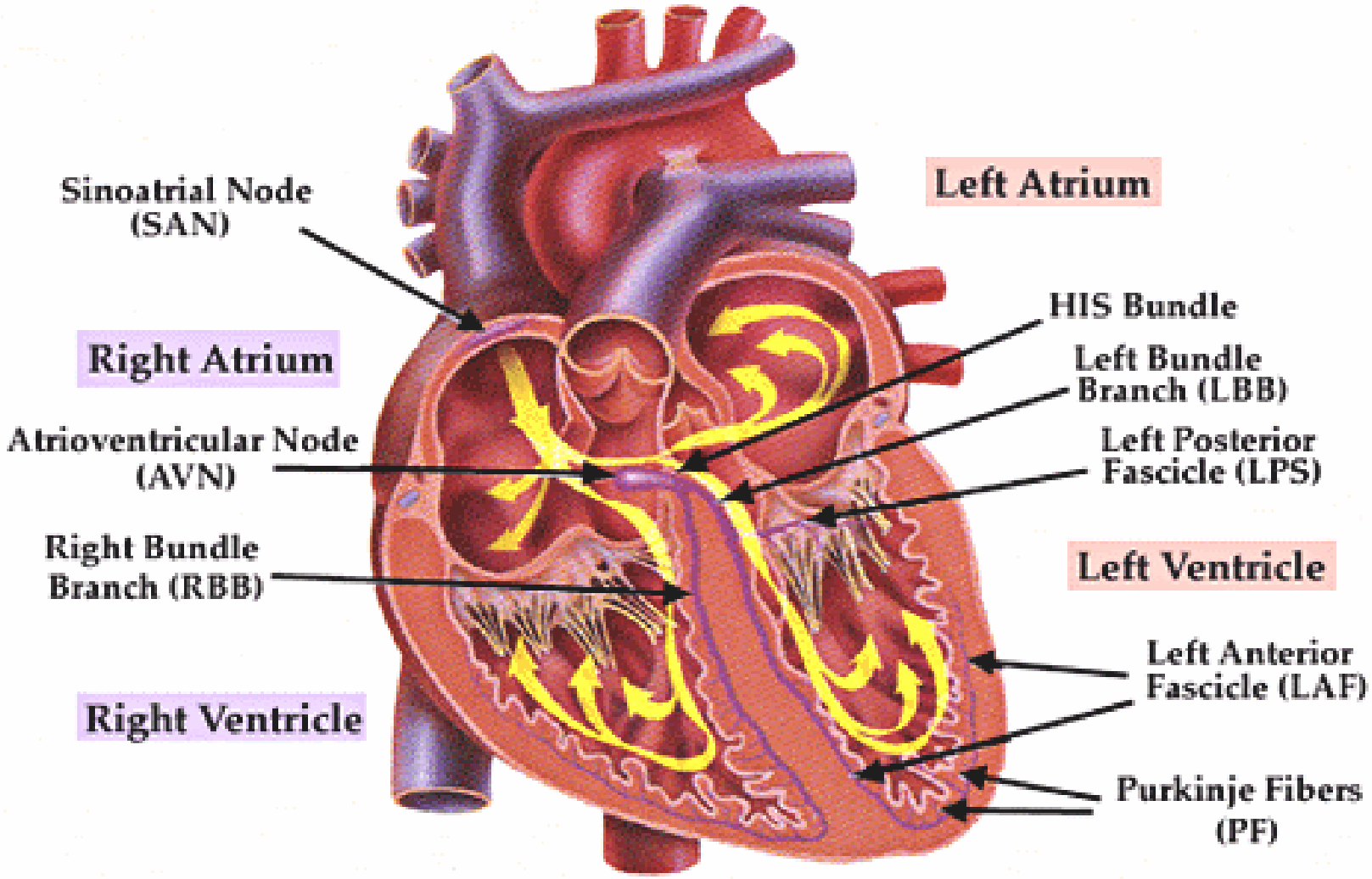
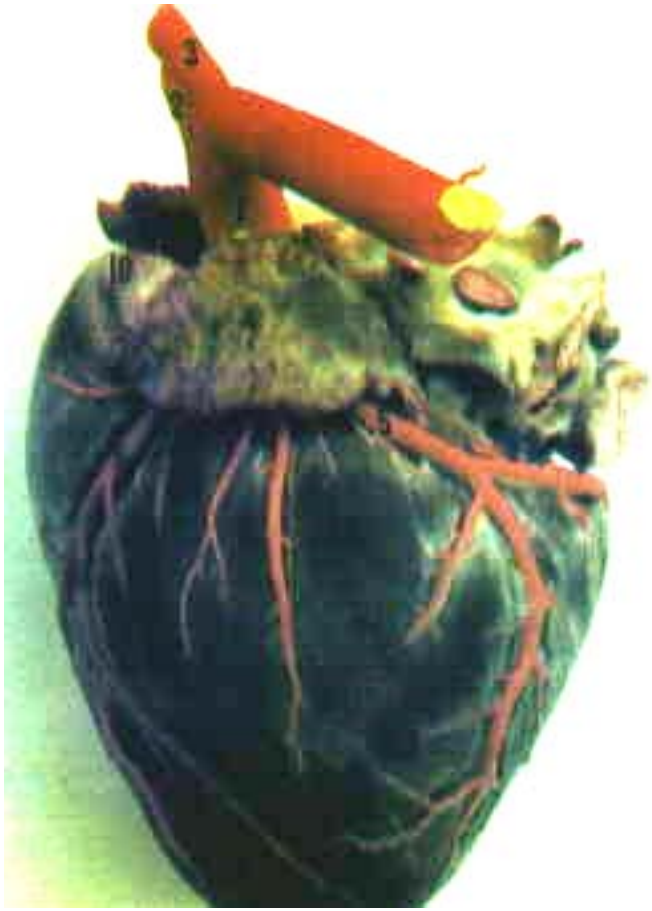
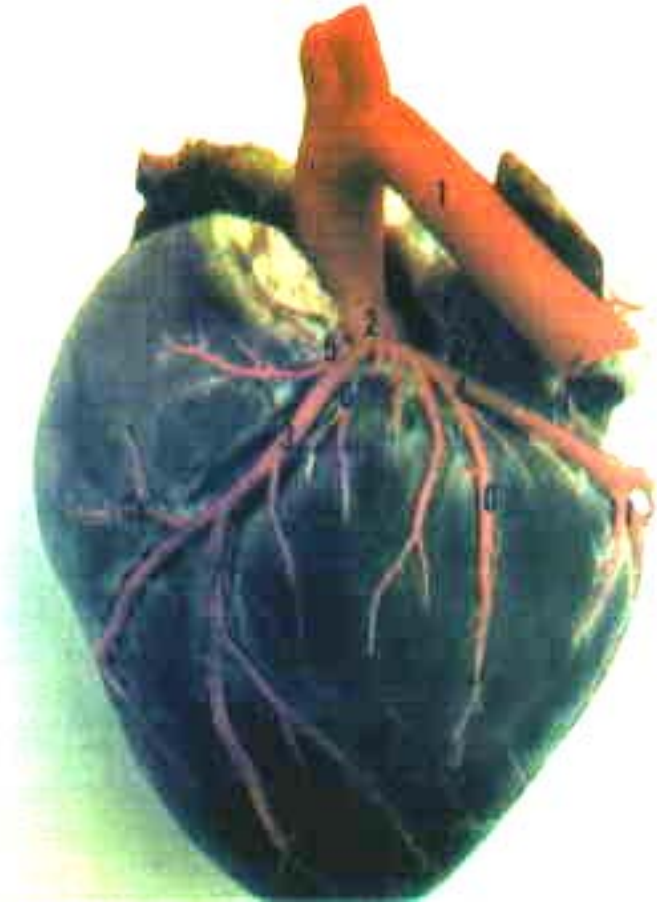
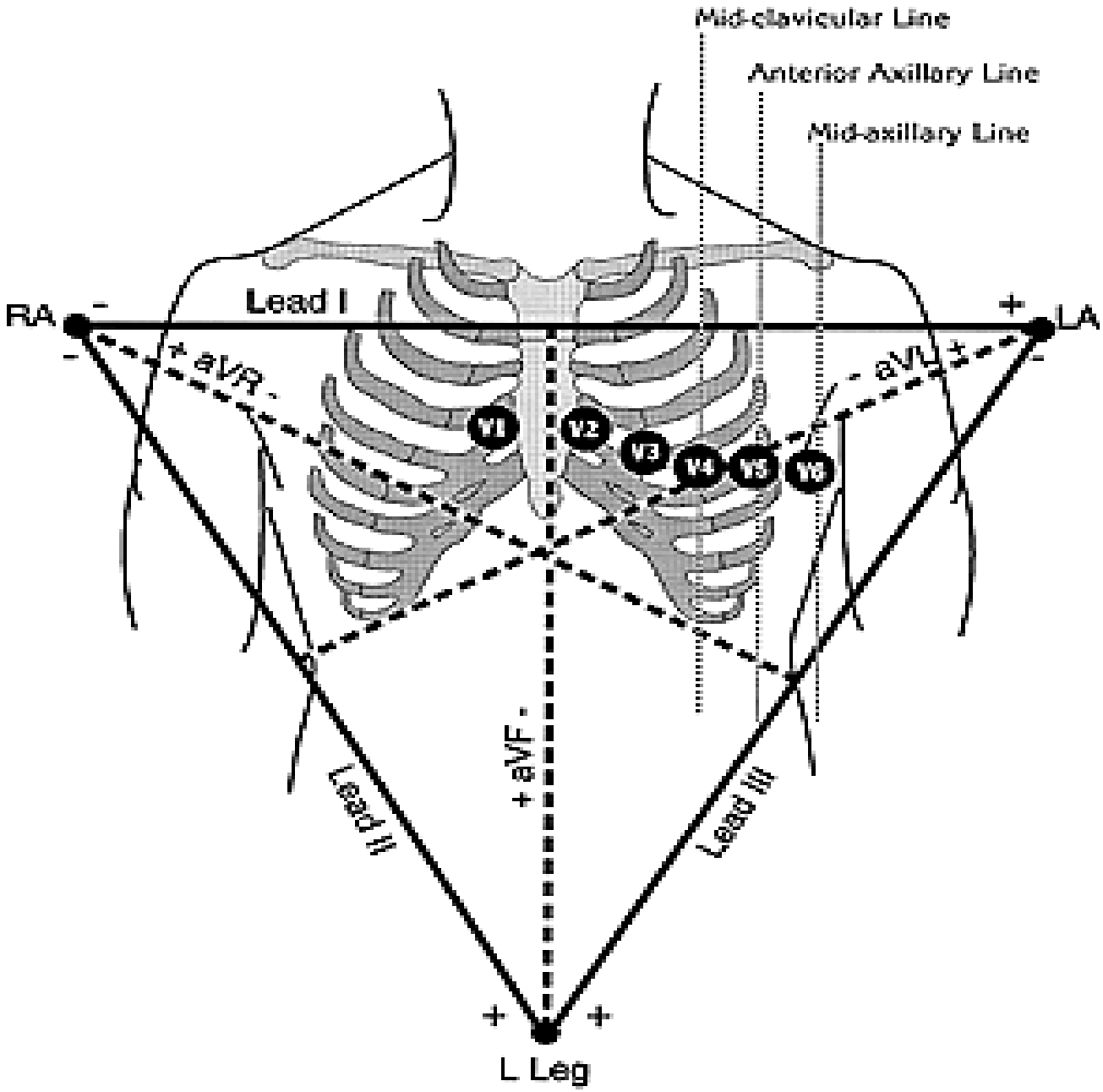
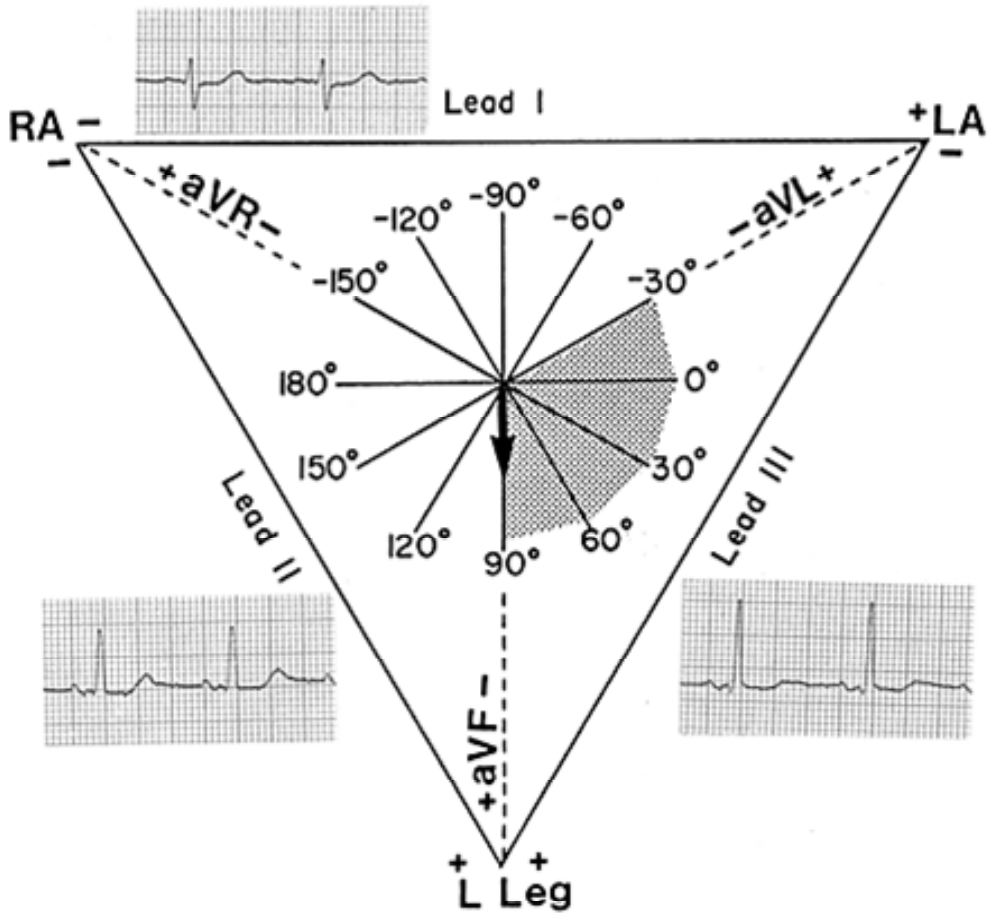


