MULTIPLE CHOICE

1. In sinus arrhythmia, a gradual increasing of the heart rate is usually associated with _____.
   a. expiration
   b. inspiration
   c. excessive caffeine intake
   d. early signs of heart failure

   ANS: B
   Sinus arrhythmia that is associated with the phases of breathing and changes in intrathoracic pressure is called respiratory sinus arrhythmia. The rhythm is irregular; the heart rate increases gradually during inspiration (R-R intervals shorten) and decreases with expiration (R-R intervals lengthen).

   OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus arrhythmia.

2. The rate of sinus tachycardia is _____ beats/min.
   a. slower than 60
   b. 40 to 80
   c. 60 to 100
   d. faster than 100

   ANS: D
   The rate of sinus tachycardia is between 101 and 180 beats/min.

   OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus tachycardia.

3. An ECG rhythm strip shows a ventricular rate of 46 bpm, a regular rhythm, a PR interval of 0.14 seconds, a QRS duration of 0.06 seconds, and one upright P wave before each QRS. This rhythm is _____.
   a. sinus rhythm
   b. sinus bradycardia
   c. sinus arrest
   d. sinoatrial block

   ANS: B
   The rhythm described fits the ECG criteria for a sinus bradycardia.

   OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus bradycardia.

4. An ECG rhythm strip shows a ventricular rate of 128 bpm, a regular rhythm, a PR interval of 0.16 seconds, a QRS duration of 0.08 seconds, and one upright P wave before each QRS. This rhythm is sinus _____.
   a. arrhythmia
   b. bradycardia
c. rhythm  
d. tachycardia

ANS: D
The rhythm described fits the ECG criteria for a sinus tachycardia.

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus tachycardia.

5. Which of the following are possible causes of sinus tachycardia?
   a. Hypothermia, hypovolemia  
   b. Hypoxia, calcium channel blocker overdose  
   c. Fever, pain, anxiety  
   d. Vomiting, vagal maneuvers

ANS: C
Causes of sinus tachycardia include: acute myocardial infarction; caffeine-containing beverages; dehydration, hypovolemia; drugs such as cocaine, amphetamines, ecstasy, cannabis; exercise; fear and anxiety; fever; heart failure; hyperthyroidism; hypoxia; infection; medications such as epinephrine, atropine, and dopamine; nicotine; pain; pulmonary embolism; shock; sympathetic stimulation.

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus tachycardia.

6. Which of the following are possible causes of sinus bradycardia?
   a. Elevated temperature, pain  
   b. Increased intracranial pressure, beta-blocker overdose  
   c. Hypoxia, fright, caffeine-containing beverages  
   d. Hypovolemia, administration of sympathomimetics

ANS: B
Causes of sinus bradycardia include: disease of the SA node; hyperkalemia; hypokalemia; hypothermia; hypothyroidism; hypoxia; increased intracranial pressure; inferior myocardial infarction (MI); medications such as calcium channel blockers, digitalis, beta-blockers, amiodarone, and sotalol; obstructive sleep apnea; post heart transplant; posterior MI; and vagal stimulation.

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus bradycardia.

7. The rate of a sinus rhythm is ____ beats/min.
   a. slower than 60  
   b. 60 to 100  
   c. 80 to 120  
   d. faster than 100

ANS: B
The rate of a sinus rhythm is between 60 and 100 beats/min.

OBJ: Describe the ECG characteristics of a sinus rhythm.
8. Which of the following may cause a sinus bradycardia?
   a. Stress or anxiety
   b. Increased sympathetic tone
   c. Fever
   d. Hypothermia

   ANS: D

   Causes of sinus bradycardia include: disease of the SA node; hyperkalemia; hypokalemia; hypothermia; hypothyroidism; hypoxia; increased intracranial pressure; inferior myocardial infarction (MI); medications such as calcium channel blockers, digitalis, beta-blockers, amiodarone, and sotalol; obstructive sleep apnea; post heart transplant; posterior MI; and vagal stimulation.

