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The Pre-Live Modules are carefully designed to help you prepare for the 35-day Boot Camp and/or the 10-Day Live Course. They are designed to help you refresh your basic concepts that were commonly asked in the actual NCLEX for the last 3-6 months. The modules are very crucial to your NCLEX success! According to our own study, 98.38% of Rachell Allen students who really studied the modules performed better than those who did not pay much attention to the modules prior to attending the 10-Day Comprehensive Live Course.

Since you are getting the modules for free, let us make it a habit to say "Thank You". A grateful heart attracts success, brilliance and abundance!

Happy Learning!

- The Rachell Allen Success Team

MODULE 8

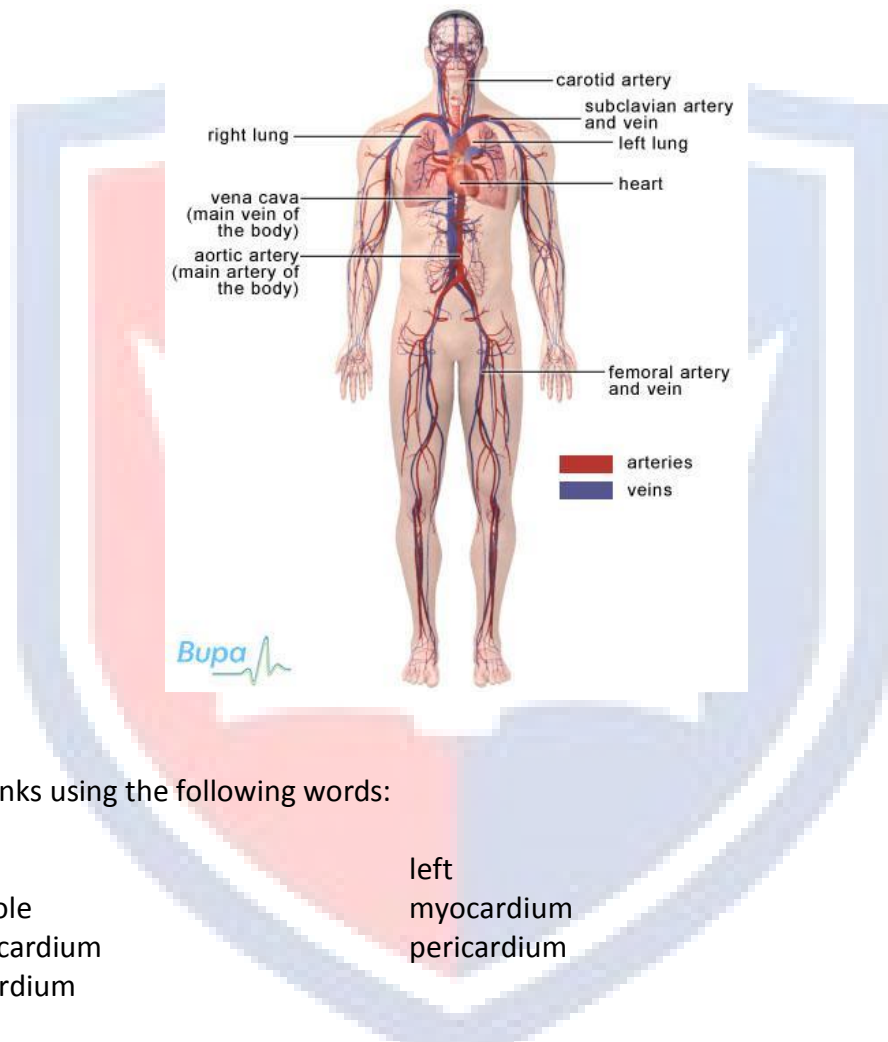
Cardiovascular System

"If you don't go after what you want, you'll never have it. If you don't ask, the answer is always no. If you don't step forward, you're always in the same place."

~ Nora Roberts

Review of Anatomy and Physiology

The cardiovascular system consists of the heart and blood vessels (arteries, veins, and capillaries). It delivers oxygen and nutrients to the tissues and carries waste products to the organs responsible for elimination. The arteries carry blood from the heart to the rest of the body, and the veins carry blood back to the heart.



The Heart

Fill in the blanks using the following words:

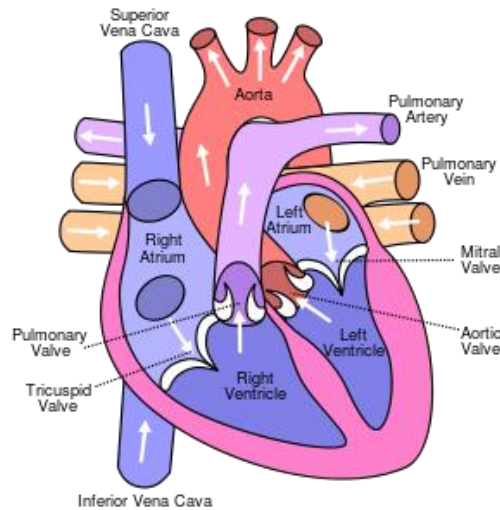
atria
diastole
endocardium
epicardium

left
myocardium
pericardium

right
systole
ventricles

The heart is composed of specialized tissue that contracts and relaxes in a coordinated fashion. The outer surface of the heart is known as the 1. _____. The 2. _____ is the inner surface of the heart that comes in contact with blood, and the heart muscle itself is the 3. _____. The 4. _____ is a thin, fibrous sac that surrounds the heart's surface and serves as protection.

Contraction of the heart muscle is referred to as 5. _____, while relaxation of the heart muscle is referred to as 6. _____. The chambers of the heart are 7. _____ and the 8. _____. The 9. _____ ventricle provides blood to the entire body, therefore, its wall is thicker than that of the 10. _____ ventricle.



The Heart Valves

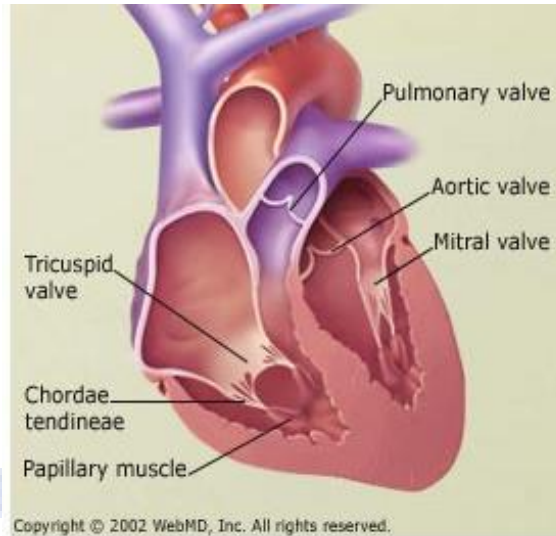
Match the valves with the correct anatomic location:

Column A

1. ___ Located between the right ventricle and the pulmonary artery.
2. ___ Located between the left ventricle and the aorta
3. ___ Located between the right atrium and the right ventricle
4. ___ Located between the left atrium and the left ventricle

Column B

- A. aortic valve
- B. mitral valve
- C. pulmonary valve
- D. tricuspid valve



The Electrical Conduction Pathway of the Heart

Specialized cells in the heart conduct electrical impulses to myocardial cells, resulting in contraction. The **sinoatrial node** initiates impulses that are conducted along the myocardial cells to the **atrioventricular node**. The impulse then travels through specialized fibers called the **bundle of His** and terminates in the **Purkinje's fibers**, resulting in **systole** (contraction).

Arrange the following parts of the heart in order of the conduction pathway of the heart, and then fill in the blanks.

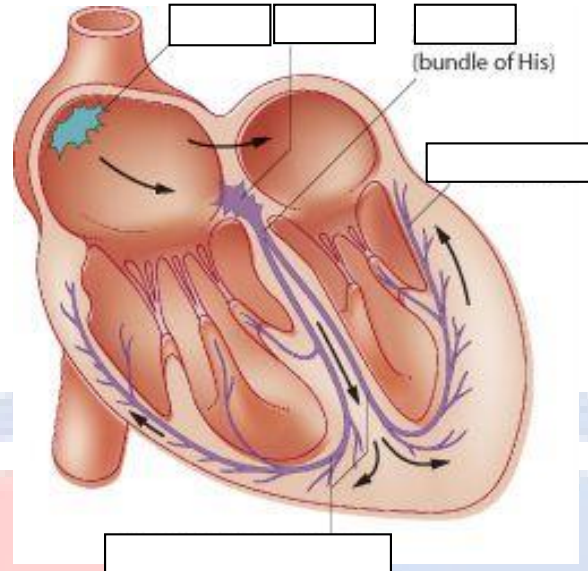
40-60
60-100

atrioventricular node
bundle of His

Purkinje's fibers
sinoatrial node

The 1. _____ is known as the pacemaker of the heart and has an intrinsic rate of 2. _____ beats per minute. The 3. _____ has an intrinsic rate of 4. _____ beats per minute. The 5. _____ are specialized muscle fibers in the septum carrying the impulse to the 6. _____, where it terminates, resulting in contraction of the muscle.

ELECTRICAL CONDUCTION PATHWAY OF THE HEART



The Cardiac Cycle

The heart has an anatomic and physiologic pump cycle. Match the parts of the cardiac cycle below with the correct description.