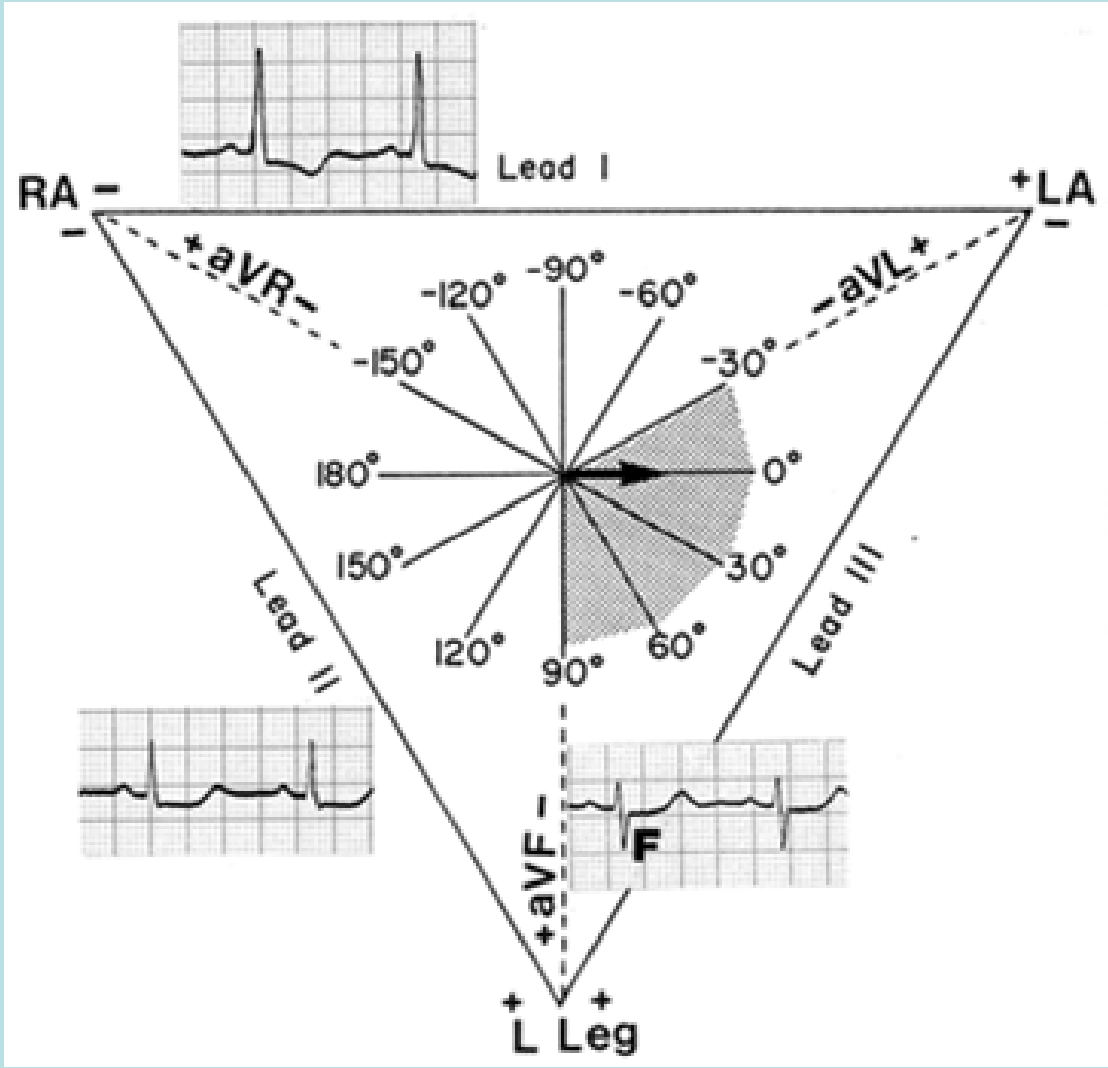
Cardiac Conduction System

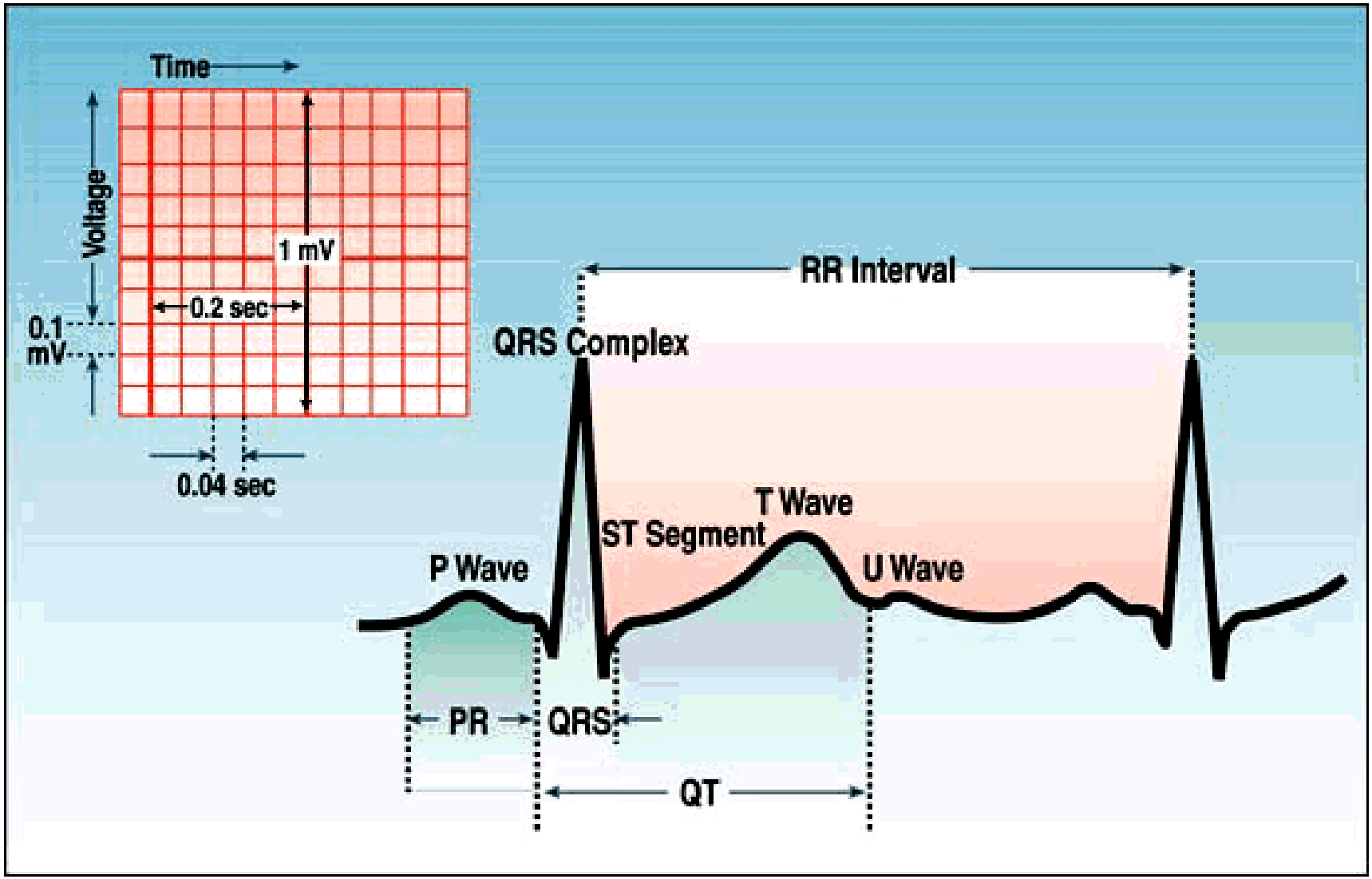

3
2
1
10

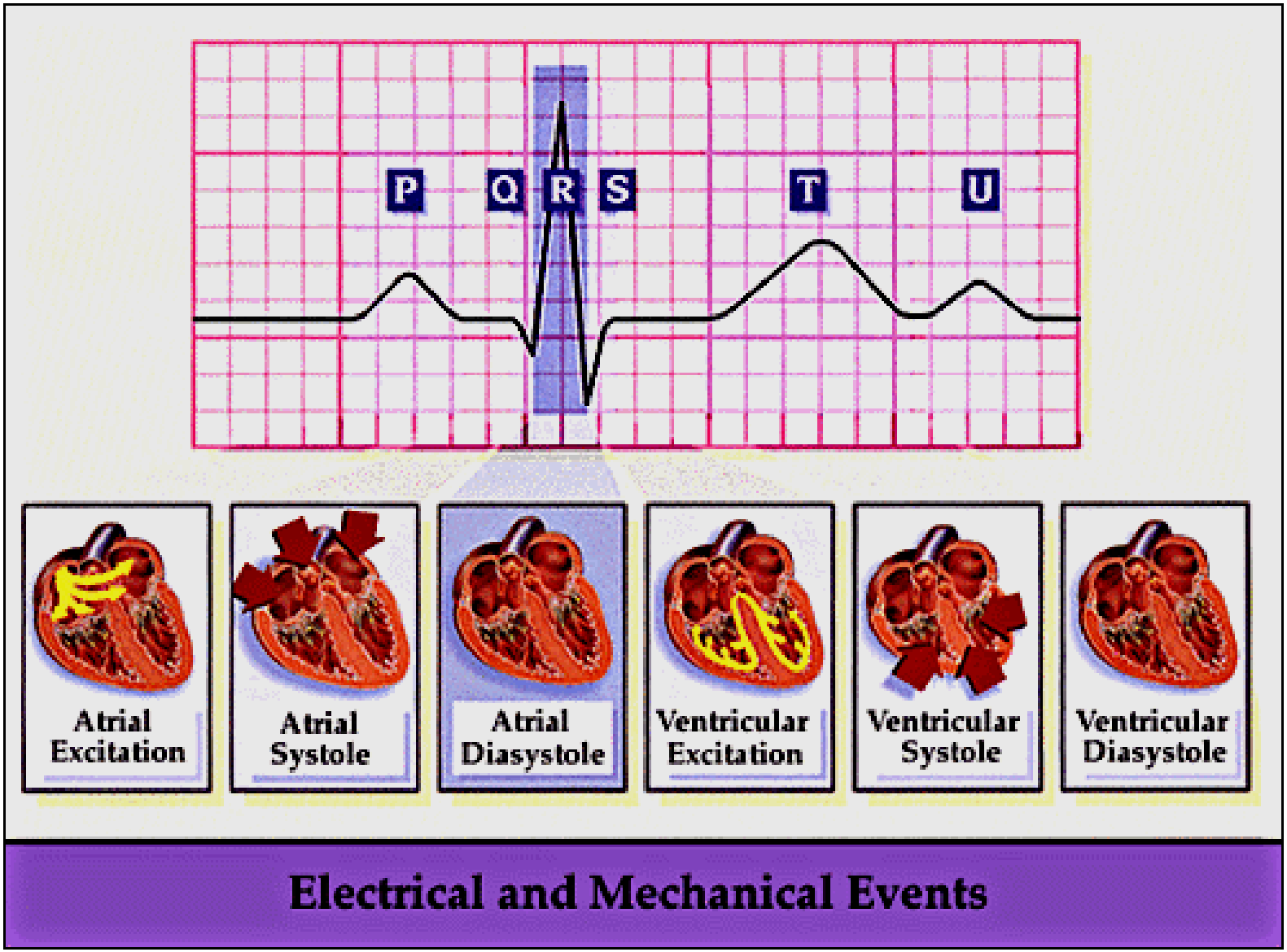

1
2
10


Mid-clavicular Line
Anterior Axillary Line
Mid-axillary Line
RA
LA
Lead I
- aVR +
+ aVL -
V1
V2
V3
V4
V5
V6
Lead II
+ aVF -
Lead III
L Leg

