Board Exam Desk

Respiratory Therapy Reviewer

Respiratory Therapy Licensure Examination | PRC | 120 original questions

2026 Edition | Updated November 2026

Original board-style practice questions with an answer key.

Practice questions

Patient Assessment and Electrocardiography

1. A ventilated trauma patient suddenly becomes hypotensive. The trachea is shifted to the left, the right hemithorax is hyperresonant, and breath sounds are absent on the right. What is the most likely problem?

A. Right-sided tension pneumothorax
B. Right lower lobe pneumonia
C. Left-sided pleural effusion
D. Right mainstem bronchus intubation

2. Over the right lower lobe of a febrile patient you find dull percussion, increased tactile fremitus, and bronchial breath sounds. These findings best fit which condition?

A. Large pneumothorax
B. Pulmonary emphysema
C. Large pleural effusion
D. Lobar consolidation

3. On a standard ECG recorded at 25 mm/s, a regular rhythm has 15 small boxes between consecutive R waves. What is the heart rate?

A. 75 beats per minute
B. 125 beats per minute
C. 100 beats per minute
D. 150 beats per minute

4. A rhythm strip shows regular sawtooth-shaped atrial waves at about 300 per minute with every second wave followed by a QRS complex. What is the rhythm?

A. Atrial fibrillation
B. Atrial flutter with 2:1 conduction
C. Sinus tachycardia
D. Ventricular tachycardia

5. The PR interval gets longer with each beat until a P wave is not followed by a QRS complex, and then the cycle repeats. Which conduction disturbance is this?

A. First-degree AV block
B. Second-degree AV block, Mobitz type II
C. Second-degree AV block, Mobitz type I
D. Third-degree (complete) AV block

6. A patient with chronic kidney disease who missed dialysis has tall, narrow, peaked T waves on the ECG. Which electrolyte disturbance should be suspected first?

A. Hypokalemia
B. Hyperkalemia
C. Hypocalcemia
D. Hypernatremia

7. A child with a swollen neck has a high-pitched sound heard mainly during inspiration without a stethoscope. This sound most strongly suggests:

A. Upper airway obstruction
B. Lower airway bronchospasm
C. Fluid in the alveoli
D. Pleural surface inflammation

8. During inspiration, a patient's abdomen moves inward while the chest wall rises. This paradoxical pattern most likely indicates:

A. Normal quiet breathing
B. Metabolic acidosis
C. Upper airway stridor
D. Diaphragmatic fatigue or weakness

9. Digital clubbing is most commonly associated with which of the following conditions?

A. Uncomplicated asthma
B. Acute viral bronchitis
C. Simple common cold
D. Bronchiectasis

10. A head-injured patient opens the eyes only to pain, speaks with inappropriate words, and withdraws from a painful stimulus. What is the Glasgow Coma Scale score?

A. 7
B. 9
C. 8
D. 11

11. A 12-lead ECG shows ST-segment elevation in leads II, III, and aVF. Which region of the heart is most likely affected by the infarction?

A. Inferior wall
B. Anterior wall
C. Lateral wall
D. Septal wall

12. In a patient with a severe asthma attack, the systolic blood pressure falls by 18 mmHg during each inspiration. This finding is called:

A. Pulsus alternans
B. Orthostatic hypotension
C. Pulsus paradoxus
D. Widened pulse pressure

13. A diabetic patient with ketones in the urine has very deep, rapid breathing. This breathing pattern is a compensatory response to:

A. Metabolic alkalosis
B. Metabolic acidosis
C. Respiratory acidosis
D. Increased intracranial pressure

Cardiopulmonary Pathophysiology

14. A 38-year-old nonsmoker has severe emphysema mainly in the lower lobes. Which underlying cause should be investigated?

A. Cystic fibrosis gene mutation
B. Chronic asbestos exposure
C. Recurrent childhood croup
D. Alpha-1 antitrypsin deficiency

15. A patient with a recent myocardial infarction coughs up pink frothy sputum and has a pulmonary capillary wedge pressure of 26 mmHg. What is the most likely diagnosis?

