

***EKG Plain and Simple, 4e (Ellis)***  
**Chapter 2 Electrophysiology**

2.1 Multiple Choice Questions

1) What electrical event must occur for atrial contraction to occur?

- A) Atrial depolarization
- B) Ventricular depolarization
- C) Atrial repolarization
- D) Ventricular repolarization

Answer: A

LO: 2.1: Define the terms polarized, depolarization, and repolarization and relate them to contraction and relaxation.

2) The cardiac cell at rest has what kind of electrical charge?

- A) Positive charge
- B) Negative charge
- C) Neutral charge
- D) No charge at all

Answer: B

LO: 2.1: Define the terms polarized, depolarization, and repolarization and relate them to contraction and relaxation.

3) The term *repolarization* refers to the

- A) heart's mechanical activity.
- B) brain's electrical activity.
- C) heart's electrical activity.
- D) heart's electrical and mechanical activity.

Answer: C

LO: 2.1: Define the terms polarized, depolarization, and repolarization and relate them to contraction and relaxation.

4) Depolarization is a(n)

- A) electrical event that should result in muscle relaxation.
- B) mechanical event that should result in depolarization.
- C) electrical event that should result in muscle contraction.
- D) mechanical event that should result in repolarization.

Answer: C

LO: 2.1: Define the terms polarized, depolarization, and repolarization and relate them to contraction and relaxation.

5) Which of the following is NOT true?

- A) Cardiac cells can contract without having been depolarized.
- B) Cardiac cells must be depolarized before they can contract.
- C) Cardiac contraction occurs as a result of phase 0 of the action potential.
- D) Cardiac contraction requires the presence of calcium ions.

Answer: A

LO: 2.1: Define the terms polarized, depolarization, and repolarization and relate them to contraction and relaxation.

6) Which of the following ions has a direct effect on ventricular muscle contraction?

- A) Sodium
- B) Potassium
- C) Magnesium
- D) Calcium

Answer: D

LO: 2.1: Define the terms polarized, depolarization, and repolarization and relate them to contraction and relaxation.

7) In the action potential, phase 0 is

- A) depolarization.
- B) plateau.
- C) rapid repolarization.
- D) rest.

Answer: A

LO: 2.2: Describe and label the phases of the action potential.

8) In the action potential, phase 3 is

- A) depolarization.
- B) rapid repolarization.
- C) plateau.
- D) rest.

Answer: B

LO: 2.2: Describe and label the phases of the action potential.

9) Phase 0 of the action potential corresponds with what wave or complex on the EKG?

- A) T wave
- B) QRS complex
- C) U wave
- D) ST segment

Answer: B

LO: 2.2: Describe and label the phases of the action potential. 2.4: Draw and explain the P wave, QRS complex, T wave, and U wave.

10) +20 mV is the

- A) resting transmembrane potential.
- B) transmembrane potential at the conclusion of phase 3 of the action potential.
- C) transmembrane potential at the conclusion of phase 0 of the action potential.
- D) transmembrane potential at the beginning of cardiac rest.

Answer: C

LO: 2.2: Describe and label the phases of the action potential. 2.3: Define transmembrane potential.

11) Which of the following correctly describes the relative refractory period?

- A) It is the period in which even a weak impulse can cause another depolarization.
- B) It is the period in which only a strong impulse can cause another depolarization.
- C) It is the period in which no impulses at all can cause another depolarization.
- D) It is the period in which the heart function stops temporarily to allow impulse transmission to occur.

Answer: B

LO: 2.6: Define the absolute and relative refractory periods and the implications of each.

12) The relative refractory period extends from the

- A) beginning of the T wave to the beginning of the next QRS complex.
- B) beginning of the P wave to the beginning of the QRS complex.
- C) beginning of the QRS complex to the upstroke of the T wave.
- D) upstroke of the T wave to the end of the T wave.

Answer: D

LO: 2.6: Define the absolute and relative refractory periods and the implications of each.

13) The P wave represents

- A) atrial depolarization.
- B) atrial repolarization.
- C) ventricular depolarization.
- D) ventricular repolarization.

Answer: A

LO: 2.4: Draw and explain the P wave, QRS complex, T wave, and U wave.