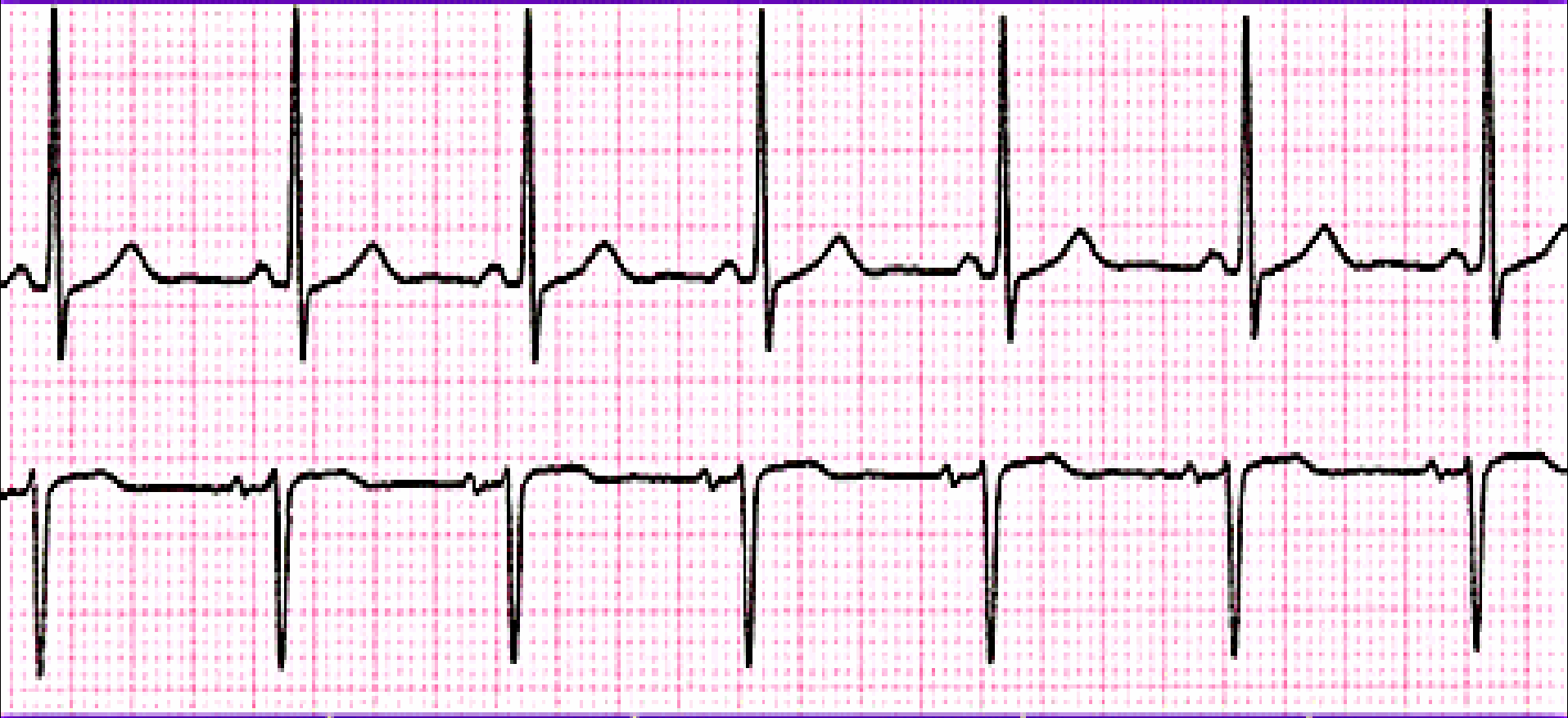

Lead I
RA
+LA
+aVR
-aVL+
-120°
-90°
-60°
-150°
-30°
180°
0°
150°
30°
120°
90°
60°
Lead II
Lead III
+aVF
L Leg


Lead I
RA
LA
aVR
aVL
-120°
-90°
-60°
-150°
-30°
180°
0°
150°
30°
120°
90°
60°
Lead II
Lead III
aVF
F
L Leg


Time
Voltage
1 mV
0.2 sec
0.1 mV
0.04 sec
RR Interval
QRS Complex
T Wave
ST Segment
P Wave
U Wave
PR
QRS
QT

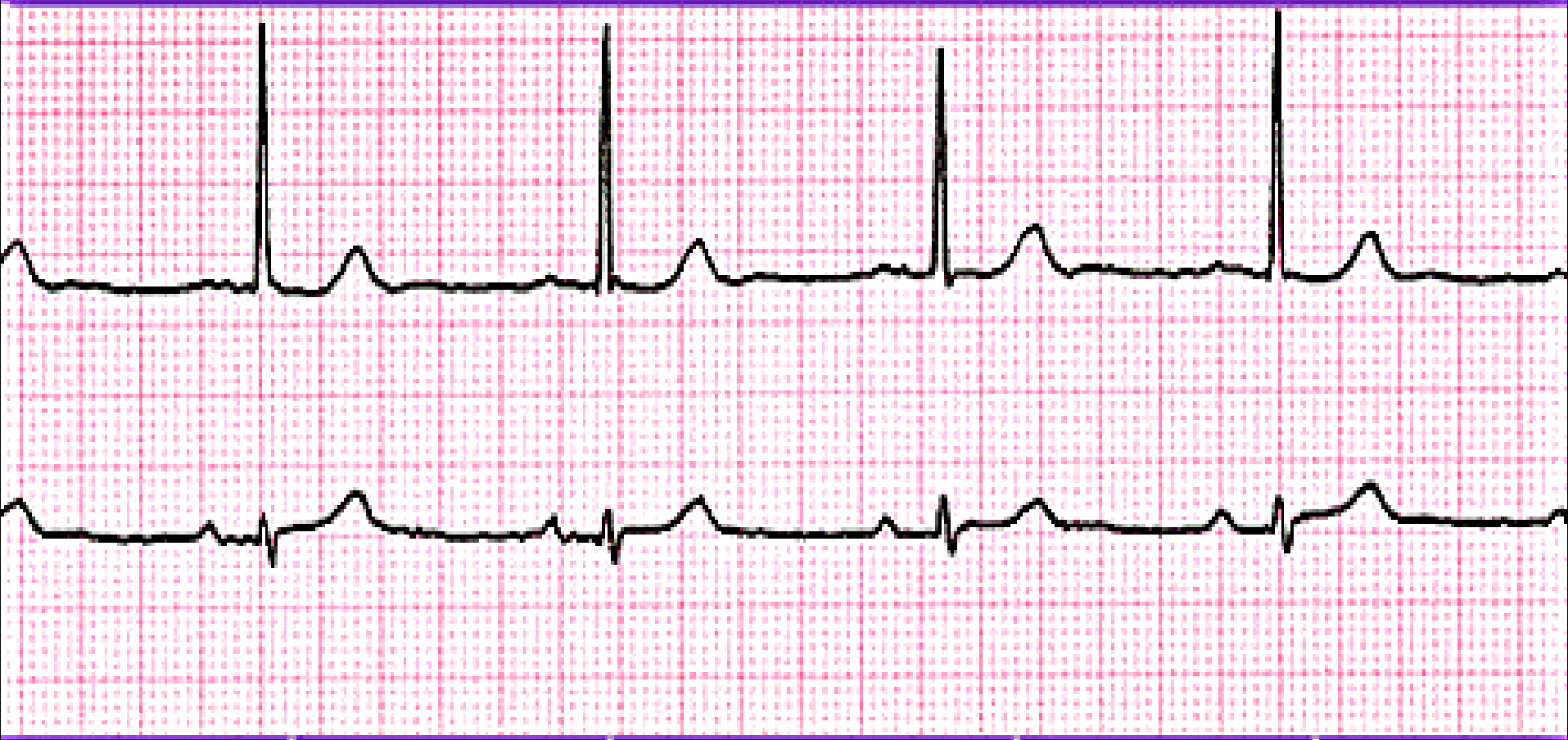

P
Q
R
S
T
U
Atrial Excitation
Atrial Systole
Atrial Diasystole
Ventricular Excitation
Ventricular Systole
Ventricular Diasystole
Electrical and Mechanical Events

Normal Sinus Rhythm



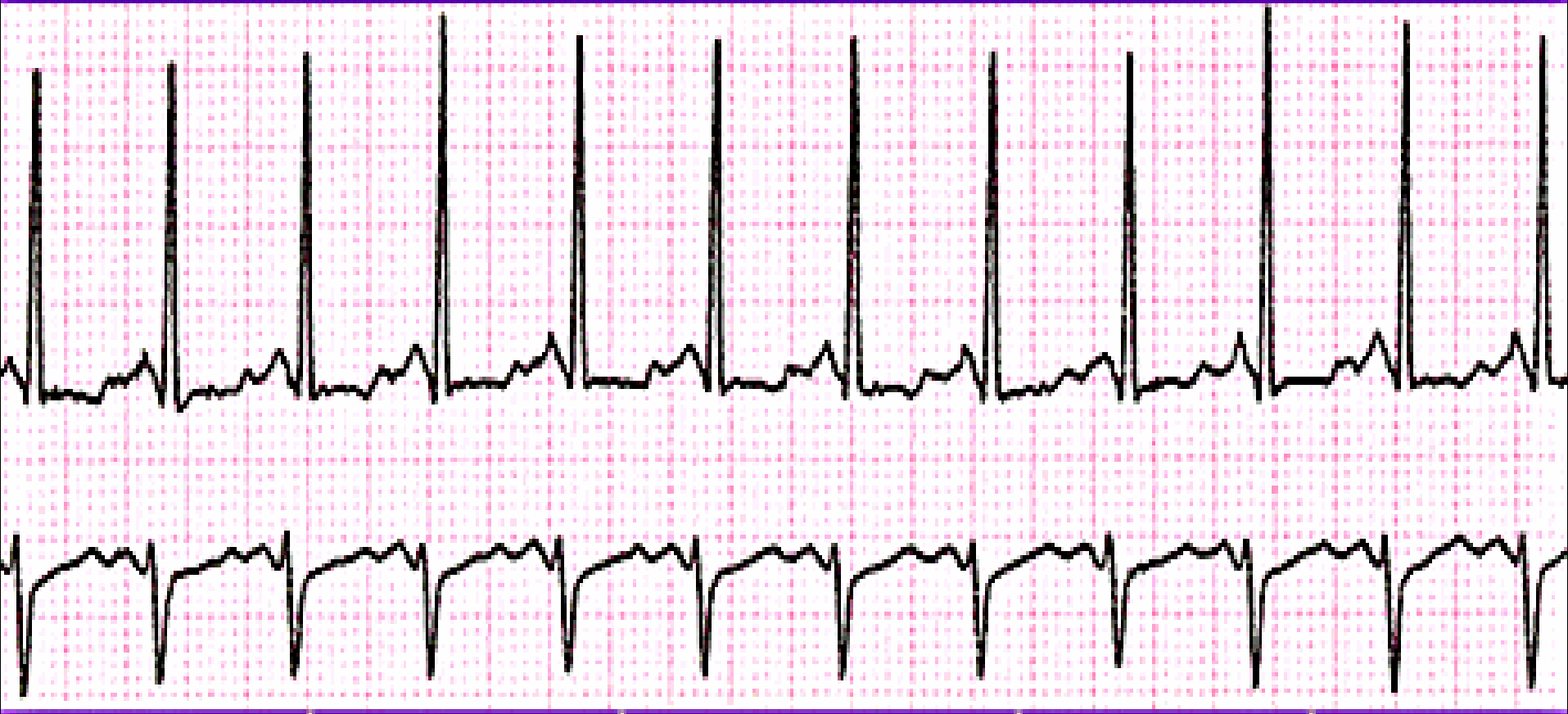
Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
60-100 bpm	Regular	Before each QRS, identical	.12 to .20	<.12

Sinus Bradycardia



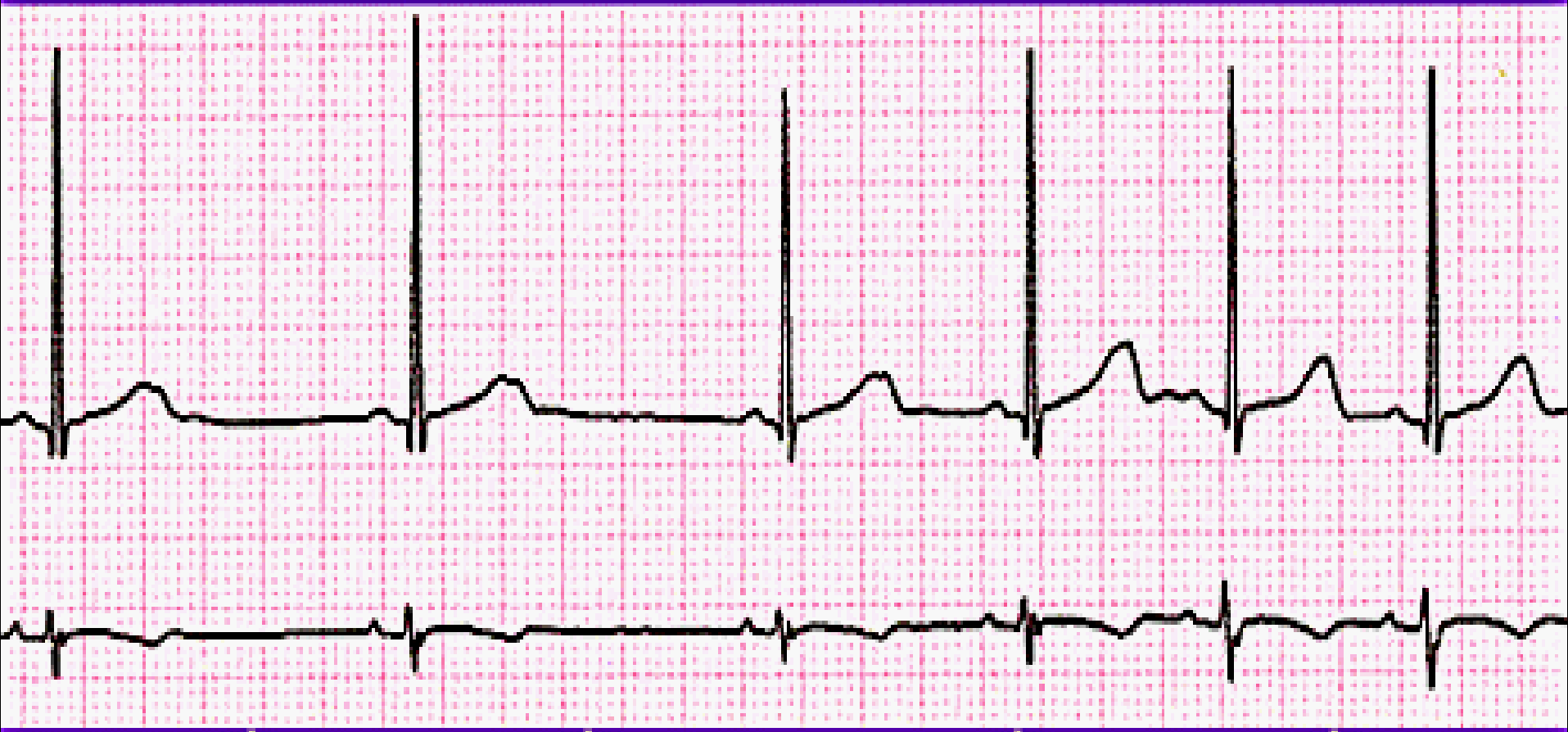
Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
<60 bpm	Regular	Before each QRS, identical	.12 to .20	<.12

