Sinus Rhythms

6

Learning Outcomes

6.1 Analyze normal sinus rhythm and its effect on the patient, including basic patient care and treatment.

6.2 Analyze sinus bradycardia and its effect on the patient, including basic patient care and treatment.

6.3 Analyze sinus tachycardia and its effect on the patient, including basic patient care and treatment.

6.4 Analyze sinus dysrhythmia and its effect on the patient, including basic patient care and treatment.

6.5 Analyze sinus arrest and its effect on the patient, including basic patient care and treatment.

6.6 Analyze sinus exit block and its effect on the patient, including basic patient care and treatment.

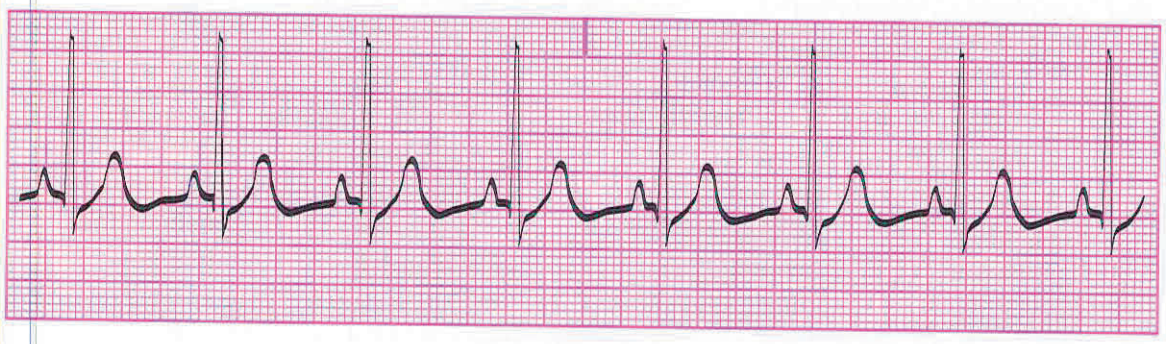
Key Terms

asystole
cardiac output
hypotension
ischemia
palpitations
sinus bradycardia
sinus (SA) exit block
sinus tachycardia
stroke volume
syncope
vagal tone

6.1 Rhythms Originating from the Sinus Node

The sinoatrial (SA) node is the normal or primary pacemaker of the heart. It generates an electrical impulse that travels through the normal conduction pathway to cause the myocardium to depolarize. Electrical current starts at the sinoatrial node, travels the normal (intra-articular) conduction pathway to the atrioventrical node, and after a brief pause, continues through the bundle of His and bundle branches to the ventricles. Because rhythms in this category start at the sinoatrial node, they are called *sinus rhythms*. Normally, the inherent rate of the sinoatrial node (SA node) is between 60 and 100 times per minute. In a normal heart, each electrical impulse would result in a cardiac contraction. So the rate of 60 to 100 impulses per minute would result in a heart rate of 60 to 100 beats per minute. The types of sinus rhythms are distinguished by heart rate and

Figure 6-1 Normal sinus rhythm.



pattern and include normal sinus rhythm, sinus bradycardia, sinus tachycardia, sinus dysrhythmia, and sinus exit block.

Normal sinus rhythm reflects a normally functioning conduction system (Figure 6-1). The electrical current is following the normal conduction pathway without interference from other body systems or disease processes.

Criteria for Classification

- ***Rhythm:*** The intervals between the two P and two R waves occur in a consistent (regular) pattern.
- ***Rate:*** Both the atrial and the ventricular rates are equal and between 60 and 100 beats per minute.
- ***P wave morphology:*** The shape of each P wave is upright and uniform. There is a P wave in front of each QRS complex. No additional P waves or QRS complexes are noted.
- ***PR interval:*** The PR interval measurement is between the normal limits of 0.12 and 0.20 second. Each PR interval is identical in measurement and appearance, without variation.
- ***QRS duration and morphology:*** The QRS duration measurement is between 0.06 and 0.10 second, which is within normal limits. Each QRS duration and its morphology are the same, without any variations from QRS complex to complex.

Interpret-TIP

Normal Sinus Rhythm

Sinus rhythm is the only rhythm for which all five steps are within normal limits.

How the Patient Is Affected and What You Should Know

Normal sinus rhythm is the desired rhythm. Patients with this rhythm should have normal **cardiac output.** Normal cardiac output means that the heart is beating adequately, pumping enough blood to the body's vital organs to maintain normal function. A patient who has adequate cardiac output is alert and oriented with no difficulty breathing, no chest pain or pressure, and a stable blood pressure. Recall that the formula for determining cardiac output (CO) is heart rate (HR) × stroke volume (SV): HR × SV = CO. **Stroke volume**

cardiac output The volume of blood the heart pumps each minute.

stroke volume The volume of blood ejected by the left ventricle with each contraction.

TABLE 6-1 Signs and Symptoms of Decreased Cardiac Output

Be aware of these signs and symptoms associated with decreased cardiac output during ECG monitoring.

Neurological	Cardiac	Respiratory	Urinary	Peripheral
• Change in mental status • Light-headedness • Dizziness • Confusion • Loss of consciousness	• Chest pain • Palpitation • Chest discomfort • Enlarged cardiac size (seen on X-ray) • **Congestive heart failure** • Weak, rapid pulse • Low blood pressure	• Difficulty breathing • Shortness of breath • Frothy sputum • Fluid present in lungs • Lung congestion	• Decreased urinary output of less than 30 mL in 1 hour	• Hypotension • Pale skin • Skin cool and clammy to the touch

congestive heart failure (CHF) Failure of the heart to pump an adequate amount of blood to the body tissues. Includes symptoms of shortness of breath (SOB), edema, pale skin, increased respiratory rate, and potential frothy sputum.

represents the volume of blood ejected by the left ventricle during one contraction. The average ventricle ejects 70 mL of blood with each contraction.

Because this is a normal rhythm, no intervention is necessary. If the patient's rhythm returns to sinus rhythm from another dysrhythmia, it is always important to make sure that the patient is not experiencing problems with low cardiac output, which indicates that the heart is not pumping adequately (Table 6-1). Anytime a patient displays signs and symptoms of low cardiac output, a licensed practitioner needs to be informed for further assessment.

Think It Through

Report the Patient Condition and the Tracing

The patient you are monitoring is very pale and appears to be breathing very fast. Their monitor indicates a sinus rhythm. What should you do?

