

ECG Cookbook

Question	Answer	Diagnosis
1. Rhythm	Criteria for sinus rhythm: <ol style="list-style-type: none"> Are the P waves positive in I and II? Is there a QRS complex after each P wave? Are the PR intervals constant? Are the RR intervals constant? 	sinus rhythm or no sinus rhythm?
2. Heart rate	Estimate heart rate: 300/number of large boxes between two QRS complexes	heart rate in beats per min
3. P waves	a) Large P-wave amplitude (>2.5 mm in II, III, or aVF)	right atrial enlargement
	b) Prolonged negative part of P wave in V1 (1 mm) and P wave with 2 peaks in II, P-wave duration >0.12 s	left atrial enlargement
4. PR interval	a) >0.2 s (if PR interval constant for all beats and each P wave is followed by a QRS complex)	I° AV block
	b) <0.12 s and QRS complex normal	LGL syndrome
	c) <0.12 s and visible delta wave	WPW syndrome
5. QRS axis	Determine the axis according to leads I, II, and aVF	normal axis left axis deviation right axis deviation northwest axis
6. QRS duration	a) ≥0.12 s (always think of WPW syndrome as a differential)	complete bundle branch block
	b) >0.1 s and <0.12 s with typical bundle branch block appearance (notching)	incomplete bundle branch block
7. Rotation	Rotation is defined according to the heart's transition zone. Normally the transition zone is located at V4, which means that right ventricular myocardium is located at V1-V3 and left ventricular myocardium is at V5-V6.	transition zone at V5-V6: clockwise rotation transition zone at V1-V3: counterclockwise rotation NOTE: don't evaluate rotation in the setting of myocardial infarction, WPW syndrome, or bundle branch block
8. QRS amplitude	a) QRS amplitude <0.5 mV in all standard leads	low voltage
	b) Positive criteria for left ventricular hypertrophy	left ventricular hypertrophy
	c) Positive criteria for right ventricular hypertrophy	right ventricular hypertrophy
9. QRS infarction signs	abnormal Q waves, QS waves, missing R-wave progression	myocardial infarction; localization according to affected leads

10. ST-T segment							
	tall T wave	ST depression	ST depression	ST elevation		negative T	
QRS normal	→					hyperkalemia, vagotonia	
QRS normal	→					probably ischemia (DD: digitalis)	
QRS normal	→					nonspecific repolarization abnormality	
QRS normal	→					acute ischemia, perimyocarditis, variant angina	
QRS normal	→					STEMI/ perimyocarditis in resolution	
QRS normal	→					STEMI subacute, NSTEMI, perimyocarditis	
QRS with Q wave	→					STEMI acute, STEMI in resolution, STEMI subacute	
QRS: left ventricular hypertrophy	→					left ventricular hypertrophy with abnormal repolarization	
QRS: right ventricular hypertrophy, bundle branch block, or WPW syndrome	→					In these situations an ST-segment deviation is almost always present and cannot be interpreted in and of itself. It has to be left out in the ECG report	
11. QT duration, T-U waves	a) QT shortening					hypercalcemia	
	b) QT prolongation					hypocalcemia	
	c) tall and peaked T wave					hyperkalemia	
	d) U wave, ST depression, T-wave flattening, or a combination of these					hypokalemia	