Sinus Tachycardia



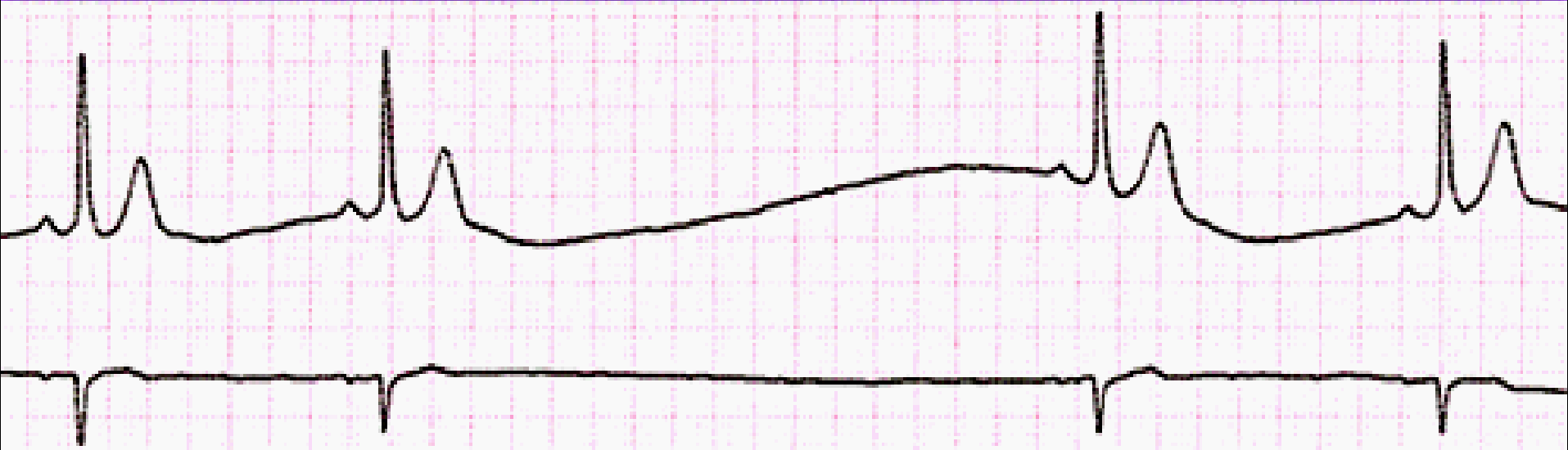
Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
> 100 bpm	Regular	Before each QRS, identical	.12 to .20	<.12

Sinus Arrhythmia



Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
Usually 60-100 bpm	Irregular	Before each QRS, identical	.12 to .20	<.12

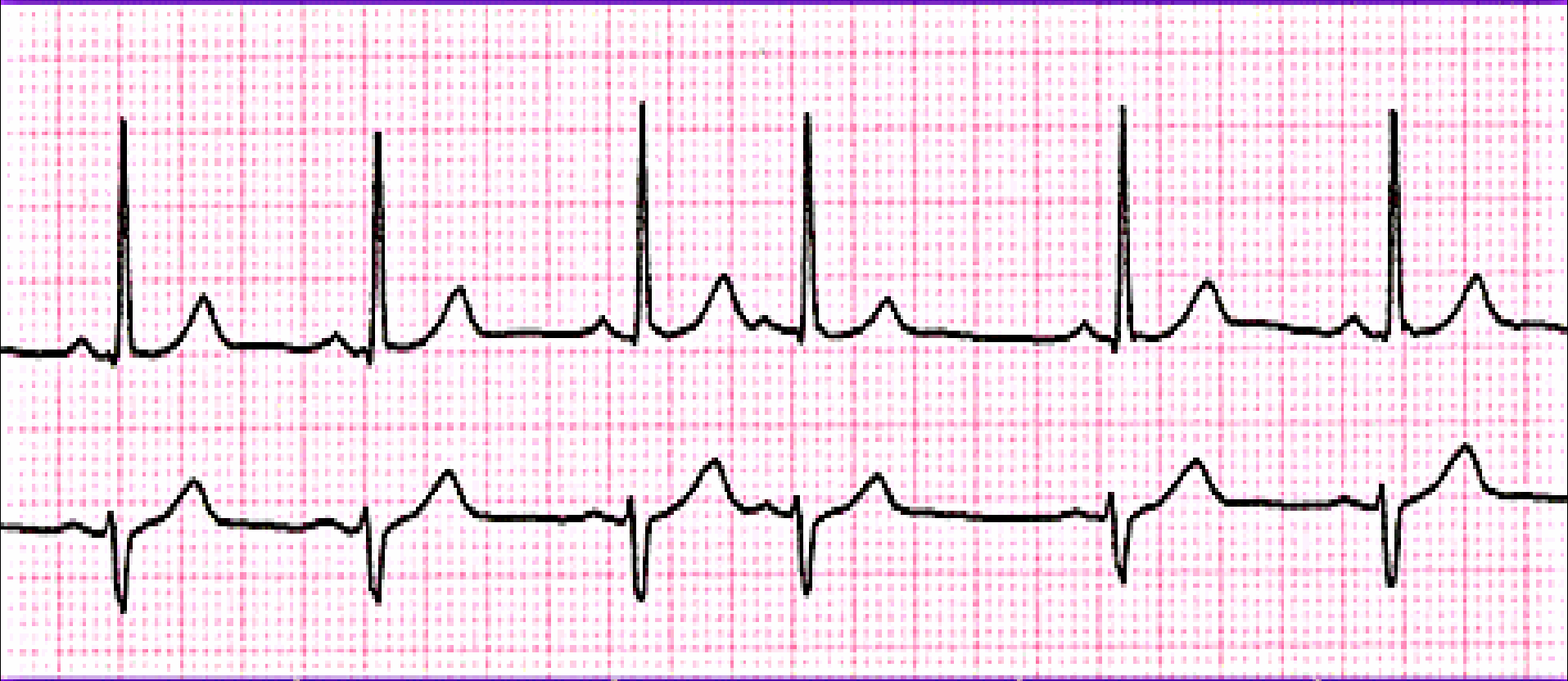
Sinus Arrest



Please note: trace and grid have been reduced in size

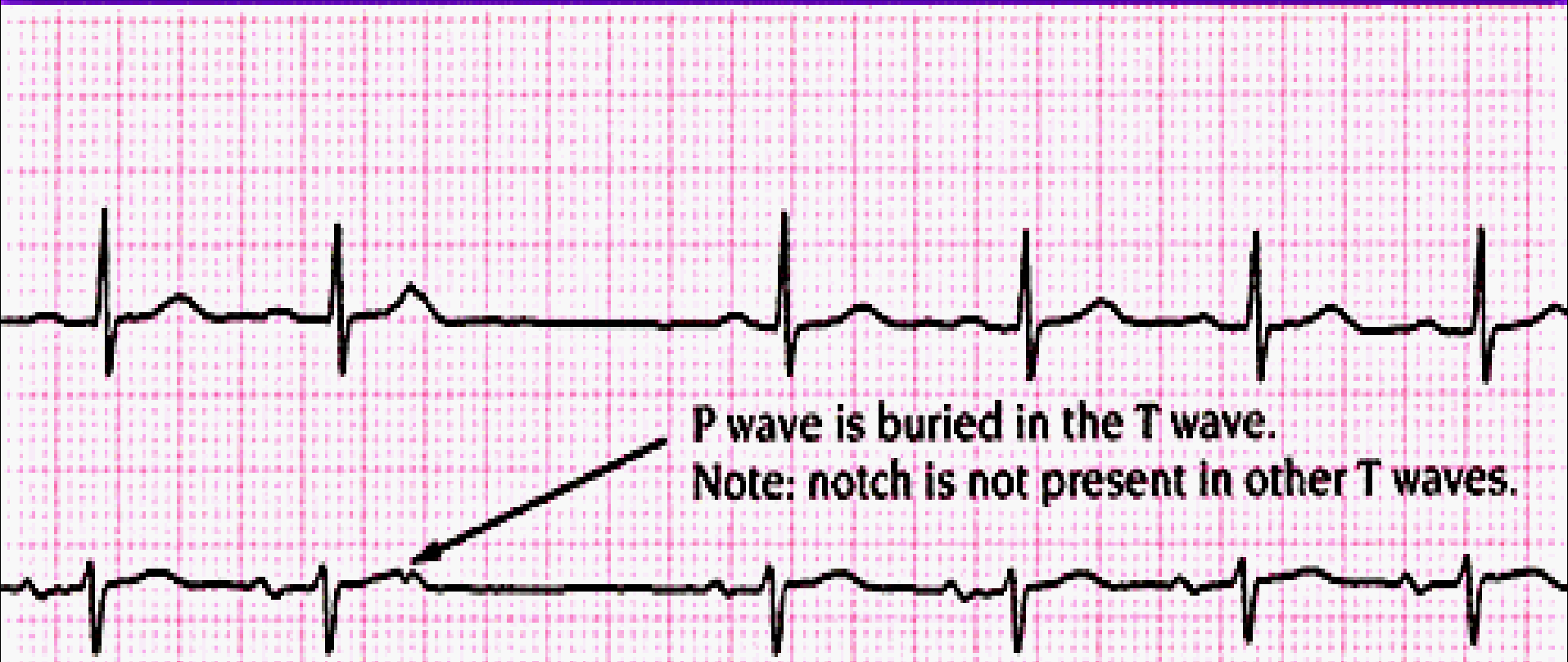
Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
N/A	Irregular	Before each QRS identical. New rhythm begins after a pause. The P to P interval is disturbed.	.12 to .20	<.12

