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Heart Rate

Fast & Easy ECGs – A Self-Paced Learning Program

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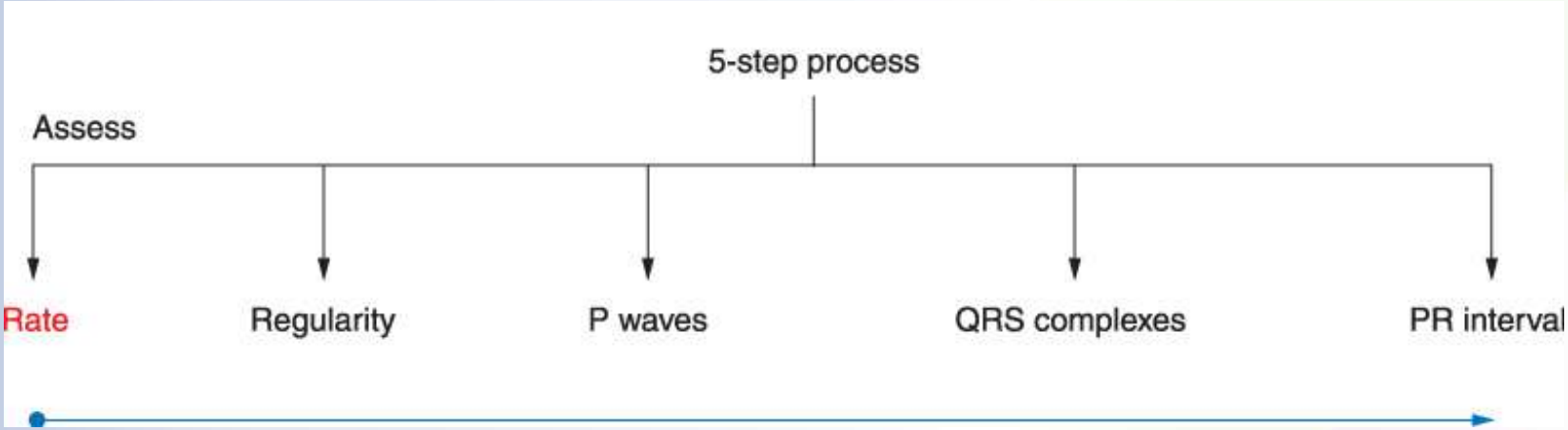
Dysrhythmias

- Irregularities in heart rate or rhythm
  - Some are of little significance whereas others are life threatening

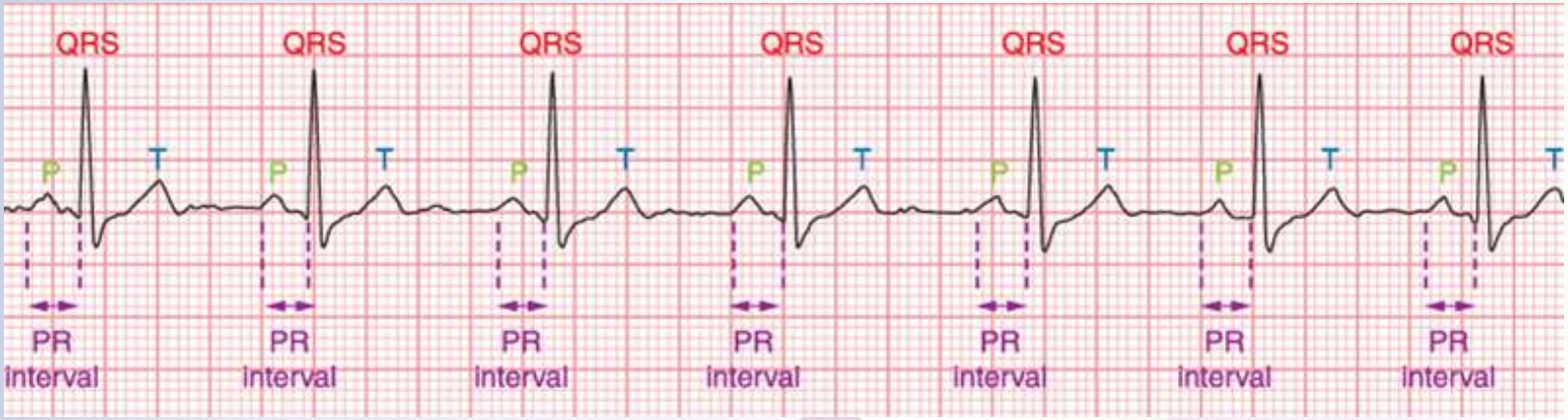
ECG Analysis

- Five Step Process is a logical and systematic process for analyzing ECG tracings



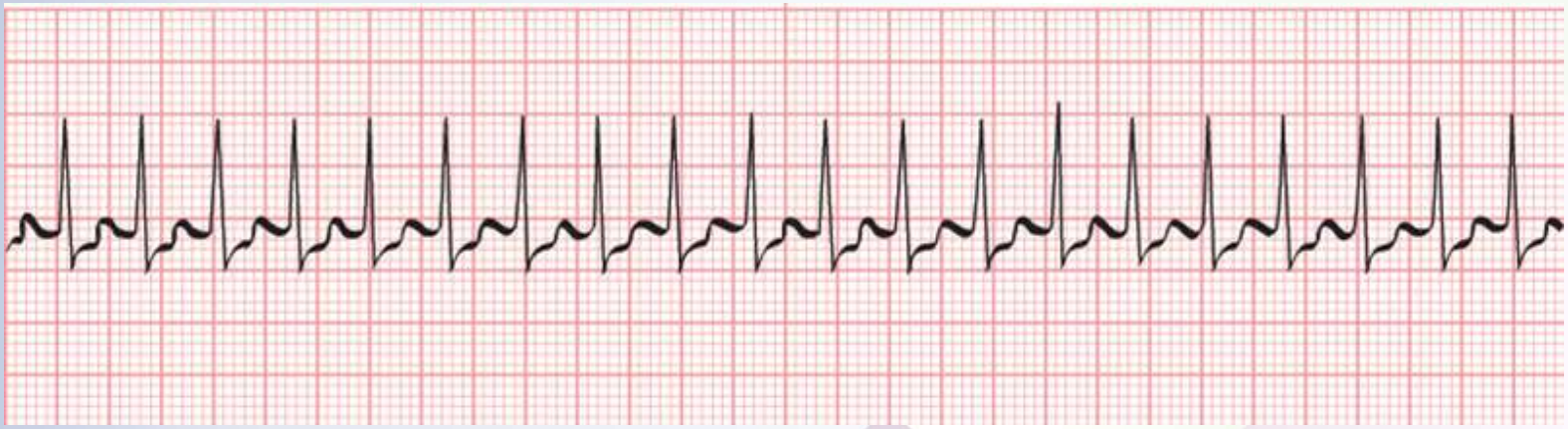
Normal Sinus Rhythm Characteristics

- **Rate:** 60 - 100 BPM
- **Rhythm:** Regular
- **P waves:** Upright and round, one preceding each QRS complex
- **QRS complexes:** Narrow, 0.06 - 0.12 seconds in duration
- **PR Interval:** 0.12 - 0.20 seconds in duration
- **T waves:** Upright and slightly asymmetrical



Determining Heart Rate

- First step in analyzing an ECG rhythm
- Begin by quickly checking ECG monitor or tracing to see if rate is slow, normal or fast