Column A

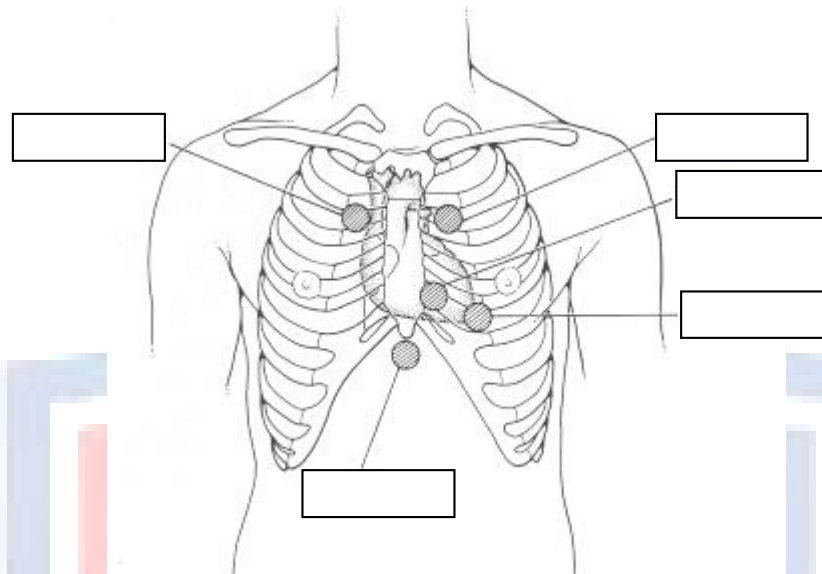
1. ___ Amount of blood ejected in a heartbeat
2. ___ Atrioventricular valves open, returning blood from veins to the atria and the ventricles; ventricles are relaxed
3. ___ Atrioventricular valves close and ventricle contracts.
4. ___ Measure of myocardial contractility, percentage of blood emptied from the ventricle during contraction.
5. ___ End diastolic ventricular volume.
6. ___ Tension in the ventricular wall during contraction.
7. ___ The inside of myocardial cells becomes less negative and contraction of the myocardium occurs.
8. ___ The inside of myocardial cells becomes more negative and relaxation of the myocardium occurs.
9. ___ Amount of blood pumped by ventricle during a time period; equals stroke volume x heart rate

Column B

- A. Afterload
- B. Cardiac output
- C. Depolarization
- D. Diastole
- E. Ejection fraction
- F. Preload
- G. Repolarization
- H. Stroke volume
- I. Systole

Cardiovascular History and Assessment

Identify the areas of inspection and palpation of the chest during the physical assessment.



HEART SOUNDS

Heart sounds are produced by the closure of the **heart valves**. Assign the following heart sounds to the appropriate description:

Column A

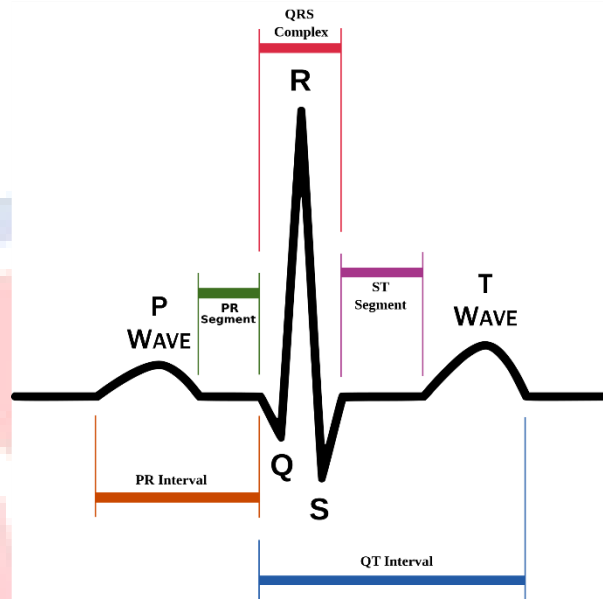
1. ___ Heart during rapid ventricular filling and can be a normal finding in young children; often associated with congestive heart failure and failure of ventricles to eject blood
2. ___ Heard over mitral area; created by closure of the mitral and tricuspid valves
3. ___ Heard during atrial contractions and often associated with ventricular hypertrophy and resistance to filling; also associated with coronary artery disease, hypertension, aortic stenosis
4. ___ Heard at the base of the heart; created by the closure of the aortic and pulmonic valves
5. ___ Created by the flow of blood through narrow valves or incomplete closure of valves resulting in prolonged sounds
6. ___ Transient sounds during systole and diastole, associated with an impedance to blood flow
7. ___ Caused by the abrasion of pericardial surfaces secondary to inflammation

Column B

- A. Friction rubs
- B. gallops
- C. murmurs
- D. S1
- E. S2
- F. S3
- G. S4

ELECTROCARDIOGRAMS

An **electrocardiogram** (E.C.G.) is the visual representation of the heart's conduction system (electrical activity). It is particularly useful in identifying disturbances in the rate and rhythm of the heart, electrolyte imbalances, the presence of myocardial ischemia or infarction, enlargement of heart chambers, and conduction problems.



Match the waves and segments to the appropriate statements below:

- _____ Second negative deflection after the P wave
- _____ First negative deflection after the P wave
- _____ First positive deflection after the P wave
- _____ Represents the impulse travelling from the atria through the conduction system
- _____ Represents early ventricular repolarization
- _____ Represents ventricular muscle repolarization
- _____ Represents atrial depolarization
- _____ Represents ventricular depolarization

List three sinus rhythms of the heart:

- _____
- _____
- _____

List three common atrial rhythms of the heart:

- _____
- _____
- _____

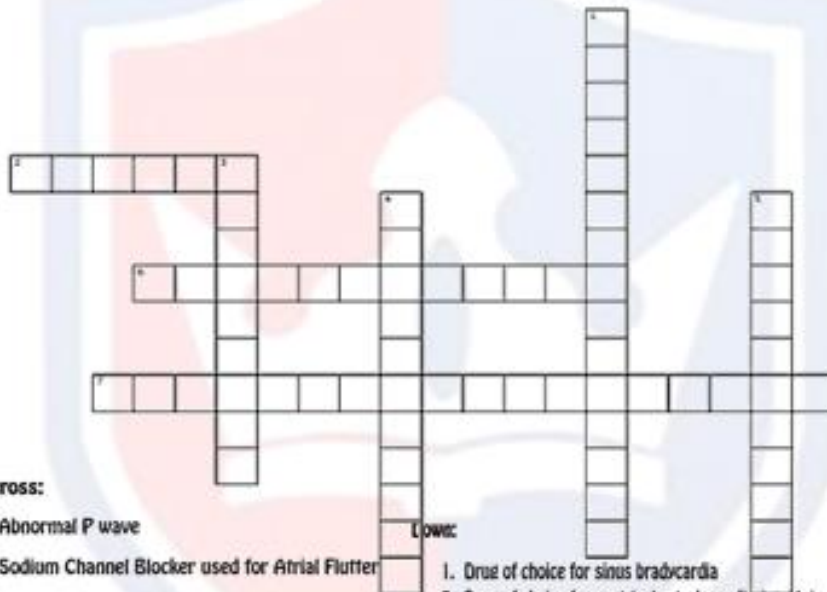
List three common ventricular rhythms of the heart

1. _____
2. _____
3. _____



Identify different ECG readings and interventions by completing the puzzle below.

EASY G!



Across:

2. Abnormal P wave
6. Sodium Channel Blocker used for Atrial Flutter
7. Chaotic P waves (quivering aorta)
8. normal P wave

1. Drug of choice for sinus bradycardia
3. Drug of choice for ventricular tachycardia (stable)
4. Abnormal P wave and abnormal QRS (stable, not normal, bizarre)
5. Management for ventricular tachycardia (unstable)



Identify what kind of heart rhythm is shown below by looking at the pictures for clues.

**Guess!
What!**

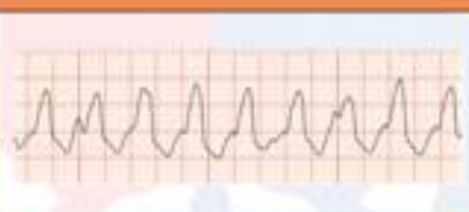


____ N ____ R ____ A ____
____ I ____ RI ____ A ____ O ____

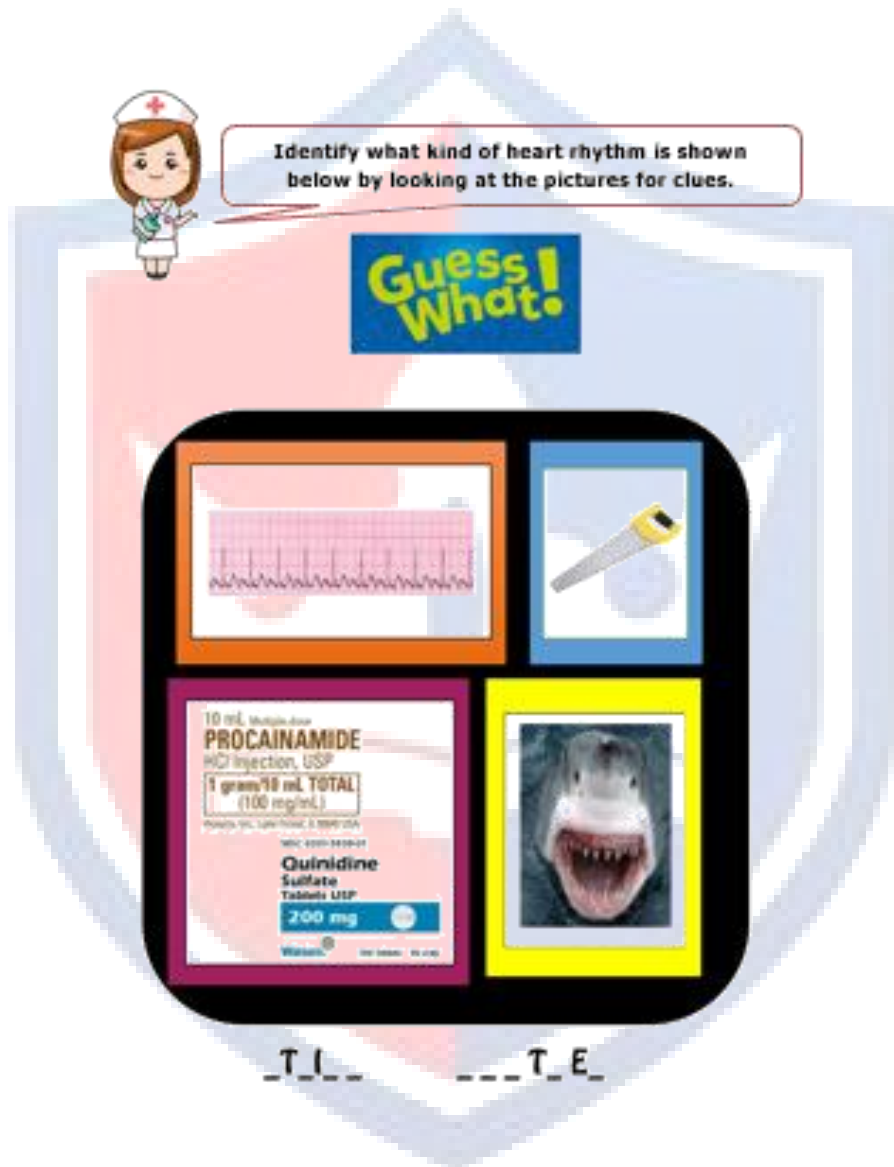


Identify what kind of heart rhythm is shown below by looking at the pictures for clues.

