Determining Intensity: Using Maximum Heart Rate

Heart rate can be used to determine exercise intensity because of the direct relationship between heart rate and percent of appropriate cardiovascular capacity. One of the most important features of a cardiovascular workout is making sure that you are training at the appropriate heart rate. When a person’s heart rate is at 50%–85% of their maximum, they are exercising at an appropriate intensity to gain the cardiovascular health benefits that come with aerobic exercise.

The following are three common ways individuals can measure the intensity of their training:

1. talk test
2. using the Rating of Perceived Exertion method for estimating intensity
3. measuring heart rate and computing the appropriate “training zone” or Target Heart Rate Zone that represents 50%–85% of the maximum heart rate

What Is an Individual’s Maximum Heart Rate? Maximum heart rate is best determined from a progressive, maximal exercise test. However, most individuals will not have had a maximal exercise test, nor will they have the resources to have this type of test performed. In this case, individuals can estimate their maximum heart rate (HRmax) using this simple formula:

\[ *\text{HRmax} = 220 - \text{age} \]

Example: The HRmax of a 15-year-old would be:

\[ 220 - 15 = \text{HRmax} \]

or 205 BPM

*Please note that this formula provides an estimate based on information collected from a large number of Americans. Your maximum heart rate may be higher or lower than this formula predicts.

Computing Training Zones from HRmax

Once the HRmax is determined, that number is used to calculate the appropriate exercise heart rates for cardiovascular conditioning. There are different formulas that can be used to determine appropriate exercise heart rate zones.
We will use the formula that uses resting heart rate as a factor. Most charts use the average of 85 BPM for middle/junior high school students and 72 for senior high school students. If your heart rate is different than the average, it will affect your own personal THR zone. Try using the following formula in Figure 3.4 to determine your own personal THR zone. You can use the example of the 15-year-old as a guide of how to perform calculations.

A 15-year-old individual with a resting heart rate of 80 BPM.

1. Compute HRmax by subtracting age from 220.
   \[ 220 - 15 = 205 \text{ BPM (HRmax)} \]

2. Subtract resting heart rate from HRmax.
   \[ 205 - 80 \text{ (resting heart rate)} = 125 \text{ (Resting Heart Rate Reserve)} \]

3. Compute the lower end of Target Heart Rate Zone by multiplying HR Reserve by .5 to get 50% of HR Reserve.
   \[ 125 \times .50 = 62.5 \text{ Low End or 50\% of Heart Rate Reserve} \]
   Then add RH rate to that 50\% number.
   \[ 62.5 + 80 \text{ (Resting Heart Rate)} = 142.5 \text{ (low end or 50\% of MHR)} \]

4. Compute the upper end of Target Heart Rate Zone by multiplying HR Reserve by .85 to get 85\% of HR Reserve
   \[ 125 \times .85 = 106.25 \text{ High End or 85\% of Heart Rate Reserve} \]
   Then add RH rate to that 85\% number
   \[ 106.25 + 80 \text{ (Resting Heart Rate)} = 186.25 \text{ (high end or 85\% of MRH)} \]

   \[
   \text{50\%–85\% Training Zone} = 143–186 \text{ BPM}
   \]

This individual will want to exercise with a heart rate between 143 and 186 BPM to receive cardiovascular benefits. One more step is necessary if you are checking your pulse manually. Since you must take your exercise pulse quickly for 10 seconds, you need to divide the low and high end numbers by 6 to determine the pulse.

\[ 142 \text{ divided by 6} = 23.6 \quad 186 \text{ divided by 6} = 31 \]

   \[
   \text{50\%–85\% Training Zone for 10-second manual HR count} = 24–31 \text{ BPM}
   \]
Determine Your Own Personal Target Heart Rate Zone Formula

Calculate your own target heart rate zone by using the formula below. Then add those two numbers in the Putting It All Together Chart.

Figure 3.4

<table>
<thead>
<tr>
<th></th>
<th>Low End of THR</th>
<th>High End of THR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Your Age</td>
<td>220</td>
<td>220</td>
</tr>
<tr>
<td>Your Maximum Heart Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your Resting Heart Rate</td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td>Answer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent of Intensity</td>
<td>0.50</td>
<td>0.85</td>
</tr>
<tr>
<td>Your Resting Heart Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Your HR for Aerobics</td>
<td>TO</td>
<td></td>
</tr>
</tbody>
</table>
Putting It All Together: Perceived Exertion Scale and Heart Rate

<table>
<thead>
<tr>
<th>Borg Scale</th>
<th>Percent MHR</th>
<th>Your Calculated THR Zone</th>
<th>12</th>
<th>14</th>
<th>16</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very, Very Light</td>
<td>20% MHR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very Light</td>
<td>30% MHR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light</td>
<td>40% MHR</td>
<td>134</td>
<td>133</td>
<td>125</td>
<td>124</td>
<td></td>
</tr>
<tr>
<td>Moderately Light</td>
<td>50% MHR</td>
<td>146</td>
<td>146</td>
<td>138</td>
<td>137</td>
<td></td>
</tr>
<tr>
<td>A Little Hard</td>
<td>70% MHR</td>
<td>171</td>
<td>170</td>
<td>164</td>
<td>163</td>
<td></td>
</tr>
<tr>
<td>Hard</td>
<td>80% MHR</td>
<td>183</td>
<td>182</td>
<td>178</td>
<td>176</td>
<td></td>
</tr>
<tr>
<td>Very Hard</td>
<td>85% MHR</td>
<td>190</td>
<td>188</td>
<td>184</td>
<td>183</td>
<td></td>
</tr>
<tr>
<td>Very, Very Hard</td>
<td>95% MHR</td>
<td>202</td>
<td>200</td>
<td>197</td>
<td>196</td>
<td></td>
</tr>
<tr>
<td>Exhaustion</td>
<td>100% MHR</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Target Heart Rate Zone Activity

The purpose of this activity is to work out in your own personal Target Heart Rate Zone. You will use a heart rate monitor. Set the high and low limits of your own zone so the watch will beep when you go outside of your zone.

- Perform a warm-up and dynamic stretch for 5–10 minutes.
- Perform a cardio workout in your Target Heart Rate Zone for 20–40 minutes.
- Perform a cool-down and stretch for 5–10 minutes.

Evaluation

1. How many minutes were you in the Target Heart Rate Zone?

__________________________________________________________________________________

2. How successful were you in estimating your intensity level? Explain.

__________________________________________________________________________________