CPFT Practice Test

1. Which of the following measures provides the most information about oxygen levels in the blood?

a. CaO_2
b. PaO_2
c. SaO_2
d. SpO_2

2. The type of precautions indicated when working with a patient with a surgical site infection and purulent discharge is

a. droplet.
b. airborne.
c. contact and droplet.
d. contact.

3. A young adult with a history of chronic lung disease is being evaluated for cystic fibrosis. Which of the following findings are consistent with that diagnosis?

1. Reduced FVC
2. Increased airflow rates
3. High ratio of RV to TLC
4. Increased pulmonary diffusing capacity

a. 1 and 3
b. 2 and 4
c. 1 and 4
d. 1, 3, and 4

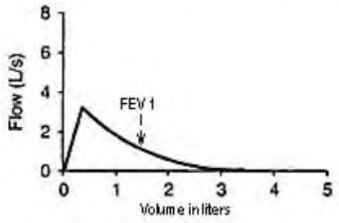
4. A patient's ECG exhibits irregular impulses that increase with inspiration and decrease with expiration. ECG shows the following:

Pulse rate of 90
PR interval of 0.16 seconds
P to QRS ratio of 1:1
P waves in front of QRS with duration and shape normal

These findings are consistent with which of the following arrhythmias?

a. Atrial flutter
b. Sinus arrhythmia
c. Sinus tachycardia
d. Premature atrial contraction

5. A patient has an FEV1/FVC ratio of 45%. The patient's flow volume (FV) curve is displayed below.



Which of the following is most likely true?

a. The patient is a child.
b. The patient has a restrictive pulmonary disorder.
c. The patient has an obstructive pulmonary disorder.
d. The patient is an older adult with normal lung function.

6. When testing the maximal inspiratory pressure (MIP) or negative inspiratory force (NIF) with a mechanical pressure gauge and mouthpiece, during the maximal inspiration the technologist should

a. occlude the inhalation valve.
b. occlude the exhalation valve.
c. occlude the inhalation and exhalation valves.
d. leave both valves open.

7. The technologist administers an incorrect dose of a bronchodilator during a test. The technologist should

a. immediately inform the patient.
b. document the dosage given on the patient's record, indicating that it was a medication error.
c. document the dosage given only on the incident report.
d. document the dosage given on the patient's record, but indicate it was an error on the incident report only.

8. A patient's $PaCO_2$ has shown an abrupt increase from 42 mm Hg to 52 mm Hg and the pH has decreased from 7.38 to 7.3 although the HCO_3 remains within normal limits. The most likely cause is

a. acute respiratory acidosis.
b. chronic respiratory acidosis.
c. respiratory alkalosis.
d. metabolic alkalosis.

9. A patient's external pulse oximeter is showing a decrease in SpO_2 to 80% although the patient does not appear to be in respiratory distress. The first step should be to

a. request arterial blood gases.
b. reposition the pulse oximeter.
c. replace the pulse oximeter.
d. place the pulse oximeter on the opposite side.

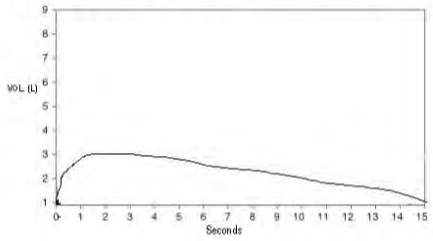
10. When performing a helium dilution test to measure FRC, the helium concentration suddenly reduces sharply. Which action should the technologist take?

a. Increase helium concentration.
b. Ensure that the CO_2 absorber is functioning correctly.
c. Discontinue the test.
d. Continue the test.

11. Which of the following pulmonary function tests is most indicated to assess flow of air through the bronchi to evaluate upper airway obstruction?

a. Peak inspiratory flow rate (PIFR)
b. Peak expiratory flow rate (PEFR)
c. Maximum expiratory flow rate (MEFR)
d. Maximum voluntary ventilation (MVV)

12. During a calibration check of a volume displacement spirometer, the technologist observes the volume time tracing displayed below.



The technologist should

a. verify calibration.
b. repeat the test.
c. locate and repair a leak in the system.
d. use a different calibration syringe.

13. Prior to collecting a radial arterial sample for arterial blood gas, the technologist should

a. conduct a modified Allen test.
b. check both the radial and apical pulse.
c. conduct a nailbed test.
d. observe the hand for signs of poor circulation.

14. When attempting to collect a specimen of pulmonary secretions, the patient is unable to expectorate a sample. The best solution is to

a. return at a later time to make a second attempt to get a sample.
b. leave the sputum container with the patient so the patient can save a sample.
c. administer small volume nebulizer (SVN) treatment with 10% saline and then attempt to get a sample.
d. obtain a specimen through nasotracheal suctioning.