A. Acute respiratory distress syndrome
B. Massive pulmonary embolism
C. Cardiogenic pulmonary edema
D. Bacterial lobar pneumonia

16. A patient meeting ARDS criteria has a PaO2 of 75 mmHg on an FiO2 of 0.50 with PEEP of 10 cm H2O. Using the Berlin definition, how is the ARDS classified?

A. Mild ARDS
B. Severe ARDS
C. Moderate ARDS
D. Does not meet ARDS oxygenation criteria

17. Right ventricular hypertrophy and failure that develop because of pulmonary hypertension caused by chronic lung disease is termed:

A. Left ventricular failure
B. Constrictive pericarditis
C. Mitral valve stenosis
D. Cor pulmonale

18. After a long bus trip, a patient develops sudden dyspnea, pleuritic chest pain, and tachycardia. The main gas exchange abnormality caused by this suspected condition is:

A. Increased intrapulmonary shunt from consolidation
B. Decreased airway resistance
C. Increased lung compliance
D. Increased alveolar dead space

19. Which staining method is used on sputum smears to detect the organism responsible for pulmonary tuberculosis?

A. Gram stain
B. India ink preparation
C. Giemsa blood smear stain
D. Ziehl-Neelsen acid-fast stain

20. A sleep study shows repeated pauses in airflow lasting over 10 seconds while chest and abdominal belts continue to record breathing effort. What type of apnea is present?

A. Obstructive apnea
B. Central apnea
C. Mixed apnea
D. Cheyne-Stokes breathing

21. Two weeks after a diarrheal illness, a patient develops symmetric weakness starting in the legs and ascending upward. Serial vital capacity measurements are ordered. What is the most likely diagnosis?

A. Guillain-Barre syndrome
B. Myasthenia gravis
C. Amyotrophic lateral sclerosis
D. Duchenne muscular dystrophy

22. Cystic fibrosis results from a defect in a membrane protein that regulates the transport of which ion?

A. Calcium
B. Chloride
C. Magnesium
D. Phosphate

23. Pleural fluid protein is 4.2 g/dL and serum protein is 6.0 g/dL. Based on this ratio alone, how should the effusion be classified?

A. Exudate
B. Transudate
C. Chylothorax
D. Hemothorax

24. Which feature most reliably distinguishes asthma from chronic obstructive pulmonary disease?

A. Presence of expiratory wheezing
B. Increased mucus production
C. Largely reversible airflow obstruction
D. Episodes of dyspnea on exertion

25. A tall, thin 20-year-old male smoker develops sudden chest pain and dyspnea at rest. Which condition is most likely?

A. Acute myocardial infarction
B. Primary spontaneous pneumothorax
C. Bilateral lobar pneumonia
D. Chronic pleural effusion

26. Which of the following disorders characteristically produces a restrictive ventilatory defect?

A. Chronic bronchitis
B. Bronchial asthma
C. Bronchiectasis
D. Idiopathic pulmonary fibrosis

Neonatal and Pediatric Respiratory Therapy

27. At 5 minutes a newborn has a heart rate of 110, slow irregular respirations, some flexion of the extremities, a grimace to stimulation, and a pink body with blue extremities. What is the Apgar score?

A. 5
B. 6
C. 7
D. 8

28. A 29-week preterm infant has grunting, retractions, and a ground-glass chest film with air bronchograms soon after birth. The primary cause of this condition is:

A. Aspiration of meconium-stained fluid
B. Retained fetal lung fluid
C. Deficiency of pulmonary surfactant
D. Congenital diaphragmatic hernia

29. A 2-year-old has a barking cough, inspiratory stridor, and low-grade fever; the neck film shows subglottic narrowing (steeple sign). What is the most likely diagnosis?