**Guess!
What!**



__EN__ IC __A__
T__C__YC__R__



CARDIAC CATHETERIZATION

A **cardiac catheterization** is a diagnostic procedure performed by a physician and is used to determine specific areas of disease in the heart. By threading a catheter through an artery into the heart, the physician is able to visualize the coronary arteries, valves, and great vessels of the heart. The NCLEX-RN examiners love questions regarding this test because of the large role a nurse plays in preventing complications that may arise from this procedure.

Nursing considerations for the client undergoing cardiac catheterization or angiography include the following (circle one or more correct answers):

1. The client must be NPO at least (4 hours, 8 hours, 12 hours, 24 hours) prior to the procedure.
2. Prepare the client for sensations such as (cold, heat, palpitations, numbness) when contrast medium to the heart via the catheter.
3. Teach the client of possible entry sites for cardiac catheterization such as the (carotid artery, femoral artery, radial artery, brachial artery).
4. Assess the client for (numbness, sensation, pulses, bleeding) in the affected extremity every 15 minutes for 1 to 2 hours following the procedure.
5. Report to the provider immediately complaints of (chest pain; numbness/tingling of extremity; tachycardia; pain at site; a warm, wet feeling at the site that could signal bleeding).

DISORDERS OF THE CARDIOVASCULAR SYSTEM

ANGINA

Angina is **pain** resulting from ischemia (decreased blood supply to the heart muscle). It is characterized by substernal (sub- = below) or retrosternal (retro- = behind) pain that can radiate to the inside of one or both arms, the neck and jaws. Angina is usually described as squeezing, heavy discomfort or pressure which is precipitated by an event such as emotion, exertion, cold or eating. Angina usually lasts a few minutes and then subsides. It is often relieved with sublingual nitroglycerine.

MYOCARDIAL INFARCTION

The heart requires its own constant supply of oxygen and nutrients, like any muscle in the body. Two large, branching coronary arteries deliver oxygenated blood to the heart muscle. If one of these arteries or branches becomes blocked suddenly, a portion of the heart is starved of oxygen, a condition called "cardiac ischemia."

If cardiac ischemia lasts too long, the starved heart tissue dies. This is a heart attack, otherwise known as a myocardial infarction -- literally, "death of heart muscle."

Most heart attacks occur during several hours -- so never wait to seek help if you think a heart attack is beginning. In some cases there are no symptoms at all, but most heart attacks produce some chest pain.

Other signs of a heart attack include shortness of breath, dizziness, faintness, or nausea. The pain of a severe heart attack has been likened to a giant fist enclosing and squeezing the heart. If the attack is mild, it may be mistaken for heartburn. The pain may be constant or intermittent. Also, women are less likely to experience the classic symptoms of chest pain as compared to men. Pain from myocardial infarction is usually not relieved by sublingual nitroglycerin. Intravenous nitroglycerin and/or morphine sulfate is usually given for the pain.

List four common complications of myocardial infarction:

1. _____
2. _____
3. _____
4. _____





Which of the following are true regarding manifestations/management of heart attack?

BINGO TIME!

HEART ATTACK!		
BLUNT PAIN	NAGGING PAIN	RELIEVED BY REST
NALOXONE	LEVINE'S PAIN	AMBULATE
OXYGEN	MORPHINE	ANTIPLATELET

Mark all that apply. 😊



Which of the following are applicable interventions for heart attack?

BINGO TIME!

ANGINA!

HAIRY CHEST	INTRAVENOUS	MORPHINE
NON HAIRY CHEST	TRANSDERMAL PATCH	12 MONTHS ALLOWANCE
INTRAVENOUS	SUBLINGUAL	6 MONTHS ALLOWANCE

myfreebingocards.com

Mark all that apply. 😊



Below are signs of right-sided heart failure.
Unscramble each of the clue words to reveal the
answer.

Below are signs of right-sided heart failure. Unscramble each of the clue words to reveal the answer.

_____ neck veins	SIEDEONDT	<input type="text"/>
_____ neck vein distention	RUJUGL	<input type="text"/>
_____	TESCAIS	<input type="text"/>
_____ in ICP	INSEACER	<input type="text"/>
_____	TAEGAHYAPOL	<input type="text"/>
_____	NOGESMALPYL	<input type="text"/>
_____	EDAEW	<input type="text"/>
Weight _____	NIGA	<input type="text"/>
Nocturia	RDUONTA	<input type="text"/>
In right-sided heart failure, there is backflow of blood to the _____ of the body.		<input type="text"/>

This Pre-five module is only intended as supplementary material to the 30-day NCLEX Boot Camp and the 30-day Live Course.
(Copy the letters in the numbered cells to other cells with the same number to know the answer.)

2018-ARD-Rachael Allen

Digoxin Therapy

Digoxin is a cardiac glycoside, antiarrhythmic-agent used in the treatment of congestive heart failure and tachyarrhythmias (atrial fibrillation, atrial flutter, paroxysmal atrial tachycardia). Digoxin increases cardiac output and slows the heart rate. Nursing considerations in managing the client undergoing **digoxin therapy** include correct administration and monitoring the patient for toxicity. The apical pulse should be monitored for one full minute. Withhold dose and notify physician if pulse is < 60.

List four signs and symptoms of digoxin toxicity:

- | | |
|----------|----------|
| A. _____ | D. _____ |
| B. _____ | E. _____ |

In order to prevent toxicity in digoxin therapy, the nurse must assess for what 3 things?

- A. _____
 B. _____
 C. _____

Digoxin **INCREASES** or **DECREASES** the following:

- | | |
|----------|--------------------------|
| A. _____ | cardiac output |
| B. _____ | heart rate |
| C. _____ | venous pressure |
| D. _____ | myocardial contractility |

Vasodilator Therapy

Vasodilator therapy is important in the management of the client with congestive heart failure. Commonly used drugs include nitroglycerin and sodium nitroprusside (Nipride). These vasodilators reduce or increase specific functions of the heart.

Vasodilator therapy **reduces** or **increases** the following:

- | | |
|----------|---|
| A. _____ | resistance to left ventricular ejection |
| B. _____ | venous capacity |
| C. _____ | left ventricular filling pressure |
| D. _____ | pulmonary congestion |

CARDIOGENIC SHOCK

Cardiogenic shock occurs when the heart loses its contractile ability, resulting in inadequate tissue perfusion to the vital organs. Cardiogenic shock is the end stage of heart failure when the left ventricle is severely damaged (often due to myocardial infarction). It has also been associated with cardiac tamponade and pulmonary embolism. Cardiogenic shock is a life-threatening situation in which the nurse must carefully and continually assess the client's hemodynamic status.

Identify the following characteristics associated with cardiogenic shock as **true** or **false**:

- | | |
|-----------------------------|--------------------------------|
| 1. ____ High blood pressure | 6. ____ Dysrhythmias |
| 2. ____ Low blood pressure | 7. ____ Hypoxia |
| 3. ____ Rapid pulse | 8. ____ Reduced cardiac output |
| 4. ____ Bounding pulse | 9. ____ Reduced urine output |
| 5. ____ Confusion | |

The damage to the myocardial tissue in cardiogenic shock greatly reduces the heart's ability to act as a pump, thereby reducing cardiac output, arterial blood pressure, and coronary artery flow. This condition is manifested by low blood pressure, rapid weak pulse, decreased urine output, and hypoxia. It continues in a cyclic manner and often leads to death if not immediately treated.

OTHER INFECTIONS AND DISORDERS OF THE CARDIOVASCULAR SYSTEM

There are certain disorders you should recognize for the NCLEX-RN. The purpose of this matching is to get you to use the information provided to choose the best answer. Match the following cardiac infections (-itis) and disorders with the appropriate description:

- | | |
|--|---------------------------|
| 1. ____ An infection of the valves and endothelial surface of the heart; a direct invasion of bacteria or other organism leading to deformity of the leaflet valves | A. Aortic insufficiency |
| 2. ____ Heart damage not infectious in origin; response to streptococcal infection usually seen with polyarthrititis; results in formation of nodules that eventually lead to scarring | B. Cardiomyopathy |
| 3. ____ Caused by inflammatory lesions deforming flaps of the valve resulting in incomplete closure, allowing back flow of blood from the aorta into the left ventricle | C. Infective endocarditis |
| 4. ____ Causes high pulmonary arterial pressures resulting from incomplete emptying of left atrium; progressive thickening of valve cusps results, causing obstruction | D. Mitral stenosis |
| 5. ____ Disease of the muscle either from unknown etiology or from a systematic disorder; leads to severe heart failure and often death. | E. Pericarditis |
| 6. ____ Pain most common characteristics, often accompanied by friction rub; refers to inflammation of the membranous sac protecting the heart | F. Rheumatic endocarditis |



How about a venous problem? Encircle manifestations of a venous disorder.