Premature Atrial Contraction • Isolated PAC's: Occur Single



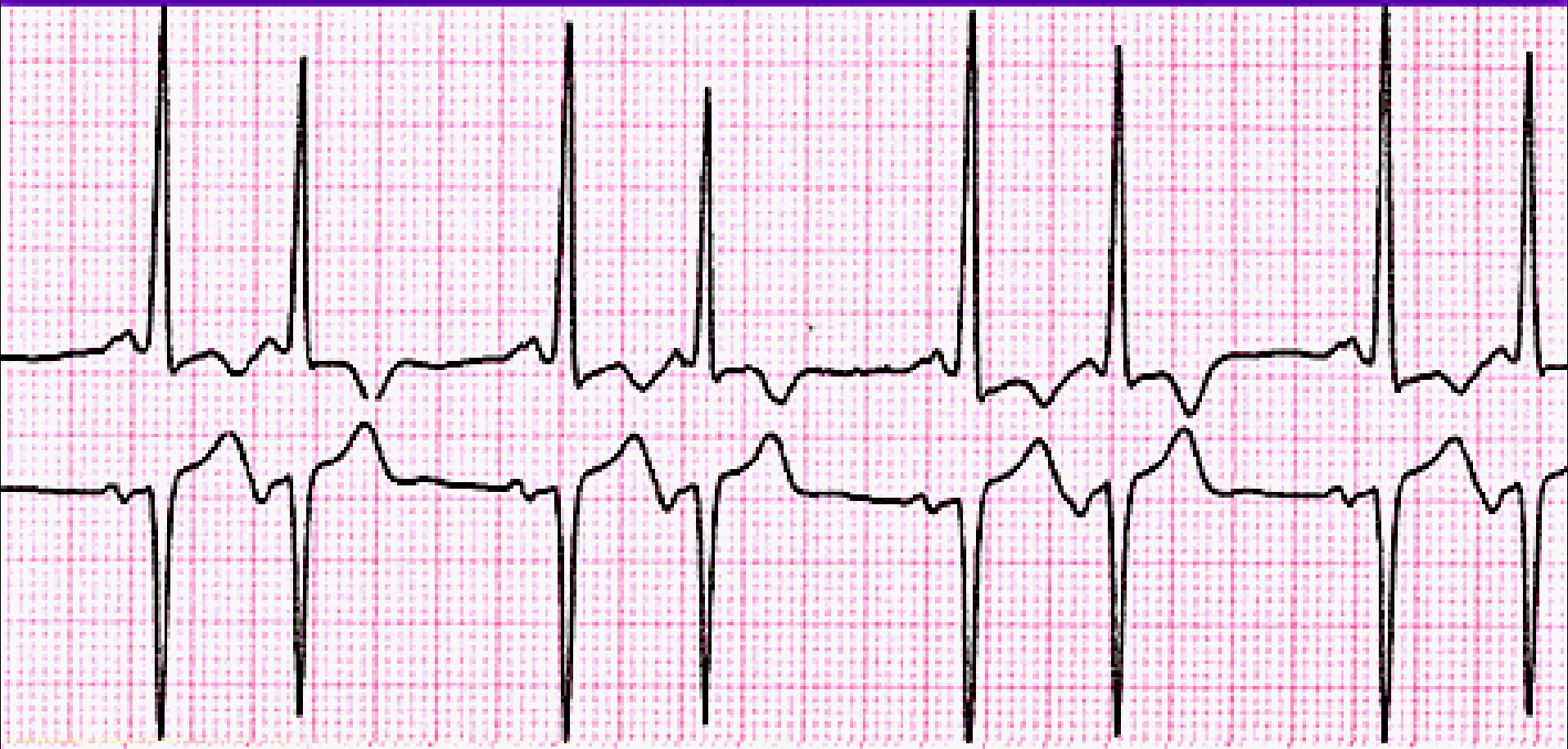
Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
N/A	Irregular	Premature & abnormal or hidden	<.20	<.12

Nonconducted Premature Atrial Contraction



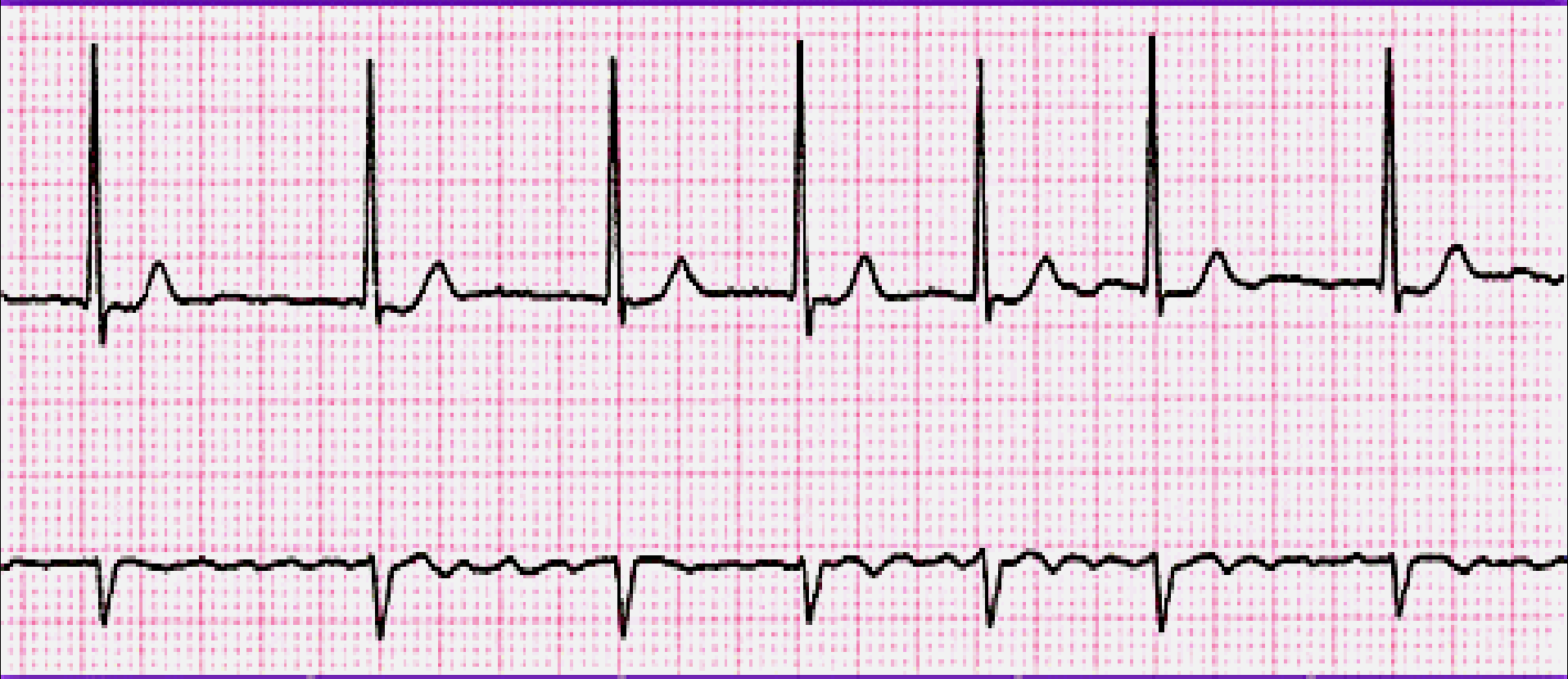
Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
N/A	Irregular	Premature & abnormal or hidden	N/A	Absent

Premature Atrial Contraction • Atrial Bigeminy: Every Other Beat is a PAC



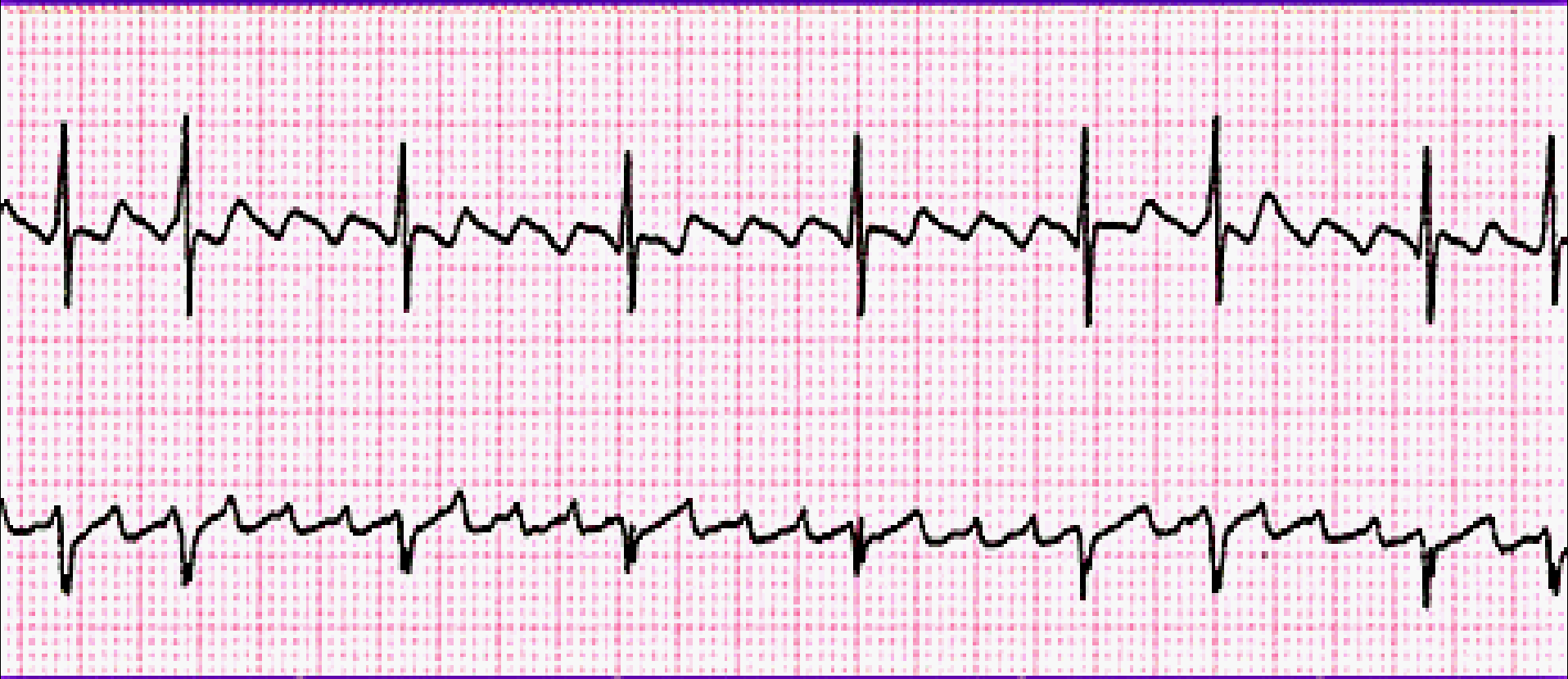
Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
N/A	Irregular	Premature & abnormal or hidden	<.20	<.12

Atrial Fibrillation



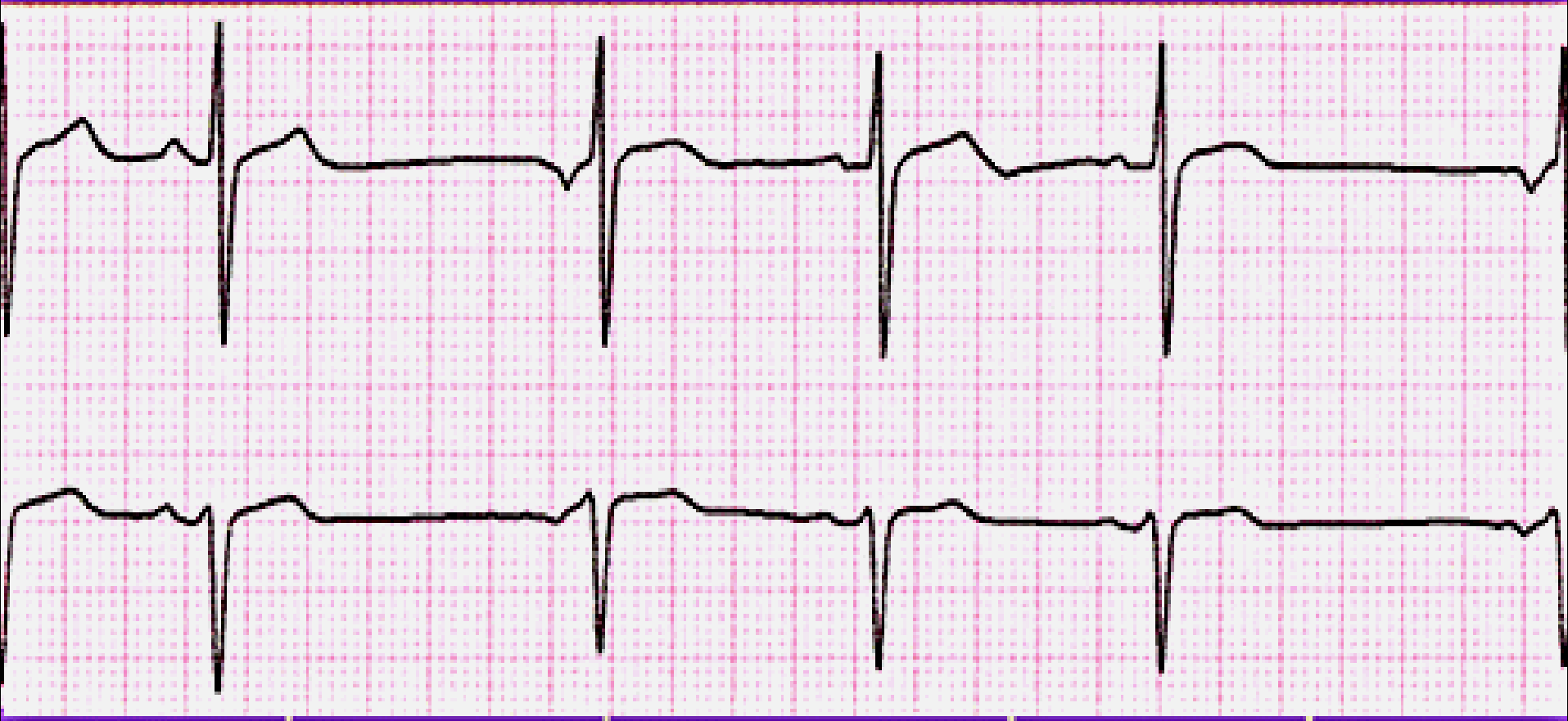
Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
A: 350-650 bpm V: Slow to rapid	Irregular	Fibrillatory (fine to course)	N/A	<.12