14) The QRS complex represents

- A) atrial depolarization.
- B) atrial repolarization.
- C) ventricular depolarization.
- D) ventricular repolarization.

Answer: C

LO: 2.4: Draw and explain the P wave, QRS complex, T wave, and U wave.

- 15) The T wave represents  
A) atrial depolarization.  
B) atrial repolarization.  
C) ventricular depolarization.  
D) ventricular repolarization.

Answer: D

LO: 2.4: Draw and explain the P wave, QRS complex, T wave, and U wave.

- 16) The PR segment is located between the  
A) P wave and the QRS complex.  
B) QRS complex and the T wave.  
C) T wave and the next P wave.  
D) P wave and the T wave.

Answer: A

LO: 2.5: Explain where the PR and ST segments are located.

- 17) The ST segment is located between the  
A) P wave and the QRS complex.  
B) QRS complex and the T wave.  
C) T wave and the next P wave.  
D) P wave and the T wave.

Answer: B

LO: 2.5: Explain where the PR and ST segments are located.

- 18) The normal ST segment is  
A) at the isoelectric line.  
B) elevated above the isoelectric line.  
C) depressed below the isoelectric line.  
D) both above and below the isoelectric line.

Answer: A

LO: 2.5: Explain where the PR and ST segments are located.

- 19) The baseline on the EKG strip is considered to be the  
A) PT segment.  
B) PR segment.  
C) TP segment.  
D) QT segment.

Answer: C

LO: 2.5: Explain where the PR and ST segments are located.

- 20) The wave or complex that represents ventricular repolarization is the  
A) P wave.  
B) QRS complex.  
C) T wave.  
D) U wave.

Answer: C

LO: 2.4: Draw and explain the P wave, QRS complex, T wave, and U wave.

21) An upward deflection of the QRS complex is called a(n)

- A) P wave.
- B) Q wave.
- C) R wave.
- D) T wave.

Answer: C

LO: 2.4: Draw and explain the P wave, QRS complex, T wave, and U wave.

22) Which of these statements about the sinus node is FALSE?

- A) It is the normal pacemaker of the heart.
- B) It has the fastest inherent rate of all the possible pacemaker sites.
- C) It is the slowest pacemaker of the heart.
- D) It fires at an inherent rate of 60—100 beats per minute.

Answer: C

LO: 2.12: List the different pacemakers of the heart and their inherent rates.

23) The job of the cardiac conduction system's pacemaker is to

- A) propagate electrical impulses.
- B) conduct electrical impulses.
- C) cause depolarization of myocardial cells.
- D) all of the above.

Answer: A

LO: 2.11: Define pacemaker.

24) The normal pacemaker of the heart is the

- A) sinus node.
- B) AV node.
- C) Purkinje fibers.
- D) coronary sinus.

Answer: A

LO: 2.12: List the different pacemakers of the heart and their inherent rates.

25) The normal inherent rate of the sinus node as a pacemaker is

- A) 20—40 beats per minute.
- B) 40—60 beats per minute.
- C) 60—80 beats per minute.
- D) 60—100 beats per minute.

Answer: D

LO: 2.12: List the different pacemakers of the heart and their inherent rates.

26) The ventricle's inherent rate is

- A) 20—40 beats per minute.
- B) 40—60 beats per minute.
- C) 60—80 beats per minute.
- D) 60—100 beats per minute.

Answer: A

LO: 2.12: List the different pacemakers of the heart and their inherent rates.

27) After the sinus node initiates an impulse, where does the impulse go next?

- A) Interatrial tracts
- B) Purkinje fibers
- C) Ventricular tissue
- D) Bundle branches

Answer: A

LO: 2.13: Track the cardiac impulse from the sinus node through the conduction system.

28) Which of the following characteristics of heart cells is mechanical?

- A) Automaticity
- B) Contractility
- C) Excitability
- D) Conductivity

Answer: B

LO: 2.14: Define the four characteristics of cardiac cells.

29) Contractility is the ability of a cardiac cell to

- A) initiate an impulse without outside stimulus.
- B) pass an impulse along to neighboring cells.
- C) respond to a stimulus by depolarizing.
- D) contract.

