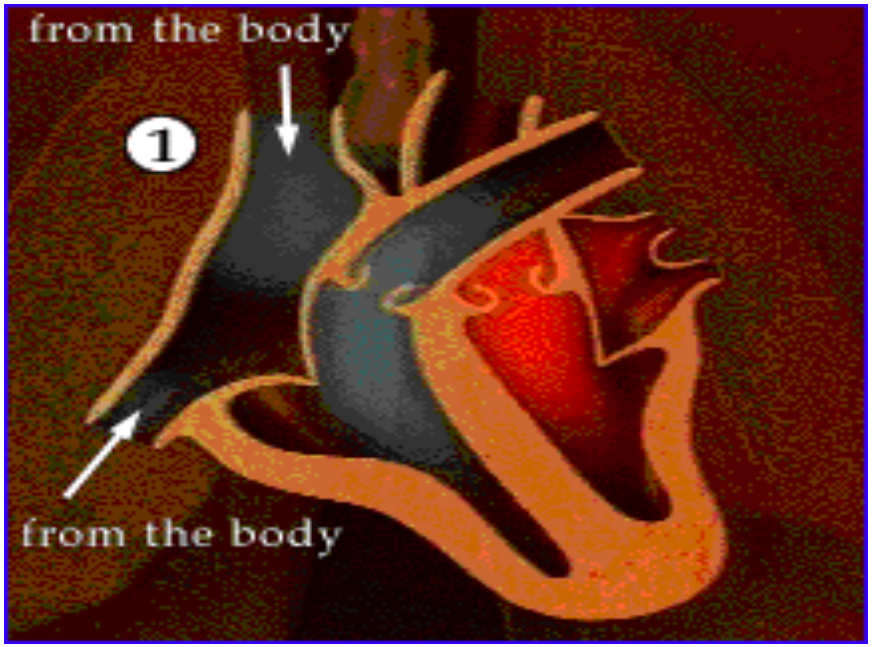
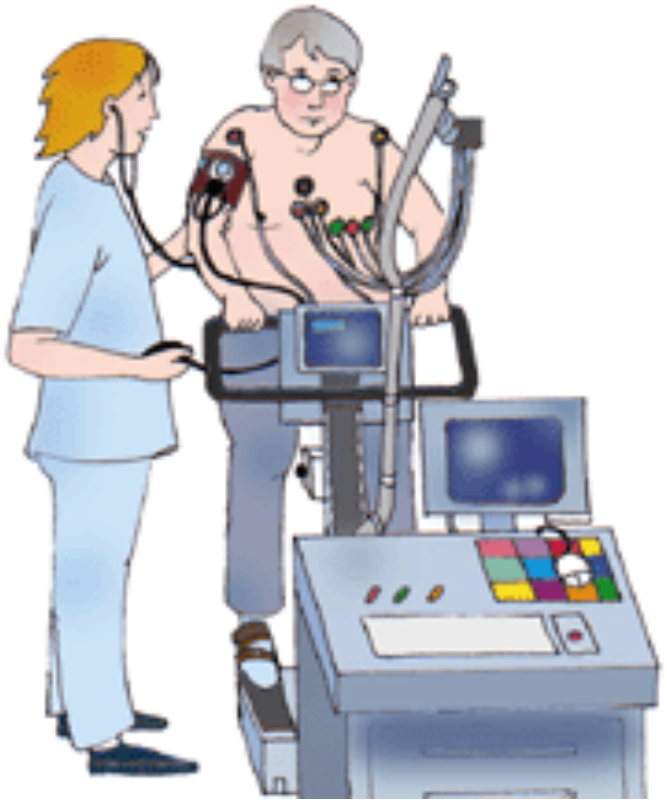
How do we determine our heart rate using the EKG sensor?



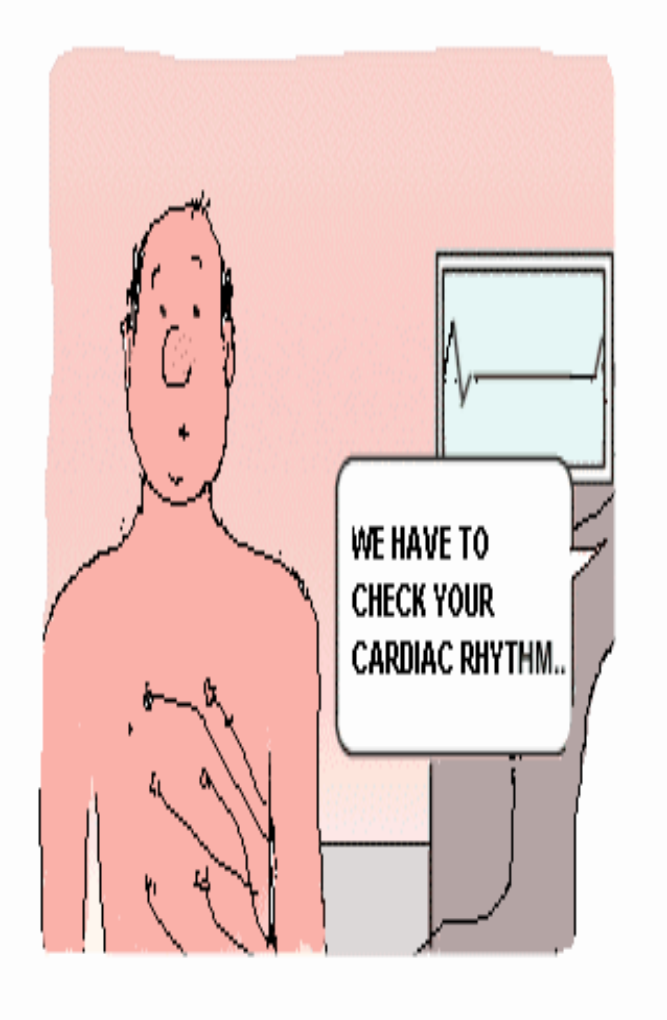
Instructional Objectives:

- Background Information on EKG
- Methods of Measuring Heart Rate
- Experimental Setup

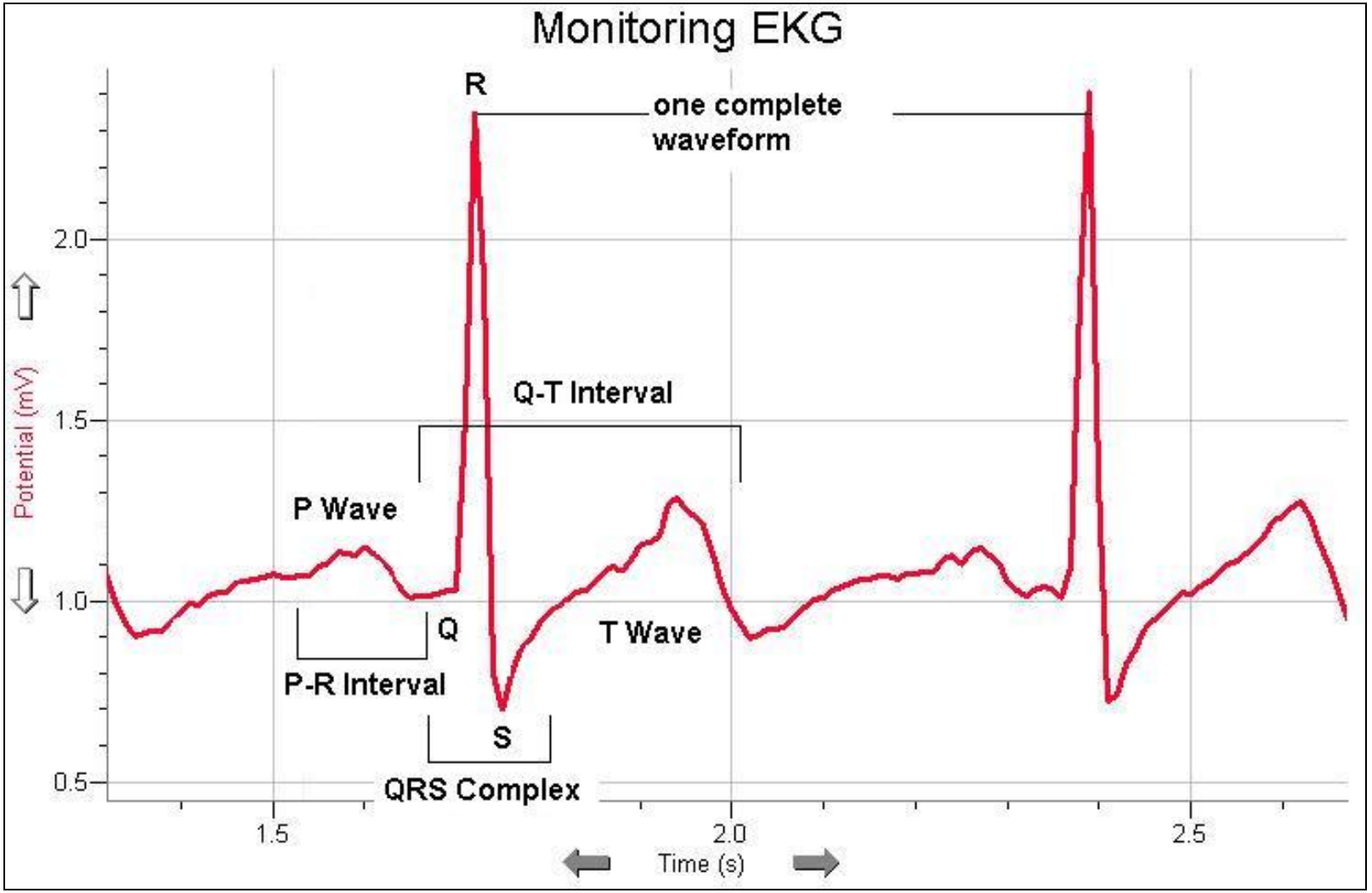


What is an EKG?

