TeachEngineering

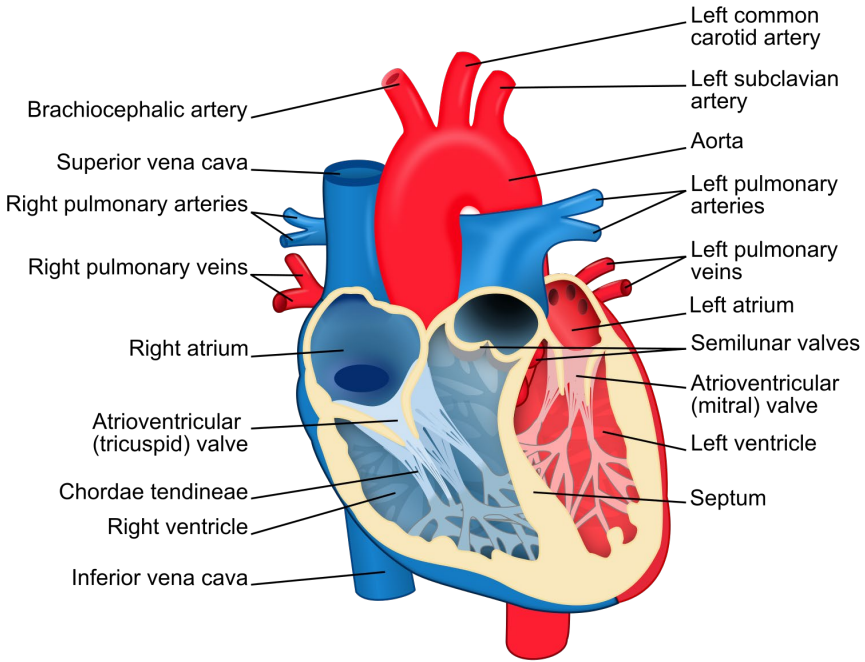
Ignite STEM learning in K-12

What is an ECG?

Background: The Heart

- **The heart is responsible for pumping blood throughout the body**
- **The heart contains two atria and two ventricles**
    - **Right atrium: receives deoxygenated (used) blood from the body**
    - **Right ventricle: pumps deoxygenated blood to the lungs, where the blood is oxygenated**
    - **Left atrium: receives oxygenated (“new”) blood from the lungs**
    - **Left ventricle: pumps oxygenated blood into the body**

Background: The Heart



https://upload.wikimedia.org/wikipedia/commons/thumb/e/e0/Heart_diagram-en.svg/1524px-Heart_diagram-en.svg.png

Background: The Heart

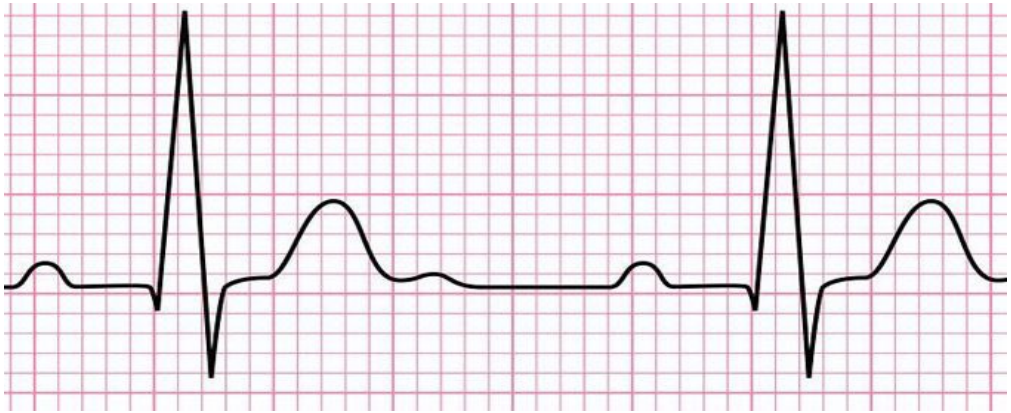
- **Did you know the heart runs on electricity?**
    - **The electrical signals that flow through the heart regulate two important rhythms:**
        - **Heart rate: how fast is the heart beating?**
        - **Cardiac muscle coordination: which heart muscles are moving, and when do they move?**
- **We can measure the electrical activity in the heart to ensure that there are no abnormalities or diseases of the heart**

The Electrocardiogram (ECG)

- **An ECG (electrocardiogram) is a test used to measure the electrical activity of the heart**
- **ECGs can measure**
    - **Time intervals**
        - **This allows medical professionals to see how long it takes for the electrical wave to pass through the heart**
    - **And the amount of electrical activity in the heart**
        - **This allows cardiologists to see if certain parts of the heart are being overworked**