Answer: D

LO: 2.14: Define the four characteristics of cardiac cells.

30) What is TRUE about the following intervals: PR 0.14, QRS 0.08?

- A) The QRS interval is prolonged.
- B) PR interval is shortened.
- C) PR interval is prolonged.
- D) Intervals are normal.

Answer: D

LO: 2.9: On a rhythm strip, determine if the PR, QRS, and QT intervals are normal or abnormal.

31) On a rhythm strip, the P wave is normally

- A) spiked.
- B) small.
- C) inverted.
- D) last.

Answer: B

LO: 2.7: Be able to label, on a rhythm strip, all the waves and complexes.

32) On EKG paper, one big block represents

- A) 0.04 sec.
- B) 0.10 sec.
- C) 0.20 sec.
- D) 1 sec.

Answer: C

LO: 2.8: Explain the delineations of EKG paper.

33) The PR interval would be considered abnormal if it measured \_\_\_\_\_ small blocks on the EKG paper.

- A) 3
- B) 4
- C) 5
- D) 6

Answer: D

LO: 2.9: On a rhythm strip, determine if the PR, QRS, and QT intervals are normal or abnormal.

34) A QRS complex with one positive deflection followed by one negative deflection would be labeled

- A) RS.
- B) QS.
- C) QR.
- D) RR'.

Answer: A

LO: 2.10: Name the waves in a variety of QRS complexes.

35) A QRS complex that has both an R and an R' wave will have

- A) one positive deflection.
- B) two positive deflections.
- C) one negative deflection.
- D) two negative deflections.

Answer: B

LO: 2.10: Name the waves in a variety of QRS complexes.

36) The area of the conduction system that initiates the impulse is called the

- A) internodal tract.
- B) pacemaker.
- C) bundle of His.
- D) lead.

Answer: B

LO: 2.11: Define pacemaker.

37) The pacemaker is the \_\_\_\_\_ of the conduction system of the heart.

- A) beginning
- B) pump
- C) highway
- D) end

Answer: A

LO: 2.11: Define pacemaker.

38) The electrical impulse travels through the \_\_\_\_\_ to get from the atrium to the AV node.

- A) interatrial tracts
- B) bundle of His
- C) Purkinje fibers
- D) internodal tracts

Answer: D

LO: 2.13: Track the cardiac impulse from the sinus node through the conduction system.

39) A beat that appears on the rhythm strip after a long pause and causes a slower rhythm than the normal rhythm is called a(n)

- A) usurpation beat.
- B) irritable beat.
- C) escape beat.
- D) pacemaker beat.

Answer: C

LO: 2.15: Describe the difference between escape and usurpation.

40) If a pacemaker becomes irritable and fires at a faster than normal rate, \_\_\_\_\_ will occur.

- A) escape
- B) usurpation
- C) cardiac block
- D) refraction

Answer: B

LO: 2.15: Describe the difference between escape and usurpation.

41) If a heart rhythm is slower than normal, it is called a(n)

- A) arrhythmia.
- B) plateau.
- C) complex.
- D) deflection.

Answer: A

LO: 2.16: Define arrhythmia.

42) If the sinus node and atria both fail, the \_\_\_\_\_ will be absent on the rhythm strip.

- A) P wave
- B) QRS complex
- C) R wave
- D) T wave

Answer: A

LO: 2.17: Tell what happens: When the sinus node fails, when the sinus node and atria both fail, and when the sinus node, atria, and AV node all fail.

43) If the sinus node, atria, and AV node all fail, the heart rate will be between

- A) 40 to 60 beats per minute.
- B) 20 to 40 beats per minute.
- C) 10 to 20 beats per minute.
- D) 60 to 100 beats per minute.

Answer: B

LO: 2.17: Tell what happens: When the sinus node fails, when the sinus node and atria both fail, and when the sinus node, atria, and AV node all fail.

44) The EKG is a recording of the

- A) heart's mechanical activity.
- B) brain's electrical activity.
- C) heart's electrical activity.
- D) heart's electrical and mechanical activity.

Answer: C

45) The job of the cardiac conduction system is to

- A) propagate electrical impulses.
- B) conduct electrical impulses.
- C) cause depolarization of myocardial cells.
- D) all of the above.