9. Which of the following correctly reflects the ECG criteria for a sinus rhythm?
   a. More P waves than QRS complexes
   b. P waves that look alike and upright in lead II, one before each QRS complex
   c. Irregular atrial and ventricular rhythm
   d. PR interval exceeding 0.20 seconds

   ANS: B

   Characteristics of sinus rhythm:
   - Rhythm: R-R and P-P intervals are regular
   - Rate: 60 to 100 beats/min
   - P waves: Positive (upright) in lead II; one precedes each QRS complex; P waves look alike
   - PR interval: 0.12 to 0.20 seconds and constant from beat to beat
   - QRS duration: 0.11 seconds or less unless abnormally conducted

10. Management of a patient with a sinus tachycardia might include _____.
    a. identification and treatment of the underlying cause
    b. administration of atropine
    c. use of a pacemaker
    d. vagal maneuvers, such as carotid sinus pressure

    ANS: A

    Treatment for sinus tachycardia is directed at correcting the underlying cause (i.e., fluid replacement, relief of pain, removal of offending medications or substances, reducing fever or anxiety). Sinus tachycardia in a patient experiencing an acute myocardial infarction (MI) may be treated with medications to slow the heart rate and decrease myocardial oxygen demand (e.g., beta-blockers), provided there are no signs of heart failure or other contraindications.

11. The rate of a sinus bradycardia is _____ beats/min.
    a. slower than 60
If the SA node fires at a rate that is slower than normal for the patient’s age, the rhythm is called *sinus bradycardia*. The rhythm starts in the SA node and then travels the normal conduction pathway, resulting in atrial and ventricular depolarization. In adults and adolescents, a sinus bradycardia has a heart rate of less than 60 beats/min. The term *severe sinus bradycardia* is sometimes used to describe a sinus bradycardia with a rate of less than 40 beats/min.

**OBJ:** Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus bradycardia.

**SHORT ANSWER**

1. Identify the following rhythm (lead II):

   ![EKG Image 1]

   **ANS:**
   Sinus rhythm at 70 beats/min

   **OBJ:** Describe the ECG characteristics of a sinus rhythm.

2. Identify the following rhythm (lead II):

   ![EKG Image 2]

   **ANS:**
   Sinus bradycardia at 48 beats/min with ST-segment depression

   **OBJ:** Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus bradycardia.

3. Identify the following rhythm (lead II):

   ![EKG Image 3]
ANS:
Sinus rhythm at 65 beats/min with ST-segment depression

OBJ: Describe the ECG characteristics of a sinus rhythm.

4. Identify the following rhythm (lead II):

ANS:
Sinus rhythm at 98 beats/min with ST-segment elevation

OBJ: Describe the ECG characteristics of a sinus rhythm.

5. Identify the following rhythm (lead II):

ANS:
Sinus rhythm at a rate of 36 to 71 beats/min with an episode of SA block

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinoatrial block.

6. Identify the following rhythm:

ANS:
Sinus rhythm at 71 beats/min with a wide QRS, ST-segment depression

OBJ: Describe the ECG characteristics of a sinus rhythm.

7. Identify the following rhythm (lead II):

ANS:
Sinus rhythm at a rate of 24 to 81 beats/min with an episode of sinus arrest

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus arrest.

8. Identify the following rhythm (lead II):

ANS: Sinus tachycardia at 140 beats/min

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus tachycardia.

9. Identify the following rhythm (lead II):

ANS: Sinus rhythm at 65 beats/min

OBJ: Describe the ECG characteristics of a sinus rhythm.

10. Identify the following rhythm (lead II):

ANS: Sinus tachycardia at 167 beats/min

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus tachycardia.

11. Identify the following rhythm (lead II):
ANS: 
Sinus rhythm with a wide QRS at 100 beats/min; ST-segment depression, inverted T waves 

OBJ: Describe the ECG characteristics of a sinus rhythm.

12. Identify the following rhythm (lead II): 

ANS: 
Sinus tachycardia at 111 beats/min 

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus tachycardia.

13. Identify the following rhythm (lead II): 

ANS: 
Sinus rhythm (borderline sinus bradycardia) at 60 beats/min 

OBJ: Describe the ECG characteristics of a sinus rhythm.

14. Identify the following rhythm (lead II): 

ANS: 
Sinus bradycardia at 58 beats/min 

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus bradycardia.