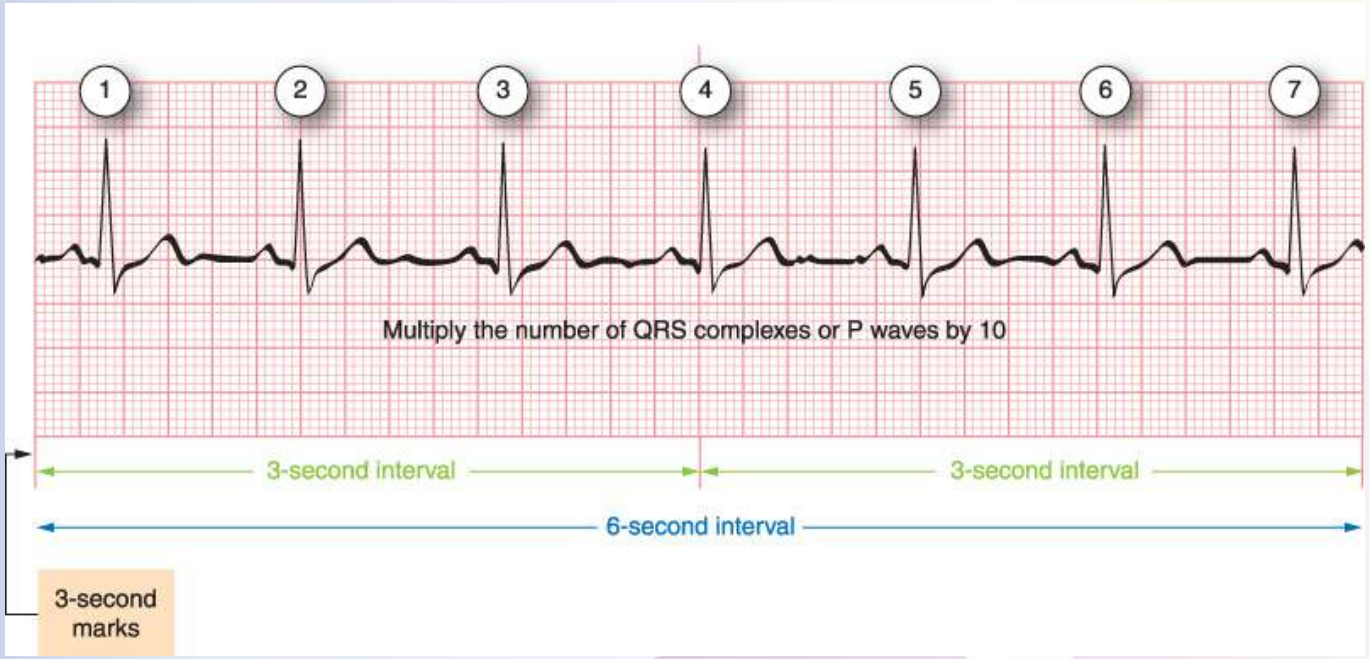


Calculating Heart Rate

- Several methods can be used including:
  - 6-Second Interval x 10 Method
  - 300, 150, 100, 75, 60, 50 Method
  - 1500 Method
  - Rate Calculator

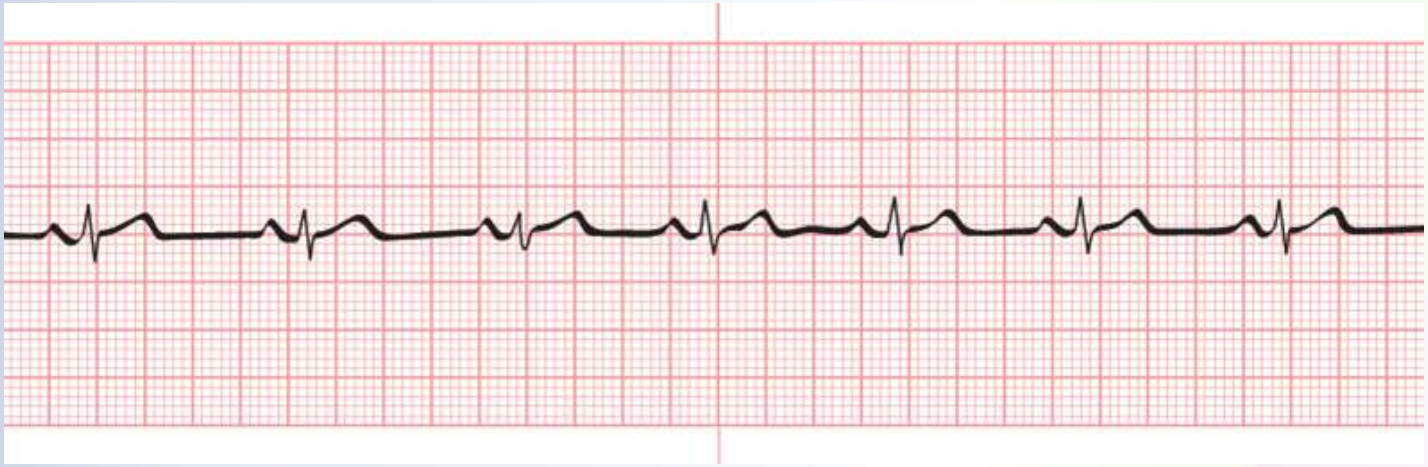
6-Second Interval x 10 Method

- Quick and easy and does not require tools or devices
- Not as accurate as other methods
- Multiply by 10 the number of QRS complexes found in a six second portion of ECG tracing



Practice Makes Perfect

- Determine the heart rate using the 6-second interval x 10 method



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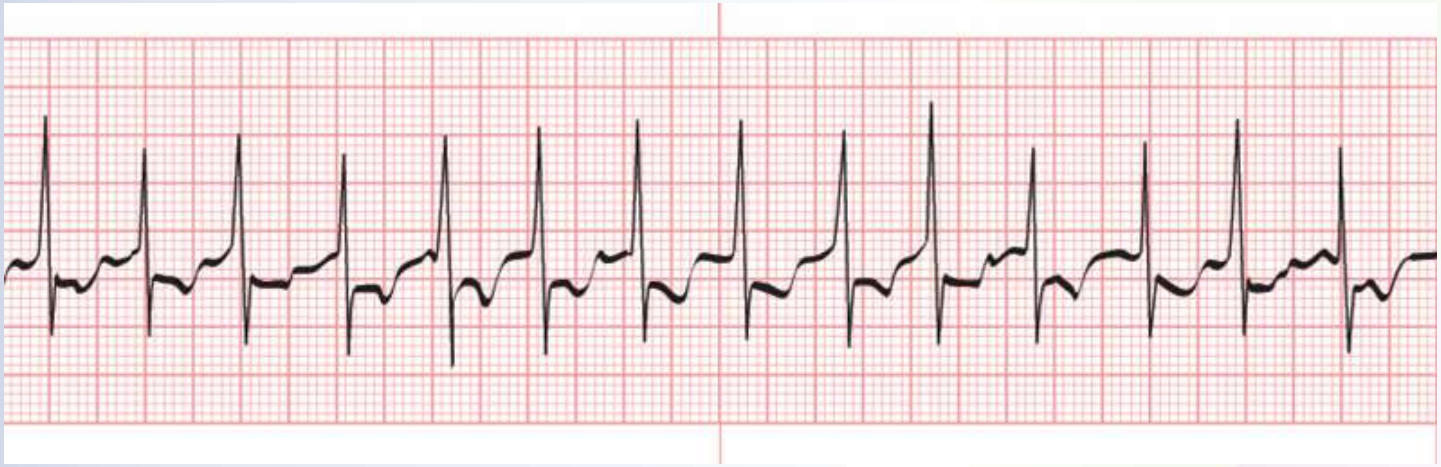
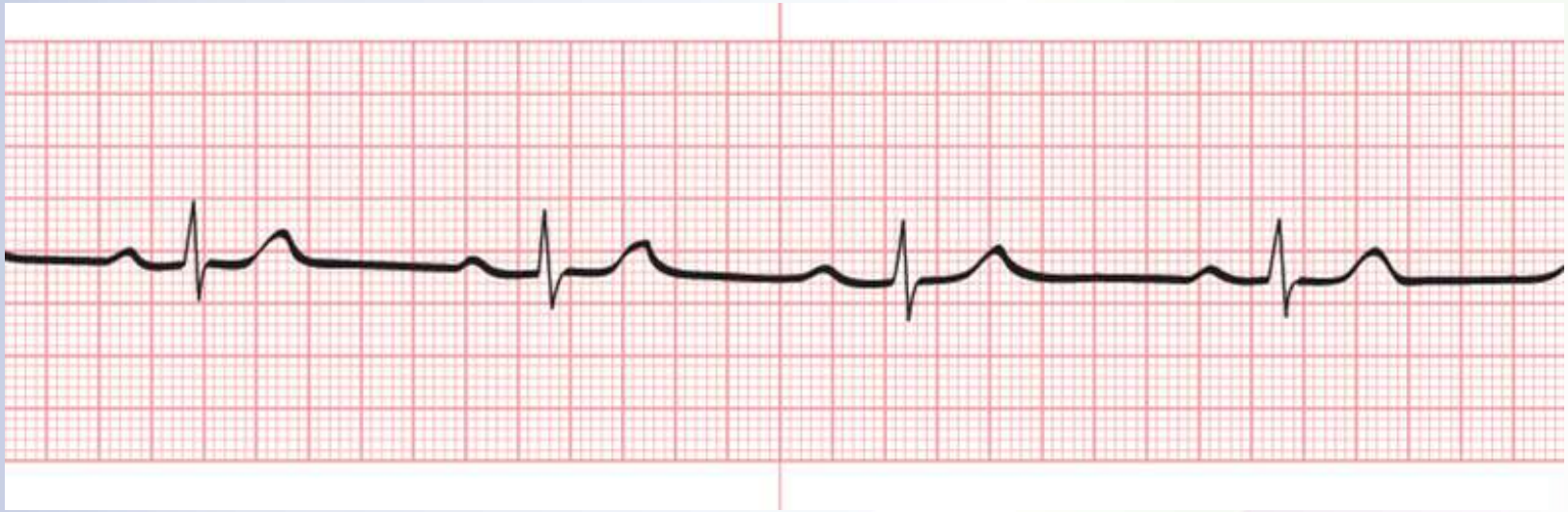