Law & Ethics

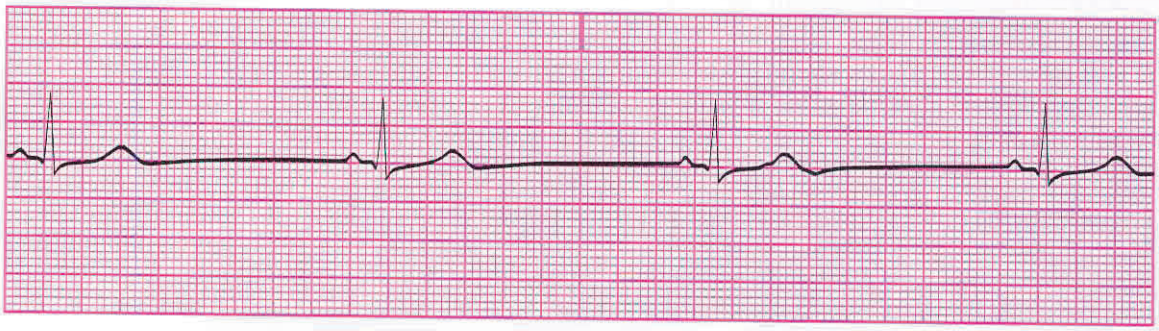
Documenting the ECG Rhythm and Tracing

The ECG tracing, which is considered a legal document, must be included in the patient's medical record. The patient's name, date, and time plus the initials of the person performing the ECG must be identified on each tracing (rhythm strip). Documentation of the ECG rhythm and the patient's condition helps support the reason for the medical treatment.

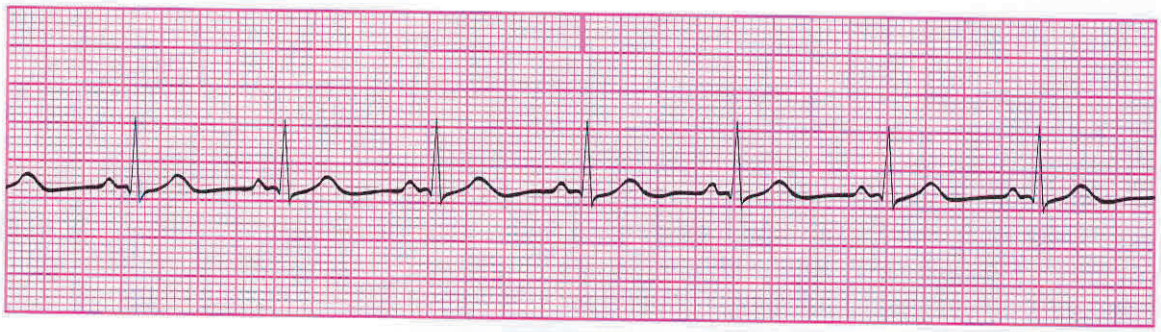
Checkpoint Questions (LO 6.1)

1. Using the criteria for classification, select the rhythm that most closely resembles normal sinus rhythm.

A.



B.



Which distinguishing feature(s) led you to make the selection?

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6.2 Sinus Bradycardia

sinus bradycardia A slow heart rate, usually less than 60 beats per minute.

Sinus bradycardia looks very much like normal sinus rhythm, but with the distinguishing feature of a rate of less than 60 beats per minute. All other analysis steps are within normal limits (Figure 6-2.). Sinus bradycardia originates from the SA node and travels the normal conduction pathway. The only difference between this rhythm and sinus rhythm is that the rate is less than the normal inherent rate of the SA node.

Criteria for Classification

- ***Rhythm:*** The R-R interval and P-P interval occur on a regular and constant basis.
- ***Rate:*** The atrial and ventricular rates are equal and less than 60 beats per minute.
- ***P wave morphology:*** The shape of each P wave is upright and uniform. There is a P wave in front of each QRS complex. No additional P waves or QRS complexes are noted.

Figure 6-2 Sinus bradycardia.

- ***PR interval:*** The PR interval measurement is between the normal limits of 0.12 and 0.20 second. All PR intervals are the same.
- ***QRS duration and morphology:*** The QRS duration measurement is between the normal limits of 0.06 and 0.10 second. Each QRS duration and its morphology are the same, without any variations from QRS complex to complex.

Interpret-TIP

Sinus Bradycardia

In sinus bradycardia, the heart rate is less than 60 beats per minute, and all other measurements are within normal limits.

How the Patient Is Affected and What You Should Know

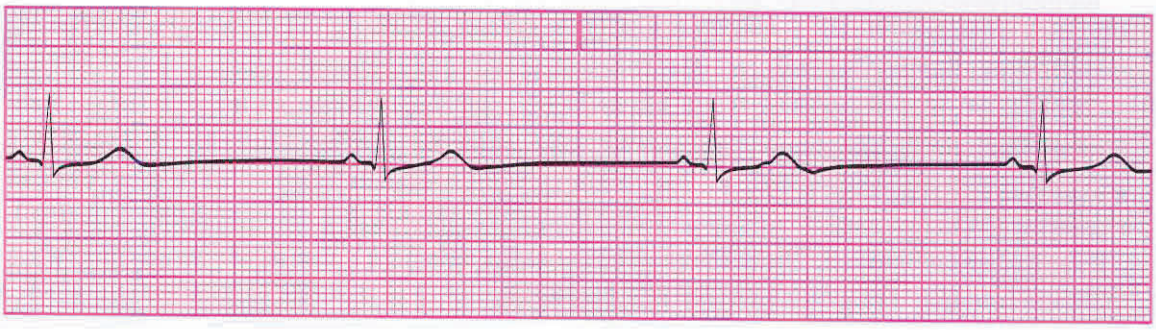
The patient with sinus bradycardia may or may not experience or demonstrate signs and symptoms of low cardiac output. For example, athletes may have sinus bradycardia normally. However, when performing an ECG to a patient with a slow heart rate, it is important to observe for the signs and symptoms of low cardiac output (see Table 6-1). Remember that although the patient may look all right, they can quickly experience difficulties with low cardiac output. When you observe signs and symptoms of low cardiac output, report any findings to a licensed practitioner immediately. A patient with this rhythm may require drug administration or application of a pacemaker.

Checkpoint Question (LO 6.2)

1. Using the criteria for classification, select the rhythm that most closely resembles sinus bradycardia rhythm.

A.

B.



Which distinguishing feature(s) led you to make the selection?

