

Electrocardiogram (ECG)

An electrocardiogram (ECG) measures the **action potentials** of the heart (see page 11). Electrodes are placed on different parts of the body to detect electrical impulses and a machine amplifies the impulses during each heart beat and records them.

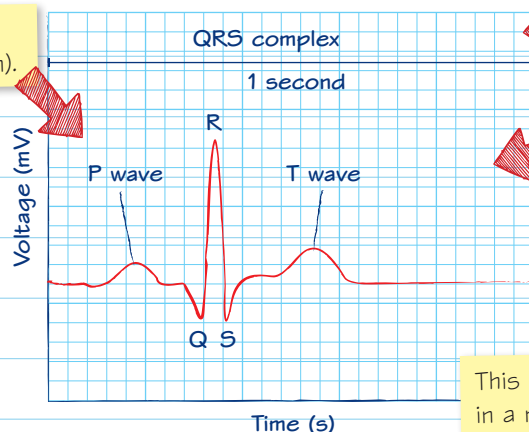
Electrocardiogram trace

The electrical changes in the heart can be measured and presented as an Electrocardiogram (ECG).

If disease disrupts the heart's normal conduction pathways there is a disruption of the expected ECG pattern (which is 60 to 100 beats per minute at regular intervals). ECGs can therefore be used for diagnosis of cardiovascular disease.

Links See page 90 and 92 for more information on the heart and heart beat.

The P wave is the time of atrial systole (contraction).



The QRS complex is the time of ventricular systole (contraction).

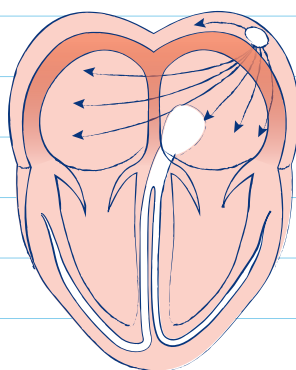
The T wave is caused by repolarisation of the ventricles during diastole (relaxation and recovery).

This ECG trace shows the electrical changes in a normal heart during the cardiac cycle.

The heart beat

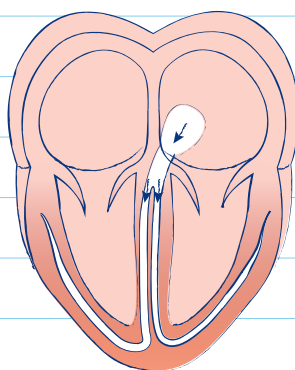
The heart contracts because a small cluster of cells (pacemaker) produces an electrical impulse, which causes the heart muscle to contract. The three key stages of the heart beat are shown below.

P wave



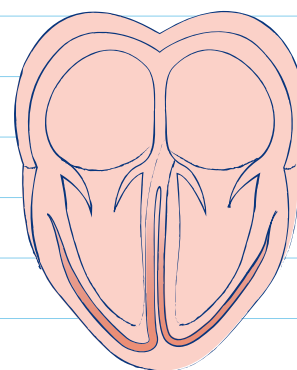
Depolarisation of the atria (upper heart chambers), so they contract.

QRS complex



Depolarisation of the ventricles (lower heart chamber), so they contract.

T wave



Repolarisation of the ventricles (recovery).

Heart muscle

The peripheral nervous system (PNS) (see page 10) connects the central nervous system (brain and spinal cord) to other organs of the body. This includes the **autonomic nerves**. These regulate automatic or involuntary functions of the body, for example contracting the heart muscle.

Now try this

Explain why the QRS complex is much larger than the P wave.

The atria move blood into the ventricles, whilst the ventricles move blood around the body. See page 90 to find out about the structure of the heart.