Practice Makes Perfect

- Determine the heart rate using the 6-second interval x 10 method

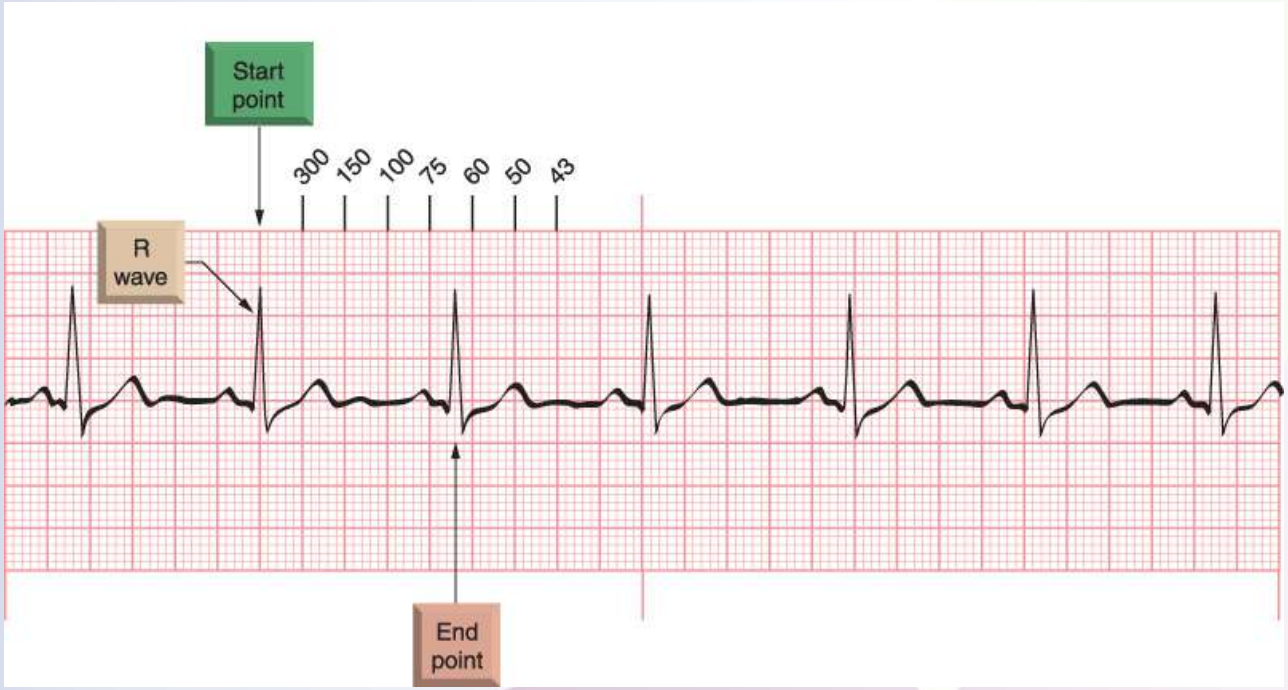


300, 150, 100, 75, 60, 50 Method

- Quick, fairly accurate, requires no special tools, or calculations
- Cannot be used with irregular rhythms
- Find an R wave located on a bold line. Then find the next consecutive R wave. Bold line it falls on (or is closest to) represents the heart rate.

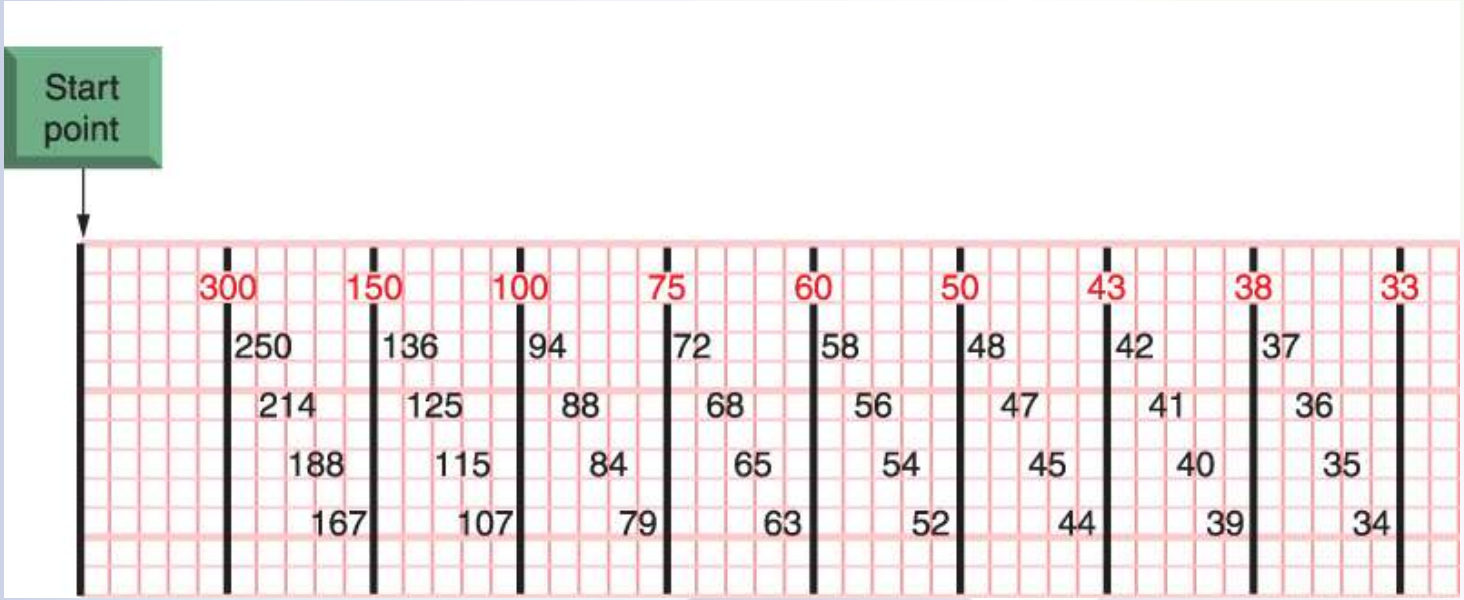
300, 150, 100, 75, 60, 50 Method

- If the second R wave does not fall on a bold line the heart rate is approximated
  - Example: if it falls between the 4th and 5th bold line the heart rate is between 60 and 75 BPM



