

# The Six Second ECG



## ECG Quiz 1B

Version 1.2

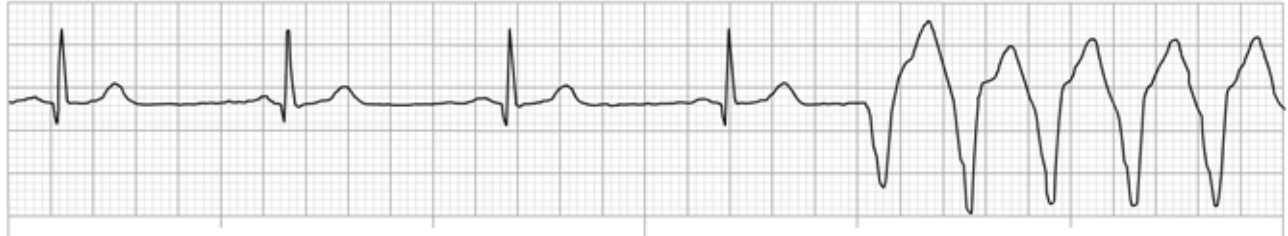
## Annotated Answer Key

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## The Six Second ECG Quiz 1B (version 1.2)

This annotated answer key is provided for ECG instructors and students as a reference for the Six Second ECG Quiz 1B (version 1.2). Answers and a brief explanation are provided.

### Question 1



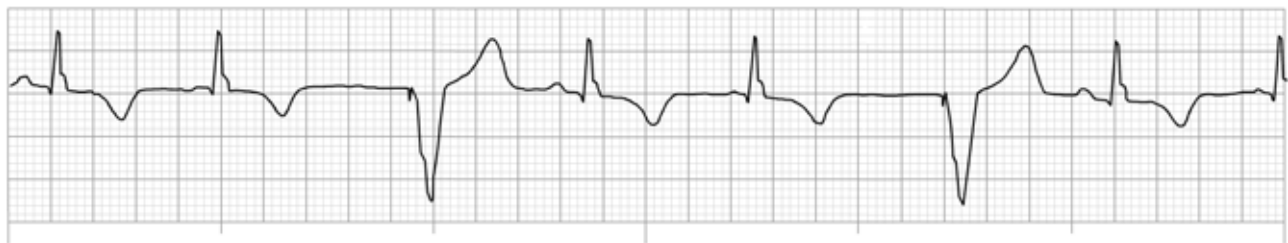
This ECG rhythm is called:

- a) **Sinus bradycardia changing to ventricular tachycardia**
- b) Junctional rhythm with a run of ventricular tachycardia
- c) Sinus rhythm terminating in ventricular fibrillation
- d) Sinus bradycardia changing to junctional tachycardia

**Answer:** a) Sinus bradycardia changing to ventricular tachycardia

**Explanation:** The ECG rhythm strip begins with a sinus bradycardia: a series of narrow QRS complexes, upright P waves and a rate of about 56/minute. A wide and premature QRS (premature ventricular complex) begins a rapid, regular series of wide QRS complexes that are most likely ventricular tachycardia. The deep Q waves might indicate a previous myocardial infarction.

### Question 2



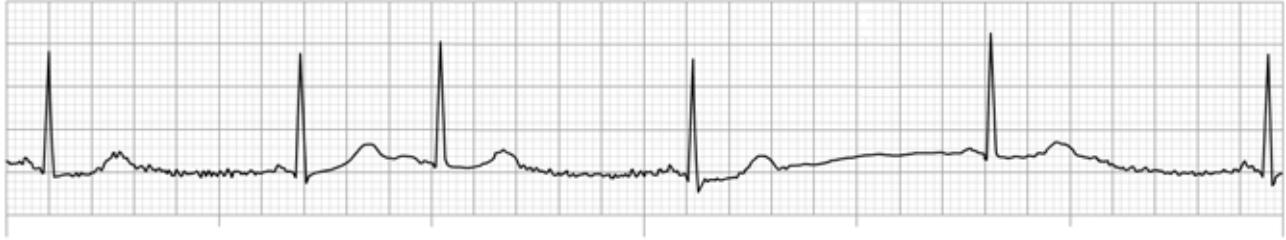
This ECG rhythm is called:

- a) Sinus rhythm with multifocal premature ventricular complexes (PVCs)
- b) Sinus bradycardia with ventricular paced beats
- c) **Sinus rhythm with paced ventricular beats**
- d) Junctional rhythm with unifocal PVCs

**Answer:** c) Sinus rhythm with ventricular paced beats

**Explanation:** The underlying rhythm is a sinus rhythm: narrow QRS, upright P waves and a rate of about 75/minute. The two wide QRS complexes are preceded by the small spike which strongly suggests that these are initiated by an electronic ventricular pacemaker. Note also that the ventricular complexes are not early (premature) but rather arrive late with the electronic pacemaker probably set in demand mode with a rate of 60/minute.