Venous Disorder

Cool to touch	Heavy & aching	Swelling
warm to touch	Intermittent claudication	Absent pulses
Brownish discoloration	Pallor	Bounding pulses

A client is diagnosed with deep vein thrombosis (DVT). Find the risk factors for DVT in the puzzle.



P Z G X Y P H K Z F O P N C L
 L R V C H D W X Z N Y A Y W F
 C E E V J S L V G R S U Z N Y
 F O M G H R A S E X F O V T M
 P N K J N S C G A Y X T O W U
 R L N I Z A R D S O X T A J Q
 R A D A M U N M Y B N O Z M G
 R F L S S P O C S E G J Q X X
 B R O T Y K B S Y S Y V S X S
 M D S X I M E H B I S L L I P
 K O N N C H A X G T Z N Z Q F
 P Y G O R F A P E Y Z W Q L J
 J H J G H E Z V E V L P A E R
 A P I N A C T I V I T Y D Y Y
 S H G Z X B D E J B O Z Y P J

INACTIVITY

OBESITY

PILLS

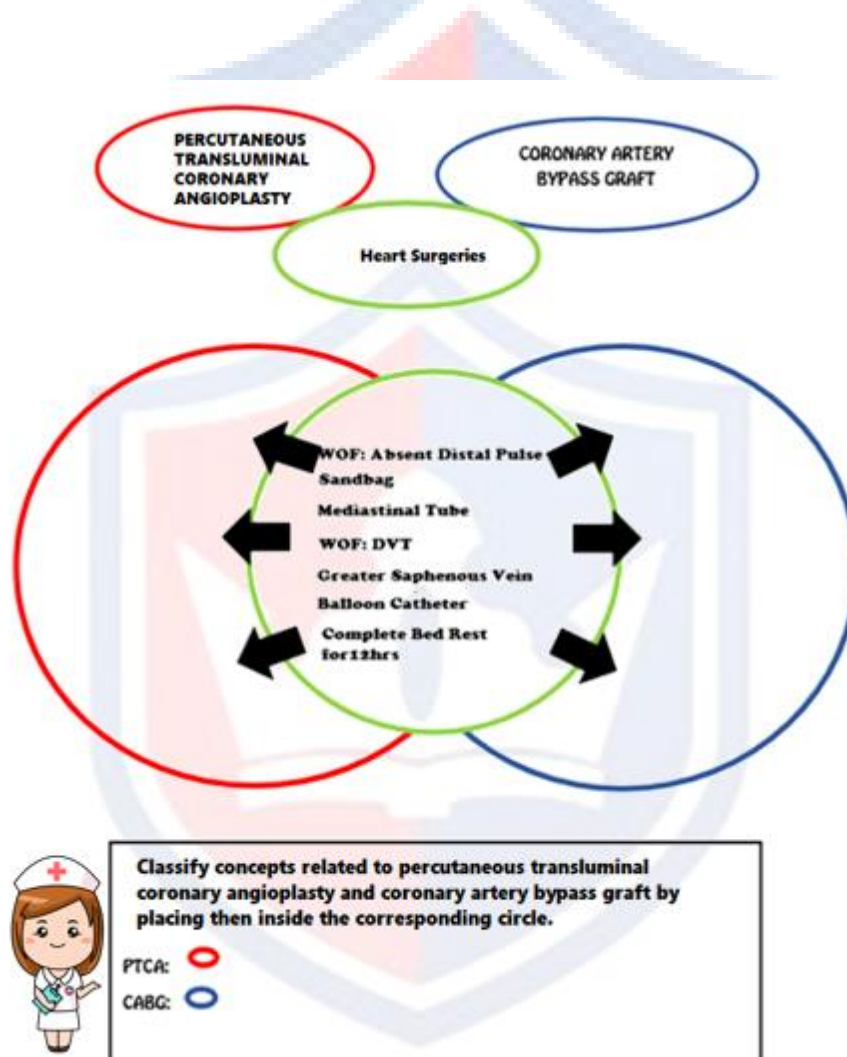
POSTSURGERY

FREQUENCY

SMOKING

NUTRITION AND THE PREVENTION OF HEART DISEASE

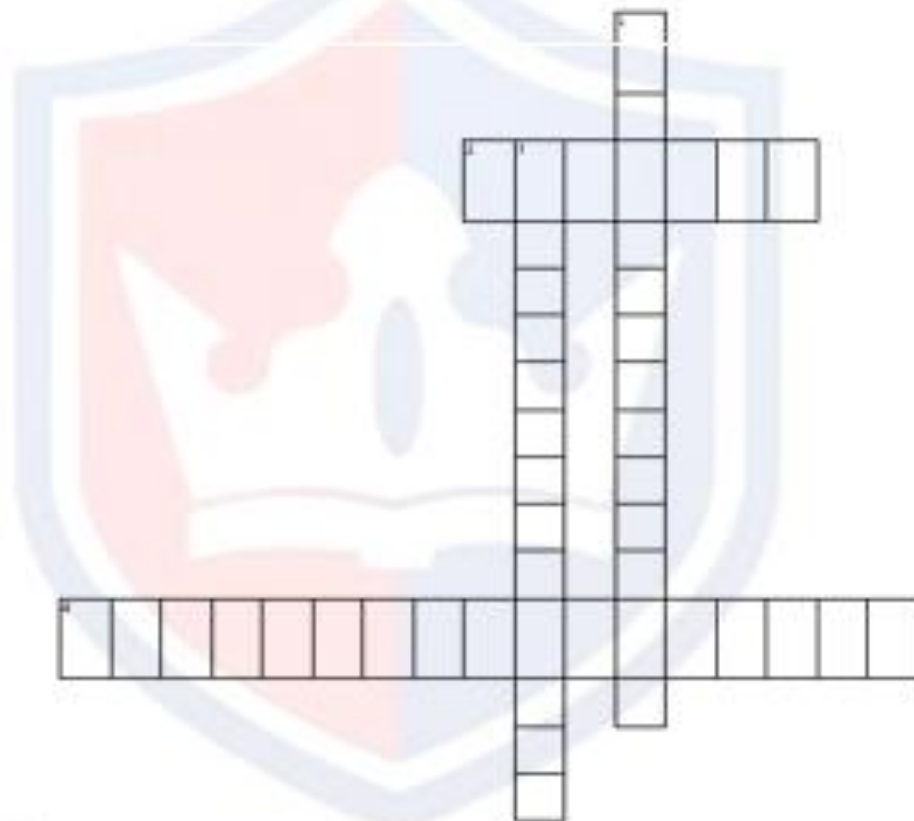
Since nutrition plays such a large role in the prevention of heart disease, education is the key. Primary goals include limiting total fat calories to less than 30 percent of total dietary intake, and limiting saturated fat calories to less than 10 percent of total dietary intake. Cholesterol intake should be less than 300 mg/day. Secondary goals include decreasing saturated fat intake to less than 7 percent/day and cholesterol intake to less than 200 mg/day. Clients should be taught to read labels in the grocery store. All clients with existing heart disease should have a consultation with a nutritionist who can instruct them on the proper diet restrictions to prevent progression of heart disease. Low sodium (2-3 grams) low fat, and low cholesterol are the three major dietary restrictions of which nurses should be aware.





Patient ABC is admitted with a diagnosis of the abdominal aortic aneurysm (AAA). The nurse anticipates that the following medications may be prescribed to the client:

AAA Medications



Across

- 2. to lower down cholesterol
- 4. to decrease blood pressure

Down

- 1. to prevent clot formation
- 3. to dissolve the clot

NCLEX-RN STYLE QUESTIONS

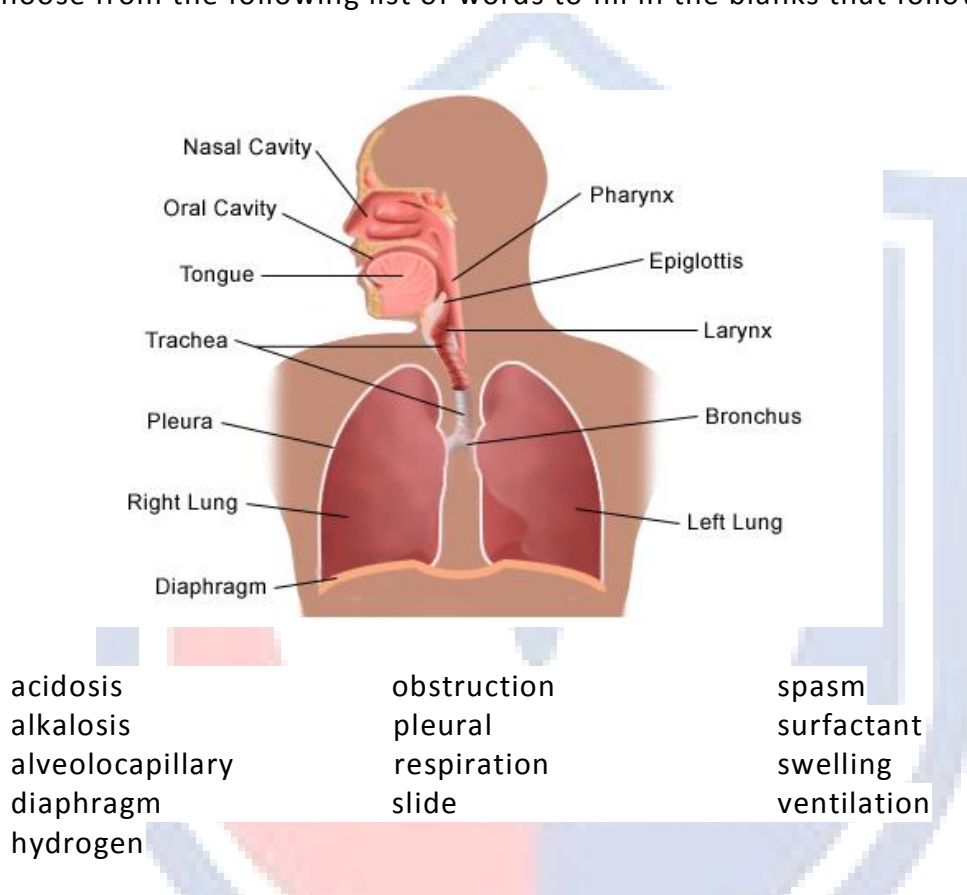
1. A client with congestive heart failure (CHF) has gained 7 pounds since yesterday. In assessing this situation, it would be important for the nurse to	<ul style="list-style-type: none"> (1) asks the client if he or she needs the backrest higher to breathe comfortably (2) check the client's 24-hour intake-output record for the past 2 days (3) auscultate the lungs for a pericardial friction rub (4) examine the client's legs and sacral area
2. A client returns from a cardiac catheterization with a bandage over the right groin. An unlicensed personnel (UP) assigned to the client reports that the client's right foot is cool to the touch. The first action of the nurse should be to	<ul style="list-style-type: none"> (1) check the foot every 15 minutes (2) call the provider and report the findings (3) loosen the bandage (4) check the client's groin
3. A client who is admitted with Addison's disease has hyponatremia. Signs and symptoms that the nurse would assess for include	<ul style="list-style-type: none"> (1) thirst and dry skin (2) weakness and weight gain (3) restlessness and abdominal cramps (4) tachycardia and headaches
4. The mother of a child who just returned from a cardiac catheterization asks the nurse why her son has to keep his leg straight for 4-6 hours. The nurse's response includes which of the following statements?	<ul style="list-style-type: none"> (1) "This will minimize pain and discomfort." (2) "This will facilitate healing of the vessel." (3) "This will promote adequate rest for the heart." (4) "This will maintain circulation."
5. A client who was hospitalized for congestive heart failure is getting ready to discharge on 40 mg furosemide (Lasix) once a day by mouth (PO). The nurse should include which of the following in the teaching plan?	<ul style="list-style-type: none"> (1) Signs and symptoms of hypertension (2) Signs and symptoms of hypokalemia (3) Advising client to go to the beach to be exposed to direct sunlight (4) Advising client to take Lasix before bed
6. The nurse knows that when assessing a client suspected of having a myocardial infarction it is most	<ul style="list-style-type: none"> (1) "What medications are you currently taking?" (2) "Have you ever had similar symptoms in the past?"

important to ask which of the following?	(3) "How long ago did these symptoms start?" (4) "Have you been under a lot of stress lately?"
7. Prior to administering morphine IV push to a client with chest pain, the nurse should	(1) evaluate the EKG (2) not administer the drug; it is outside the RN scope of practice (3) perform the Glasgow coma scale to evaluate neurologic status (4) check the blood pressure
8. A client discharged on digoxin (Lanoxin) 0.25 mg po daily. Which statement by the client would reflect an understanding of the discharge teaching?	(1) "I will notify the clinic if I experience increased urinary output." (2) "If I experience an increase in heart rate I will notify the clinic." (3) "I will notify the clinic if I experience nausea and vomiting." (4) "If I experience an increase in muscle strength, I will notify the clinic."
9. A client, with a history of congestive heart failure, is admitted to the hospital complaining of changes in vision, nausea, and vomiting. Stat diagnostic studies are ordered. The nurse expects which finding?	(1) Digoxin level of 2.2 ng/mL (2) Digoxin level of 0.5 ng/mL (3) Serum potassium of 5.5 mEq/L (4) Serum potassium of 2.0 mEq/L

Review of Anatomy and Physiology

You usually don't even notice it, but twelve to twenty times per minute, day after day, you breathe -- thanks to your body's respiratory system. Your [lungs](#) expand and contract, supplying life-sustaining oxygen to your body and removing from it, a waste product called [carbon dioxide](#).

Look at the following diagrams to refresh your knowledge of the respiratory system; then choose from the following list of words to fill in the blanks that follow.



The pleural membrane covers the lungs. The parietal pleura lines the thoracic cavity. Between these two layers is the pleural space, where a small amount of
 1. _____ fluid fills the space. This fluid allows the two layers to
 2. _____ over each other without separating. The major respiratory muscles are the 3. _____ and the external intercostal muscles.

The alveoli house the 4. _____ membrane, where oxygen enters the blood and carbon dioxide is removed from the blood. The type II alveolar cells secrete 5. _____, which coats the inner surface of the alveolus and aids in its expansion during inspiration.

6. _____ is the mechanical movement of gas or air into and out of the lungs (inspiration and expiration). 7. _____ is the exchange of oxygen and

carbon dioxide during cellular metabolism. The most common causes of airway resistance are 8. _____, _____, and _____.

Chemoreceptors monitor the pH, PO₂ and PCO₂ of arterial blood. They respond to changes in 9. _____ ion concentration. An increased concentration of hydrogen ions causes 10. _____. A decreased concentration of hydrogen ions causes 11. _____.

Assessment of the Respiratory System

ADVENTITIOUS BREATH SOUNDS

The significance of the different adventitious breath sounds is always included somewhere on the NCLEX-RN. We reviewed some of this in the chapters on the nervous and cardiovascular systems. The following exercises should give you more confidence in your ability to assess breath sounds. Match the following types of breath sounds with the correct description:

1. ____ Inflamed surface of the pleura rubbing together
2. ____ Caused by rapid vibration of bronchial walls (bronchospasm)
3. ____ Due to obstruction of the large airways with secretions
4. ____ Due to sudden opening of collapsed alveoli
5. ____ Due to air passing through airways intermittently occluded by mucus
6. ____ The usual breath sounds throughout the lungs
7. ____ Partial obstruction of larynx or trachea

A. coarse crackles (rales)

B. fine crackles (rales)

C. pleural friction rub

D. rhonchi

E. stridor

F. vesicular

G. wheezes

When documenting adventitious breath sounds, include where on the chest they were auscultated; whether they occurred on inspiration, expiration, or both, and if the breath sounds cleared with coughing or deep breathing.

RESPIRATORY PATTERNS

When assessing the respiratory system, it is important to note the client's pattern of respirations. The following exercise will increase your familiarity with the different patterns that may appear on the NCLEX-RN. Match the following breathing patterns with the correct definitions:

1. ___ Occurs as a result of disorders that stiffen the lungs or chest walls and decrease compliance
2. ___ Difficulty breathing, shortness of breath
3. ___ Characterized by slightly increased respiratory rate; often occurs with strenuous exercise and metabolic acidosis
4. ___ Position dyspnea; in the supine position, abdominal contents exert pressure on the diaphragm
5. ___ Respiration that exceeds metabolic demands; lungs remove carbon dioxide faster than it is being produced (low pCO₂; associated with severe anxiety and acute head injury)
6. ___ Cessation of respiration
7. ___ Alternating periods of deep and shallow breathing; apnea may last 15-60 seconds; results from any condition that slows blood flow to the brain stem
8. ___ Occurs if airways are obstructed as in C.O.P.D.; slow respiratory rate, increased effort, prolonged inspiration or expiration; wheezing or stridor is often present
9. ___ Inadequate alveolar ventilation in relation to metabolic demands
10. ___ Unpredictable irregularity; breaths may be shallow, deep, and stop for short periods of time; associated with respiratory depression and brain damage

- A. apnea
- B. ataxia (Biot's breathing)
- C. Cheyne-Stokes respirations
- D. dyspnea
- E. hyperventilation
- F. hypoventilation
- G. Kussmaul's respirations (hyperpnea)
- H. labored or obstructed respirations
- I. orthopnea
- J. restricted breathing

Signs of dyspnea include nasal flaring, retraction of intercostals spaces, and use of accessory muscles. Other abnormal clinical manifestations of respiratory problems include (match the terms with the proper definition below):

1. ___ Commonly associated with diseases that interfere with oxygenation; changes in the appearance of fingernails and toenails
2. ___ Caused by an increase in the amount of desaturated haemoglobin or a decrease in the amount of haemoglobin. Skin, mucus membranes, and nail beds will become pale, eventually blue secondary to decreased oxygenation. Extremities are affected first.
3. ___ Coughing up blood or bloody secretions; usually an indication of infection or inflammation that causes damage to the bronchi or lung parenchyma; note amount and duration, which may provide clues to cause; bronchoscopy is used to confirm the site of bleeding.
4. ___ A protective reflex that cleanses the lower airways; if persistent, can indicate the presence of disease.
5. ___ Color, consistency, and amount vary with different pulmonary disorders
6. ___ Caused by different pulmonary disorders; originates in the pleurae, the lungs, or the chest wall

- A. clubbing
- B. cough
- C. cyanosis
- D. hemoptysis
- E. pain
- F. sputum

DIAGNOSTIC STUDIES

There are different diagnostic studies used to evaluate pulmonary function and the etiology of respiratory disease. Use the roots of the words to match the study with its correct definition:

Column A

1. ___ Radiographic exam useful in diagnosing pneumonia, neoplasms, abscesses, tuberculosis, atelectasis, and penumo/hemothorax
2. ___ Allows for direct inspection of the larynx, trachea, and bronchi
3. ___ Aspiration of fluid from the pleural cavity; can be used as a diagnostic or therapeutic procedure
4. ___ Obtained to determine the etiology of and appropriate antibiotic therapy for respiratory infection
5. ___ Measures lung volume and airway flow; helps in assessing the progression of lung disease and in evaluating a client's response to drug therapy (e.g., bronchodilators) and other interventions

Column B

- A. bronchoscopy
- B. pulmonary function test
- C. sputum cultures
- D. thoracentesis
- E. x-ray

ARTERIAL BLOOD GASES

Arterial blood gases (A.B.G.s) are diagnostic laboratory tests used to evaluate the etiology of pulmonary disease. A.B.G.s cause panic among nursing students and beginning nurse Here, we break down the components of an A.B.G. so you know- what is important for passing the NCLEX-RN.