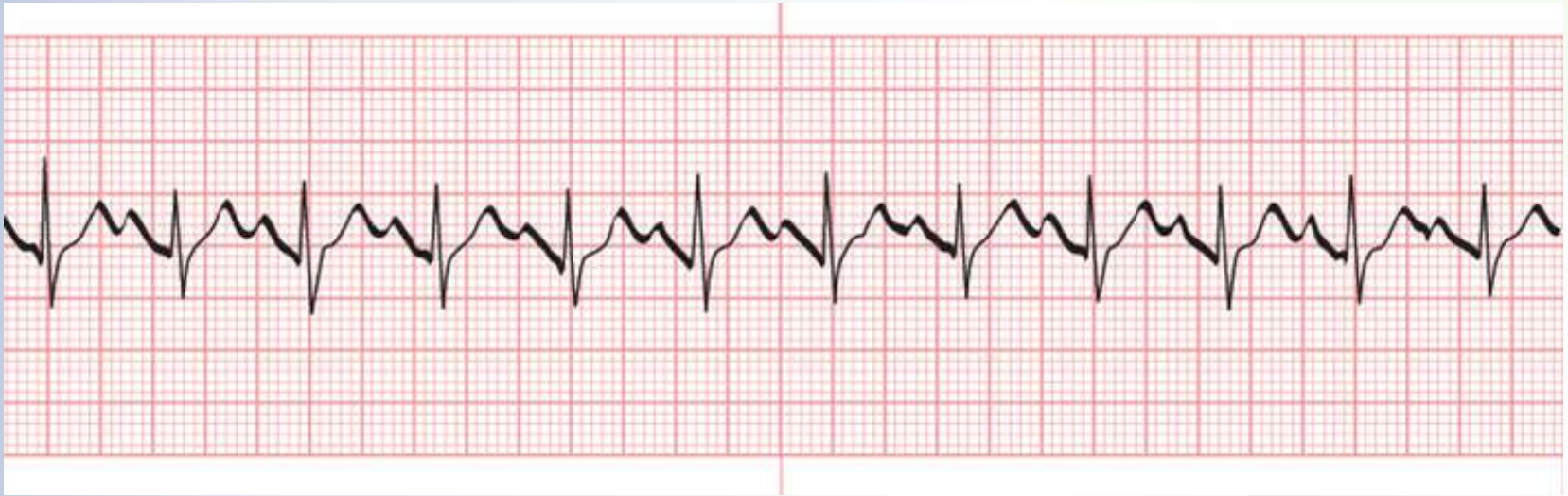
300, 150, 100, 75, 60, 50 Method

- If the second R wave falls in between two bold lines the heart rate can be more precisely determined using the identified values for each thin line



Practice Makes Perfect

- Determine the heart rate using the 300, 150, 100, 75, 60, 50 method



Practice Makes Perfect

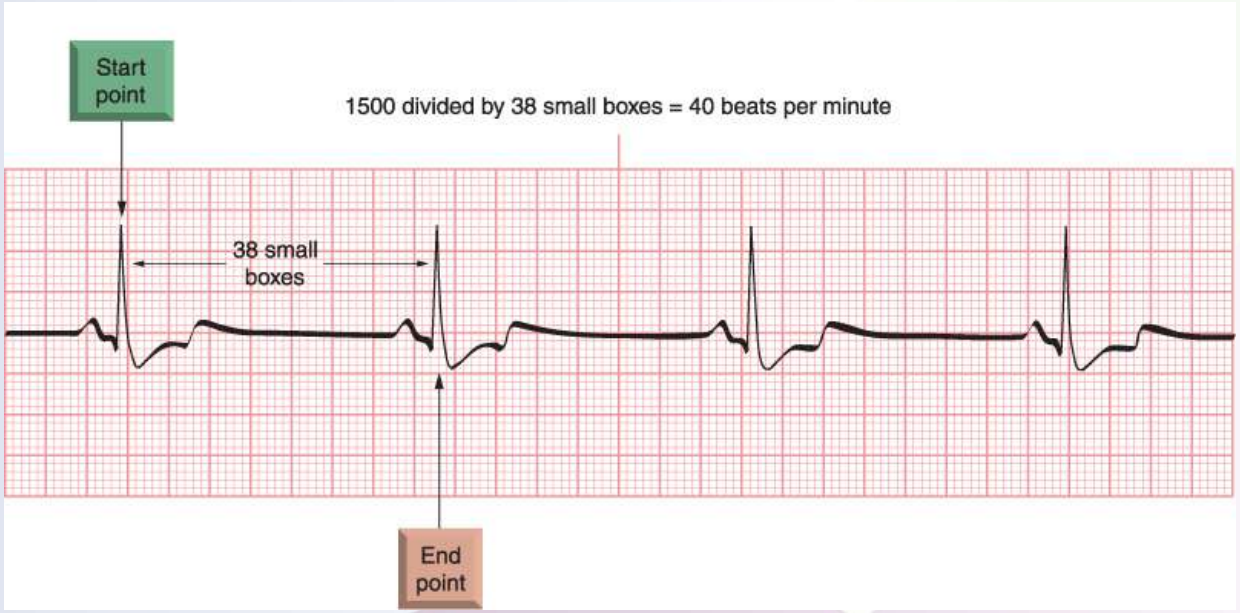
- Determine the heart rate using the 300, 150, 100, 75, 60, 50 method

Practice Makes Perfect

- Determine the heart rate using the 300, 150, 100, 75, 60, 50 method

1500 Method

- Most accurate and requires no special tools but math calculation must be done to determine heart rate
- Cannot be used with irregular rhythms
- Count the number of small squares between two consecutive R waves and divide 1500 by that number



Practice Makes Perfect

- Determine the heart rate using the 1500 method

Practice Makes Perfect

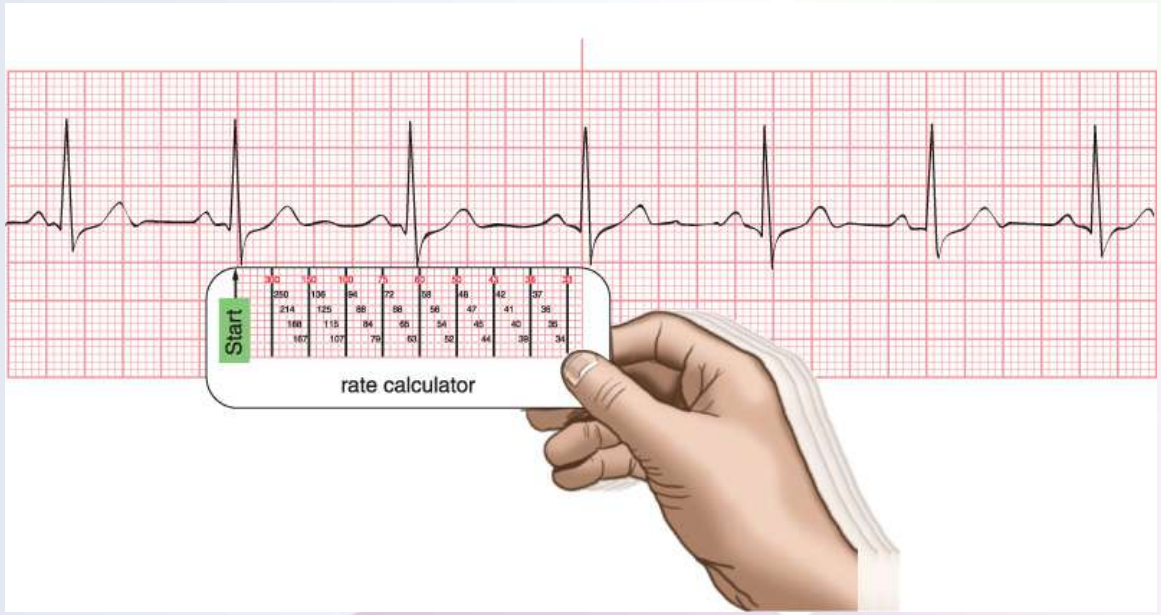
- Determine the heart rate using the 1500 method

Practice Makes Perfect

- Determine the heart rate using the 1500 method

Rate Calculators

- Easy to use but not always available
- Ineffective on irregular rhythms where a consistent baseline is not present
- Position the “start mark” on an R wave
- Then find the next consecutive R wave – where it lines up is the approximate heart rate

