

## Technology Idea: Monitoring Heart Rate

### Background:

Your heart rate will increase when you participate in physical activity - why? Your nervous system monitors your entire body and signals your heart to beat faster in response to increased activity. This response is necessary if the circulatory system is going to be able to meet the increased oxygen demands of the body.

Heart rate is a measure of how fast your heart is beating. Recovery time is how long it takes for the heart to return to its normal resting rate after exercise. Generally, individuals who are in better physical condition will have shorter recovery times.

In this activity, heart rate and recovery time will be measured by a computer sensor and different individuals will be compared.

### Question:

What is your normal resting heart rate? How does it change during exercise and how long does it take to recover from that exercise?

### Materials:

- Heart rate sensor
- Computer interface

### Procedure:

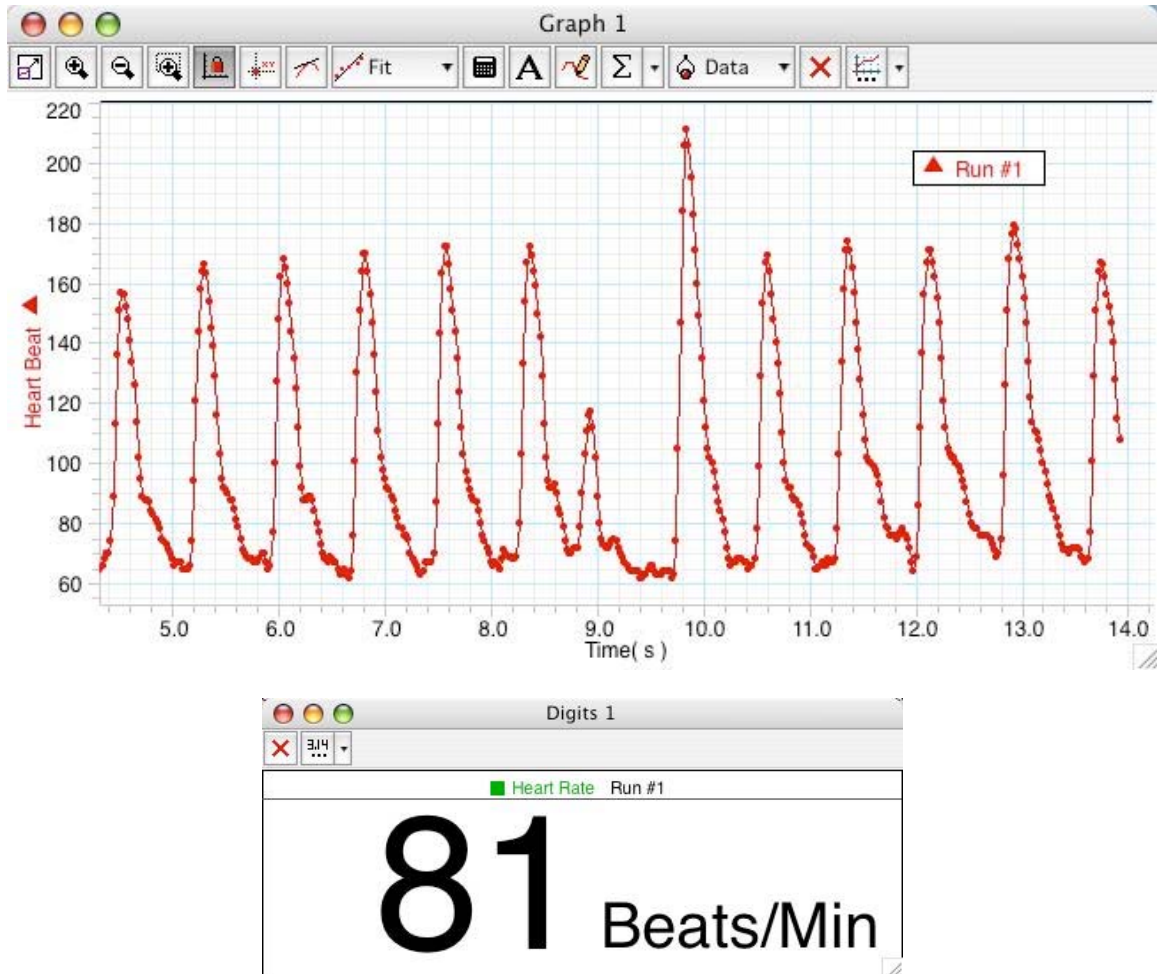
#### Step 1:

Connect the heart rate sensor to the computer interface (such as a USB link), then clip the heart rate sensor to your ear as shown;