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6.3 Sinus Tachycardia

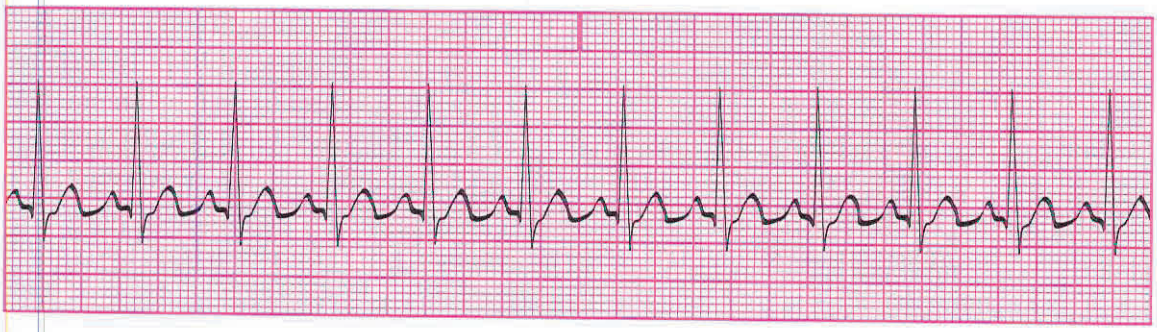
sinus tachycardia A fast heart rate, usually greater than 100 beats per minute.

Sinus tachycardia is a condition in which the SA node fires and the electrical impulse travels through the normal conduction pathway, but the rate of impulse firing is faster than 100 beats per minute (Figure 6-3).

Criteria for Classification

- ***Rhythm:*** The R-R interval and P-P interval are regular.
- ***Rate:*** The atrial and ventricular rates are the same, between 100 and 150 beats per minute.
- ***P wave morphology:*** The shape of each P wave is upright and uniform. There is a P wave in front of each QRS complex. No additional P waves or QRS complexes are noted.
- ***PR interval:*** The PR interval measurement is between the normal limits of 0.12 and 0.20 second. Each PR interval measures the same.
- ***QRS duration and morphology:*** The QRS duration measurement is between the normal limits of 0.06 and 0.10 second. Each QRS duration and its morphology are the same, without any variations from QRS complex to complex.

Figure 6-3 Sinus tachycardia.



Interpret-TIP

Sinus Tachycardia

In sinus tachycardia, the heart rate is greater than 100 beats per minute, and all other measurements are within normal limits.

How the Patient Is Affected and What You Should Know

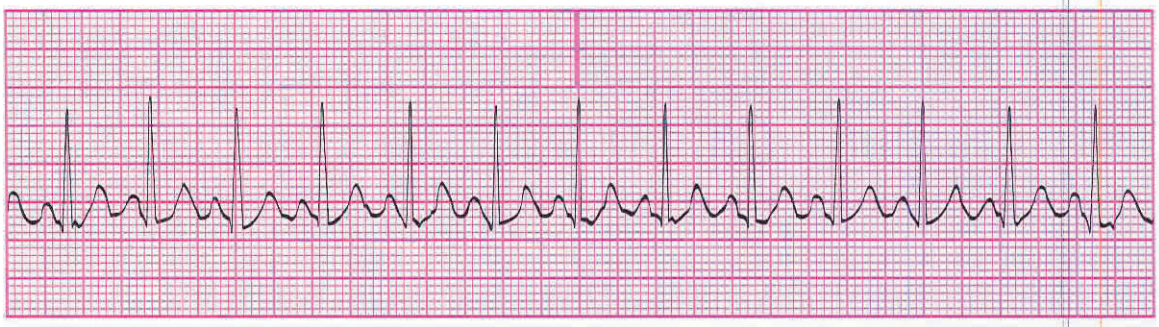
The effect of this rhythm on the patient depends on the rate of tachycardia above the patient's normal resting heart rate. For example, if the patient's normal resting heart rate is 90 and now the patient is exhibiting a rate of 108 beats per minute after walking the hallway, the tachycardia would be expected and is viewed as the patient's normal response to exercise. However, if the patient's normal heart rate is 60 and it is now 140, the patient is probably experiencing signs and symptoms of low cardiac output. Often the patient will complain of heart racing in their chest. If the patient has had a recent myocardial infarction, sinus tachycardia is considered to be more serious or even life threatening due to the increased need for oxygen caused by the increased heart rate.

When caring for a patient who is experiencing sinus tachycardia, first observe for signs and symptoms of low cardiac output. If evidence of low cardiac output is observed, notify a licensed practitioner immediately. The licensed practitioner may need to perform advanced measures to stabilize the patient. Medication may be needed to help slow down the heart rate of a patient in sinus tachycardia.

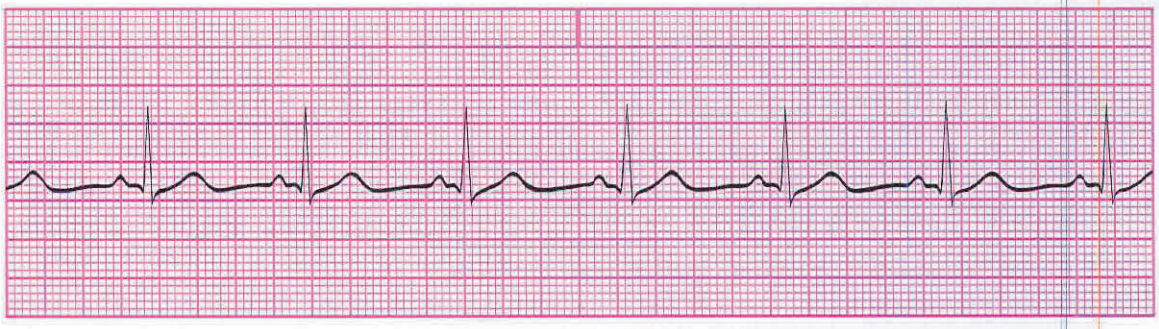
Checkpoint Question (LO 6-3)

1. Using the criteria for classification, select the rhythm that most closely resembles sinus tachycardia rhythm.

A.



B.



Which distinguishing feature(s) led you to make the selection?

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6.4 Sinus Dysrhythmia

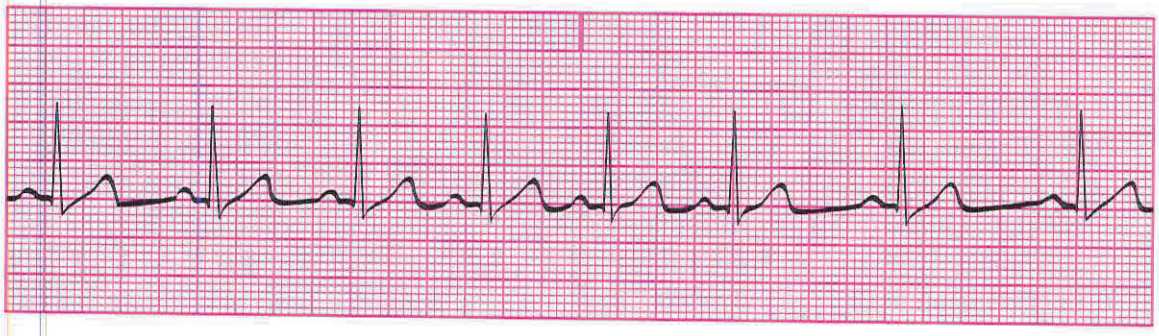
vagal tone A constant tension on the vagus nerve that causes the heart to beat more slowly.