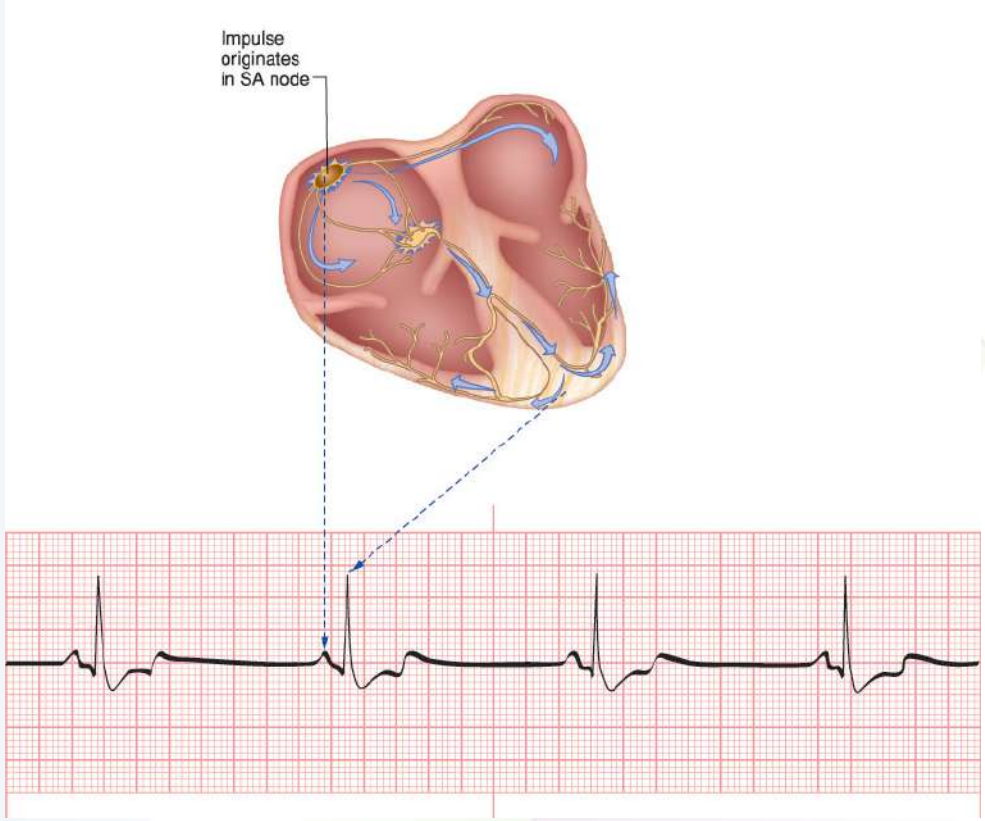


Heart Rates

- Average adult has a heart rate of 60-100 BPM
- Heart rate < 60 BPM called *bradycardia*
- Heart rate > 100 BPM called *tachycardia*

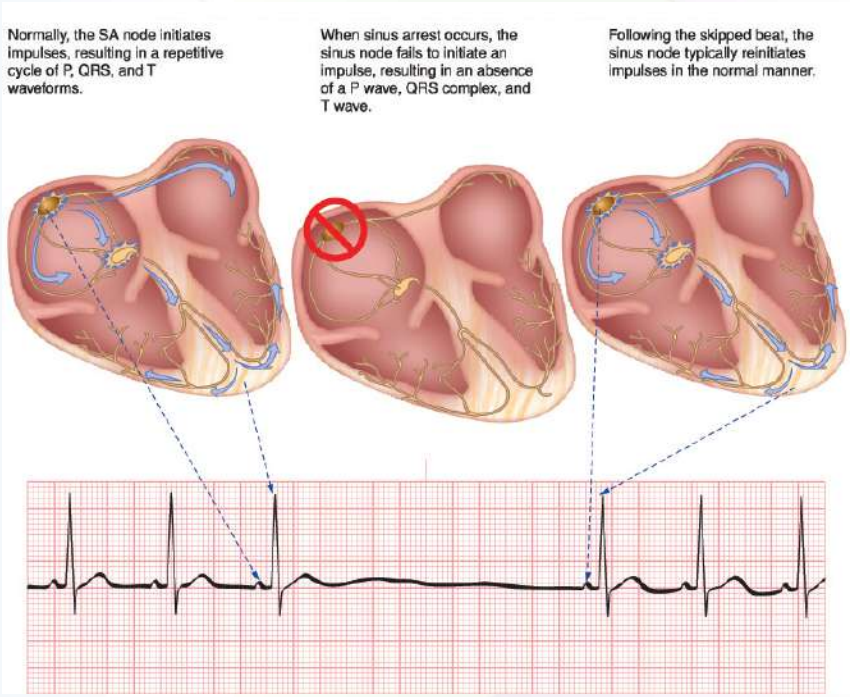
Sinus Bradycardia

- Slow rate that arises from SA node
- May or may not have an adverse affect on cardiac output
- In extreme cases it can lead to severe reductions in cardiac output and eventually deteriorate into asystole



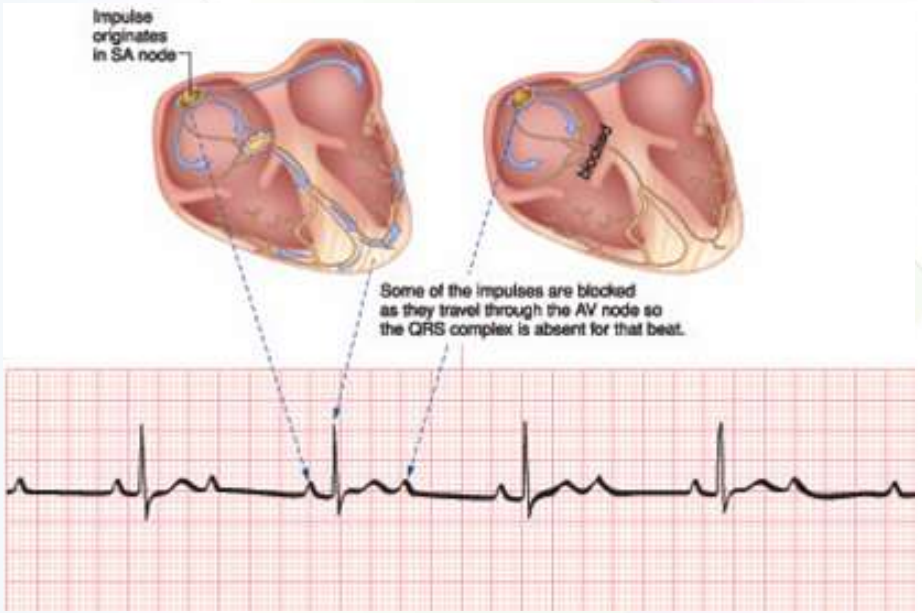
Sinus Arrest

- Transient failure of SA node to initiate a heart beat
- Can lead to a slow heart rate



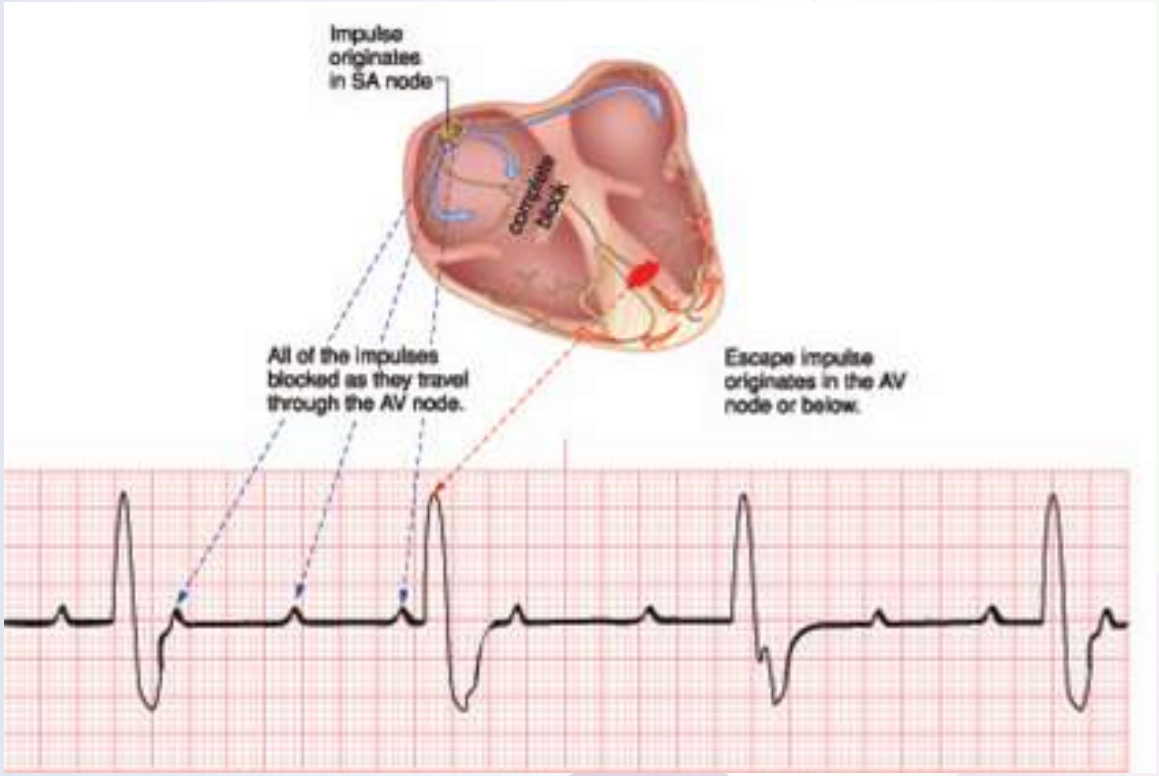
AV Heart Blocks

- Blockage of the impulse traveling through the AV node can cause a slow heart rate
- 2nd – degree AV heart block