Atrial Flutter



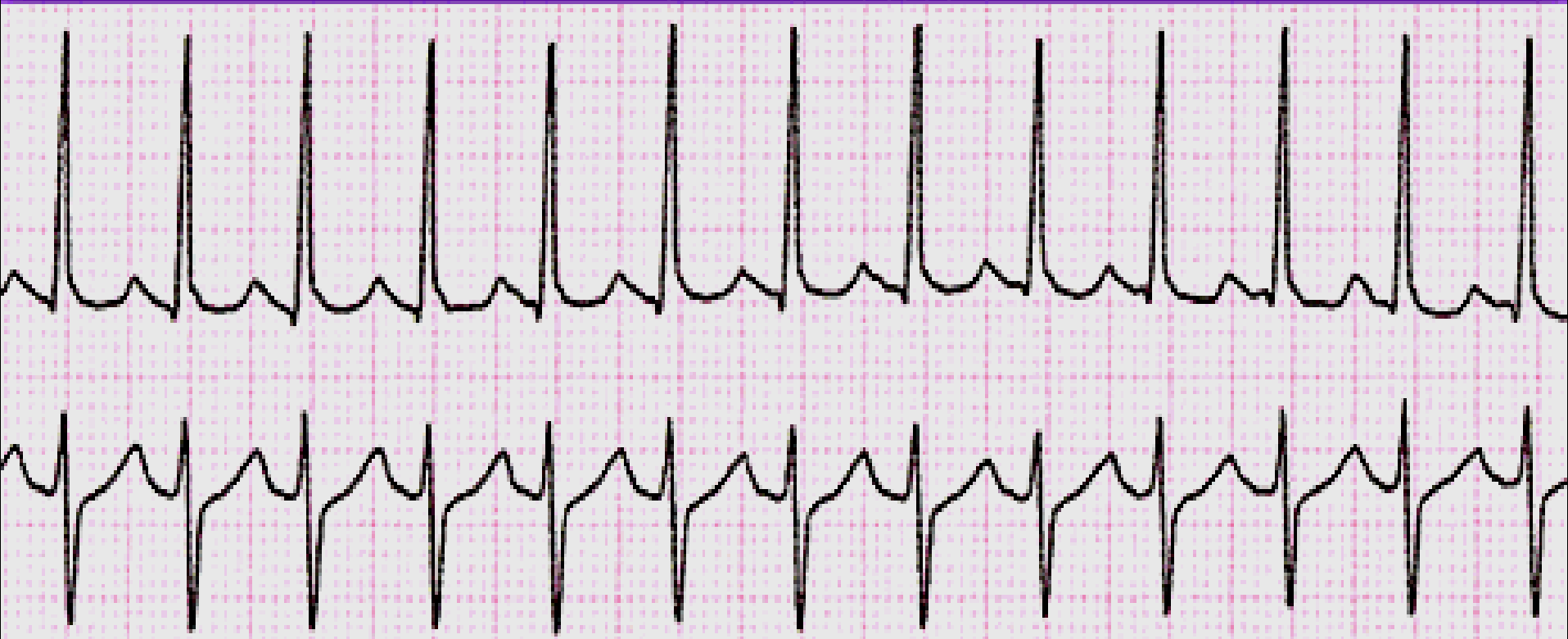
Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
A: 220-430 bpm V: <300 bpm	Regular or variable	Sawtoothed appearance	N/A	<.12

Wandering Pacemaker

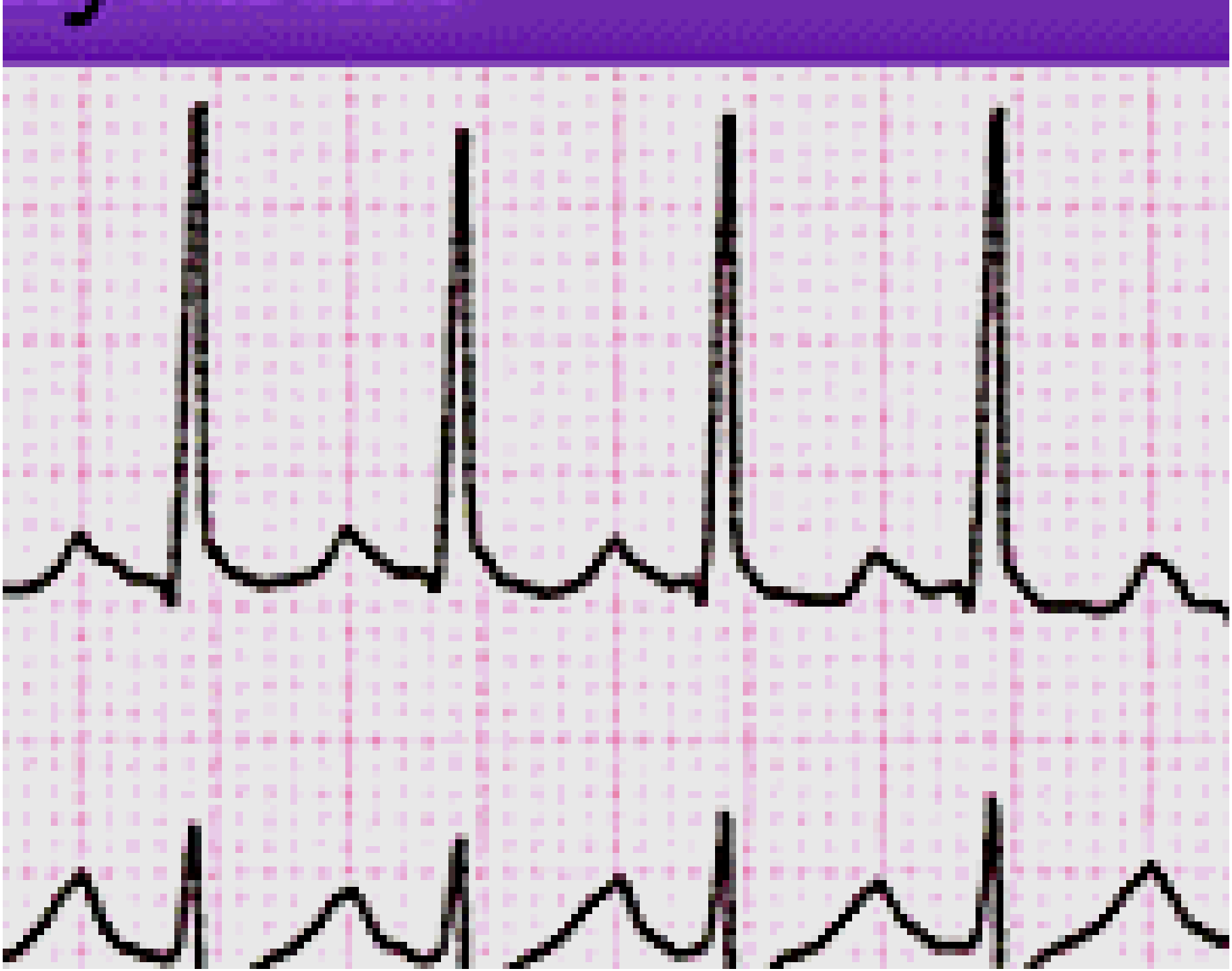


Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
Usually <60 bpm	Irregular	Multiple forms	Variable	<.12

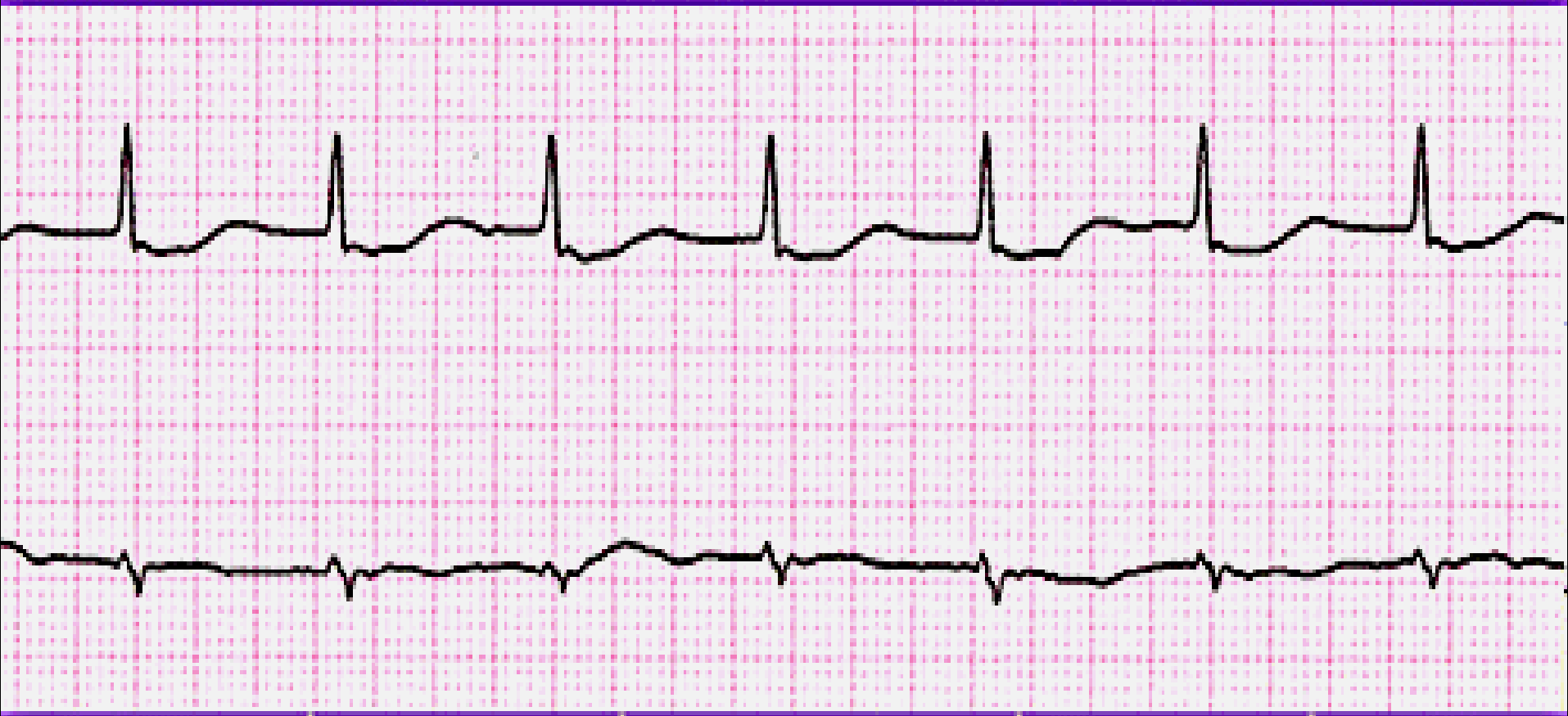
Atrial Tachycardia



Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
140-250 bpm	Regular	Abnormal P before each QRS (difficult to see)	<.20	<.12