15. Identify the following rhythm (lead II): 

ANS: 
Sinus rhythm with a wide QRS at 100 beats/min; ST-segment depression, inverted T waves 

OBJ: Describe the ECG characteristics of a sinus rhythm.
ANS:
Sinus rhythm at 85 beats/min

OBJ: Describe the ECG characteristics of a sinus rhythm.

16. Identify the following rhythm (lead II):

ANS:
Sinus arrhythmia at 52 to 94 beats/min

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus arrhythmia.

17. Identify the following rhythm (lead I):

ANS:
Sinus tachycardia at 150 beats/min

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus tachycardia.

18. Identify the following rhythm (lead II):

ANS:
Sinus bradycardia at 40 beats/min; ST-segment depression, inverted T waves

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus bradycardia.
19. Identify the following rhythm (lead II):

ANS:
Sinus rhythm at 95 beats/min

OBJ: Describe the ECG characteristics of a sinus rhythm.

20. Identify the following rhythm (lead II):

ANS:
Sinus arrhythmia at 71 to 100 beats/min

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus arrhythmia.

21. Identify the following rhythm (lead II):

ANS:
Sinus rhythm at 71 beats/min

OBJ: Describe the ECG characteristics of a sinus rhythm.

22. Identify the following rhythm (lead II):

ANS:
Sinus bradycardia at 44 beats/min, ST-segment depression. Note the upright U waves following each T wave.

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus bradycardia.
23. Identify the following rhythm:

ANS: Sinus rhythm at 75 beats/min, ST-segment depression

OBJ: Describe the ECG characteristics of a sinus rhythm.

24. Identify the following rhythm (lead II):

ANS: Sinus rhythm with a wide QRS at 83 beats/min

OBJ: Describe the ECG characteristics of a sinus rhythm.

25. Identify the following rhythm (lead II):

ANS: Sinus arrhythmia at 64 to 94 beats/min

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus arrhythmia.

26. Identify the following rhythm (lead II):
ANS:
Sinus rhythm at 94 beats/min with a wide (and notched) QRS, ST-segment depression

OBJ: Describe the ECG characteristics of a sinus rhythm.

27. Identify the following rhythm (lead II):

ANS:
Sinus rhythm at 0 to 75 beats/min with an episode of sinus arrest; tall T waves

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus arrest.

28. List three significant signs and/or symptoms that, if observed with a sinus bradycardia, would require management of this dysrhythmia.

ANS:
Clinical signs and symptoms of hemodynamic compromise can include: acute changes in mental status; chest pain or discomfort; cold, clammy skin; fall in urine output; heart failure; low blood pressure; pulmonary congestion; shock; and shortness of breath.

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus bradycardia.

29. Complete the following ECG criteria for a sinus rhythm:

<table>
<thead>
<tr>
<th>Rhythm</th>
<th>Rate</th>
<th>P waves</th>
<th>PR interval</th>
<th>QRS duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rhythm P-P interval regular, R-R interval regular.</td>
<td>60 to 100 beats/min.</td>
<td>Positive (upright) in lead II, one precedes each QRS complex, P waves look alike.</td>
<td>0.12 to 0.20 seconds and constant from beat to beat.</td>
<td>0.11 seconds or less unless abnormally conducted.</td>
</tr>
</tbody>
</table>
OBJ: Describe the ECG characteristics of a sinus rhythm.

30. Complete the following ECG criteria for a sinus bradycardia:
Rhythm __________________________________________
Rate ____________________________________________
P waves __________________________________________
PR interval ______________________________________
QRS duration ____________________________________

ANS:

<table>
<thead>
<tr>
<th>Rhythm</th>
<th>P-P interval regular, R-R interval regular.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>Less than 60 beats/min.</td>
</tr>
<tr>
<td>P waves</td>
<td>Positive (upright) in lead II, one precedes each QRS complex, P waves look alike.</td>
</tr>
<tr>
<td>PR interval</td>
<td>0.12 to 0.20 seconds and constant from beat to beat.</td>
</tr>
<tr>
<td>QRS duration</td>
<td>0.11 seconds or less unless abnormally conducted.</td>
</tr>
</tbody>
</table>

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus bradycardia.