A. Acute epiglottitis
B. Laryngotracheobronchitis (croup)
C. Foreign body in a bronchus
D. Bacterial pneumonia

30. A 4-year-old with high fever sits leaning forward, drooling, and has muffled speech. The lateral neck film shows a thumb sign. What is the most appropriate action?

A. Examine the throat with a tongue depressor
B. Avoid throat examination and prepare to secure the airway
C. Place the child supine for a chest film
D. Give a cool mist tent and observe at home

31. A term infant delivered by elective cesarean section has tachypnea that resolves within two days, with fluid in the fissures on chest film. The most likely diagnosis is:

A. Transient tachypnea of the newborn
B. Respiratory distress syndrome
C. Bronchopulmonary dysplasia
D. Persistent pulmonary hypertension

32. A post-term infant born through thick meconium-stained fluid develops respiratory distress. Which serious complication is this infant at particular risk of developing?

A. Retinopathy of prematurity
B. Surfactant-deficient hyaline membrane disease
C. Persistent pulmonary hypertension of the newborn
D. Bronchopulmonary dysplasia at 36 weeks

33. Which organism is the most common cause of bronchiolitis in infants?

A. Haemophilus influenzae type b
B. Streptococcus pneumoniae
C. Respiratory syncytial virus
D. Mycobacterium tuberculosis

34. To detect right-to-left shunting through the ductus arteriosus, preductal and postductal oxygen saturations are compared. Which site gives the preductal reading?

A. Right hand
B. Left foot
C. Right foot
D. Umbilical area

35. After drying, warming, and stimulating a newborn, the infant is still apneic with a heart rate of 80 per minute. What is the next step?

A. Start chest compressions at once
B. Begin positive-pressure ventilation
C. Give intravenous epinephrine
D. Continue tactile stimulation only

36. During neonatal resuscitation with chest compressions, what compression-to-ventilation ratio is used?

A. 3 compressions to 1 breath
B. 15 compressions to 2 breaths
C. 30 compressions to 2 breaths
D. 5 compressions to 1 breath

37. Using the common formula for uncuffed tubes, age in years divided by 4 plus 4, what endotracheal tube internal diameter is estimated for a 6-year-old child?

A. 4.5 mm
B. 6.5 mm
C. 7.0 mm
D. 5.5 mm

38. Why are oxygen saturation targets kept within a limited range for extremely preterm infants receiving oxygen?

A. To prevent transient tachypnea of the newborn
B. To avoid meconium aspiration syndrome
C. To speed closure of the foramen ovale
D. To reduce the risk of retinopathy of prematurity

39. A former 26-week preterm infant still needs supplemental oxygen at 36 weeks postmenstrual age. Which chronic condition does this define?

A. Transient tachypnea of the newborn
B. Respiratory syncytial virus infection
C. Bronchopulmonary dysplasia
D. Congenital lobar emphysema

Mechanical Ventilation

40. A ventilated patient has a tidal volume of 450 mL and a total respiratory rate of 16 breaths per minute. What is the minute ventilation?

A. 6.4 L/min
B. 8.1 L/min
C. 7.2 L/min
D. 4.5 L/min

41. A patient breathes at a tidal volume of 500 mL with a dead space of 150 mL and a rate of 12 per minute. What is the alveolar ventilation?

A. 6.0 L/min
B. 4.2 L/min
C. 1.8 L/min
D. 7.8 L/min

42. A volume-controlled patient has a tidal volume of 500 mL, a plateau pressure of 30 cm H2O, and PEEP of 10 cm H2O. What is the static compliance?

A. 17 mL/cm H2O
B. 50 mL/cm H2O
C. 12 mL/cm H2O
D. 25 mL/cm H2O

43. With a constant inspiratory flow of 60 L/min, a patient's peak inspiratory pressure is 40 cm H2O and plateau pressure is 28 cm H2O. What is the airway resistance?

A. 0.2 cm H2O/L/s
B. 20 cm H2O/L/s
C. 12 cm H2O/L/s
D. 28 cm H2O/L/s

44. Over an hour, a patient's peak inspiratory pressure rises from 30 to 42 cm H2O while plateau pressure stays at 24 cm H2O. Coarse rhonchi are heard. What is the most appropriate action?