An A.B.G. is drawn to assess disturbances in the blood's acid-base balance caused by either a respiratory or metabolic disorder. It also gives a quick indication of the client's oxygenation. Always ensure a patent airway before assessing A.B.G. results!

A.B.G. Component	Normal Value
pH	7.35-7.45
PCO ₂	35-45 mmHg
HCO ₃	22-26 mEq/L
BE	+2 to -2
Oxygen saturation	>90%
PO ₂	>60 mmHg

Select words from the following list to fill in the blanks below:

acid-base
bicarbonate
hemoglobin
metabolic
oxygen
respiratory

1. The pH measures the _____ value.
2. The PCO_2 measures the adequacy of _____ contribution to the acid-base balance.
3. The HCO_3 measures the _____ contribution to acid-base balance
4. BE (base excess) reflects the deviation of _____ concentration from normal.
5. Oxygen saturation is the percentage of haemoglobin saturated with _____.
6. PO_2 is the pressure that causes oxygen to bind to _____.

To interpret A.B.G. results, start with the pH. Is it high (alkalosis) or low (acidosis)? Then go to the pCO_2 : Is it abnormal (respiratory etiology) or normal? Then assess the HCO_3 and BE: Are they normal (respiratory) or abnormal (metabolic)? Let's sum up:

Acid-Base Imbalance	pH	pCO_2	HCO_3	BE
Respiratory acidosis	Low	high	normal	normal
Respiratory alkalosis	High	low	normal	normal
Metabolic acidosis	Low	normal	low	low
Metabolic alkalosis	High	normal	high	high

The body will try to compensate for a shift in either direction (acidotic or basic); in these cases the pH should return to normal while the other values do not.

Disorders of the Respiratory System

CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Chronic obstructive pulmonary disease (C.O.P.D.) is a group of diseases that includes emphysema, chronic bronchitis, bronchiectasis, and bronchial asthma. Recurrent obstruction of air flow is common link among these diseases. C.O.P.D. is a major cause of death and disability in the United States.

1. _____ is the permanent enlargement of the air spaces distal to the terminal bronchioles (i.e. the alveoli). An early symptom of emphysema is dyspnea that becomes progressively more severe. There is minimal coughing with no, or scant amounts of, mucoid sputum. Later in the disease, the anterior-

posterior diameter of the chest increases causing a “barrel chest.” Clients will demonstrate chest breathing as they use their accessory and intercostals muscles to increase alveolar ventilation. Hypoxemia, especially during exercise, may also be present. Clients usually have weight loss and, in advanced stages, may develop clubbing. Clients with emphysema are often referred to as “pink puffers.” Hyperinflation causes adequate oxygenation of tissues and no cyanosis is present. The client with emphysema does not have hypoxia at rest, hypercapnea, and respiratory acidosis until late in the disease.

2. _____ is caused by a chronic inflammation (-itis) and is characterized by an excessive production of mucus in the bronchi, accompanied by a recurrent cough persists for at least 3 months of the year, for at least 2 years.

Clients with this disorder are often referred to as “blue bloaters” because of the hypoxemia and hypercapnia that develop as a result of alveolar hypoventilation. Their skin has a reddish-blue color from increased red blood cells as the body tries to compensate for chronic hypoxemia.

3. _____ is characterized by a hyperresponsiveness of the tracheobronchial tree to a variety of stimuli, such as antigen inhalation, respiratory infection, drug and/or food additives, exercise, and emotional stress. Normally, the bronchioles constrict upon expiration. During attack, bronchospasm, edema, and increased mucus further narrow the bronchioles, and air then takes longer to move out. These conditions produce the prolonged wheezing associated with this disorder. The client may have a non-productive cough, or one that produces a minimal amount of sputum, which means there is widespread mucus plugging. Dyspnea occurs because of the client’s difficulty in moving air in, and out of the lungs. During an attack, the client will position himself upright and use his accessory muscles in an attempt to ventilate more effectively. The client may also be restless, anxious, tachycardic, and hypertensive during the attack.

The complications of C.O.P.D. include 4. _____ (right-sided heart hypertrophy resulting from pulmonary hypertension) and pneumonia. Nutrition is a big issue with these clients, as eating is strenuous and a full stomach decreases the space available for lung expansion. Small, frequent, calorie-dense foods should be encouraged. Overfeeding should be avoided at all costs, especially with carbohydrates, as carbon dioxide is a product of carbohydrate metabolism.

INFECTIOUS PROCESSES

1. _____ is an inflammatory process of the respiratory bronchioles and the alveolar spaces caused by infection. Because this is an infectious process, you can

anticipate that the physician will order antibiotics for its treatment if the source is isolated as bacterial. 2. _____ is often seen in the hospital setting as a complication of surgery or prolonged bed rest due to the stasis of secretions in the distal airways. 3. _____, on the other hand, must run its course without antibiotic treatment. The goal of treatment for this disease is to manage the symptoms.

You may see a question on the NCLEX-RN about *Pneumocystis carinii* pneumonia, the infectious process most commonly associated with human immunodeficiency virus (HIV). *P. carinii* attacks victims whose immune systems are already compromised and can be fatal unless treated properly with pentamidine and trimethoprim-sulfamethoxazole (Bactrim) or dapsone with trimethoprim.

4. _____ is an infectious pulmonary process that can be transmitted by inhalation of minute dried droplet nuclei coughed or sneezed into the air by a person whose sputum contains virulent tubercle bacilli. It is more commonly spread to those individuals who have repeated, close contact with an infected person. There is an increased risk for the development of the clinical disease in those clients who are immunosuppressed (e.g., the elderly and client with AIDS, as well as those on chemotherapy and long-term steroids), diabetic, those under 2 years old, and adolescents. Strict respiratory isolation is indicated as soon as this infection is suspected.

Early in the disease the client may be free of symptoms. Systemic manifestations include night sweats and a dry cough. Diagnosis and screening is done through tuberculin skin testing.

Purified protein derivative (PPD) of the tuberculin is injected intradermally to detect the delayed hypersensitivity response of the immunocompetent individual. A positive reaction occurs 3 to 10 weeks after the initial infection.

A positive PPD may not necessarily indicate active TB. A chest x-ray may show calcification at the original site (occurs after several years of infection). Sputum culture is positive for Gram-positive *Mycobacterium tuberculosis* within 2 to 3 weeks of onset of active disease. Sputum culture is negative for mycobacterium in the latent phase, but positive for acid-fast bacilli.

The mainstay of tuberculosis treatment is drug therapy. In active disease, isoniazid (INH) and rifampin are used most frequently. The priority nursing intervention is assuring that the client completes the entire course of TB drug therapy (up to 1 year) to prevent development of drug resistant strains of TB. Clients infected with the same organism may share a hospital room, if hospitalization is necessary.

F E L O W V E R G R A D E

C O U G H

A T S H T N I G S W E

E F A T I G U

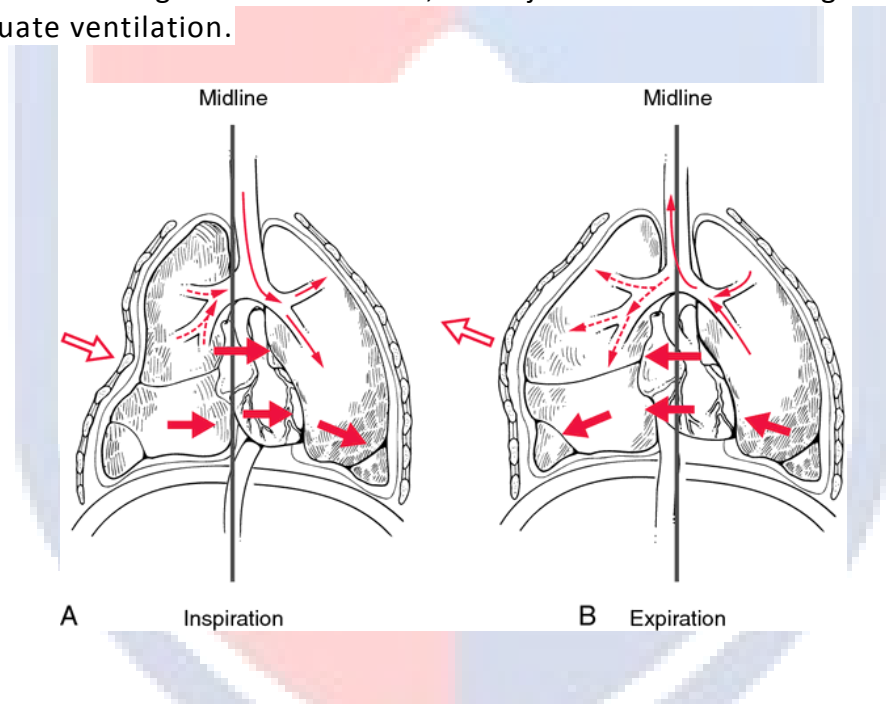
G H T L O S S W E I

Determine signs and symptoms of tuberculosis (TB) by unscrambling the tiles.