AV Heart Blocks

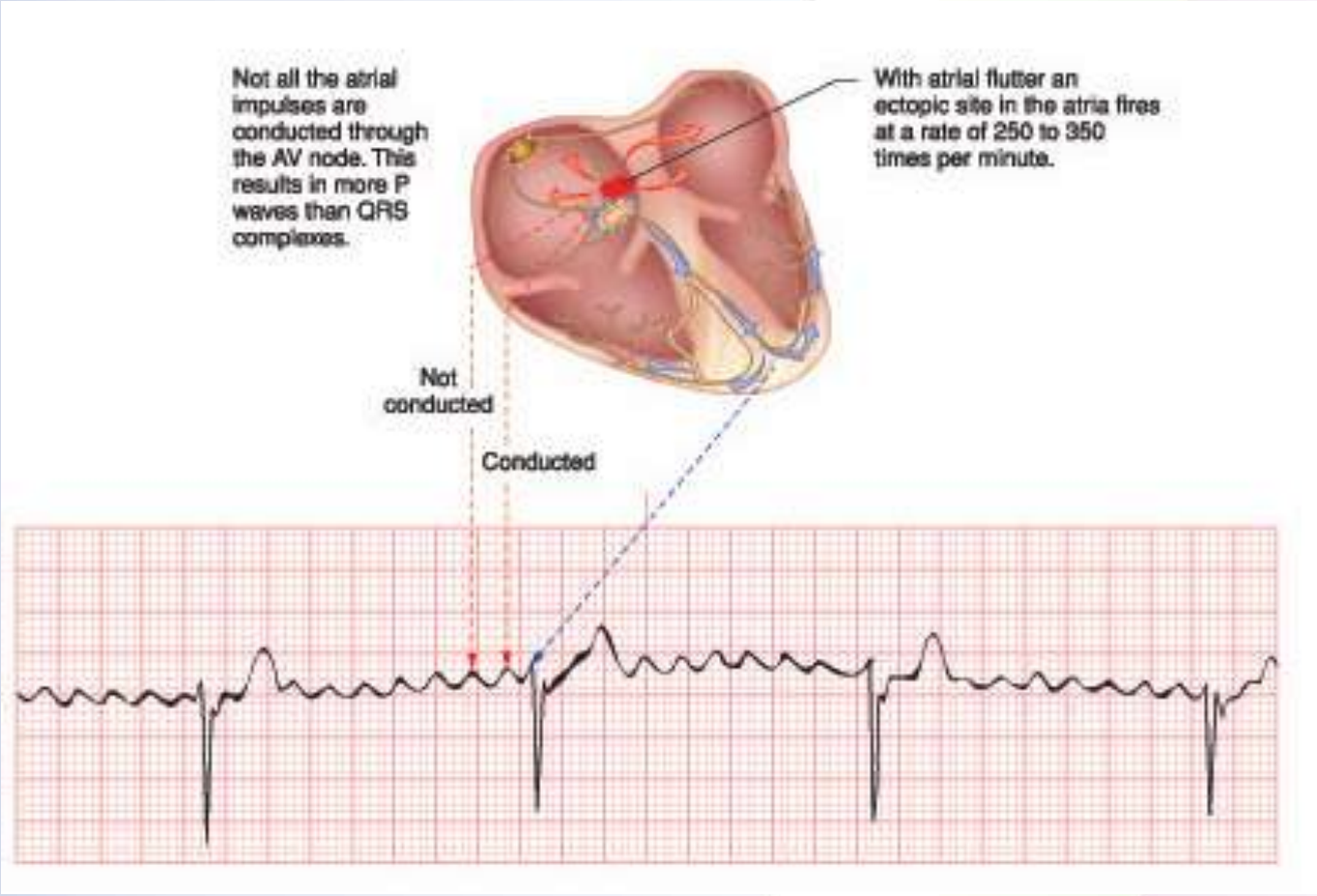
- 3rd - degree AV heart block occurs with complete blockage of AV node



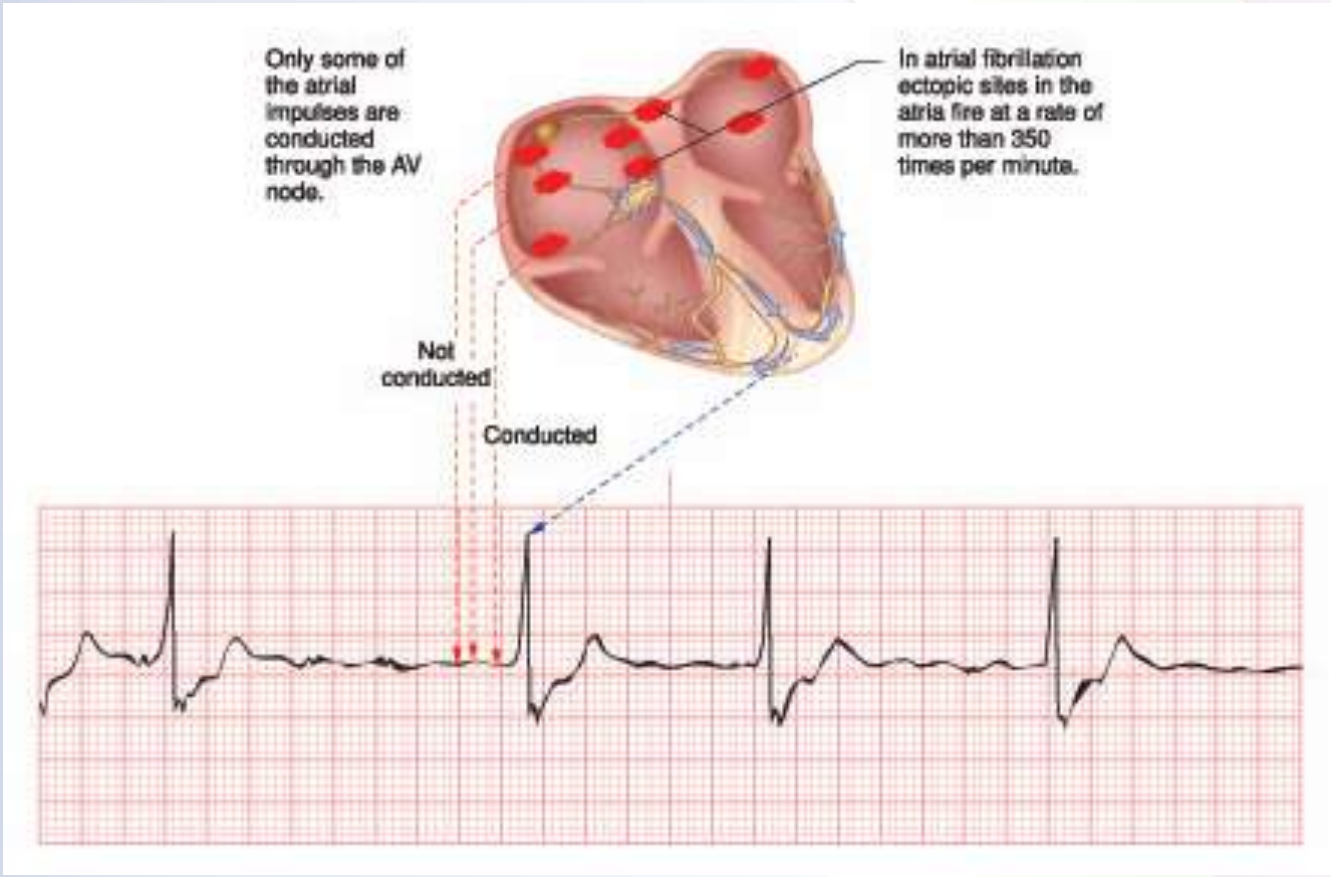
Rapid Atrial Rates With Slow Ventricular Rates