### Question 3



This ECG rhythm is called:

- a) Junctional rhythm with a premature atrial complex (PAC)
- b) Sinus bradycardia with a premature atrial complex (PAC)**
- c) Sinus arrhythmia
- d) Sinus rhythm with a PVC

**Answer:** b) Sinus bradycardia with a premature atrial complex (PAC)

**Explanation:** The underlying rhythm is a sinus bradycardia with narrow QRS complexes, upright P waves and a rate of about 50/minute. A premature atrial complex (PAC) is the third QRS present (a narrow QRS complex arriving prematurely and accompanied by a biphasic P wave).

### Question 4



This ECG rhythm is called:

- a) Sinus tachycardia with a PVC
- b) Atrial fibrillation with rapid ventricular response
- c) Sinus tachycardia with a PAC**
- d) Sinus arrhythmia with a PAC

**Answer:** c) Sinus tachycardia with a premature atrial complex (PAC)

**Explanation:** The underlying rhythm is a sinus tachycardia with narrow QRS complexes, upright P waves and a rate of about 110/minute. A premature atrial complex (PAC) is the sixth QRS present (a narrow QRS complex arriving prematurely and accompanied by a biphasic or otherwise abnormally shaped P wave - an absent or an inverted P wave suggests a PJC).

Note that the T wave prior to the premature QRS complex is more elevated than the other T waves. This finding supports the possible presence of an upright P wave buried in the T wave. Since a PJC is accompanied by absent or inverted P waves (which when buried in a T wave would not change the T wave, decrease the size of the T wave or produce an inverted notch in the T wave), this premature supraventricular complex is most likely a PAC.

**Question 5**

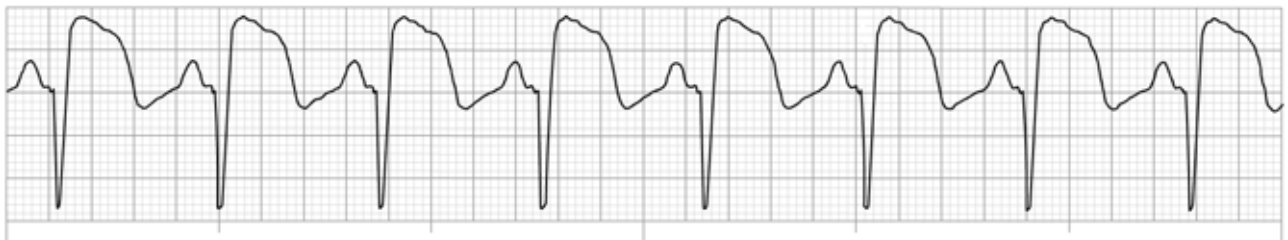
This ECG rhythm is called:

- a) Sinus arrhythmia
- b) Junctional tachycardia
- c) Ventricular tachycardia
- d) Sinus tachycardia**

**Answer:** d) Sinus tachycardia

**Explanation:** With a rate of about 104/minute and a narrow QRS complex, this is a tachycardia of supraventricular origin. The upright P waves with a heart rate less than 150/minute strongly point to the sino-atrial node as the site of impulse generation. The best answer is that this rhythm is a sinus tachycardia.

Note: The heart rate was determined by the rule of 300s rather than the six second count (which would provide a rate of 100/minute). The last R-R interval is perhaps the most telling with the R-R interval being less than 3 large squares. Thus, the heart rate is marginally faster than 100/minute. Also note the ST elevation present with this rhythm. Of worthy mention is the tall and peaked T waves (a possible sign of early cardiac ischemia or hyperkalemia).