STRUCTURAL PROBLEMS

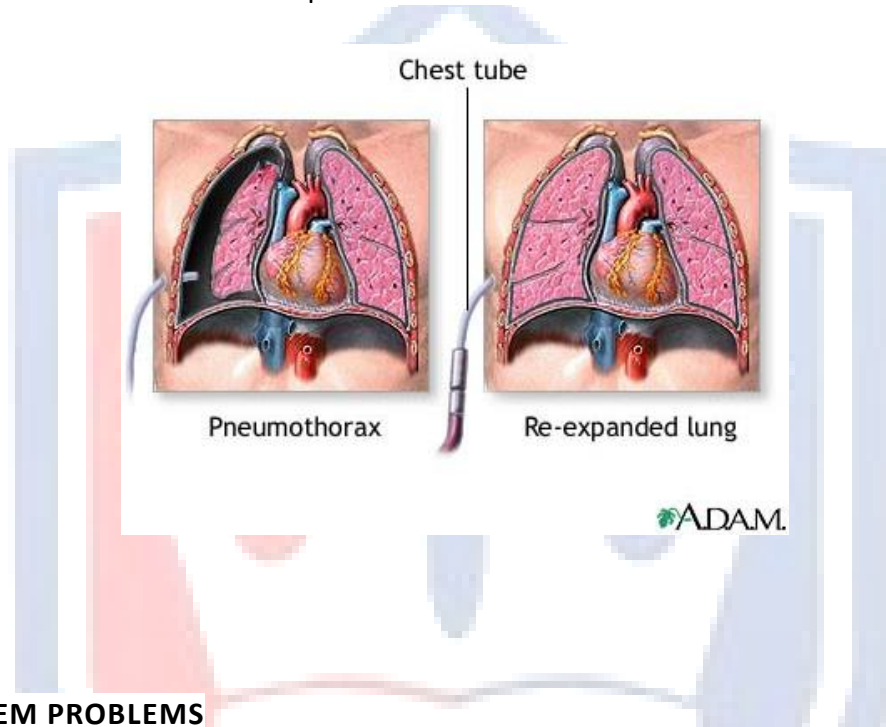
1. _____ (A.R.D.S.) occurs when pulmonary capillary permeability increases and fluid enters the lungs. The result is congestion, bleeding, and stiff lungs that cannot perfuse oxygen. Causes of A.R.D.S. include trauma, inhalation of toxins, liquid aspiration, infection, and drug overdose.
2. _____ is the collapse of airless alveoli. The most common cause is retained secretions. Deep inspiration is needed to open the pores effectively. For this reason, coughing and deep breathing exercises are important in the prevention of this disorder.
3. _____ results from multiple rib fractures that cause instability of the chest wall. During inspiration, the affected portion is sucked in; during expiration it bulges out. As a result, the injured area of the lung cannot obtain adequate ventilation.



4. _____ is the collection of fluid in the pleural space. Physical examination reveals dullness on percussion over the affected area and decreased or absent breath sounds as well. The goal of therapy is treatment of the underlying cause (e.g., infection) and a thoracentesis to remove the fluid. Nursing care of the client includes efforts to maximize ventilation and monitoring for signs of respiratory distress.
5. _____ or _____ is the result of a partial or complete collapse of a lung as a result of the accumulation of air or blood in the intrapleural space. A closed type has no external wound, whereas an open type has an opening in the chest wall through which air enters the pleural space. The

client with this disorder will present with respiratory distress, a cough (possible hemoptysis), and chest pain.

Definitive treatment is chest tube insertion with water seal drainage. In caring for the client, it is important to monitor for patency of the chest tube and drainage apparatus, as well as to provide supplemental oxygen therapy, pulmonary toileting, and comfort measures. A tension pneumothorax may occur when chest tubes are clamped or become blocked.



MULTISYSTEM PROBLEMS

1. _____ is caused by fluid in the lungs. It occurs when the heart's left ventricle fails or when fluid overload causes fluid to leave the vascular space and go into the interstitial tissues of the lungs. It is characterized by pink, frothy sputum, dyspnea, and confusion.
2. _____ occur when a pulmonary artery is blocked by a thrombus (clot) originating from peripheral vein. The embolus causes obstruction of the blood supply to the lung tissue and reflex bronchoconstriction occurs. Three factors (Virchow's triad) are related to the development of a venous thrombus.
 - a. Venous stasis (immobilized clients, C.H.F., obesity, venous insufficiency)
 - b. Injury to the vein wall
 - c. Increased blood coagulability

Early ambulation is vital in preventing pulmonary emboli. Clinical manifestations of a pulmonary embolus include dyspnea, cyanosis, unexplained hemoptysis, and apprehension.

CANCER

Like other clients with cancer, clients with lung cancer have generally experienced drastic weight loss and increased fatigue. Other signs of lung cancer include hemoptysis and clubbing. Nursing care for the client with lung cancer involves maximizing ventilation and educating the client and family about possible treatment options.

General Care of the Client with Pulmonary Dysfunction

In general, most pulmonary diseases require very similar nursing assessments and interventions. The following are general guidelines for caring for the client with pulmonary dysfunction. You should know that, after physically stabilizing the client, nursing interventions move to client and family education, ensuring adequate nutrition, and increasing the client's activity tolerance.

A priority nursing function is preventing pulmonary congestion and infection through "pulmonary toileting":

- Chest physiotherapy (C.P.T.) and postural drainage to loosen and remove secretions
- Frequent position changes in bed
- Early ambulation after surgery
- Coughing, deep breathing, and using the incentive spirometer (while splinting) if the client has had surgery.

The client with hypoxia and/or respiratory distress requires expedient nursing assessment:

- Assess for signs of hypoxia: restlessness, anxiety, confusion, agitation, cardiac arrhythmias, color of extremities, and circumoral cyanosis.
- Assess for signs of respiratory distress: nasal flaring, cyanosis, intercostal retractions, and use of accessory muscles.
- Auscultate lungs for adventitious breath sounds, assess pulse oximetry.
- Check that patient is wearing oxygen as ordered.

And intervention:

- Position client in the upright position (high Fowler's) to facilitate maximum ventilation.
- Teach pursed lip breathing to facilitate maximum emptying of the alveoli.
- Notify physician.

OXYGEN ADMINISTRATION

The NCLEX-RN always includes question or two on the proper oxygen administration device for different scenarios. The following information will prepare you to choose the best method of oxygen administration for the clients presented on the exam.

Oxygen therapy is an important adjunct to nursing care. The nurse needs a provider's written order to administer oxygen, as it is a drug. Provide minimum concentration of oxygen possible to prevent oxygen toxicity, atelectasis, and hypoventilation (as in clients with C.O.P.D.). Note the following regarding oxygen masks:

- A non-rebreather mask delivers the highest concentration of oxygen short of intubation.
- A face mask effectively delivers high concentrations of oxygen, but a Venturi mask delivers exact oxygen concentrations regardless of the client's respiratory pattern.
- A nasal cannula effectively delivers low concentrations of oxygen and is used frequently in clients with C.O.P.D. so that low oxygen concentration delivery will not compromise respiratory drive.



Which of the following are causes of a low pressure alarm in a mechanically ventilated client? Encircle your answer.

Low Pressure Alarm

Kinked ET tube	Broncho spasm	Coughing
Patient fights ventilator	Air leak	Loss of airway
Pulmonary edema	Secretions	Disconnection



A client has just been intubated for placement on a mechanical ventilator. The nurse should note for causes of a high pressure alarm which may include: (Encircle you answer).

High Pressure Alarm

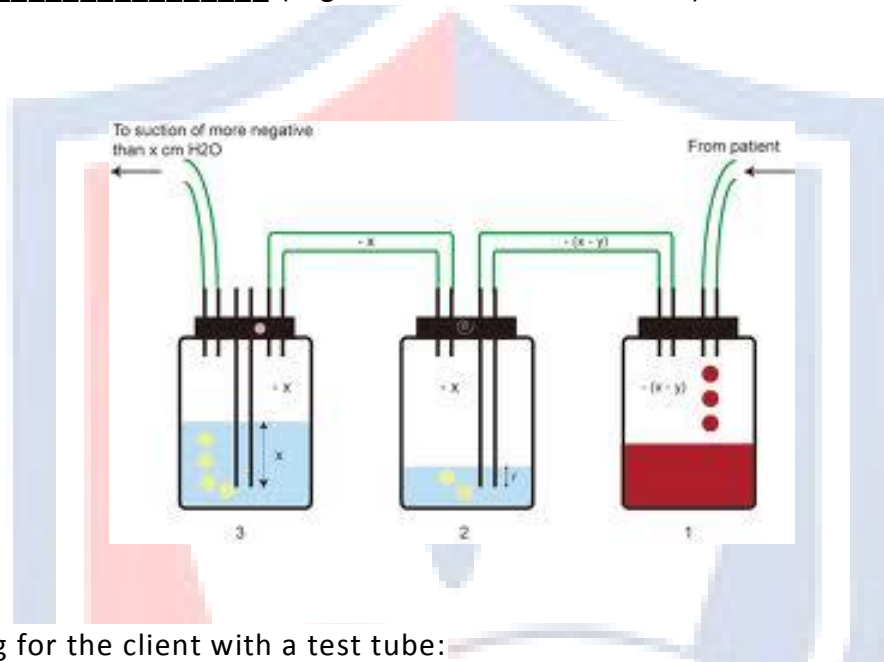
Secretions	Coughing	Patient fights ventilator
Air leak	Disconnection	Broncho spasm
Pulmonary edema	Loss of airway	Kinked ET tube

PLEURAL DRAINAGE

Chest tubes and pleural drainage are inserted by the provider to remove air and fluid from the intrapleural space to restore the normal negative pressure, allowing the lungs to re-expand.

Most pleural drainage systems have three compartments:

1. _____ (collects fluid from the chest)
2. _____ (acts as one-way valve to prevent reinhalation of air)
3. _____ (regulates amount of suction)



When caring for the client with a test tube:

- Maintain sterility of the system to prevent infection from developing in the pleural cavity.
- Maintain patency of the system to prevent tension pneumothorax.
- If the chest tube becomes dislodged from the client's chest, the client should exhale forcefully, and a petroleum jelly gauze dressing should be applied over the site, then notify physician.
- If the drainage compartment (bottle) breaks, clamp the tube nearest to the client until system integrity can be re-established.
- No chest tube should be clamped any longer than is absolutely necessary.
- Note type and amount of drainage.