A. Increase the PEEP level
B. Insert a chest tube
C. Suction the airway
D. Decrease the tidal volume by half

45. Both peak and plateau pressures increase by about 10 cm H2O in a ventilated patient. Which problem best explains this change?

A. Bronchospasm only
B. Kinked endotracheal tube
C. Secretions in the airway
D. Decreased lung or chest wall compliance

46. A male patient with ARDS is 175 cm tall. Using predicted body weight (50 + 0.91 x [height in cm - 152.4]) and 6 mL/kg, what tidal volume should be set?

A. About 420 mL
B. About 350 mL
C. About 500 mL
D. About 560 mL

47. A patient on volume control has a PaCO2 of 60 mmHg at a set rate of 14 breaths per minute. Keeping tidal volume and dead space unchanged, what rate is needed to bring PaCO2 to 40 mmHg?

A. 21 breaths per minute
B. 9 breaths per minute
C. 18 breaths per minute
D. 28 breaths per minute

48. Which bedside maneuver is used to measure auto-PEEP in a passive patient on a ventilator?

A. End-inspiratory pause (hold)
B. Negative inspiratory force test
C. Slow vital capacity maneuver
D. End-expiratory pause (hold)

49. In lung-protective ventilation for ARDS, the plateau pressure is generally kept at or below what level?

A. 15 cm H2O
B. 40 cm H2O
C. 30 cm H2O
D. 50 cm H2O

50. How is a pressure support breath triggered, limited, and cycled?

A. Time triggered, pressure limited, time cycled
B. Patient triggered, pressure limited, flow cycled
C. Patient triggered, volume limited, volume cycled
D. Time triggered, flow limited, volume cycled

51. During a spontaneous breathing trial, a patient breathes 32 times per minute with an average tidal volume of 250 mL. What is the rapid shallow breathing index, and what does it suggest?

A. 128; weaning success is likely
B. 80; weaning success is likely
C. 128; weaning failure is likely
D. 8; weaning failure is likely

52. A ventilator low-pressure alarm sounds and the exhaled tidal volume drops sharply. What is the most common cause?

A. Patient coughing or biting
B. Mucus plug in the tube
C. Developing tension pneumothorax
D. Circuit disconnection or leak

53. A patient on FiO2 1.0 remains hypoxemic despite adequate ventilation. Which ventilator change most directly improves oxygenation by raising mean airway pressure and recruiting alveoli?

A. Increase the respiratory rate
B. Increase the PEEP
C. Decrease the inspiratory time
D. Increase the trigger sensitivity

Acid-Base Physiology and Blood Gas Interpretation

54. An ABG shows pH 7.28, PaCO2 58 mmHg, and HCO3 26 mEq/L. What is the interpretation?

A. Acute (uncompensated) respiratory acidosis
B. Compensated respiratory acidosis
C. Partially compensated metabolic acidosis
D. Acute metabolic acidosis

55. An anxious patient has pH 7.49, PaCO2 30 mmHg, and HCO3 22 mEq/L. What is the interpretation?

A. Compensated metabolic alkalosis
B. Acute respiratory alkalosis
C. Acute metabolic alkalosis
D. Compensated respiratory acidosis

56. A patient with metabolic acidosis has an HCO3 of 14 mEq/L. Using Winter's formula, what PaCO2 range indicates appropriate respiratory compensation?

A. 27 to 31 mmHg
B. 19 to 23 mmHg
C. 35 to 39 mmHg
D. 40 to 44 mmHg

57. Laboratory values are Na 140, Cl 100, and HCO3 12 mEq/L. What is the anion gap and how is it classified?

A. 12 mEq/L, normal
B. 28 mEq/L, elevated
C. 40 mEq/L, normal
D. 18 mEq/L, decreased

58. After several days of persistent vomiting, a patient has pH 7.52, PaCO2 48 mmHg, and HCO3 38 mEq/L. What is the interpretation?

