



Driving Question:

Can you visualize electrical activity of the heart?



Thinking about the question

In this activity you are going to investigate electrical activity of the heart by recording an electrocardiogram (EKG or ECG) of the heart.

For this you will use an EKG sensor, which measures voltages that are produced by the heart's electrical activity. These small voltages can be measured at the skin of the wrists and elbow through electrodes. The voltages are amplified by the sensor and transferred through an optical coupler to a measurement interface.

Materials

In your investigations you will use:

- Interface or data-logger e.g. CMA VinciLab,
- EKG sensor,
- Electrode patches (delivered with the sensor).

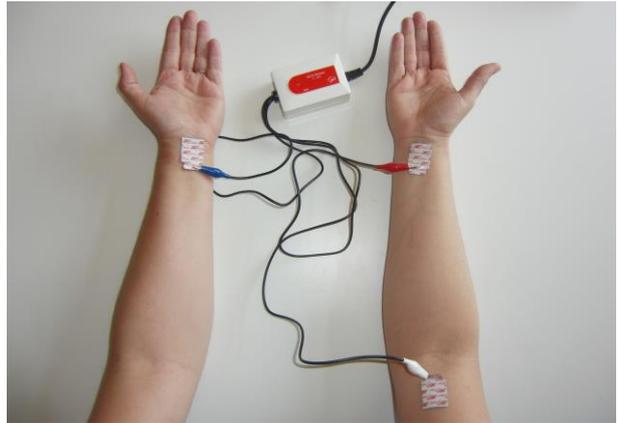
Safety

By using the optical coupler in the sensor, there is never any direct electrical contact between the test subject and the measurement interface or computer. This is for safety reasons.

Investigations

1. Connect the EKG sensor to the input 1 of your interface.
2. Start the Coach program and open Coach Activity 'Monitoring EKG'.

3. Clean the areas of the skin where the electrode patches will be applied (inside of left and right wrist and right elbow).
4. Place the electrodes on the wrists and on the right elbow. Because the electrical signal that is produced by the heart and measured at the skin is very weak, a good contact between skin and electrode is essential for the correct working of the EKG sensor.
5. Connect the white alligator clip from the sensor to the tab of the right elbow electrode.
6. Connect the red clip to the tab of the right wrist electrode.
7. Connect the blue clip to the tab of the left wrist electrode.
8. Start a measurement and record the EKG. The test person should remain calm and relaxed, and should not watch the data-logger or computer screen.
9. Enlarge the graph in order to study the EKG-pattern more precisely. Identify the P, QRS and T waves.
10. Determine the time intervals of P-R, QRS, Q-T and full-heart-cycle intervals.
11. Calculate the heart rate (beats/min) of the test subject. Describe the method you are going to use.
12. Record the EKG of the test subject:



- after jogging for a short time,
- after drinking a cup of coffee or a glass of cola
- in different body positions.

Compare these results with the EKG of a resting person. What are the differences and the similarities?

13. Find out why the EKG is used to diagnose certain type of heart disease.

Resources:

Coach Activity: Monitoring EKG.cma7

Coach Result: Monitoring EKG.cmr7