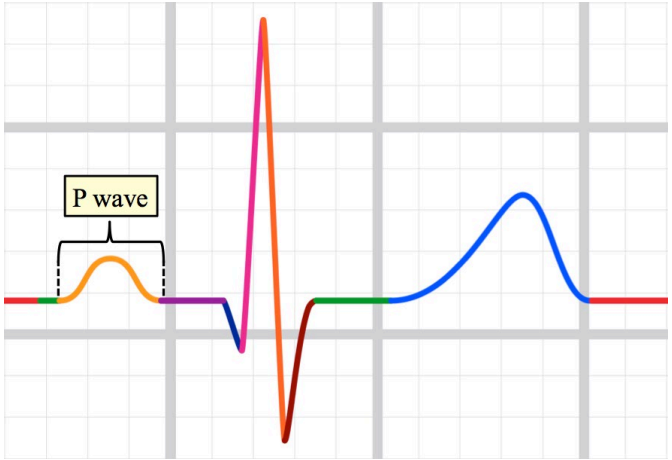
Parts of an ECG

- **An ECG can be broken up into three main parts:**
  - **The P wave**
  - **The QRS Complex**
  - **The T Wave**



Parts of an ECG: P Waves

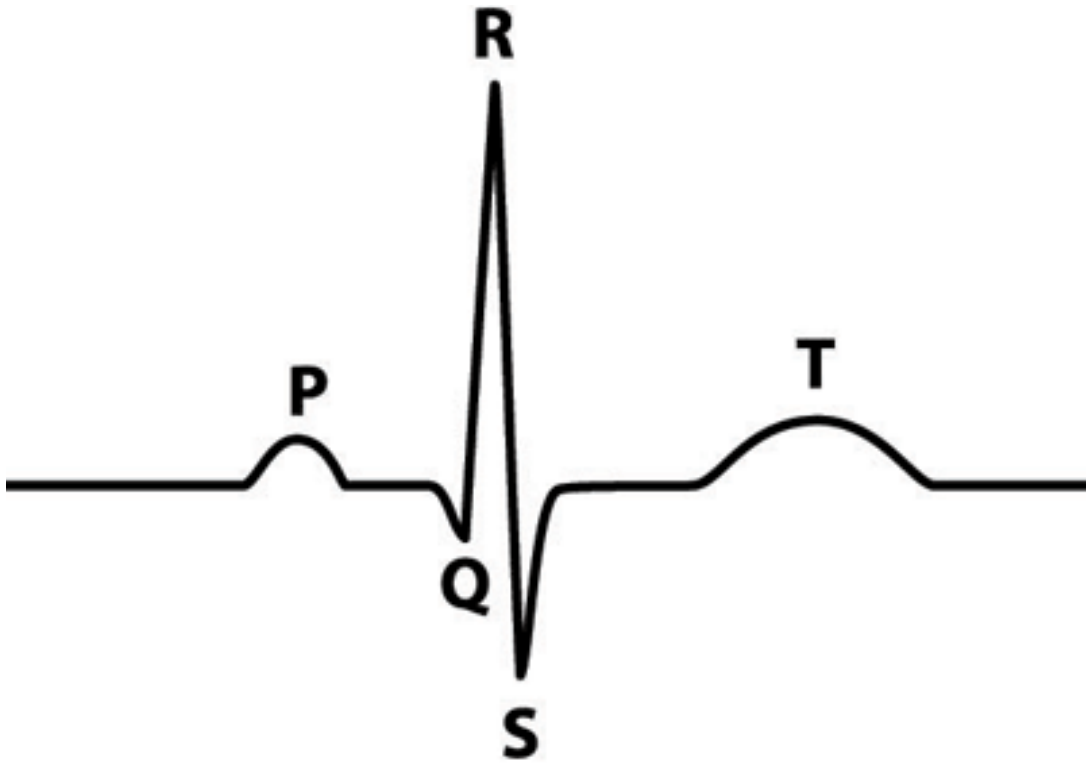
- **P waves are the first waves in an ECG waveform**
- **These waves represent the depolarization of both the right and left atria**



Parts of an ECG: QRS Complex

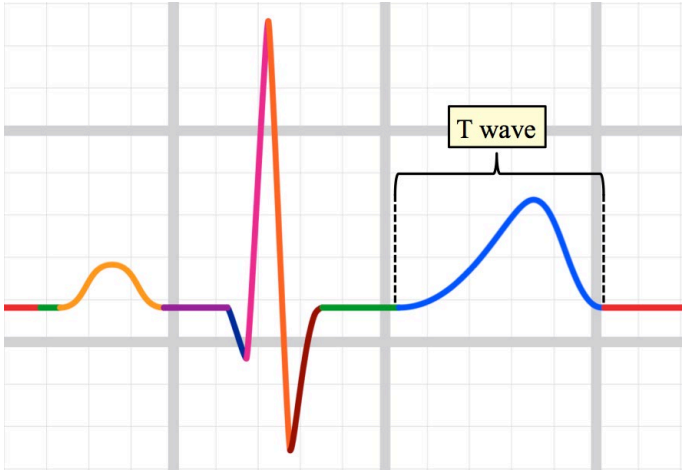
- **The QRS complex is the series of waves that represent the depolarization of the right and left ventricles of the heart**
    - **This depolarization also corresponds to the contraction of the ventricular muscles**
- **The Q wave is the first downward deflection following a P wave**
- **The R wave is an upward deflection following the Q wave**
- **The S wave is a downward deflection following the R wave**

Example: QRS Complex



Parts of an ECG: T Waves

- **T waves follow the QRS complex and represent the repolarization of the ventricles**



Example: ECG Waveforms