Sinus dysrhythmia, sometimes referred to respiratory sinus arrhythmia, is a condition in which the heart rate remains within normal limits but is influenced by the respiratory cycle and variations of **vagal tone.** *Vagal* refers to the action of the vagus nerve, a nerve that relays information between the brain and the internal organs, in this case the heart. *Tone*, in this context, refers to tension. For instance, when a patient inhales air, the pressure (tension) inside the chest cavity increases, causing pressure on the heart. The pressure on the heart sends information through the vagus nerve to the brain, causing a decrease in heart rate. As the patient exhales, the chest cavity tension decreases, along with the heart rate. Vagal maneuvers are the physical actions that make your vagus nerve act on your heart's natural pacemaker, slowing down its electrical impulses. Sinus dysrhythmia looks very much like normal sinus rhythm with the distinguishing feature that the P to P and R to R intervals are irregular. All other analysis steps are normal (Figure 6-4).

Criteria for Classification

- ***Rhythm:*** The interval between the P-P and R-R waves occur at irregular periods.
- ***Rate:*** The atrial and ventricular rates are the same, between 60 and 100 beats per minute.
- ***P wave morphology:*** The shape of each P wave is upright and uniform. There is a P wave in front of each QRS complex. No additional P waves or QRS complexes are noted.
- ***PR interval:*** The PR interval measurement is between the normal limits of 0.12 and 0.20 second. Each PR interval is the same, without any variations.
- ***QRS duration and morphology:*** The QRS duration measurement is between 0.06 and 0.10 second. Each QRS duration and its morphology are the same, without any variations from QRS complex to complex.

Figure 6-4 Sinus dysrhythmia.



Interpret-TIP

Sinus Dysrhythmia

In sinus dysrhythmia, the P-P and R-R intervals progressively widen, then narrow, following the patient's breathing pattern.

How the Patient Is Affected and What You Should Know

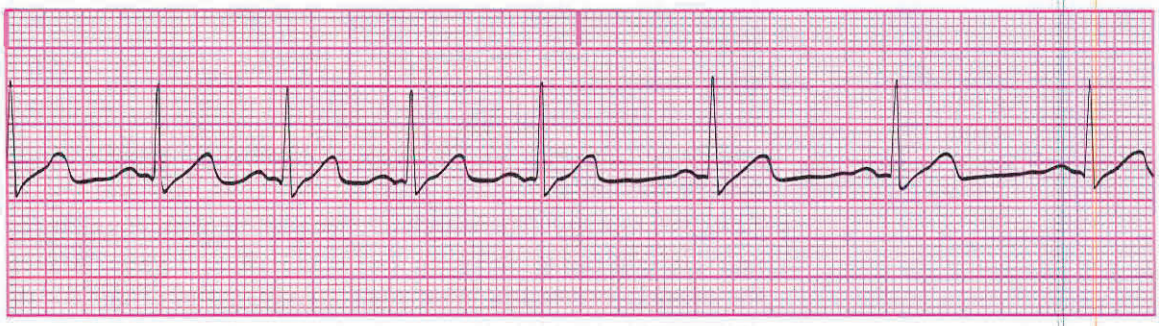
palpitations Rapid irregular beating of the heart which may or may not be associated with complaints of chest pain.

Patients usually show no clinical signs or symptoms with sinus dysrhythmia. If the irregularity is severe enough to decrease the heart rate to 40 to 50 beats per minute, the patient may complain of **palpitations** or dizziness. This depends on how slowly the heart beats when the SA node is suppressed by the respiratory or vagal influences. You should notify the physician or other licensed practitioner when the heart rate slows below 50 or the patient complains of dizziness or palpitations. A copy of the rhythm strip should be mounted on the patient's medical record for documentation.

Checkpoint Question (LO 6.4)

1. Using the criteria for classification, select the rhythm that most closely resembles sinus dysrhythmia.

A.



B.

Which distinguishing feature(s) led you to make the selection?

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6.5 Sinus Arrest

Sinus arrest, sometimes referred to as *sinus pause*, occurs when the SA node stops firing, causing a pause in electrical activity. During the pause, no electrical impulse is initiated or sent through the normal conduction system to cause either an atrial or a ventricular contraction causing a brief period of **asystole.** Other than this abnormality, the cardiac complexes will measure within normal limits. Depending upon the length of the pause and underlying heart rate, the heart rate measured may be less than 60 beats per minute (Figure 6-5).

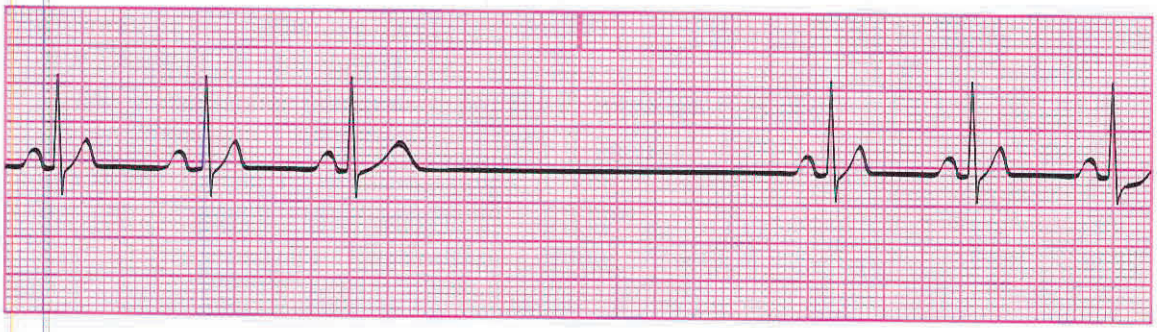
asystole A condition in which no rhythm or electrical current is traveling through the cardiac conduction system.

Criteria for Classification

- ***Rhythm:*** The cardiac complexes are regular before and after the sinus arrest period, but this rhythm is considered irregular due to the absence of electrical activity during the pause.
- ***Rate:*** The atrial and ventricular rates are the same. The rate varies, depending on the amount of electrical activity occurring from the sinoatrial node.
- ***P wave morphology:*** The shape of each P wave is upright and uniform. There is a P wave in front of each QRS complex. No additional P waves or QRS complexes are noted.
- ***PR interval:*** The PR interval measurement is between the normal limits of 0.12 and 0.20 second. Each PR interval is the same, without any variations.
- ***QRS duration and morphology:*** The QRS duration measurement is between the normal limits of 0.06 and 0.10 second. Each QRS duration and its morphology are the same, without any variations from QRS complex to complex.
- ***Length of pause:*** The length and frequency of pause(s) needs to be measured to determine how long the heart had no rhythm. To measure, place the calipers on the R-R interval around the pause. Once the time frame is determined, calculate the length of time for the pause by multiplying the number of boxes by 0.04 second. The frequency of pauses is also noted because the more frequent the pauses, the more urgent the situation.