Answer Key and Explanations

1. A: CaO_2 provides the most information about the oxygen levels in the blood because it includes measurements of PaO_2 and hemoglobin: CaO_2 = Hgb (gm/dl) x 1.34 mL O_2/gm Hgb x SaO_2 + PaO_2 x (.003 mL O_2/mm Hg/dL). PaO_2 measures free dissolved oxygen molecules in the plasma but not the oxygen in the hemoglobin. SaO_2 measures the percentage of binding sites in hemoglobin that are saturated with oxygen, but this measure must be combined with hemoglobin. SpO_2 measures only oxygenated and deoxygenated hemoglobin but results can be affected by many variables.

2. D: Contact precautions.

Contact	Use personal protective equipment (PPE), including gown and gloves, for all contacts with the patient or patient's immediate environment. Maintain patient in private room or >3 feet away from other patients.
Droplet	Use mask while caring for the patient. Maintain patient in a private room or >3 feet away from other patients with curtain separating them. Use patient mask if transporting patient from one area to another.
Airborne	Place patient in an airborne infection isolation room. Use ≥N95 respirators (or masks) while caring for patient.

3. A: Cystic fibrosis is characterized by reduced FVC and a high ratio of RV to TLC related to air trapping as well as reduced airflow rates and reduced TLC. Hypoxemia is often present, and compensatory respiratory acidosis may occur with chronic disease. Cystic fibrosis (mucoviscidosis) is a progressive congenital disease that particularly affects the pancreas and lungs. It is caused by a genetic defect that affects sodium chloride movement in cells, including mucosal cells that line the lungs, causing the production of thick mucus that clogs the lungs and provides a rich medium for bacteria.

4. B:

Sinus arrhythmia (SA) results from irregular impulses from the sinus node, is often paradoxical (increasing with inspiration and decreasing with expiration) because of stimulation of the vagal nerve during inspiration, and rarely causes a negative hemodynamic effect. Characteristics of SA include a regular pulse 50–100, P waves in front of QRS with duration (0.04 to 0.11 seconds) and shape of QRS usually normal, PR interval of 0.12 to 0.20 seconds, and P to QRS ratio of 1:1. Treatment is usually not necessary unless it is associated with bradycardia.

5. C: The combination of low FEV1/FVC ratio and the depressed, scooped FV curve are indicative of obstructive disease. Older adults may exhibit some scooping, but the FEV1 values should be in a more normal range. A normal FEV1/FVC ratio is usually between 75% and 85% although older adults may have somewhat lower ratios and children slightly higher. With restrictive disease, the ratio usually remains within normal limits or is increased because of increased elastic recoil; the curve is typically higher than with obstructive disease and with less extension.

6. C: When checking the MIP/NIF for a patient, the technologist should (with gloved hands) occlude the inhalation and exhalation valves on the mouthpiece. Procedure:

- Demonstrate proper breathing.
- Apply nose clips.
- With valves open, have patient take a few normal breaths through mouthpiece.
- Occlude valves with gloved fingers and have patient take a deep inspiration.
- Observe the needle in the gauge for the plateau, usually in 1–3 seconds.
- Repeat at least three times.
- Two best results should be reproducible within 10%.
- Normal (adult): >-60 cm H_2O; <-20 indicates need for mechanical ventilation.

7. D: While procedures vary somewhat, generally the technologist should document the dosage given on the patient's record as well as the time the physician was notified and any medical orders to prevent or treat adverse effects, but indicate it was an error on the incident report only. Patients are not informed of an error by the technologist involved and, in many cases, are never informed at all. This is an ethical issue that has legal and moral implications. Some healthcare facilities are now utilizing an open policy in which patients are informed, but more often this is not the case.

8. A: These blood gas changes indicate the patient is experiencing acute respiratory acidosis, which is characterized by an increase of 10 mm Hg in $PaCO_2$ resulting in a decrease of 0.08 in pH. In chronic respiratory acidosis, the pH decreases by 0.03. Normal blood gas values include:

- Acidity/alkalinity (pH): 7.35–7.45.
- Partial pressure of carbon dioxide ($PaCO_2$): 35–45 mm Hg.
- Partial pressure of oxygen (PaO_2): ≥80 mg Hg.
- Bicarbonate concentration (HCO_3): 22–26 mEq/L.
- Oxygen saturation (SaO_2): ≥95%.