SURGERY

Often, surgery is indicated to correct a problem with the respiratory system. Name the different types of lung surgery below:

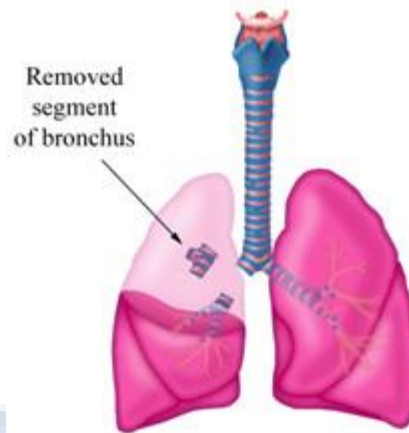
Types of Lung Surgery

1. _____
A surgical procedure in which an entire lung is removed. It is most often done for cancer of the lung that cannot be treated by removal of a smaller portion of the lung. It is an open chest technique (thoracotomy).

2. _____
Also called a pulmonary lobectomy, it is a common surgical procedure that removes one lobe of the lung that contains cancerous cells.



3. _____
A surgical procedure that removes a cancerous lobe of the lung along with part of the bronchus (air passage) that attaches to it. The remaining lobe(s) is then reconnected to the remaining segment of the bronchus. This procedure preserves part of a lung, and is an alternative to removing the lung as a whole (pneumonectomy).



4. _____
A surgical procedure during which the surgeon removes a small, wedge-shaped portion of the lung containing the cancerous cells along with healthy tissue that surrounds the area. The surgery is performed to remove a small tumor or to diagnose lung cancer. It is performed instead of a lobectomy (removing a complete lung lobe) when there is a danger of decreased lung function if too much of the lung is removed. It can be performed by minimally-invasive video-assisted thoracoscopic surgery (VATS) or a thoracotomy (open chest surgery).



5. _____
A surgical removal of a larger portion of the lung lobe than a wedge resection, but does not remove the whole lobe.



A client who has had a pneumonectomy does not require a chest tube. Fluid gradually fills the space where the lung was removed. Clients may be positioned on their backs or on the operative side with the head of the bed elevated. Positioning the client on the unaffected side can cause respiratory compromise in the remaining lung.

Pharmacology of the Respiratory System

Remember, the nurse can only administer drugs according to a written order from the provider! The NCLEX-RN will always give you both the trade and generic name of the drug. Do not waste your time memorizing both names.

1. _____ block the action of acetylcholine, resulting in bronchodilation. Side effects include flushed skin and dry mouth. They are contraindicated in clients with glaucoma.
Examples: ipratropium (Atrovent) and atropine sulfate.
2. _____ decrease edema in the bronchial airways and decrease mucus secretion. Side effects include cushingoid appearance, skin changes, increased appetite, and immunosuppression (steroids). Names of these agents end in “-one”: hydrocortisone (Solu-Cortef), methylprednisolone (Solu-Medrol, prednisone, beclomethasone (Vanceril, Beclovent), and triamcinolone acetonide (Azmacort).
3. _____ are used to relieve symptoms of the common cold and allergies by blocking the action of histamine at the receptor sites. Side effects include drowsiness (C.N.S. depression), dizziness (C.N.S. depression), dry mouth (anticholinergic effect), and GI irritation (local effect).
Examples: diphenhydramine HCl (Benadryl), promethazine HCl (Phenergan), and chlorpheniramine maleate (Chlor-Trimeton).

4. _____ include:
- Isoniazid (INH) is used in combination with other drugs, usually rifampin, to treat TB. Significant side effects to know for the boards include vitamin B₆ deficiency and GI upset.
 - Rifampin (Rifadin). The client should be told to expect urine, saliva, tears, sweat and sputum to be orange in color.
5. _____ suppress the cough reflex by acting on the cough center in the medulla. Narcotic types cause drowsiness, drying of respiratory secretions, and constipation. Non-narcotic types cause drowsiness and dizziness and are potentiated by MAO inhibitors, sedatives, tranquilizers, and alcohol. Example: dextromethorpan (Pertussin).
6. _____ reverse bronchoconstriction. Side effects include: nervousness, tremors, headaches, palpitations, and tachycardia. Examples include:
- Albuterol (Proventil)
 - Epinephrine HCl (Adrenalin)
 - Metaproterenol sulfate (Alupent)
 - Terbutaline sulfate (Brethine)
7. _____ act directly on bronchial smooth muscle to decrease spasms and relax smooth muscle of the vasculature. Side effects include: dizziness (secondary to decreased blood pressure/relaxed smooth muscle of vasculature), C.N.S. stimulation (sympathetic stimulation), and palpitations (β adrenergic stimulation). Give oral preparations with food to prevent GI upset:
- Aminophylline (Amoline)
 - Theophylline (Theo-dur)
8. _____ decrease the viscosity of secretions by increasing fluid in the respiratory tract. Side effects include nausea, vomiting, and gastric irritation.
- Guaifenesin (Robitussin)
9. _____ decrease mucous viscosity by breaking down its structural bonds (-lytic). Adverse effects include bronchospasm (especially in the asthmatic client), rhinitis, and stomatitis.
- Potassium iodide (SSKI)
 - Acetylcysteine (Mucomyst); also the antidote for acetaminophen (Tylenol) overdose

NCLEX-RN Style Questions

1. A postoperative client who has had an open cholecystomy should be encouraged to cough and deep breathe frequently to prevent	(1) aspiration pneumonia (2) atelectasis (3) spontaneous pneumothorax (4) pleurisy
2. Which of the following tests or procedures is the most reliable in diagnosing exposure to tuberculosis?	(1) Mantoux test (2) Chest x-ray (3) Auscultation (4) Tine test
3. Your client is at risk for aspiration pneumonia. Which of the following nursing interventions will help prevent aspiration pneumonia?	(1) Keeping the head of the bed elevated in at least a 45° angle after delivering enteral feedings (2) Providing vigorous pulmonary toilet (3) Performing mouth care with the client in the supine position (4) Auscultating breath sounds when ordered
4. The nurse is explaining how tuberculosis (TB) is diagnosed. Of the following, which should the nurse tell the client is the definitive diagnosis for TB?	(1) Arterial blood gases (2) Tuberculin skin test (3) Supine chest x-ray (4) Sputum culture for acid-fast bacillus
5. The nurse is caring for a client with respiratory disorders. In assessing oxygenation, it is noted that when the PaO ₂ drops below 60 mmHg, the client will probably show signs of	(1) wheezing and hypotension (2) equal expiration and inspiration (3) diminished breath sounds and cyanosis (4) restlessness and tachycardia
6. Clients with tuberculosis may come out of isolation after	(1) Sputum is negative for acid-fast bacillus (2) 3-5 days have passed (3) cough has reduced significantly (4) fever is reduced

7. Which of the following arterial blood gas values is consistent with metabolic acidosis?	(1) pH 7.35 (2) CO ₂ 48 mmHg (3) Bicarbonate 16 (4) PaO ₂ 90%
8. A blood gas reads as follows: pH 7.48, PaO ₂ 40 mmHg, HCO ₂ 34. Which of the following is the correct interpretation?	(1) Respiratory acidosis (2) Respiratory alkalosis (3) Metabolic acidosis (4) Metabolic alkalosis
9. A nurse is teaching a client who has chronic obstructive pulmonary disease (COPD) about exercise. The nurse teaches the client to	(1) have established rest periods (2) exercise strenuously when possible (3) use medications during exercise (4) avoid exercise
10. A client's blood gas reads pH 7.32, PaO ₂ , 42 mmHg, and PaO ₂ 55 mmHg. The nurse is aware that the client is exhibiting	(1) tachypnea (2) hypoxia (3) alkalosis (4) hypercapnia

Bibliography

Bates B. A Guide to Physical Examination and History Taking, 5th ed. Philadelphia: JB Lippincott Company, 1991

Beare PG. Davis' NCLEX-RN Review. Philadelphia: FA Davis Company, 1991.

Black JM and Mantassarini-Jacobs E. Luckman and Sorensen's Medical-Surgical Nursing, 4th ed. Philadelphia: WB Saunders Company, 1994

Brunner and Suddarth's Textbook of Medical-Surgical Nursing, 12th Edition, 2010

Clayman CB, ed. The American Medical Association Encyclopedia of Medicine. New York: Random House, 1989

Evans MJ and Black MA. Surgical Nursing. Philadelphia: Springhouse Corporation, 1990

Fox SI. Human Physiology, 3rd ed. Iowa: William C. Brown Publishers, 1990

Goodner B. RN NCLEX Review Cards. El Paso, TX: SR Publishing, 1993

Lewis SM and Collier IC. Medical Surgical Nursing. 3rd ed. St. Louis: Mosby-Year Book, Inc., 1992

Malseed RT. Pharmacology Drug Therapy and Nursing Considerations, 3rd ed. Philadelphia: JB Lippincott Company, 1990

McCance KL and Heuter SE. Pathophysiology. St. Louis: The CV Mosby Company, 1990.

Miller BF and Keane CB. Encyclopedia and Dictionary of Medicine, Nursing, and Allied Health. Philadelphia: WB Saunders Company, 1987

Nettina SM. The Lippincott Manual of Nursing Practice, 6th ed. Philadelphia: Lippincott, 1996

Prentice Hall Nursing, Comprehensive Review for NCLEX-RN. Pearson Education, Inc., 2008

The Princeton Review Cracking the NCLEX-RN, 6th Edition, Princeton Review Publishing, 2001

Wilson JD, et al., eds. Harrison's Principles of Internal Medicine, 12th ed. New York: McGraw Hill, 1991