It should be noted that the arrest period may be terminated by an escaped beat from one of the subsidiary pacemakers when the heart rate is less than 60 beats per minute. In this instance, there would be a junctional or ventricular escape beat, then resumption of the usual electrical activity.

Figure 6-5 Sinus arrest.



Interpret-TIP

Sinus Arrest

You will observe regularly occurring PQRSTs both before and after the arrest period. No electrical activity occurs during the arrest period.

ischemia A sudden loss or reduction in blood supply (oxygen) to a region of the heart tissue. This occurs due to the presence of atherosclerotic plaque, blood clot, emboli, or even vascular spasm (Prinzmetal's angina).

hypotension A lower than normal blood pressure that can cause reduction of blood flow to vital organs.

syncope Loss of consciousness (fainting).

How the Patient Is Affected and What You Should Know

The seriousness of sinus arrest depends on the length of the pause. The patient will experience signs and symptoms of decreased cardiac output if the pause is 2 seconds long and occurs on a frequent basis. The pauses may also cause periods of **ischemia** (when cells are deprived of oxygen), **hypotension** (low blood pressure), dizziness, and **syncope** (loss of consciousness). Evidence of ischemia can often be seen on a 12-lead ECG.

The patient may initially appear to be asymptomatic (without symptoms) and then develop signs and symptoms of low cardiac output. Therefore, it is important to observe the patient frequently for signs and symptoms of low cardiac output. Notify a licensed practitioner of these signs or symptoms, and provide information about the frequency and length of pauses. The patient will require immediate treatment. If sinus arrest reaches 6 seconds, this is considered a medical emergency and requires Code Blue procedures.

Think It Through

Sinus Arrest

A patient is in sinus arrest that lasts longer than 6 seconds. This indicates that no electrical current is traveling through the cardiac conduction system and is known as asystole. What should you do?

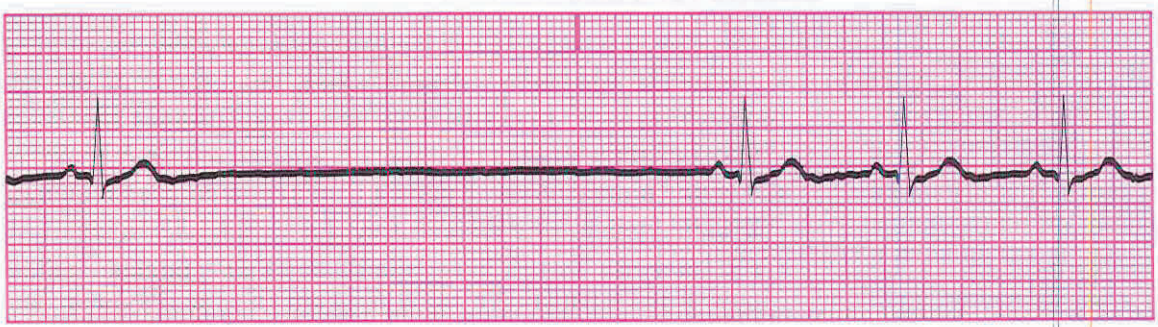
_____

_____

Checkpoint Question (LO 6.5)

1. Using the criteria for classification, select the rhythm that most closely resembles sinus arrest.

A.



B.

Which distinguishing feature(s) led you to make the selection?

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6.6 Sinus Exit Block

sinus exit block Condition in which the SA node initiates an electrical impulse but the impulse is blocked and not conducted to the atria. Also known as *sinus block* or *SA block*.

Sinus (SA) exit block occurs when the SA node initiates an electrical impulse that is blocked and not conducted to the atria. The atria and ventricles do not depolarize, and the P wave will not be seen until the next conducted complex.

Sinus exit block, also known as *sinus block* or *SA block*, looks very much the same as sinus arrest with one important distinction. The duration of the pause in sinus exit block is in a direct multiple (ratio) of the R-R or P-P interval of the underlying rhythm. Sinus arrest does not have this specific feature.

Physiologically, the difference between sinus arrest and sinus exit block has to do with the SA node. In sinus arrest, the SA node is not firing, which results in a variable pause in electrical activity. In sinus exit block, the SA node is depolarizing, but the impulse is not transmitted (blocked), resulting in the pause. This is why the pause in sinus exit block is in a direct ratio with the P-P interval. This is easily measured and confirmed by simply measuring the R-R interval (see Figure 6-6).

Criteria for Classification

- ***Rhythm:*** Irregular due to the pause(s) caused by the SA block.
- ***Rate:*** The rate varies depending on the amount of electrical activity occurring in the sinoatrial node. If several impulses are blocked, the rate may be bradycardic.
- ***P wave morphology:*** Uniform in appearance, positive (upright) in lead II when present; one P wave precedes each QRS complex.
- ***PR interval:*** The PR interval measurement is between the normal limits of 0.12 and 0.20 second and is constant from beat to beat.

Figure 6-6 Sinus exit block. As shown here, the difference between this rhythm and sinus arrest is that the measured R-R interval is a direct ratio of the P-P interval. In this case, the ratio is 3:1.

- ***QRS duration and morphology:*** The QRS duration measurement is between the normal limits of 0.06 and 0.10 second. Each QRS duration and its morphology are the same, without any variations from QRS complex to complex.
- ***Length of pause:*** The length of pause and the R-R interval need to be measured to determine how long the heart had no rhythm and the ratio between the pause and the R-R interval. Measure the R-R interval and then measure the pause by placing the calipers on the R-R interval around the pause. Once the time frame is determined, calculate the length of time for the pause by multiplying the number of boxes by 0.04 second. In addition, determine if the P-P interval and the R-R interval occur in a direct ratio. Frequency of pauses must be noted because the more frequent the pauses, the more urgent the situation.

Interpret-TIP

Sinus Exit Block

Measure the R-R interval of the pause and it will be a direct multiple or ratio of the P-P interval.