9. B: If SpO_2 falls, the oximeter should be repositioned, as incorrect position is a common cause of inaccurate readings. The oximeter uses light waves to determine oxygen saturation (SpO_2). Pulse oximetry, continuous or intermittent, utilizes an external oximeter that attaches to the patient's finger or earlobe to measure arterial oxygen saturation (SpO_2), the percentage of hemoglobin that is saturated with oxygen. Oxygen saturation should be maintained >95% although some patients with chronic respiratory disorders, such as COPD may have lower SpO_2. Results may be compromised by impaired circulation, excessive light, poor positioning, and nail polish.

10. C: The helium dilution test should be discontinued because the abrupt reduction in helium concentration indicates a leak in the closed system. Helium is an inert gas that is not absorbed into the arterial blood system, so it remains in the lungs. The concentrations of gas are known volumes, usually 21%–30% oxygen and 10%–15% helium with an in-line CO_2 absorber to maintain low levels of CO_2 to prevent rebreathing. Helium concentrations should decrease by <0.2%/30 seconds, reaching equilibrium within about 7 minutes.

11. C: MEFR (aka forced expiratory flow rate 200–1200) measures the average rate of flow through the upper airways (trachea and bronchi). PIFR is the rate of the maximum flow of air during a forced inhalation, indicating the ability of the diaphragm to generate a negative pressure. PEFR is the rate of the maximum flow of air during forced exhalation and is often used to assess patients with respiratory disorders prior to surgery. MVV is the total volume of air a patient can move in and out of the lungs with maximum effort in one minute.

12. C: After using the calibration syringe to inject 3 L of air into the spirometer, if there are no leaks, then the volume time tracing should remain horizontal. If the line falls, this indicates that there is a leak in the system, and the technologist should attempt to locate and repair the leak. With no leak, the volume on the volume time tracing should be within 3.5% of the volume used in the calibration syringe, so the volume should be between 2.9 and 3.1 liters with the 3 L calibration syringe.

13. A: The technologist should conduct a modified Allen test. The patient elevates the hand and makes a tight fist for 30 seconds. With the hand elevated, the technologist applies pressure to occlude blood flow in both the radial and ulnar arteries (causing blanching), and then the patient opens and relaxes the hand. Keeping the hand elevated, the pressure is maintained on the radial artery but released on the ulnar artery. If the ulnar artery is patent, the color in the hand should return to normal within about 7 seconds, indicating that it is safe to use the radial artery.

14. C: If a patient is unable to cough up a specimen of pulmonary secretions, the best solution is to administer an SVN treatment with a hypertonic (10%) saline solution. Procedure for obtaining a deep pulmonary specimen should begin with the patient rinsing the mouth or brushing teeth to prevent contamination of the specimen. The patient should take a deep breath and attempt to cough strongly. If other methods are unsuccessful, then nasotracheal suctioning may be used. In some cases, a specimen may be obtained by bronchoscopy.

15. D: The technologist should stop the treatment and exchange the mouthpiece for a mask, as a tight seal about the mouthpiece is important to ensure an adequate treatment. The mask should be checked for air leaks as well and should be tightened snugly with straps and molded about the bridge of the nose. With a mask, the airflow should be set at 6 to 8 L/m. SVN may also be administered per tracheostomy with a trach attachment.

16. A: With a 12-lead ECG, 10 electrodes are applied: 6 precordial leads (V1–V6) on the chest and 4 limb leads, 1 on each arm and leg. Lead V1 is at the 4th intercostal space to the right of the sternum and V2 directly across at the 4th intercostal space to the left of the sternum. Lead V4 is at the 5th intercostal space at the midclavicular line with V5 at the same space but at the anterior axillary line. V3 is between leads V2 and V4 in the 4th intercostal space. V6 is at 5th intercostal space at the midaxillary line.

17. B: With the single-breath DLCO test, if the tracing shows that the expired volume is greater than the inspired volume, then this indicates that the patient did an incomplete initial exhalation, so the test should be repeated. The patient, with nose clip in place, exhales fully to residual volume (RV) and then inhales fully to total lung capacity, holds breath for 10 seconds, and then exhales rapidly and completely. Two or three tests should be done and agreement should be within 10% for successful tests. Results are averaged.

18. D: A decrease in systolic blood pressure and an increasing arrhythmia are reasons to stop an exercise (stress) test. Pulse rate may increase markedly, even to 100% of normally predicted for age without the need to stop the test if there are no other adverse signs of distress. An increase in respiration rate is normal. Other indications for stopping the test include confusion or instability as well as signs of possible myocardial ischemia, such as chest pain or cyanosis.

19. B: Loss of dose can occur if an MDI is stored in the valve-down position, with up to 50% of the drug lost in the valve even though the propellant and amount of dose appears normal, especially after 4 hours in the valve-down position. To avoid this, a waste dose should be discharged. Loss of prime, referring to the propellant, usually occurs after days or weeks, especially if the MDI is not