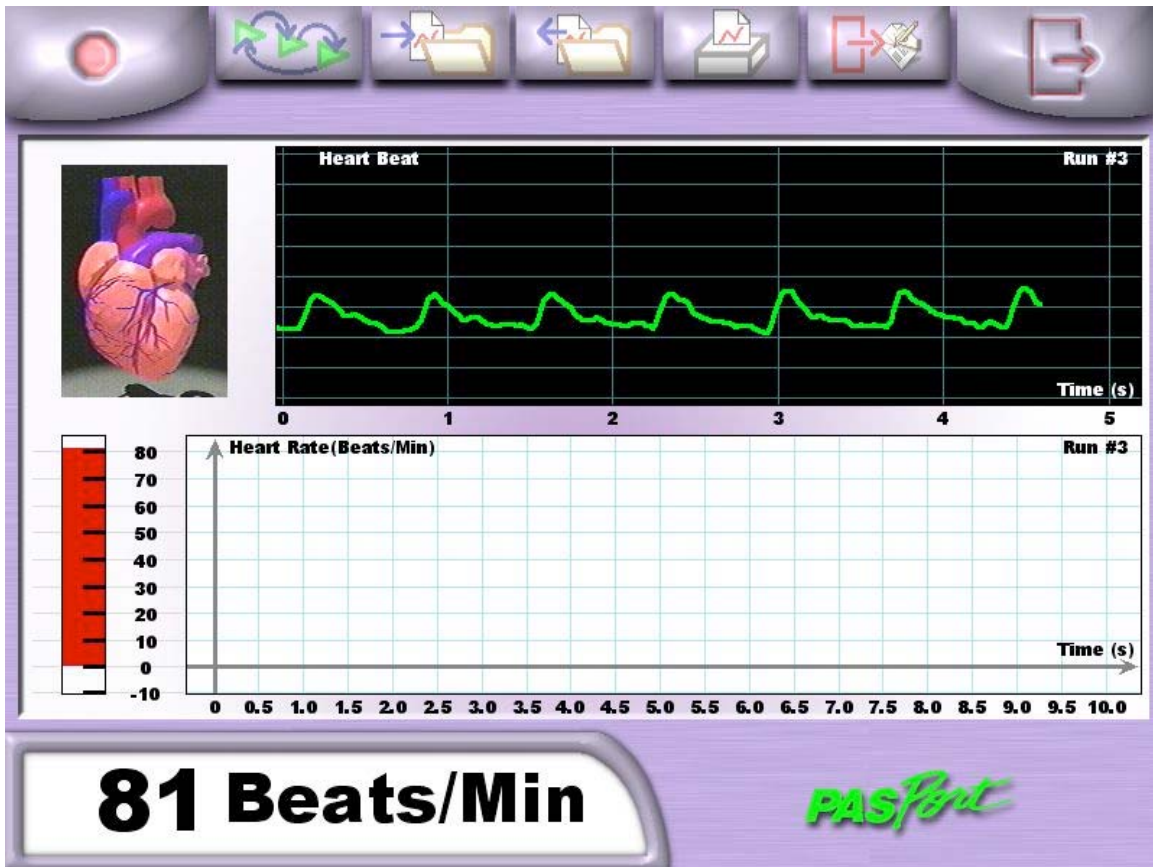
## Step 2:

If you are using properly installed DataStudio software, it will have automatically launched, giving you the choice of using DataStudio or an EZscreen to view your data. Choosing DataStudio will immediately launch a graph and digital display of heart rate:



The displays above show sample data (look carefully - can you see the heart palpitation in this data?), your displays will initially appear empty until you begin to collect data.

A simpler alternative is to use the EZ screen display. This display contains both the heart rate monitor and the beats per minute in the same display, along with a cute animated heart:



### Step 3:

Rest and breathe normally for about 1 minute. Then start collecting data with the software that you are using (if you are using DataStudio, you would click the "Start" button). Collect data for about 30 seconds, then stop recording. Avoid movement during recording - stay perfectly still to ensure the best results. If your results are poor, try again after re-clipping the sensor onto your ear. If it still doesn't work, you may not have adequate blood flow in your ear - try clipping the sensor onto your thumb.

- Make note of your resting rate value from the digital display.
- Optional - if you are using the DataStudio graph display, record the maximum "beat value" - this is an indirect indication of how hard your heart is pumping. For example, in the example data above, the maximum value is about 210.

#### Step 4:

Remove the clip and jog vigorously in place for two minutes (do not perform this against the advice of your doctor - do not exercise if you are not supposed to due to a medical condition - only perform exercise recommended by your doctor). When two minutes are up, put the clip back on. Collect data until your heart rate has returned to the normal value from step 3.

- Make note of your maximum heart rate value as reported by your digital display.
- Make note of the time it took for your heart rate to return to normal - you can read this from the timescale on the bottom of your graph.
- Optional - if you are using the DataStudio graph display, record the maximum "beat value".

#### Step 5:

Consult other students in class and make note of their resting heart rates, maximum heart rates and recovery times. Construct a chart so you can record your findings in an organized fashion:

Person	Resting HR	Maximum HR with Exercise	Recovery Time

#### Analyze:

1. What was the responding variable in this experiment?
2. How does exercise change your heart rate?
3. How can you explain differences in maximum heart rates and recovery times between different students?

#### Conclude and Apply:

1. Why does heart change with exercise - what would happen if heart rate did not change with exercise?
2. Is there any way you can change your resting heart rate without exercising? Explain your answer.