How the Patient Is Affected and What You Should Know

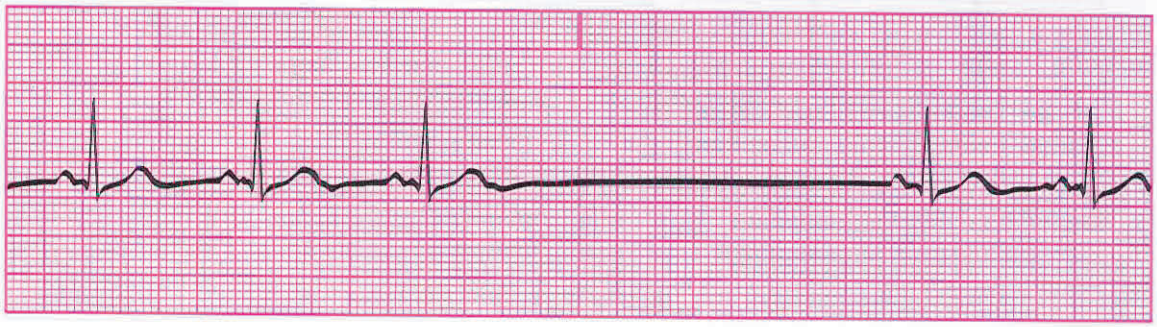
The seriousness of sinus exit block depends on the length and the frequency of the pause. If the episodes are transient and there are no significant signs or symptoms, the patient should be observed. If episodes of SA block are frequent and/or accompanied by a slow heart rate, the patient may show signs of low cardiac output, including hypotension, chest pain, shortness of breath, or changes in mental status.

Sinus exit block may occur as a result of acute myocardial infarction, ischemia, or drugs such as digitalis or quinidine. If signs or symptoms of low cardiac output are seen and the cause of the block is from medication toxicity, the medication would be withheld. For frequent episodes of SA block, temporary pacing or insertion of a permanent pacemaker may be needed.

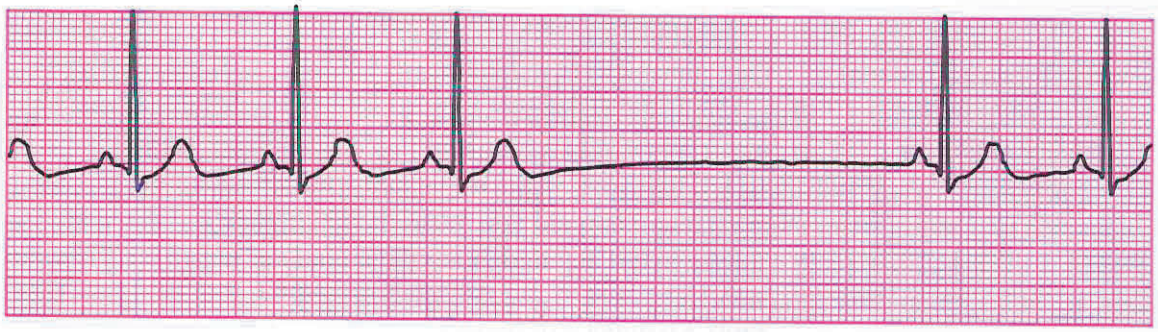
Checkpoint Question (LO 6.6)

1. Using the criteria for classification, select the rhythm that most closely resembles sinus exit block.

A.



B.



Which distinguishing feature(s) led you to make the selection?

Chapter Summary

Learning Outcomes	Summary	Pages
6.1 Analyze normal sinus rhythm and its effect on the patient, including basic patient care and treatment.	Normal sinus rhythm is the result of a normally functioning electrical conduction system and requires no specialized patient care or treatment.	143–146
6.2 Identify sinus bradycardia and its effect on the patient, including basic patient care and treatment.	Sinus bradycardia is a rhythm of less than 60 beats per minute, with electrical activity originating in the SA node. The other four criteria are within normal limits.	146–148

(Continued)

Learning Outcomes	Summary	Pages
6.3 Identify sinus tachycardia and its effect on the patient, including basic patient care and treatment.	Sinus tachycardia is a rhythm of greater than 100 beats per minute, with electrical activity originating in the SA node. The other four criteria are within normal limits.	**148–150**
6.4 Identify sinus dysrhythmia and its effect on the patient, including basic patient care and treatment.	Sinus dysrhythmia is a condition in which the heart rate remains within normal limits but is influenced by the respiratory cycle and variations of vagal tone, causing the rhythm to be irregular. The other four criteria are within normal limits.	**150–151**
6.5 Identify sinus arrest and its effect on the patient, including basic patient care and treatment.	Sinus arrest occurs when the SA node stops firing; this creates a pause in electrical activity, causing the rhythm to be irregular. The length of the pause may cause the heart rate to be less than 60 beats per minute. Otherwise, the other criteria are within normal limits.	**152–154**
6.6 Analyze sinus exit block and its effect on the patient, including basic patient care and treatment.	Sinus exit block occurs when the SA node fires normally, but the impulse is blocked, so no ventricular response occurs. The duration of the pause is an exact multiple or ratio of the R-R or P-P interval.	**154–156**

Chapter Review

Matching

Match the terms related to rhythm strip interpretation on the left with their definitions on the right.

_____ **1.** heart rate less than 60 bpm (LO 6-1)

_____ **2.** the amount of blood being pumped by the heart in 1 minute (LO 6-1)

_____ **3.** low blood pressure (LO 6-4)

_____ **4.** lack of blood supply may lead to (LO 6-4)

_____ **5.** no electrical current through cardiac conduction system (LO 6-1)

_____ **6.** irregular heartbeats felt by the patient (LO 6-2)

_____ **7.** loss of consciousness (fainting) (LO 6-4)

_____ **8.** heart rate greater than 100 bpm (LO 6-1)

_____ **9.** tension on a nerve, causing changes in heart rate (LO 6-4)

a. vagal tone
b. bradycardia
c. tachycardia
d. cardiac output
e. hypotension
f. palpitations
g. asystole
h. syncope
i. ischemia

Multiple Choice

Select the correct answer.