- Electrocardiogram (EKG) - An instrument used in the detection and diagnosis of heart abnormalities.
  - It measures electrical potentials on the body surface and generates a record of the electrical currents associated with heart muscle activity.
- By analyzing the EKG, damage to a specific region of the heart can be detected.



Experimental EKG Data



Calculating Your Heart Rate

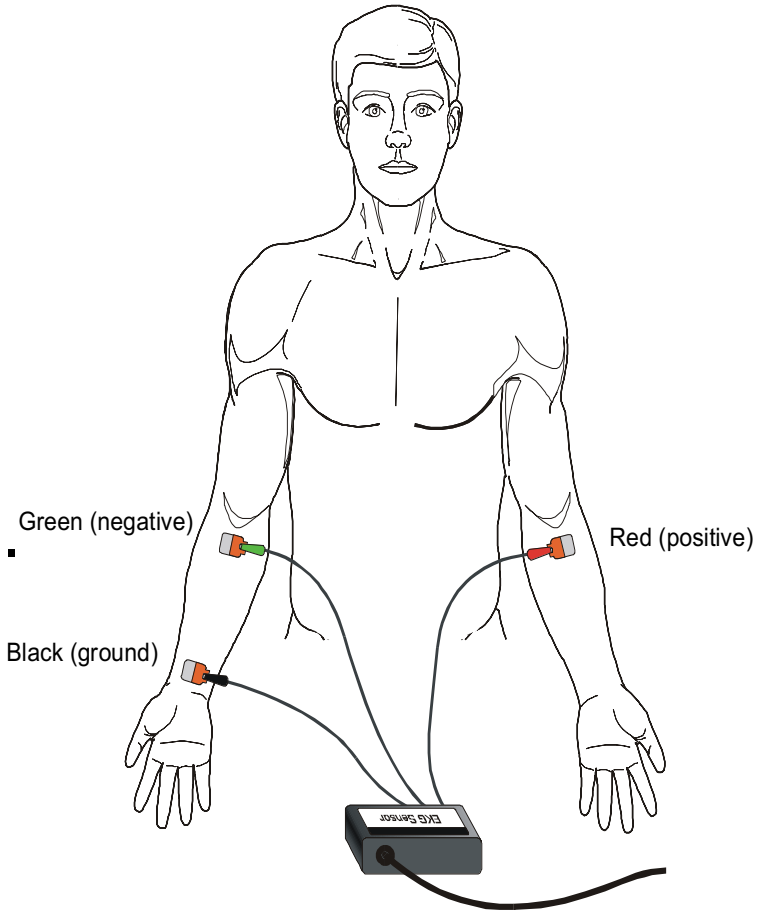
$$\frac{\#\,\text{beats}}{\text{minute}} = \frac{1\,\text{beat}}{n\,\text{seconds}} \times \frac{60\,\text{seconds}}{1\,\text{minute}}$$

Measuring Heart Rate Without Instrumentation

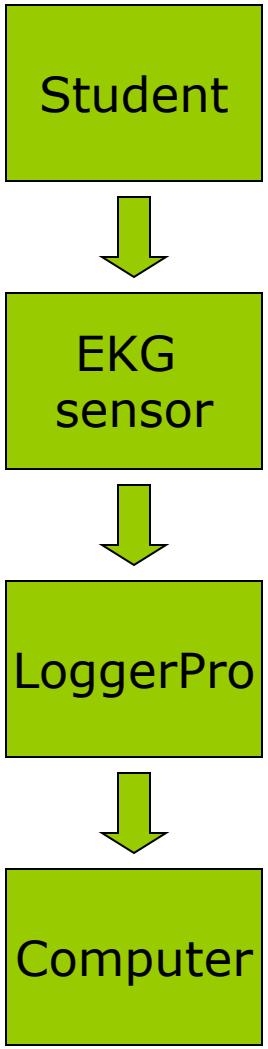
- Heart rate can be determined by measuring pulse rate.
- The pulse rate is the rate at which a series of pressure waves travel within an artery.
- Each time blood surges from the aorta, the elastic walls of blood vessels expand and stretch, causing a pulse.

Measuring Heart Rate With Instrumentation

- Use the EKG sensor to graph your heart's electrical activity.
  - Place three electrode patches on your arms as shown in the diagram.
  - Connect the alligator clips from the sensors to the tabs of the electrode patches.
  - Collect data with the LoggerPro.
- Calculate heart rate by determining the time interval between the R waves on the EKG graph.



Experimental Setup



Discussion Questions:

- *Average Heart Rate:*
  - 70-90 beats/min
- *Maximum Heart Rate:*
  - 220 beats/min – Individual's Age
- Comparison of experimental findings versus theoretical data
  - Causes for discrepancies
- Factors not taken into account during experiment:
  - Age
  - Weight
  - Health Condition
  - Gender

LAB TIME!!!