121 | 128 | 136 |  |  |  |  |  |
| 70 | 83 | 86 | 90 | 95 | 100 | 105 | 112 | 119 | 126 | 134 |  |  |  |  |  |  |
| 75 | 84 | 88 | 92 | 97 | 103 | 109 | 116 | 124 | 132 |  |  |  |  |  |  |  |
| 80 | 84 | 89 | 94 | 100 | 106 | 113 | 121 | 129 |  |  |  |  |  |  |  |  |
| 85 | 85 | 90 | 96 | 102 | 110 | 117 | 126 | 135 |  |  |  |  |  |  |  |  |
| 90 | 86 | 91 | 98 | 105 | 113 | 122 | 131 |  |  |  |  |  |  |  |  |  |
| 95 | 86 | 93 | 100 | 108 | 117 | 127 |  |  |  |  |  |  |  |  |  |  |
| 100 | 87 | 95 | 103 | 112 | 121 | 132 |  |  |  |  |  |  |  |  |  |  |

Caution Extreme Caution Danger Extreme Danger

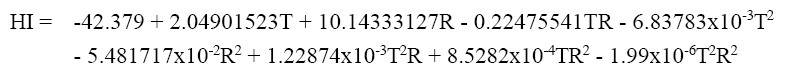
Fatigue Possible Sun stroke, muscle cramps and/or heat exhaustion possible

Sun stroke, muscle cramps and/or heat exhaustion likely

Heat stroke or sun stroke

Adapted from: <http://www.nws.noaa.gov/om/heat/index.shtml>and <http://www.floridadisaster.org/EMTOOLS/Severe/heatwave.htm>

For such a straightforward concept, the formula to calculate the [Heat Index](http://www.srh.noaa.gov/images/ffc/pdf/ta_htindx.PDF) (HI) looks very complex; but it is just algebra. Temperature (T) is in degrees Fahrenheit and Relative Humidity (RH) is in percent. Examine the Heat Index formula closely and the 9 different components.



Several of the terms include scientific notation (e.g. 10-3 and 10-6), so you will need to review Lesson [3] in the IMACS unit on doubles in order to translate this formula into Java. In addition, several of the terms are raised to the second power (e.g. T 2 and R2). You can handle exponents

simply by multiplying the terms, or you can peek ahead and learn about the Math classes’ **pow()** method. Use a calculator and determine the Heat Index for 92oF and 60% relative humidity. Verify your answer in the table above.