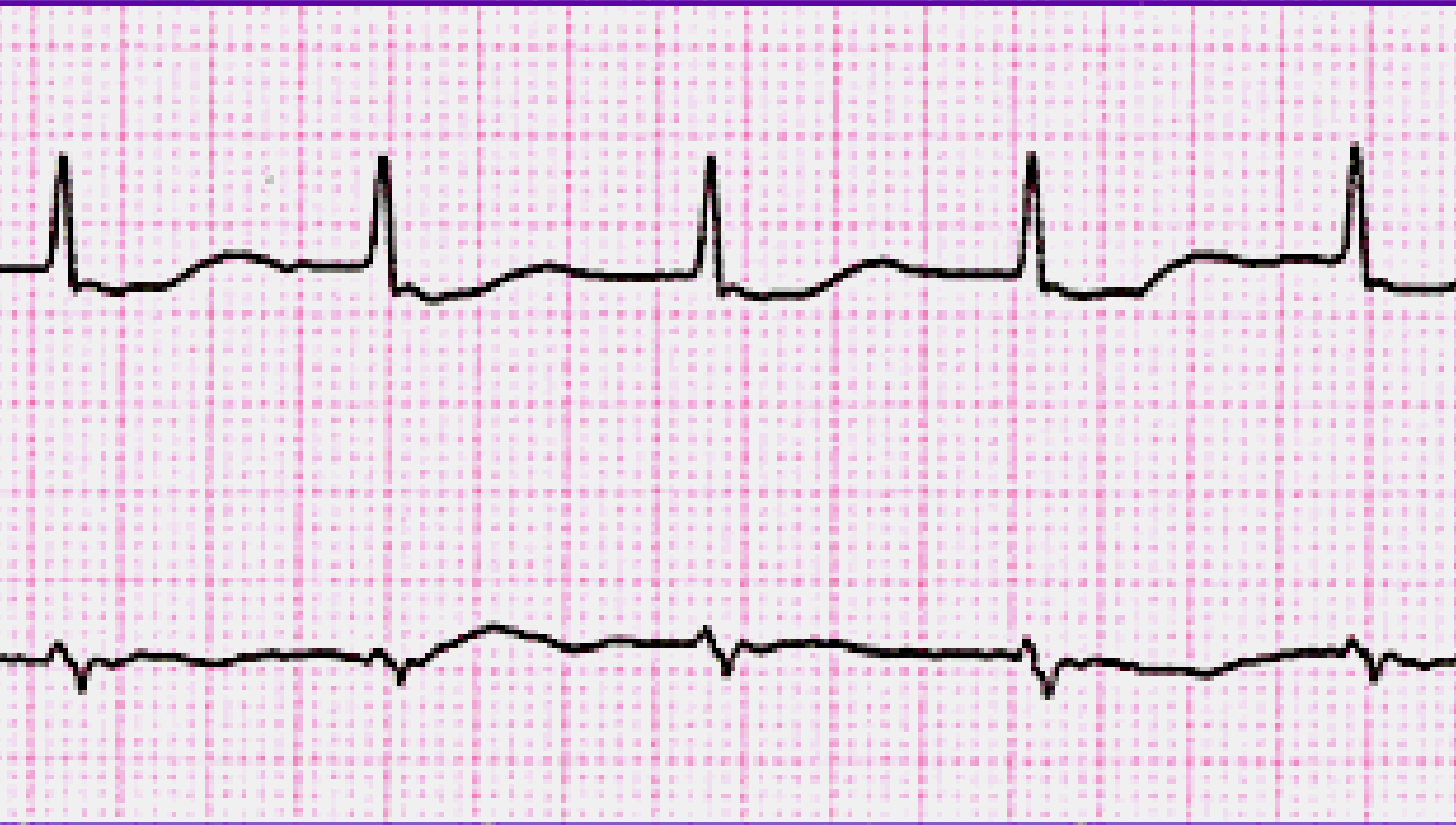


Accelerated Junctional Rhythm



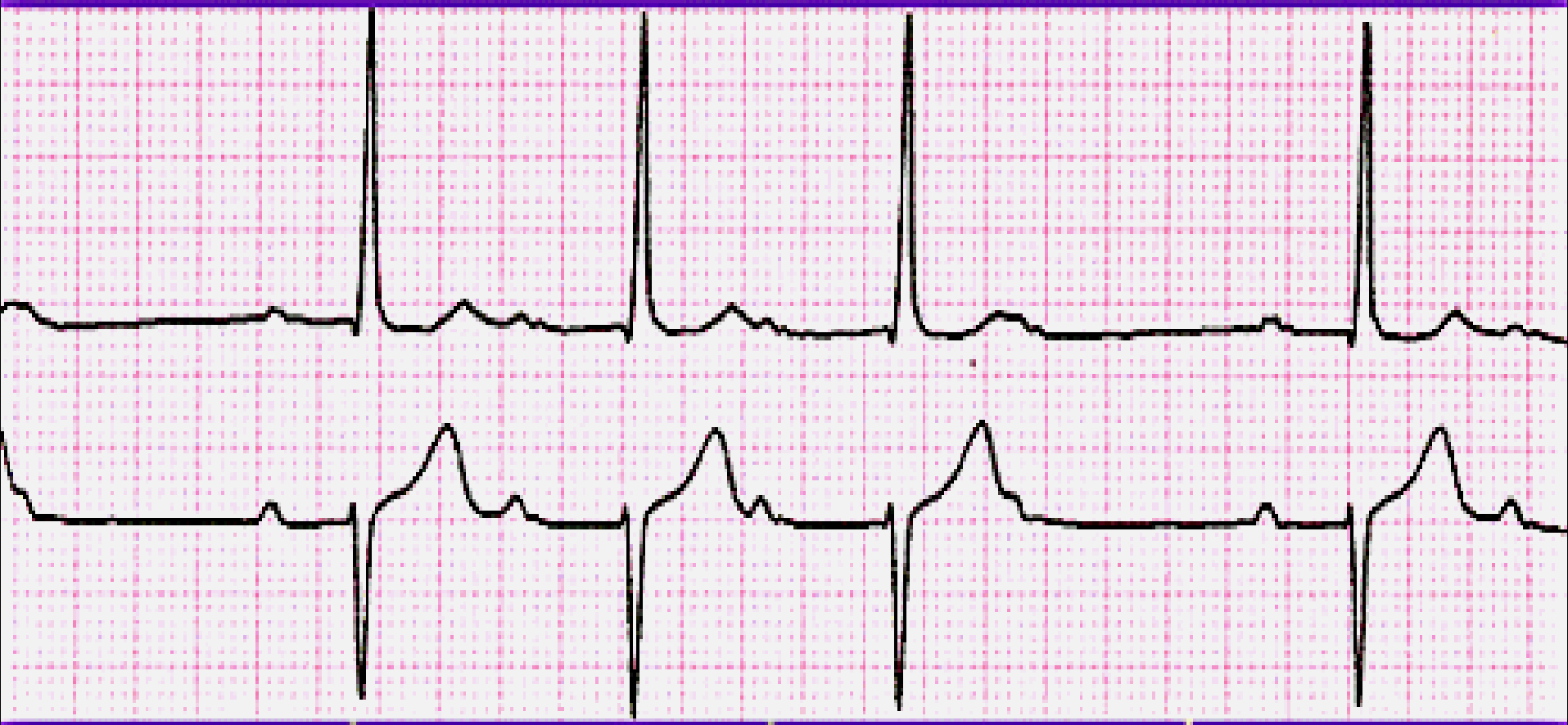
Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
60-100 bpm	Regular	Inverted, absent or after QRS	<.12	<.12

Accelerated Junctional Rhythm



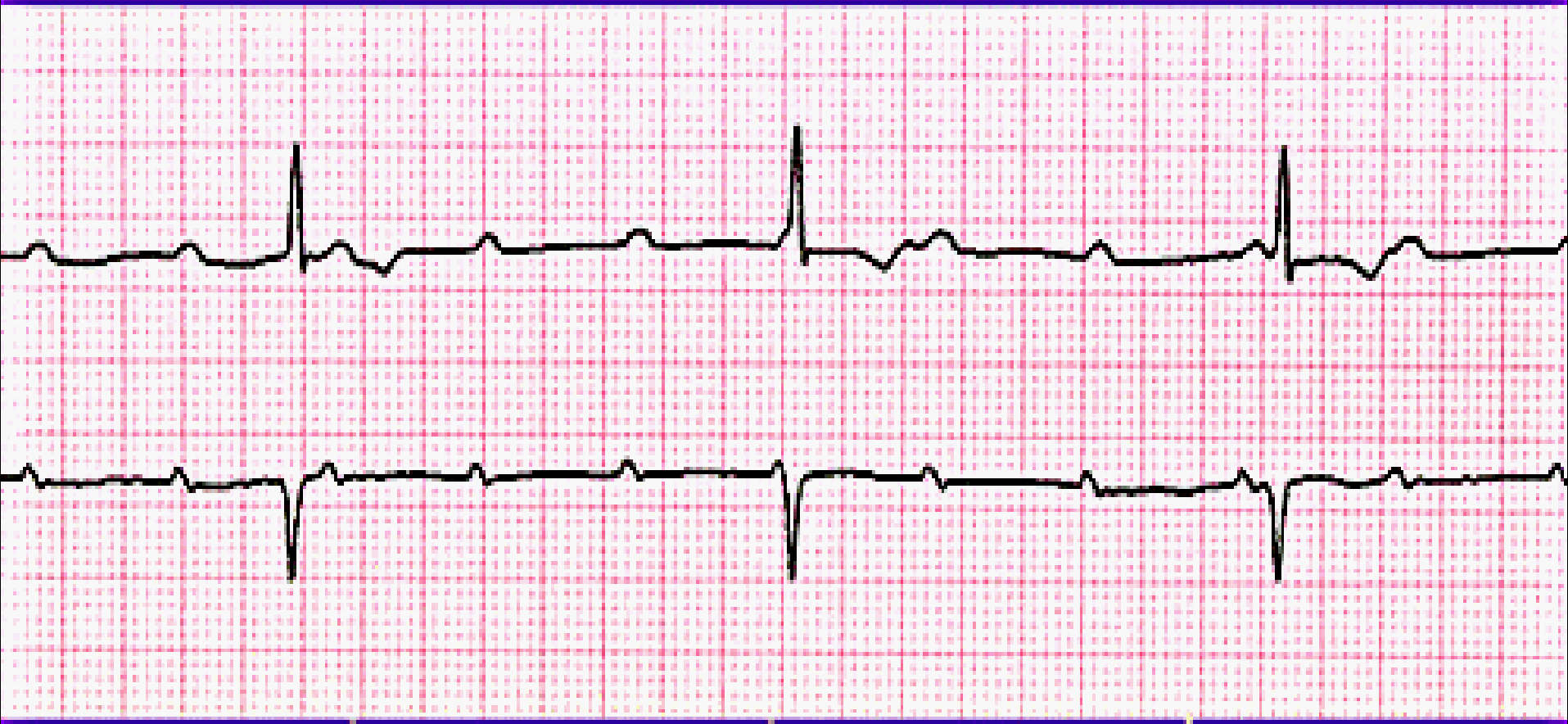
Rhythm	P Wave	PR interval (in seconds)

Second Degree AV Block • Mobitz 1 (Wenckebach)



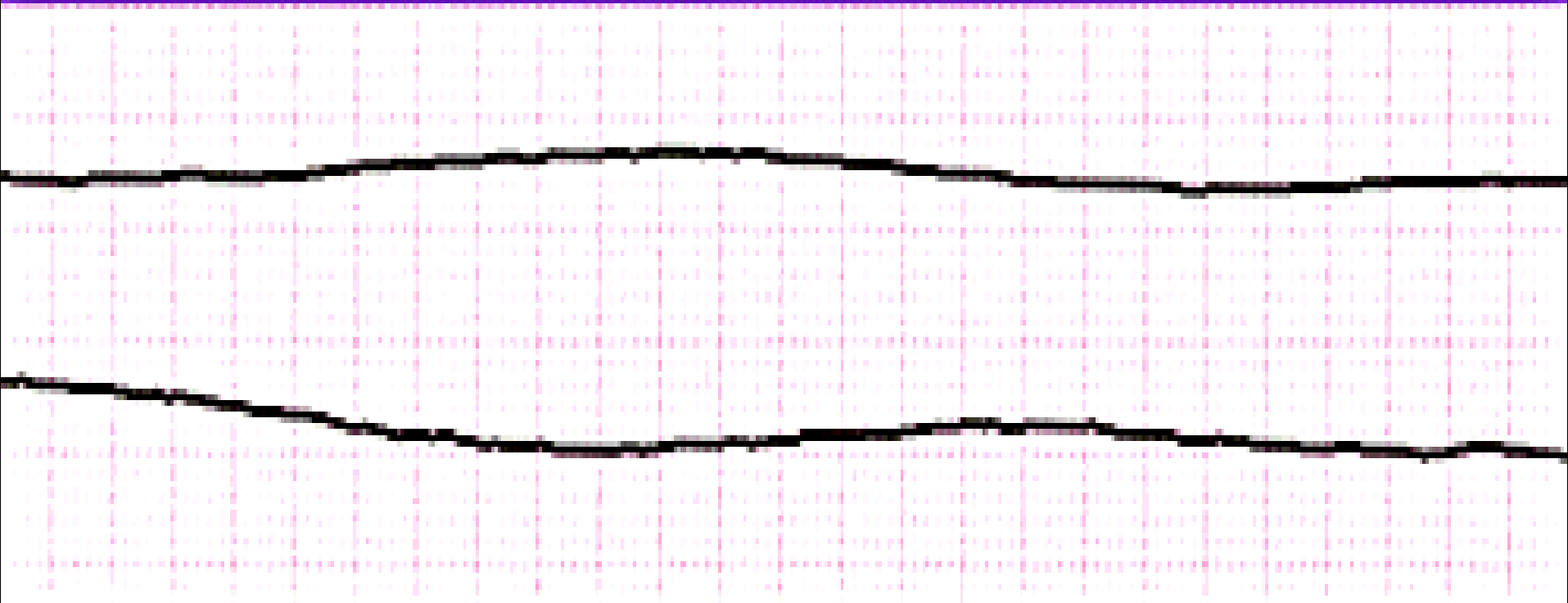
P Wave	PR Interval (in seconds)	QRS (in seconds)	Characteristics
Conduction intermittant	Increasingly Prolonged	<.12	QRS dropped in a repeating pattern

Third Degree (complete) AV Block



P Wave	PR Interval (in seconds)	QRS (in seconds)	Characteristics
Normal but not related to QRS	None	N/A	No relationship between P&RS

Ventricular Asystole (standstill)



