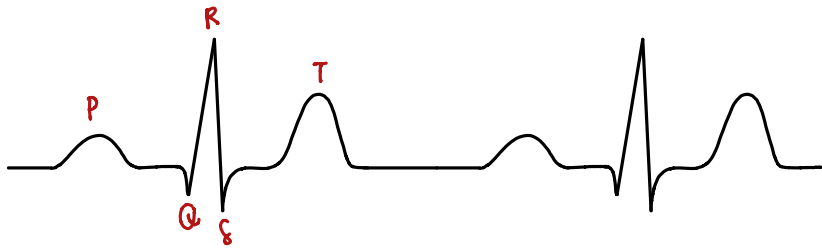


EKG

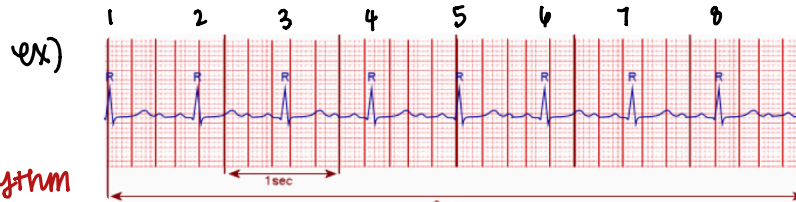
NORMAL SINUS RHYTHM



- P wave:** atrial depolarization
↳ $\leq .11$ sec
- P-R interval:** AV conduction time
↳ $.12 - .20$ sec (3-5 boxes)
- QRS complex:** ventricular depolarization, atrial repolarization
↳ $\leq .10$ sec (< 2.5 boxes)
- T wave:** ventricular repolarization

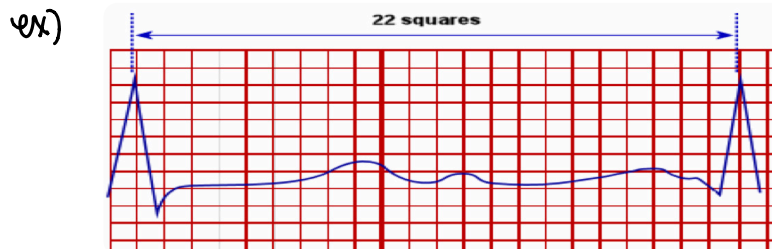
WAYS TO COUNT HEART RATE

- Count from R \rightarrow R in a 6 sec strip & multiply by 10
* must have regular rhythm



8 R waves $\times 10 =$
80 bpm

- Count # of small squares between 2 R waves & divide 1500 by that #



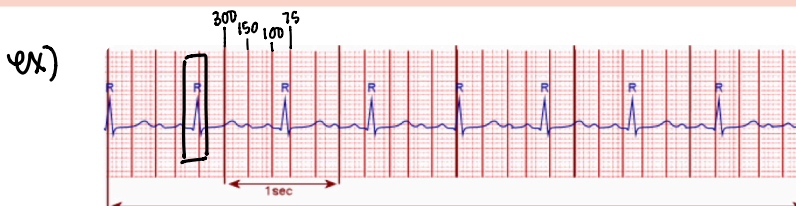
1500 / 22 squares =
68 bpm

- Count # of large squares between 2 R waves & divide 300 by that #
* this is an approximation



300 / 4 squares =
75 bpm

- Quick count Method:** find an R wave that occurs on a dark line & then count down 300, 150, 100, 75, 50, 25
* must have regular rhythm

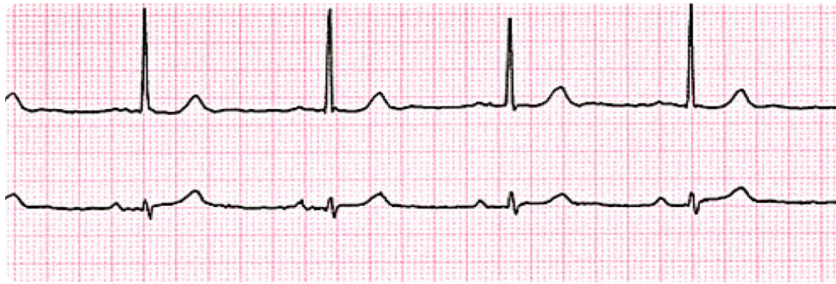


R wave in between 100 & 75, with 5 boxes in between
 $100 - 75 = 25$
 $25 / 5 \text{ boxes} = 5 \text{ per box}$
R wave is 1 box before 75
 $75 + 1(5) =$
80 bpm