- Because of the rapid rate not all atrial impulses are conducted through to the ventricles
- A slower than normal ventricular rate can result if the number of atrial impulses reaching the ventricles falls to less than normal

Atrial Flutter

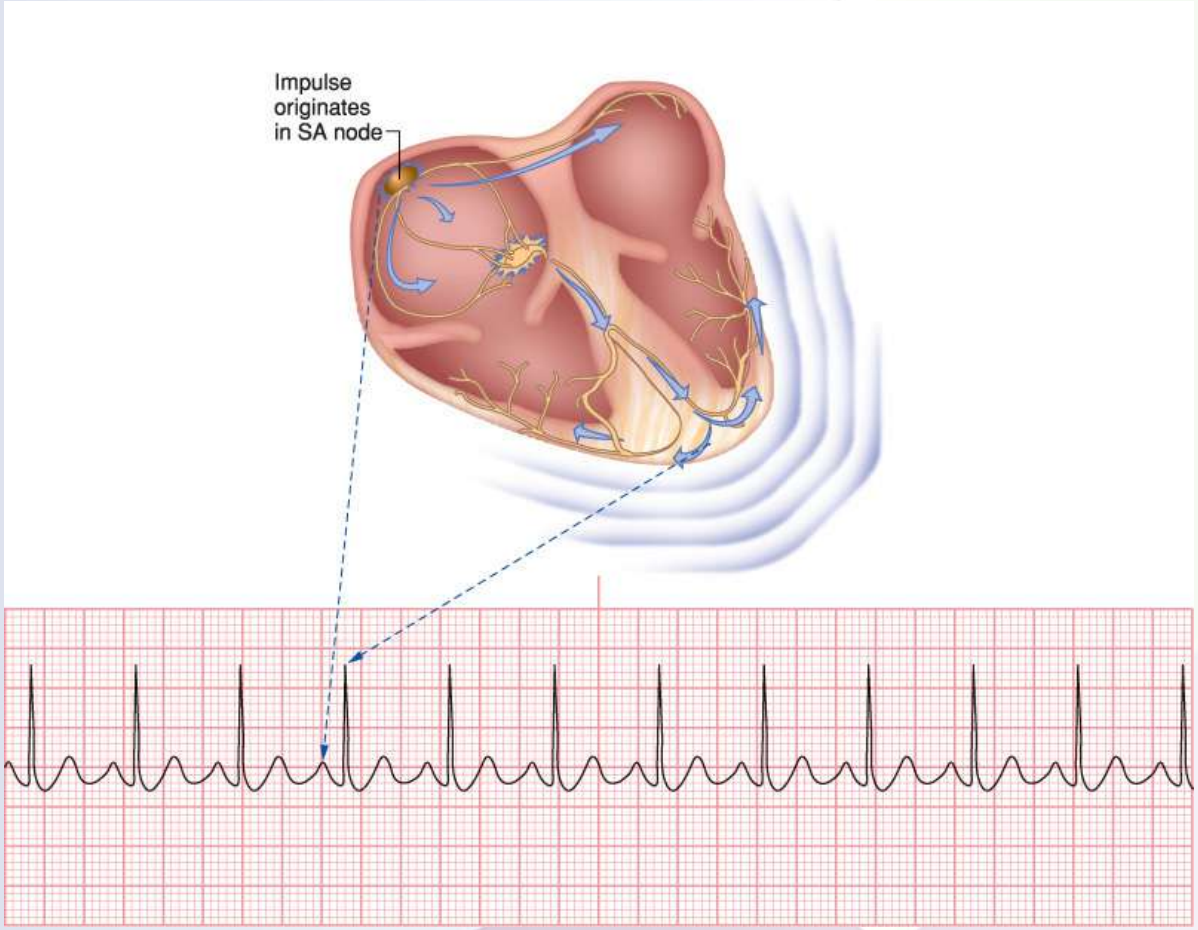


Atrial Fibrillation



Sinus Tachycardia

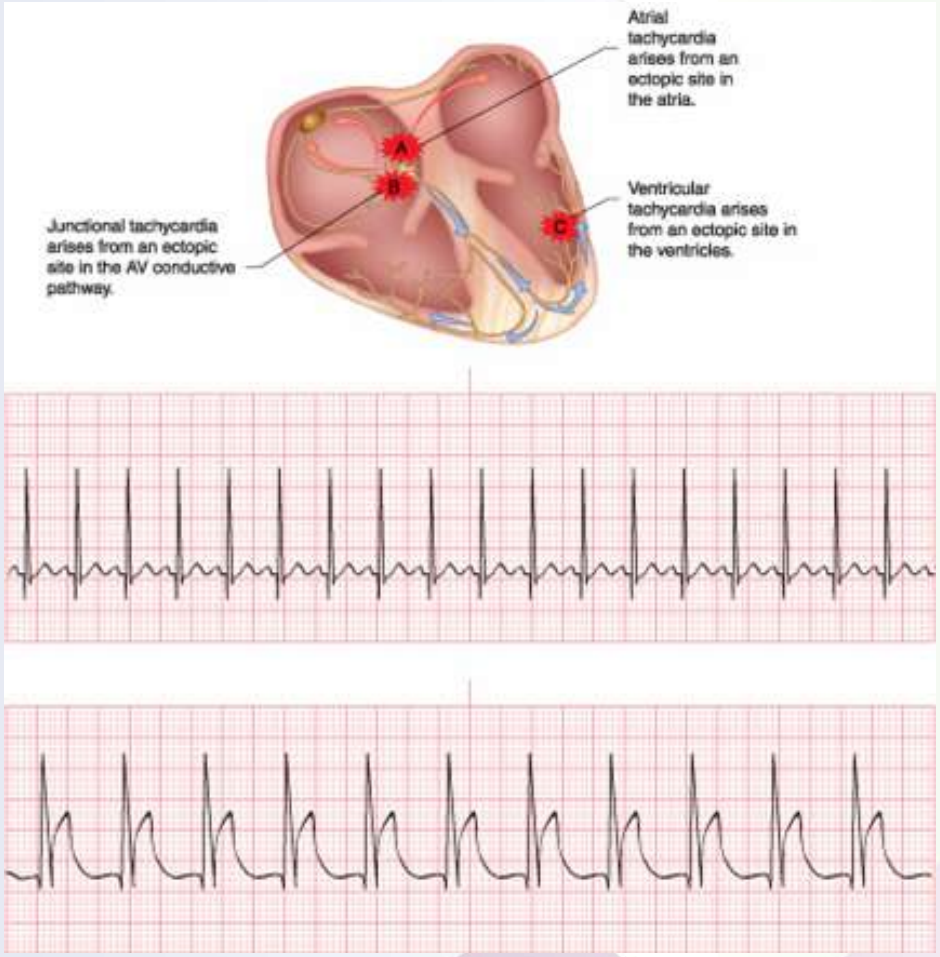
- Fast rate, > 100 BPM, arises from the SA node



Tachycardia From an Ectopic Pacemaker

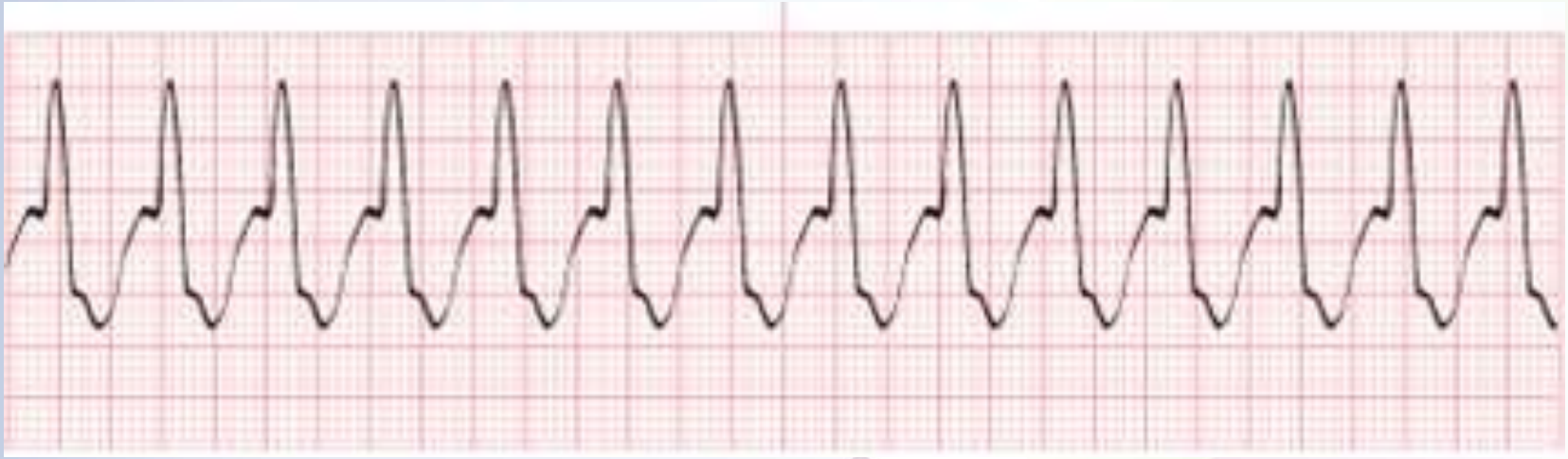
- Results from rapid depolarization that overrides the SA node
- *Supraventricular tachycardia* is term used for ectopic tachycardia arising from above the ventricles
  - Atrial tachycardia
    - Generally 150-250 BPM
  - Junctional tachycardia
    - Generally 100-180 BPM

