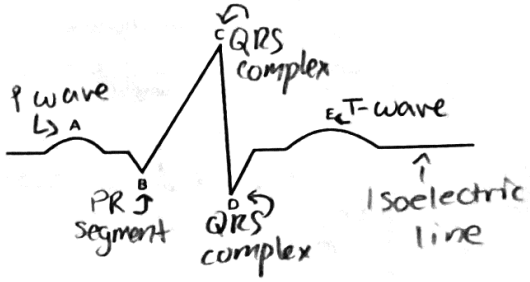
Normal heart rate is between 60 – 100 bpm, however average resting heart rate is in the 70s for both men and women. Heart rates below 60bpm are referred to as **bradycardia** and rate above 100bpm is **tachycardia**.

Activity 1. The ECG ✳

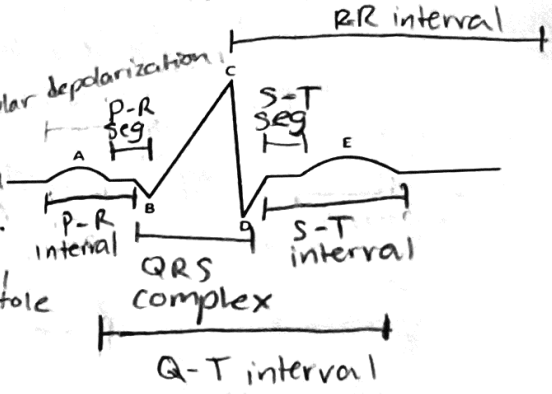
1. Label the following EKG wave and give the heart activity taking place.

A. atrial depolarization
B. delay at AV node
C. ventricular depolarization
D. ventricular depolarization
E. ventricular repolarization



2. Using vertical lines show the following segments and intervals and indicate the heart activity taking place for each.

A. P-R interval — time from atrial depolarization to ventricular depolarization
B. P-R segment — atrial depolarization
C. QRS complex — ventricular depolarization
D. S-T segment — Early ventricular depolarization
E. S-T interval — period of zero potential btwn. vent. dep. + rep.
F. R-R interval — heart beat / time btwn beats
G. Q-T interval — duration of ventricular electrical systole



3. What does each of the following distances indicate?

A. One small square — (1mm) 0.04seconds
B. 5 small squares — 0.2 seconds
C. One large square — (5mm) 0.2seconds
D. 4 large squares — 0.8 seconds
E. 5 large squares — 1second
F. 15 large squares — 3 seconds

Conditions involving irregular heart activities

- **Cardiac arrhythmias or Irregular heart rate** – deviation from normal heart rate.
  - **Atrial fibrillation (A-fib)** – absence of P wave. Atria and ventricle activity are not coordinated.
  - **Ventricular fibrillation (V-fib)** – uncoordinated activities or contraction of the ventricles
  - **Premature ventricular contractions (PVCs)** – "skipped heartbeat" sensation. There is an extra heartbeat in the ventricles.
  - **Bradycardia –** Abnormally low heart rate (less than 60 bpm)
  - **Tachycardia –** Abnormally high heart rate (above 100 bpm)
- **Heart blocks** – impairment of electrical conduction from the SA node to the purkinje fibers. May be of different types depending on the affected area.
  - **First-degree heart block** – slow electrical impulses through the conduction system
  - **Second-degree heart block** – signals are unable to reach the ventricles.
  - **Third-degree heart block** – complete blockage. Electrical impulses do not reach the ventricles.
- **Long QT syndrome (LQTS)** – The QT interval is longer than normal indicating the ventricles are taking longer to contract and relax.
- **Left and right ventricular hypertrophy** – enlargement of the ventricles. Several criteria such as deep S wave, tall R wave, abnormal QRS complex.

Repeat the measurement after 5 minutes of rest.

Component	Reading 1	Reading 2	Reading 3	Average
P wave				
T-wave				
S-T segment				
P-R interval				
P-R segment				
QRS				
Q-T				
R-R				
Heart rate (b/m)				

What was the overall effect of resting on the above readings? Describe what happened to each component.