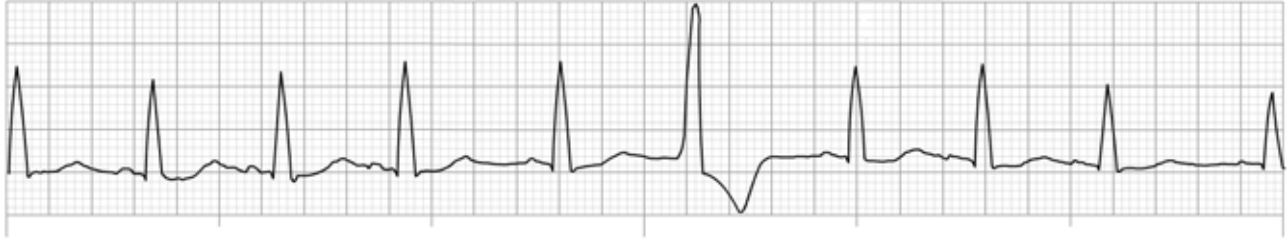
**Question 6**

This ECG rhythm is called:

- a) Accelerated idioventricular rhythm
- b) Sinus tachycardia
- c) Sinus arrhythmia with ST elevation (ST segment elevation)
- d) Sinus rhythm with ST elevation**

**Answer:** d) Sinus rhythm with ST elevation

**Explanation:** With narrow QRS complexes, upright P waves and a rate of about 80/minute, this is a sinus rhythm. Marked ST elevation of 9 mm produces the ominous tombstone configuration seen with this rhythm.

**Question 7**

This ECG rhythm is called:

- a) Junctional tachycardia with a PVC
- b) Sinus arrhythmia with a PVC**
- c) Sinus tachycardia with a PJC
- d) Atrial fibrillation with a PVC

**Answer:** b) Sinus arrhythmia with a PVC

**Explanation:** With narrow QRS complexes, upright P waves and an *irregular* rate of about 90-100/minute, the underlying ECG rhythm is a sinus arrhythmia. The premature wide QRS complex with an inverted T wave is a PVC.

**Question 8**

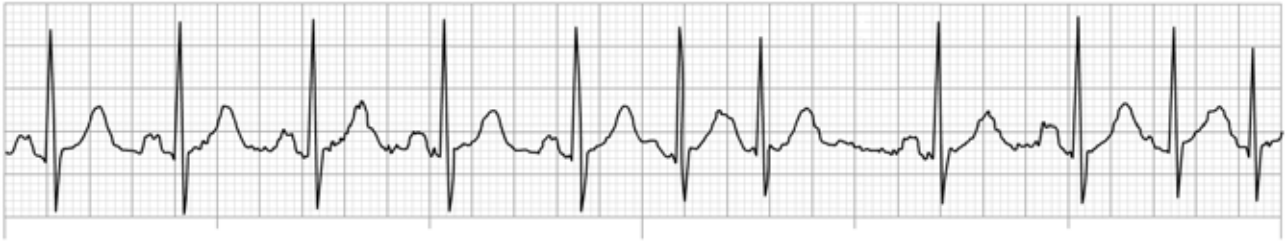
This ECG rhythm is called:

- a) Sinus arrhythmia**
- b) Wandering pacemaker
- c) Sinus bradycardia
- d) Atrial fibrillation

**Answer:** a) Sinus arrhythmia

**Explanation:** This ECG rhythm has a rate of close to 80/minute, a narrow QRS complex and upright P waves. The rhythm's pattern, though, is irregular. This is a sinus arrhythmia. Look specifically to how the R-R interval widens in the center of the rhythm strip and tightens up near the ends.

Note: ST elevation of 1 mm could be argued as well for this ECG rhythm.

**Question 9**

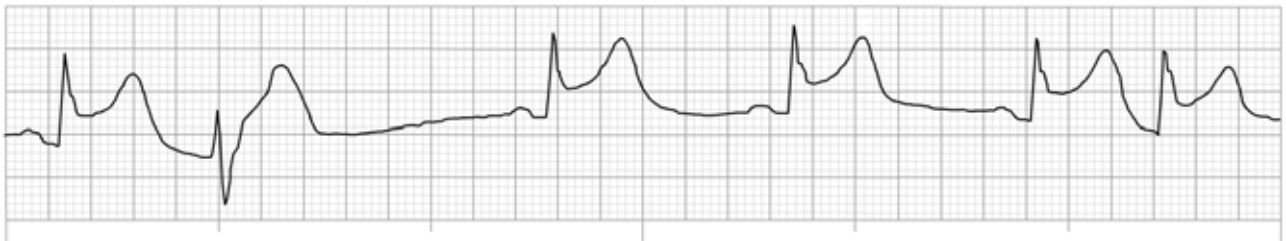
This ECG rhythm is called:

- a) Sinus arrhythmia
- b) Atrial fibrillation with ectopic atrial beats
- c) Sinus tachycardia with ventricular couplets
- d) Sinus rhythm with ectopic atrial beats**

**Answer:** d) Sinus rhythm with ectopic atrial beats

**Explanation:** The underlying sinus rhythm has a rate of close to 80/minute, a narrow QRS complex and upright P waves. The sinus rhythm is interrupted by ectopic atrial couplets with narrow QRS complexes. The atrial couplets have similar R-R intervals that, if sustained, would produce a rate of 166/minute.

Note: Artifact is present throughout the ECG. The presence of this degree of atrial ectopy may signify a tendency toward atrial fibrillation.

**Question 10**

This ECG rhythm is called:

- a) Junctional rhythm with ST elevation and a PVC and a PAC
- b) Sinus rhythm with ST elevation with a PVC and a PJC
- c) Sinus bradycardia with ST elevation with a PVC and a PJC**
- d) Sinus arrhythmia with ST elevation and a PVC

**Answer:** c) Sinus bradycardia with ST elevation with a PVC and a PJC

**Explanation:** The slow underlying sinus bradycardia has a rate of close to 54/minute, a narrow QRS complex, ST elevation and upright P waves. This bradycardia is interrupted first by a premature wide QRS (PVC) and later by a premature narrow QRS without any signs of a preceding upright P wave (probably a PJC).

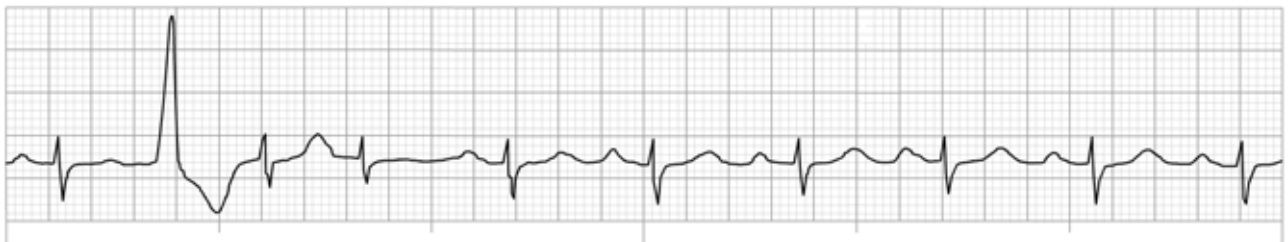
**Question 11**

This ECG rhythm is called:

- a) Atrial fibrillation with unifocal PVCs
- b) Sinus tachycardia with unifocal PVCs and one junctional escape beat**
- c) Sinus rhythm with PACs
- d) Junctional tachycardia with multifocal PVCs

**Answer:** b) Sinus tachycardia with unifocal PVCs and one junctional escape beat

**Explanation:** The underlying sinus tachycardia has a rate of close to 106/minute, a narrow QRS complex, and upright P waves (albeit with a prolonged PR interval making it a first degree AV block). This tachycardia is repeatedly interrupted by a premature and marginally wide QRS of 0.13-0.14 seconds. This is likely a series of PVCs or possibly PACs / PJs with aberrant ventricular conduction. The second last QRS complex arrives later than expected without a preceding P wave, making this a junctional escape beat (if it was premature, it would be a PJC).

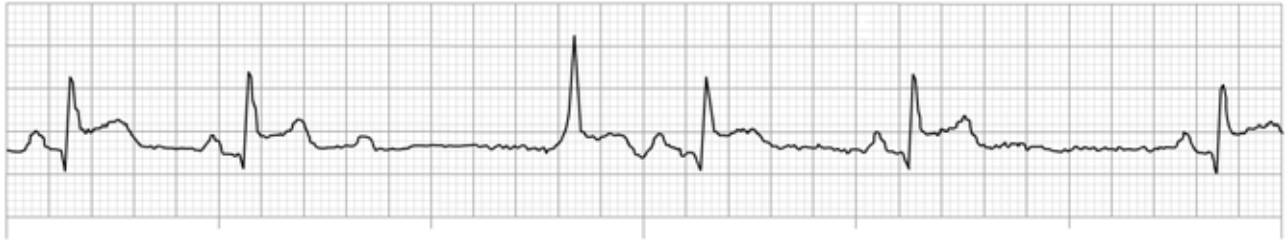
**Question 12**

This ECG rhythm is called:

- a) Wandering pacemaker with a PVC
- b) Sinus rhythm with a PVC and a PAC**
- c) Sinus tachycardia with a PVC
- d) Sinus arrhythmia with a PVC

**Answer:** b) Sinus rhythm with a PVC and a PAC

**Explanation:** The underlying sinus rhythm has a rate of close to 94/minute, a narrow QRS complex, and upright P waves (albeit with a prolonged PR interval making it a first degree AV block). The sinus rhythm is interrupted early by a premature wide QRS (PVC). The fourth QRS complex is narrow and premature. The preceding T wave has an upright notch suggesting a P wave with an upright component. The only reasonable option is that this is a PAC.

**Question 13**

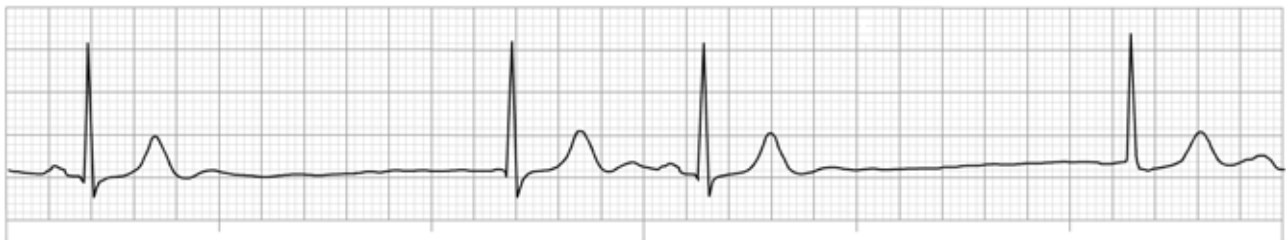
This ECG rhythm is called:

- a) **Sinus arrhythmia with a non-conducted PAC and a ventricular escape beat**
- b) Sinus bradycardia with a non-conducted PAC and a PVC
- c) Wandering pacemaker with a non-conducted PAC and a PVC
- d) Sinus rhythm with a non-conducted PAC and a PVC

**Answer:** a) Sinus arrhythmia with a non-conducted PAC and a ventricular escape beat

**Explanation:** This is a messy rhythm requiring careful examination. The underlying irregular rhythm has a rate of close to 70/minute, a narrow QRS complex with ST elevation and upright P waves. This is a sinus arrhythmia. The third QRS complex is wide and late, most likely a ventricular escape beat.

Note also the possible lonely P wave after the second QRS complex. While this may be a sign of second degree AV block type II, the lonely P wave does arrive early making this a possible sign of a non-conducted PAC.

**Question 14**

This ECG rhythm is called:

- a) Junctional rhythm with PACs
- b) Sinus rhythm with PJs
- c) **Sinus bradycardia with junctional escape beats**
- d) Accelerated junctional rhythm with PACs

**Answer:** c) Sinus arrhythmia bradycardia with junctional escape beats

**Explanation:** The underlying sinus bradycardia has a narrow QRS complex and upright P waves. The profoundly slow rate is somewhat rescued by late escape beats that also have narrow QRS complexes. Because the escape beats lack P waves, they originate from the AV junction.



### Question 15



This ECG rhythm is called:

- a) **Sinus arrhythmia with aberrant intraventricular conduction**
- b) Sinus rhythm with aberrant intraventricular conduction and PACs
- c) Accelerated junctional rhythm with aberrant intraventricular conduction
- d) Accelerated idioventricular rhythm with aberrant intraventricular conduction

**Answer:** a) Sinus arrhythmia with aberrant intraventricular conduction

**Explanation:** This rhythm has a rate of close to 90/minute, a wide QRS complex and upright P waves are present before each QRS complex. While this is a sinus rhythm, its irregular pattern makes it a sinus arrhythmia.

Note: A wide QRS most often results from impulses originating in the ventricles (ventricular rhythm). In this case, though, the presence of P waves before each QRS complex strongly suggests supraventricular control (supraventricular rhythm) with aberrant intraventricular conduction.