10. What is the rate of a normal sinus rhythm? (LO 6.1)
a. 60 to 100 beats per minute
b. 50 to 90 beats per minute
c. 100 to 150 beats per minute
d. 60 to 80 beats per minute

11. Which sinus rhythm has a rate that is consistently less than 60 beats per minute? (LO 6.2)
    a. Sinus tachycardia
    b. Sinus bradycardia
    c. Sinus dysrhythmia
    d. Sinus arrest

12. Which sinus rhythm has a rate of more than 100 beats per minute? (LO 6.3)
    a. Sinus tachycardia
    b. Sinus bradycardia
    c. Sinus dysrhythmia
    d. Sinus arrest

13. Which rhythm shows an irregularity during inspiration and expiration? (LO 6.4)
    a. Sinus tachycardia
    b. Sinus bradycardia
    c. Sinus dysrhythmia
    d. Sinus arrest

14. Which of the following is a common sign of low cardiac output? (LO 6.1)
    a. High blood pressure
    b. Alert and oriented
    c. Increased perfusion of vital organs
    d. Low blood pressure

15. Which of the following may be a cause of sinus exit block? (LO 6.6)
    a. Hypertension
    b. Low cardiac output
    c. Digitalis
    d. Sinus bradycardia

Fill in the Blank

16. Sinus tachycardia may be a normal finding in a patient as a result of _____. (LO 6.3)

17. When sinus arrest continues for 6 seconds or more, it is considered _____. (LO 6.5)

18. The rhythm originating in the sinoatrial node that is considered normal is _____. (LO 6.1)

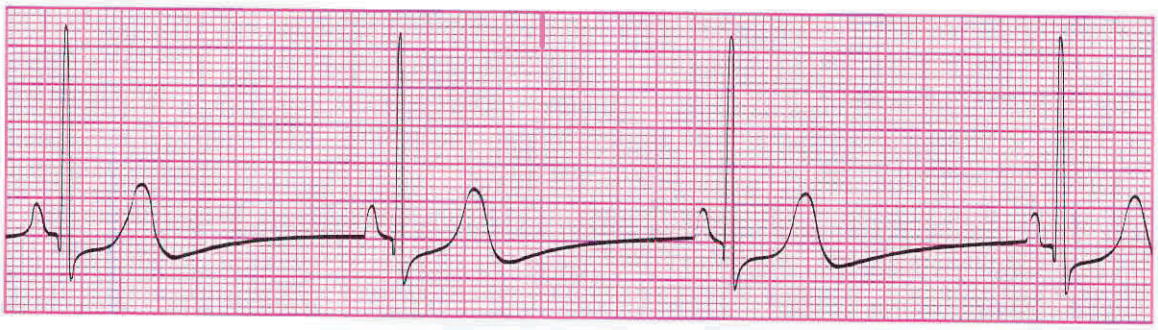
19. The rhythms originating in the sinoatrial node that result in the heart beating regularly, but slower or faster than normal are _____ and _____. (LO 6.2, 6.3)

20. The rhythm originating in the sinoatrial node that is affected by vagal tone is _____. (LO 6.4)

Critical Thinking Application *Rhythm Identification*

Review the dysrhythmias pictured here and, using the criteria for classification provided in the chapter as clues, identify each rhythm and explain what criteria you used to make your decision. (LO 6.1 to 6.6)

21.



Rhythm (regular or irregular): _____ PR interval: _____

Rate: _____ QRS: _____

P wave: _____ Interpretation: _____

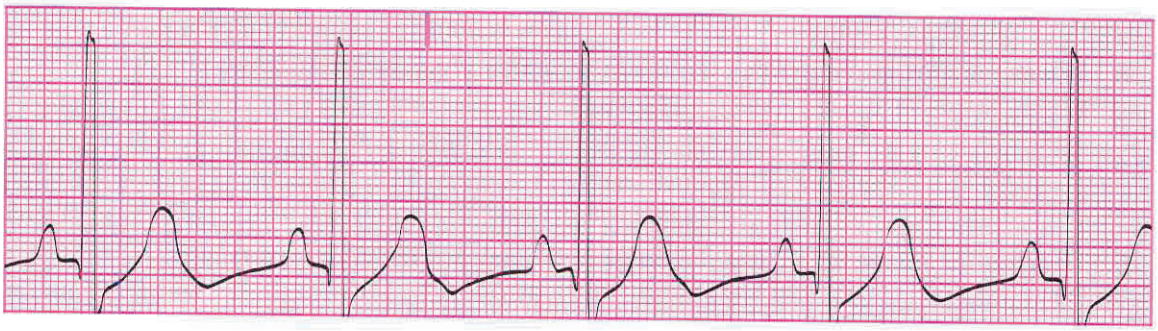
22.

Rhythm (regular or irregular): _____ PR interval: _____

Rate: _____ QRS: _____

P wave: _____ Interpretation: _____

23.

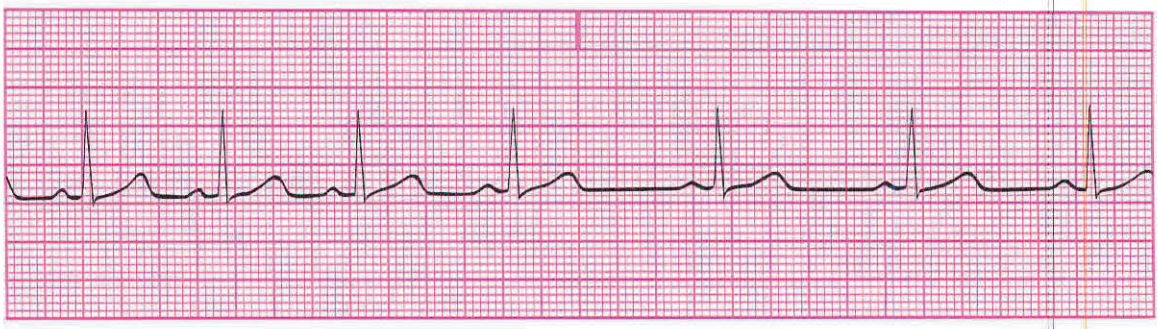


Rhythm (regular or irregular): _____ PR interval: _____

Rate: _____ QRS: _____

P wave: _____ Interpretation: _____

24.



Rhythm (regular or irregular): _____ PR interval: _____

Rate: _____ QRS: _____

P wave: _____ Interpretation: _____

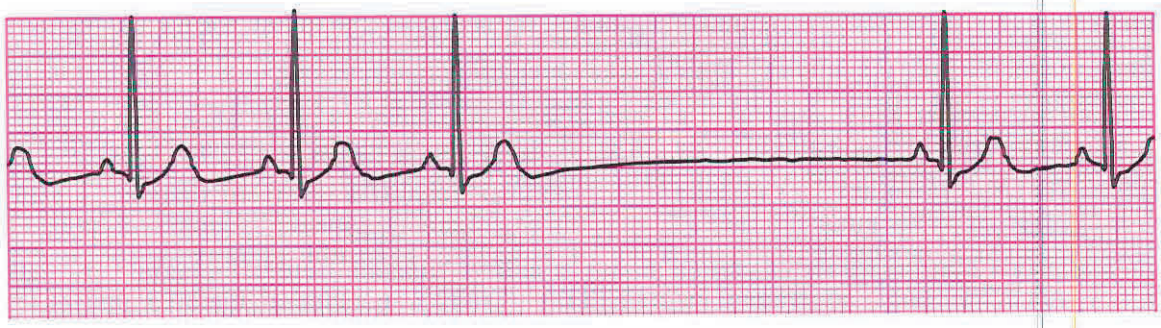
25.