RHYTHM INTERPRETATION



SINUS BRADYCARDIA



Heart Rate: < 40 bpm

Rhythm: Regular

P wave: Before each QRS, identical

PR interval: $.12 - .20$ sec

QRS: $< .12$ sec

Clinical implications:

- ↳ caused by lack of sympathetic input, medication, or physical training

SINUS TACHYCARDIA



Heart Rate: > 100 bpm

Rhythm: Regular

P wave: Before each QRS, identical

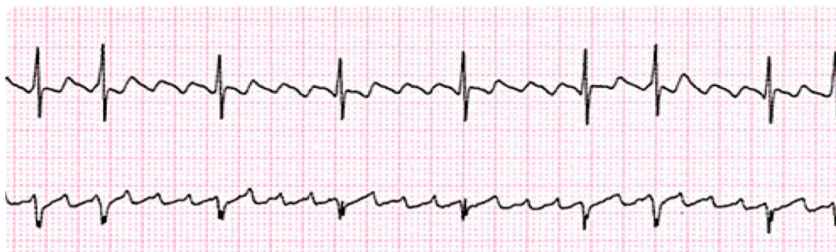
PR interval: $.12 - .20$ sec

QRS: $< .12$

Clinical Implications:

- ↳ caused by \uparrow demand for cardiac output

ATRIAL FLUTTER



* sawtoothed P wave is the classic sign of atrial flutter

Heart Rate: A [$220 - 430$ bpm], V [< 300 bpm]

Rhythm: Regular or variable

P wave: Sawtoothed appearance

PR interval: N/A

QRS: $< .12$

Clinical Implications:

- ↳ causes: age, cardiac conditions, digoxin toxicity, renal failure
- ↳ serious rhythm, although stable
- ↳ potential for developing emboli
- ↳ anticoagulant therapy

ATRIAL FIBRILLATION



* R waves are consistently inconsistent (multiple ectopic foci firing)

Heart Rate: A [$350 - 650$ bpm], V [slow \rightarrow rapid]

Rhythm: Irregular

P wave: Fibrillatory (fine to coarse)

PR interval: N/A

QRS: $< .12$

Clinical Implications: same as atrial flutter

VENTRICULAR TACHYCARDIA



* stimulation is NOT from the SA node, so no P wave

Heart Rate: < 100 bpm

Rhythm: Regular

P wave: Absent or not related

PR interval: N/A

QRS: $\geq .12$

Clinical Implications:

- ↳ causes: ischemia, acute MI, CAD, hypertensive heart disease, medicine toxicity
- ↳ symptoms: lightheadedness & syncope, weak & thready pulse
- ↳ emergency situation: \downarrow CO & BP
- ↳ may progress to V-fib & death
- ↳ Tx: meds, cardioversion, defibrillation

VENTRICULAR FIBRILLATION



Heart Rate: 300 - 400 bpm

Rhythm: extremely irregular

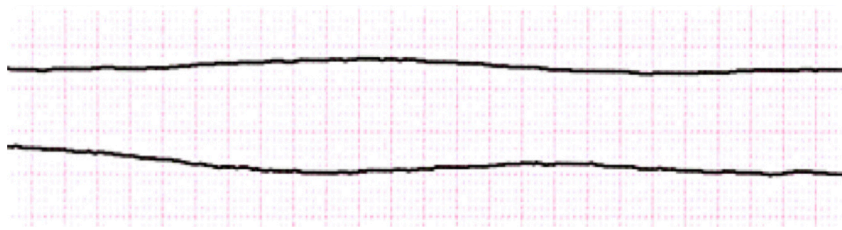
P wave: absent

PR interval: N/A

QRS: fibrillatory baseline

Clinical Implications:

ASYSTOLE



Heart Rate: Absent

Rhythm: Absent

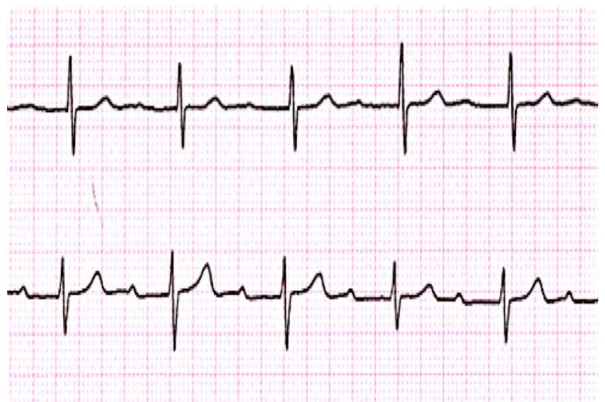
P wave: Absent or present

PR interval: N/A

QRS: Absent

Clinical Implications:

1ST DEGREE AV BLOCK



Heart Rate: 60 - 100 bpm

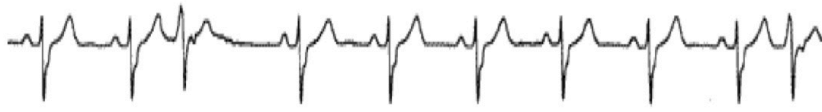
Rhythm: Regular

P wave: Before QRS, identical

PR interval: $> .20$

QRS: $> .12$

PREMATURE ATRIAL CONTRACTIONS



Heart Rate: irregular

Rhythm: regular

P wave: present but looks abnormal

↳ may be buried in preceding T wave

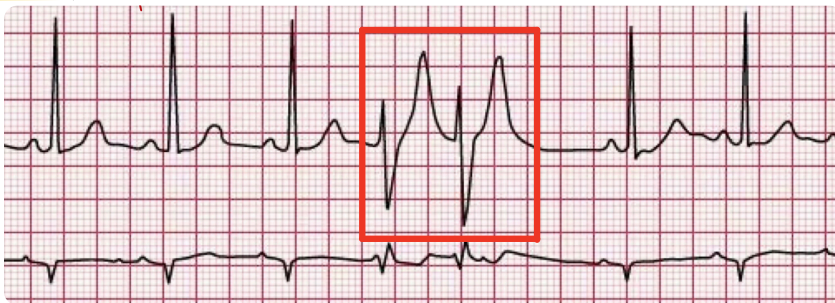
Clinical Implications:

↳ causes: emotional stresses & infection, caffeine, nicotine, alcohol, hypoxemia, myocardial ischemia, rheumatic heart disease, atrial damage

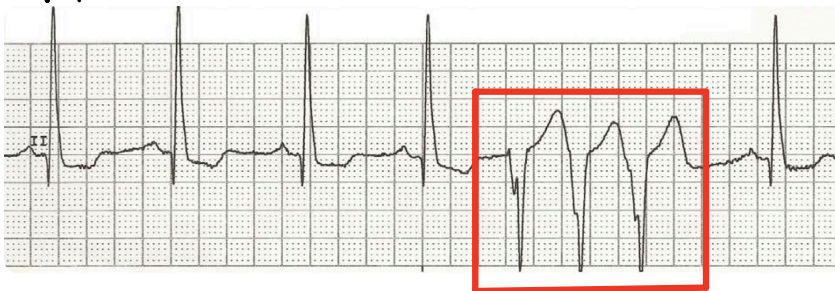
PREMATURE VENTRICULAR CONTRACTIONS

* Impulse in myocardium of one of the ventricles

PVC: Couplet



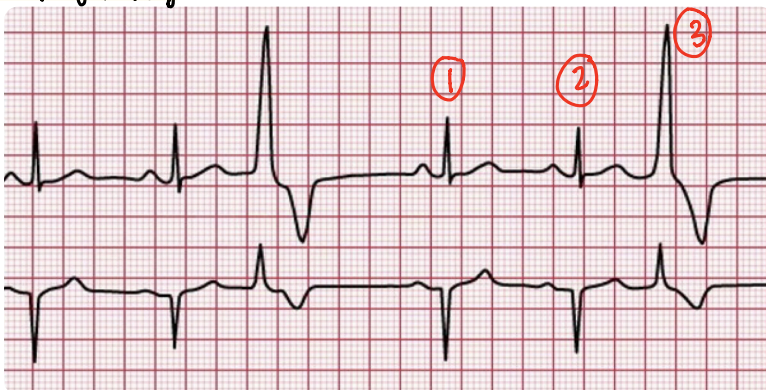
PVC: Triplet



PVC: Bigeminy * abnormal wave - every other one



PVC: Trigeminy * abnormal wave - every 3rd wave



Heart Rate:

Rhythm:

P wave: absent

PR interval:

QRS: wide & bizarre

Clinical Implications:

↳ skipped beat can be palpated when checking pulse

↳ causes: caffeine/nicotine, stress/overexertion, electrolyte imbalance/acid-base imbalance, cardiac diseases, irritation of myocardium, pharmacological toxicity, ischemia

↳ most common ventricular conduction abnormality

↳ benign/dangerous

↳ concerning if ventricular ectopy increases w/ activity

• ↑ activity = ↑ irritability

↳ 3 or more PVCs in a row = ventricular tachycardia