Tachycardia From an Ectopic Site



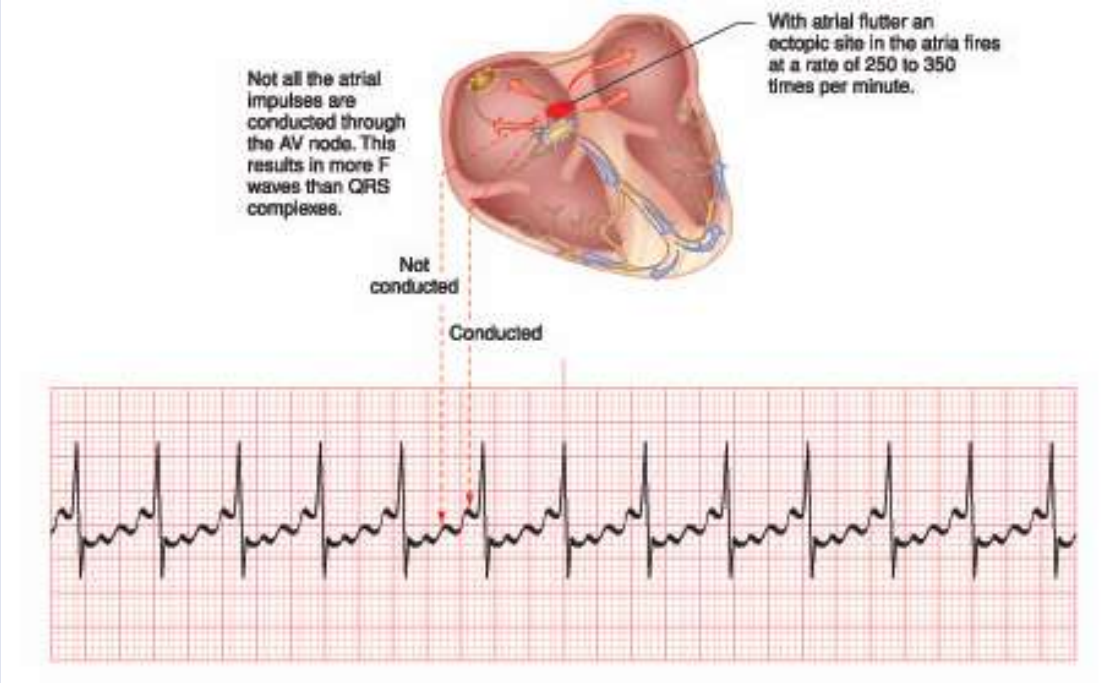
Tachycardia From an Ectopic Pacemaker

- Ventricular tachycardia arises in the ventricles and has a rate of 150-250 BPM



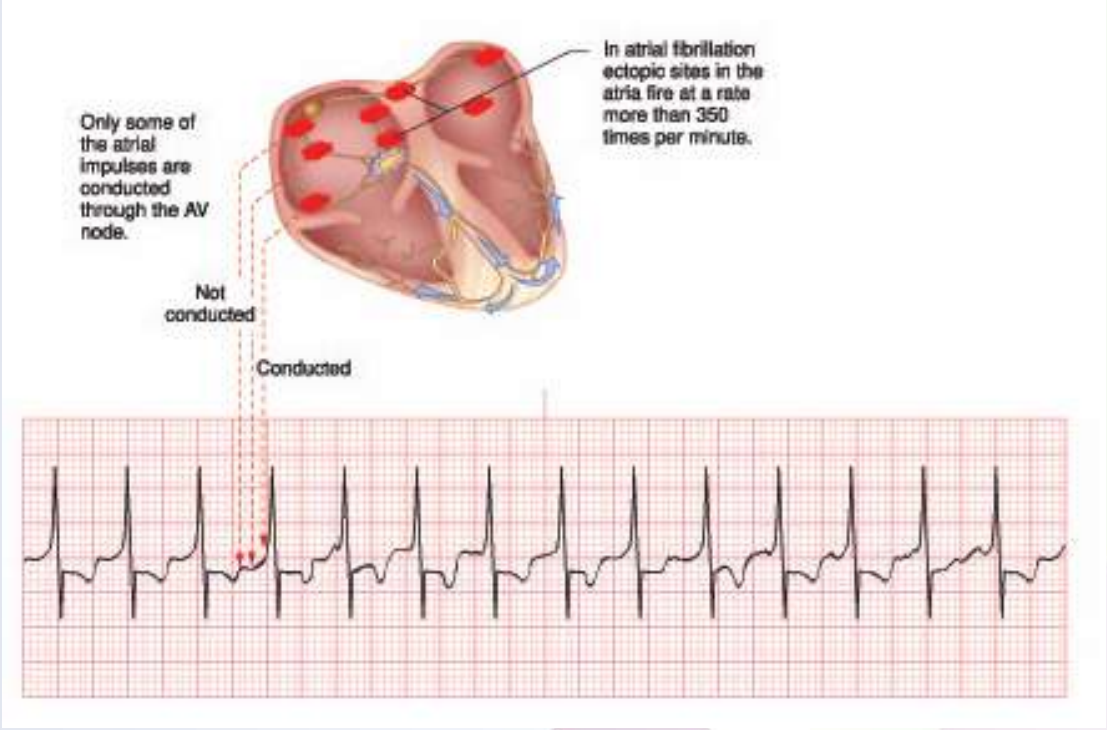
Rapid Atrial Rates With Fast Ventricular Rates

- In addition to having either a normal or slow ventricular rate in atria flutter the ventricular rate can also be fast



Rapid Atrial Rates With Fast Ventricular Rates

- In addition to having either a normal or slow ventricular rate in atria fibrillation the ventricular rate can also be fast



Summary

- Approach each ECG tracing analysis in a logical and systematic manner.
- Some dysrhythmias are of no problem to the patient whereas others are life threatening.
- Five steps to analyzing an ECG rhythm are determining the:
  1. Heart rate
  2. Regularity
  3. Presence of and characteristics of P waves
  4. Presence of and characteristics of QRS complexes
  5. Presence of and characteristics of the PR intervals

Summary

- To determine the heart rate first check to see if the rate is slow, normal or fast.
- The 6-second interval x 10 method multiplies by 10 the number of QRS complexes found in a 6-second portion of the ECG tracing.
- The 300, 150, 100, 75, 60, 50 method involves locating an R wave on a bold line on the ECG paper, then finding the next consecutive R wave and using the 300, 150, 100, 75, 60, 50 values for subsequent bold lines to determine the rate.
- To use the 1500 method count the number of small squares between two consecutive R waves and divide 1500 by that number.

Summary

- A heart rate less than 60 beats per minute is called bradycardia.
  - Slow heart rates are seen with sinus bradycardia, junctional escape rhythm, idioventricular rhythm, AV heart block and atrial flutter or fibrillation with slow ventricular response.

- A heart rate greater than 100 beats per minute is called tachycardia.
  - Fast heart rates are seen with sinus tachycardia, atrial tachycardia, junctional tachycardia, ventricular tachycardia and atrial flutter or fibrillation with rapid ventricular response.