Answer: D

46) The PR interval measures the time it takes for the impulse to travel from the

- A) AV node to the bundle branches.
- B) bundle of His to the ventricular myocardium.
- C) sinus node to the internodal tracts.
- D) atria to the ventricle.

Answer: D

## 2.2 True/False Questions

1) The polarized cardiac cell is electrically negative.

Answer: TRUE

LO: 2.1: Define the terms polarized, depolarization, and repolarization and relate them to contraction and relaxation.

2) The cardiac cell, at rest, has a transmembrane potential of +20 mV.

Answer: FALSE

LO: 2.3: Define transmembrane potential.

3) During the absolute refractory period, only a strong stimulus can result in depolarization.

Answer: FALSE

LO: 2.6: Define the absolute and relative refractory periods and the implications of each.

4) Cardiac cell stimulus during the absolute refractory period often results in very fast, dangerous rhythms.

Answer: FALSE

LO: 2.6: Define the absolute and relative refractory periods and the implications of each.

5) The P wave represents atrial depolarization.

Answer: TRUE

LO: 2.4: Draw and explain the P wave, QRS complex, T wave, and U wave.

6) The PR segment is a flat line located between the QRS complex and the T wave.

Answer: FALSE

LO: 2.5: Explain where the PR and ST segments are located.

7) The ST segment is a flat line from which the waves and complexes take off.

Answer: FALSE

LO: 2.5: Explain where the PR and ST segments are located.

8) The normal pacemaker of the heart is the AV node.

Answer: FALSE

LO: 2.12: List the different pacemakers of the heart and their inherent rates.

9) The normal rate of the sinus node is 60—100 beats per minute.

Answer: TRUE

LO: 2.12: List the different pacemakers of the heart and their inherent rates.

10) If the PR interval is 0.10 secs, the time it takes for the impulse to travel from the atrium down to the ventricle is abnormal.

Answer: FALSE

LO: 2.9: On a rhythm strip, determine if the PR, QRS, and QT intervals are normal or abnormal.

11) The baseline is a flat line from which the waves and complexes take off.

Answer: TRUE

12) The PR interval measures the time it takes for the impulse to travel from the atrium down to the ventricle.

Answer: TRUE

### 2.3 Short Answer Questions

1) Atrial depolarization is represented on the EKG as a \_\_\_\_\_.

Answer: P wave

LO: 2.4: Draw and explain the P wave, QRS complex, T wave, and U wave.

2) Depolarization is the changing of the cardiac cell to an electrically \_\_\_\_\_ charge.

Answer: positive

LO: 2.1: Define the terms polarized, depolarization, and repolarization and relate them to contraction and relaxation.

3) Transmembrane potential is the electrical charge at the \_\_\_\_\_.

Answer: cell membrane

LO: 2.3: Define transmembrane potential.

4) Refractory means \_\_\_\_\_ to.

Answer: Resistant

LO: 2.6: Define the absolute and relative refractory periods and the implications of each.

5) One small block on the EKG paper measures \_\_\_\_\_ seconds.

Answer: 0.04

LO: 2.8: Explain the delineations of EKG paper.

6) Normal QRS interval is \_\_\_\_\_ seconds or less than three small blocks.

Answer: <0.12

LO: 2.4: Draw and explain the P wave, QRS complex, T wave, and U wave. 2.9: On a rhythm strip, determine if the PR, QRS, and QT intervals are normal or abnormal.

7) A negative deflection that occurs before a positive one is labeled a \_\_\_\_\_ wave.

Answer: Q

LO: 2.4: Draw and explain the P wave, QRS complex, T wave, and U wave. 2.7: Be able to label, on a rhythm strip, all the waves and complexes.

8) Normal conduction begins with the pacemaker of the heart, the \_\_\_\_\_.

Answer: Sinus node

LO: 2.12: List the different pacemakers of the heart and their inherent rates.

9) The pacemaker with the slowest inherent rate is the \_\_\_\_\_.

Answer: Ventricle

LO: 2.12: List the different pacemakers of the heart and their inherent rates.

10) Arrhythmias are \_\_\_\_\_ heart rhythms.

Answer: Abnormal

LO: 2.16: Define arrhythmia.