Rhythm (regular or irregular): _____ PR interval: _____

Rate: _____ QRS: _____

P wave: _____ Interpretation: _____

26.

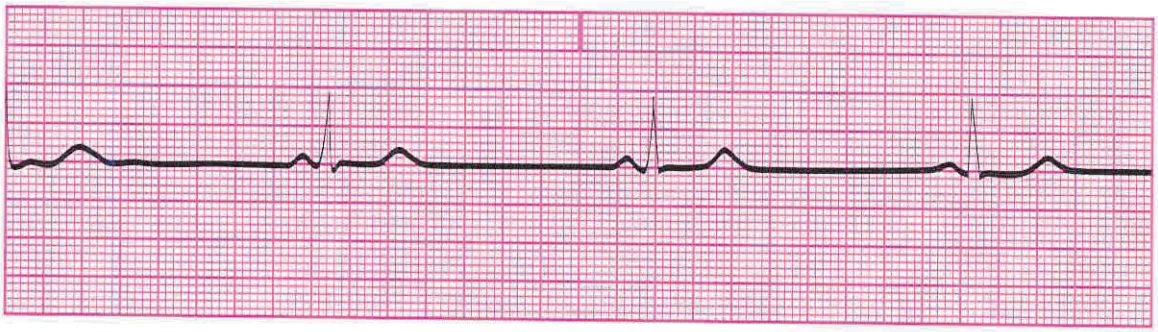


Rhythm (regular or irregular): _____ PR interval: _____

Rate: _____ QRS: _____

P wave: _____ Interpretation: _____

27.

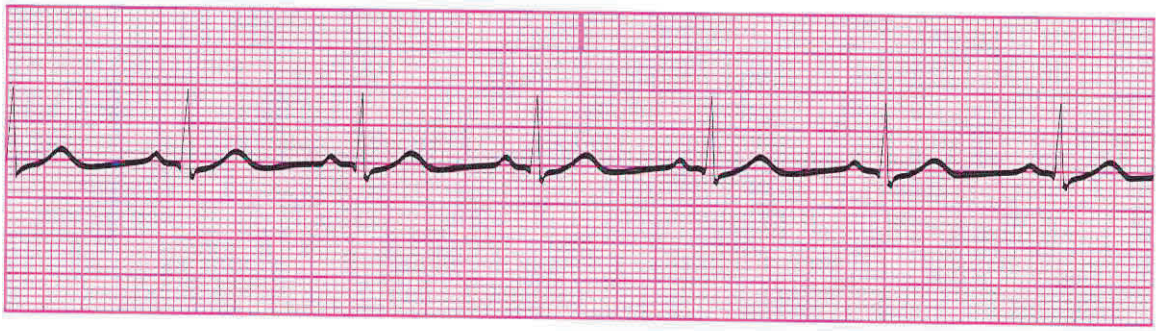


Rhythm (regular or irregular): _____ PR interval: _____

Rate: _____ QRS: _____

P wave: _____ Interpretation: _____

28.



Rhythm (regular or irregular): _____ PR interval: _____

Rate: _____ QRS: _____

P wave: _____ Interpretation: _____

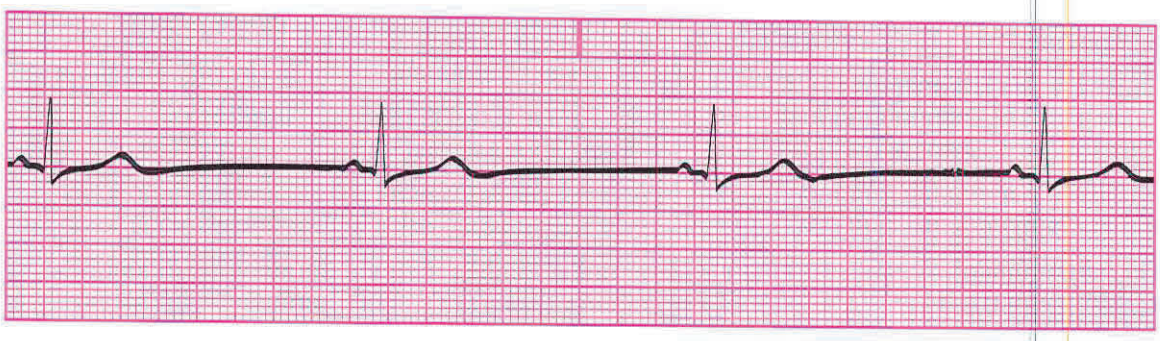
29.

Rhythm (regular or irregular): _____ PR interval: _____

Rate: _____ QRS: _____

P wave: _____ Interpretation: _____

30.



Rhythm (regular or irregular): _____ PR interval: _____

Rate: _____ QRS: _____

P wave: _____ Interpretation: _____

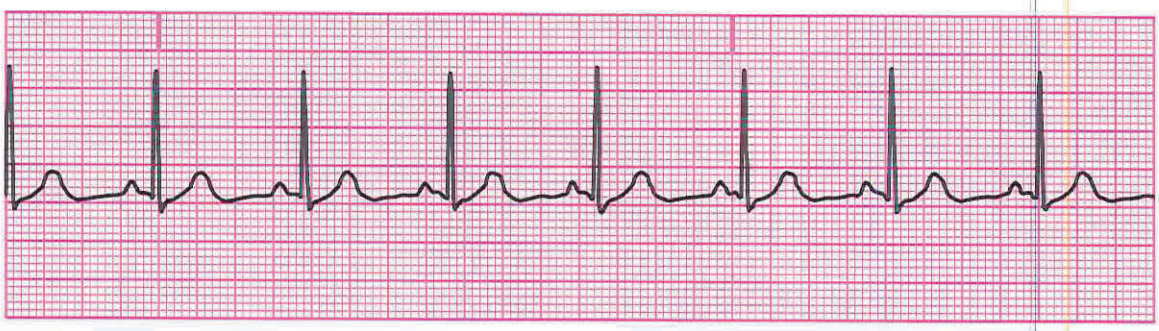
31.

Rhythm (regular or irregular): _____ PR interval: _____

Rate: _____ QRS: _____

P wave: _____ Interpretation: _____

32.



Rhythm (regular or irregular): _____ PR interval: _____

Rate: _____ QRS: _____

P wave: _____ Interpretation: _____

33.

Rhythm (regular or irregular): _____ PR interval: _____

Rate: _____ QRS: _____

P wave: _____ Interpretation: _____

Now that you have completed the material in the textbook, go to Connect and complete any chapter activities you have not yet done.