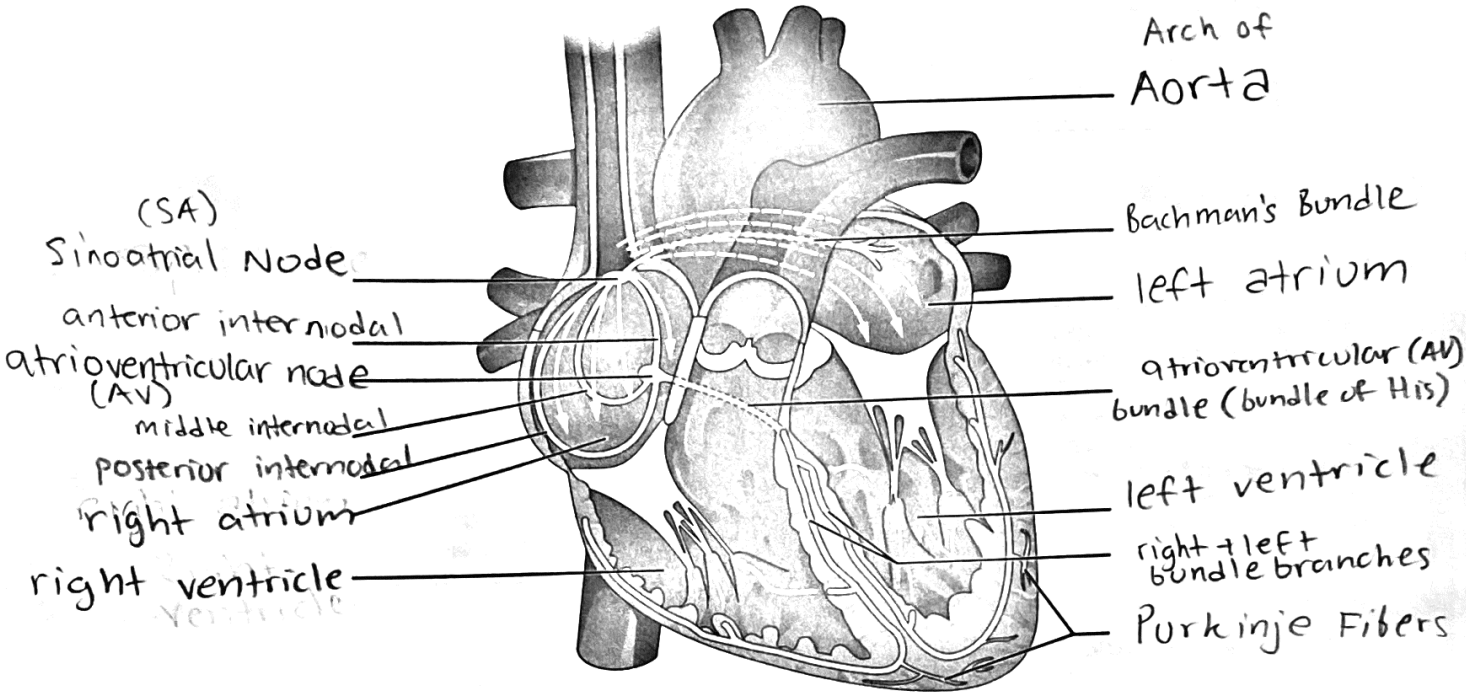
Review Exercise

1. Match the term to its correct description.

SA	**Plateau**	**AV**	**Purkinje fibers**	**bundle of His**
AV bundles	**Absolute**	**EKG**	**IV septum**	**Autorhythmic**
Internodal	**Relative**	**Calcium**	**Depolarization**	**Bachmann's bundle**

1. Autorhythmic The ability of myocytes to contract on their own.
2. Absolute Refractive Period Na^+ is responsible for this phase of an action potential.
3. Purkinje Fibers Located in the interventricular septum.
4. Depolarization Responsible for the plateau phase seen in cardiac action potential.
5. AV Bundles Connects the bundle branches to the AV node.
6. SA Node Initiates the normal contraction of the heart.
7. Bachmann's Bundle Connects the SA not to the left atrium.
8. Plateau No action potential can be initiated at this phase.
9. EKG Used to diagnose certain cardiac disorders.
10. Bundle of His Problems with these will directly affect the ventricles.
11. calcium Seen in cardiac action potential but not in skeletal action potential
12. Internodal These connect the SA node with AV node.
13. AV Node This directs the action potentials to the Bundle of HIS.
14. IV Septum location of the left and right bundles.
15. Relative Refractive Period Strong stimuli can initiate an action potential during this phase.

3. Label the following diagram.



Research

Select one of the common cardiovascular diseases and, in one paragraph, describe causes, sign and symptoms, diagnosis and treatment.

Cardiomyopathy

one common cardiovascular disease is cardiomyopathy. This is a heart muscle disease that makes pumping blood to your body more difficult for your heart. Some symptoms include: swollen extremities (ex. legs, feet), abdominal bloating, loss of breath, fatigue, and chest pain. On an ECG this can be seen as an abnormal rhythm / fast heart rate or even as a murmur. There are many ways to test for cardiomyopathy, some of the most common being Chest X-Ray (to see if heart is enlarged), Echocardiogram, ECG, or treadmill stress test. Some treatments are surgery: either coronary artery bypass or heart transplant, cardiac catheterization + revascularization, pacemaker, or medications such as antihypertensives, antiarrythmic, anticoagulents, etc... If left untreated, cardiomyopathy can lead to heart failure, the body would not receive sufficient blood supply.