31. Complete the following ECG criteria for a sinus tachycardia:
Rhythm __________________________________________
Rate ____________________________________________
P waves __________________________________________
PR interval ______________________________________
QRS duration ____________________________________

ANS:

<table>
<thead>
<tr>
<th>Rhythm</th>
<th>P-P interval regular, R-R interval regular.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>101 to 180 beats/min.</td>
</tr>
<tr>
<td>P waves</td>
<td>Positive (upright) in lead II, one precedes each QRS complex, P waves look alike; at very fast rates, it may be hard to tell the difference between a P wave from a T wave.</td>
</tr>
<tr>
<td>PR interval</td>
<td>0.12 to 0.20 seconds (may shorten with faster rates) and constant from beat to beat.</td>
</tr>
<tr>
<td>QRS duration</td>
<td>0.11 seconds or less unless abnormally conducted.</td>
</tr>
</tbody>
</table>

OBJ: Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus tachycardia.

32. Complete the following ECG criteria for a sinoatrial (SA) block:
Rhythm __________________________________________
Rate ____________________________________________
P waves __________________________________________
PR interval ______________________________________
QRS duration ____________________________________

ANS:
<table>
<thead>
<tr>
<th>Rhythm</th>
<th>Irregular because of the pause caused by the SA block; the pause is the same as (or an exact multiple of) the distance between two other P-P intervals.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>Usually normal, but varies because of the pause.</td>
</tr>
<tr>
<td>P waves</td>
<td>Positive (upright) in lead II, P waves look alike; when present, one precedes each QRS complex.</td>
</tr>
<tr>
<td>PR interval</td>
<td>0.12 to 0.20 seconds and constant from beat to beat.</td>
</tr>
<tr>
<td>QRS duration</td>
<td>0.11 seconds or less unless abnormally conducted.</td>
</tr>
</tbody>
</table>

**OBJ:** Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinoatrial block.

33. Complete the following ECG criteria for a sinus arrest:

<table>
<thead>
<tr>
<th>Rhythm</th>
<th>Irregular—the pause is of undetermined length (more than one PQRST complex is missing) and is not the same distance as other P-P intervals.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>Usually normal, but varies because of the pause.</td>
</tr>
<tr>
<td>P waves</td>
<td>Positive (upright) in lead II, P waves look alike; when present, one precedes each QRS complex.</td>
</tr>
<tr>
<td>PR interval</td>
<td>0.12 to 0.20 seconds and constant from beat to beat.</td>
</tr>
<tr>
<td>QRS duration</td>
<td>0.11 seconds or less unless abnormally conducted.</td>
</tr>
</tbody>
</table>

**ANS:**

<table>
<thead>
<tr>
<th>Rhythm</th>
<th>Irregular, phasic with breathing; heart rate increases gradually during inspiration (R-R intervals shorten) and decreases with expiration (R-R intervals lengthen).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>Usually 60-100 beats/min, but may be slower or faster.</td>
</tr>
<tr>
<td>P waves</td>
<td>Positive (upright) in lead II, one precedes each QRS complex, P waves look alike.</td>
</tr>
<tr>
<td>PR interval</td>
<td>0.12 to 0.20 seconds and constant from beat to beat.</td>
</tr>
<tr>
<td>QRS duration</td>
<td>0.11 seconds or less unless abnormally conducted.</td>
</tr>
</tbody>
</table>

**OBJ:** Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus arrest.

34. Complete the following ECG criteria for a sinus arrhythmia:

<table>
<thead>
<tr>
<th>Rhythm</th>
<th>Irregular, phasic with breathing; heart rate increases gradually during inspiration (R-R intervals shorten) and decreases with expiration (R-R intervals lengthen).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>Usually 60-100 beats/min, but may be slower or faster.</td>
</tr>
<tr>
<td>P waves</td>
<td>Positive (upright) in lead II, one precedes each QRS complex, P waves look alike.</td>
</tr>
<tr>
<td>PR interval</td>
<td>0.12 to 0.20 seconds and constant from beat to beat.</td>
</tr>
<tr>
<td>QRS duration</td>
<td>0.11 seconds or less unless abnormally conducted.</td>
</tr>
</tbody>
</table>
Describe the ECG characteristics, possible causes, signs and symptoms, and emergency management of sinus arrhythmia.