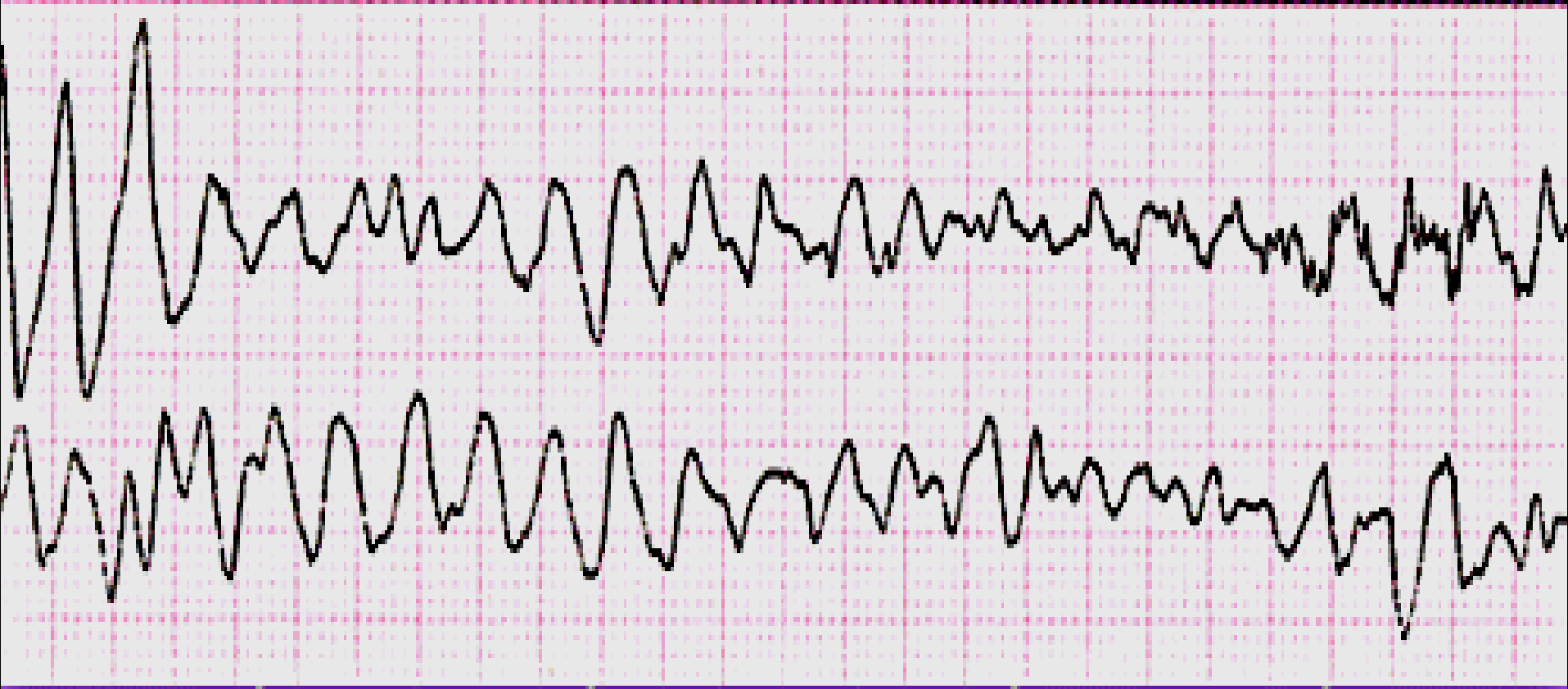
Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
Absent	Absent	Absent or present	N/A	Absent

Unifocal PVC's: identical shapes
Note: A single PVC is labeled isolated

Coupled PVC's: occur in pairs

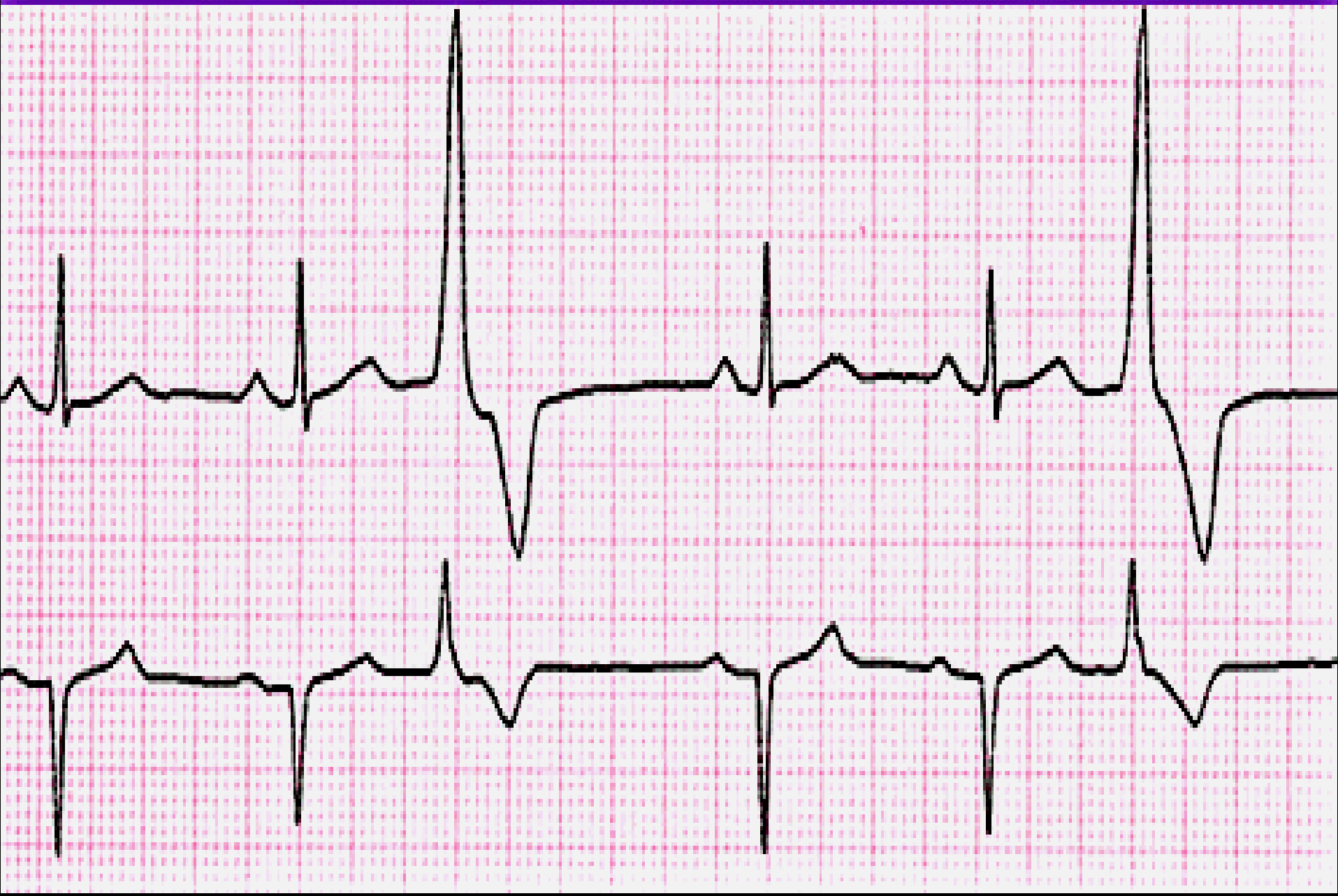
Bigeminal PVC's: every other beat is a PVC.

Ventricular Fibrillation

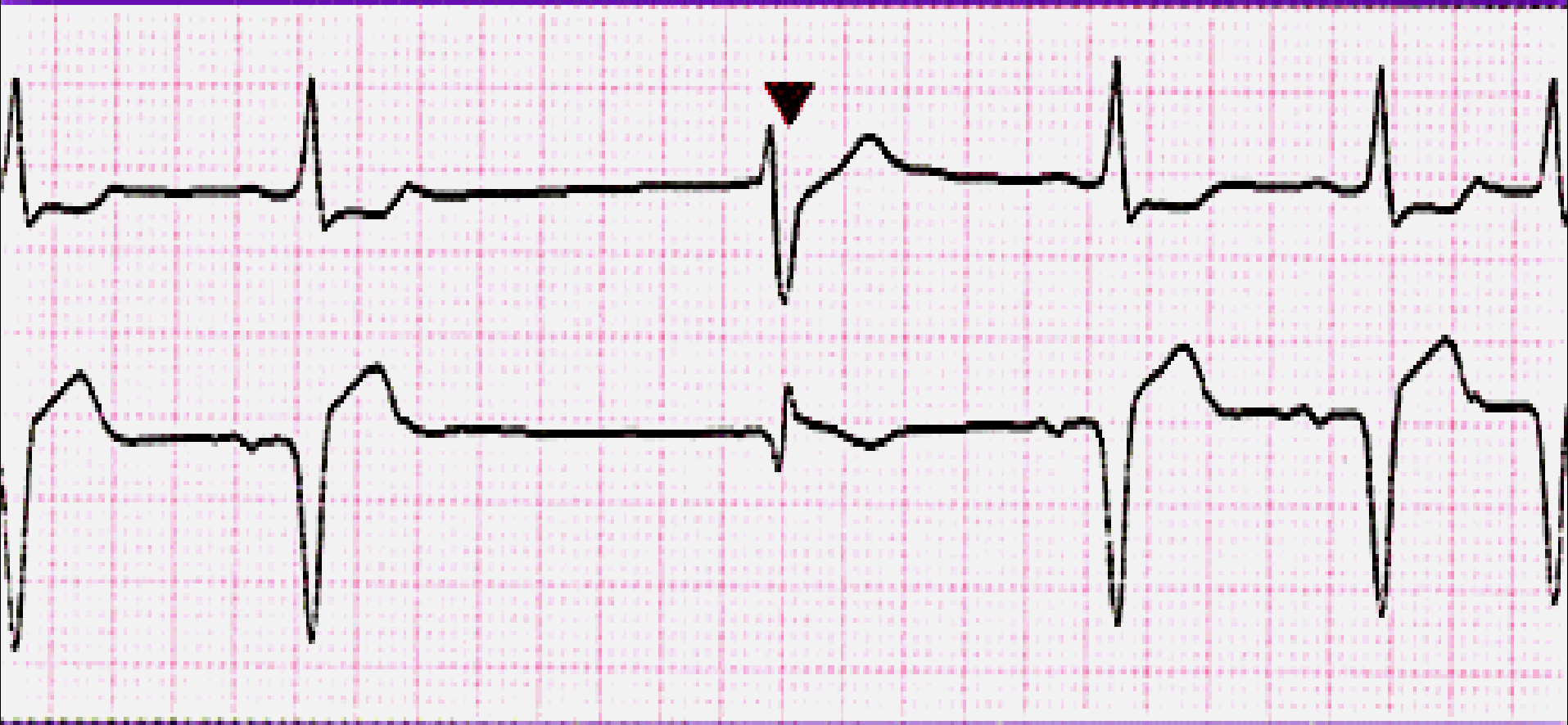


Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
300-600	Extremely irregular	Absent	N/A	Fibrillatory baseline

Trigeminal PVC's: every third beat is a PVC



Ventricular Escape Beat

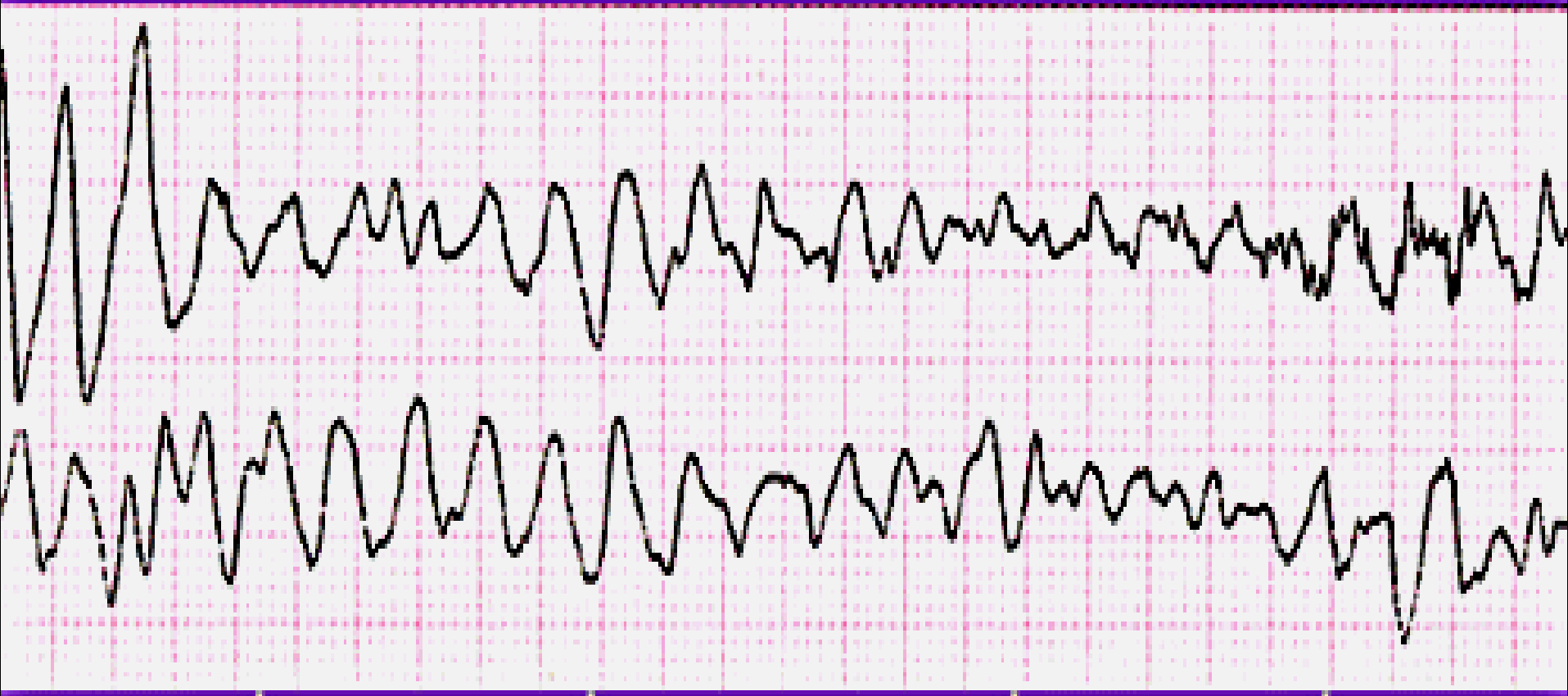


Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
N/A	occurs later than expected	Absent	N/A	≥ .12

Idioventricular Rhythms

Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
20-40	Regular	Absent or not related	N/A	≥ .12

Ventricular Fibrillation



Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
300-600	Extremely irregular	Absent	N/A	Fibrillatory baseline