A. Acute respiratory alkalosis
B. Compensated respiratory acidosis
C. Partially compensated metabolic acidosis
D. Partially compensated metabolic alkalosis

59. Using the Henderson-Hasselbalch equation, what is the pH when HCO3 is 30 mEq/L and PaCO2 is 50 mmHg?

A. 7.40
B. 7.30
C. 7.48
D. 7.22

60. A patient with normal baseline gases (pH 7.40, PaCO2 40 mmHg) acutely hypoventilates to a PaCO2 of 60 mmHg. Approximately what pH is expected?

A. 7.24
B. 7.32
C. 7.16
D. 7.36

61. At sea level (PB 760 mmHg) on room air, a patient has PaO2 60 mmHg and PaCO2 40 mmHg. Using a respiratory quotient of 0.8, what is the approximate A-a oxygen gradient?

A. 10 mmHg
B. 90 mmHg
C. 60 mmHg
D. 40 mmHg

62. Before a radial artery puncture, the modified Allen test is performed mainly to check for:

A. Proper depth of the radial artery
B. Presence of a radial artery aneurysm
C. Adequate collateral flow through the ulnar artery
D. Normal capillary refill in the toes

63. A large air bubble is left in an arterial blood gas syringe from a patient breathing room air with a PaO2 of 70 mmHg. How will the results most likely change?

A. PaO2 falls and PaCO2 rises
B. PaO2 rises and PaCO2 falls
C. Both PaO2 and PaCO2 rise
D. Neither value changes at all

64. An un-iced arterial sample sits at room temperature for an hour before analysis. What change is expected from continued blood cell metabolism?

A. PaO2 increases and PaCO2 decreases
B. pH rises and PaCO2 decreases
C. HCO3 falls while PaO2 rises
D. PaO2 decreases and PaCO2 increases

65. A patient with long-standing COPD has pH 7.36, PaCO2 62 mmHg, and HCO3 34 mEq/L. What is the interpretation?

A. Acute respiratory acidosis
B. Compensated respiratory acidosis
C. Compensated metabolic alkalosis
D. Partially compensated metabolic acidosis

66. An adult breathing room air has a PaO2 of 52 mmHg. Using the common adult classification, this hypoxemia is graded as:

A. Mild
B. Severe
C. Moderate
D. Within normal limits

67. Which condition typically causes a metabolic acidosis with a normal anion gap?

A. Diabetic ketoacidosis
B. Severe diarrhea
C. Lactic acidosis from shock
D. Methanol ingestion

Airway Care and Management

68. What range of endotracheal tube cuff pressure is generally recommended to seal the airway while limiting tracheal mucosal injury?

A. 20 to 30 cm H2O
B. 5 to 10 cm H2O
C. 40 to 50 cm H2O
D. 60 to 70 cm H2O

69. Using the rule that the suction catheter should occupy no more than half the tube's internal diameter (Fr = ID in mm x 3 / 2), what is the largest catheter for an 8.0 mm endotracheal tube?

A. 8 Fr
B. 12 Fr
C. 16 Fr
D. 24 Fr

70. When performing endotracheal suctioning in an adult, how long should each suction pass generally be limited to?

A. 30 to 45 seconds
B. About 60 seconds
C. 15 seconds or less
D. Until secretions are cleared

71. On a chest radiograph of an adult, where should the tip of a properly placed endotracheal tube be located?

A. About 3 to 5 cm above the carina
B. At the level of the carina
C. In the right mainstem bronchus
D. Just below the vocal cords

72. After intubation, breath sounds are present on the right but markedly reduced on the left, and only the right chest rises. What is the most appropriate action?

A. Withdraw the tube slightly and reassess
B. Advance the tube 2 cm further
C. Insert a left chest tube at once
D. Increase the tidal volume setting

73. An oropharyngeal airway is best suited for which patient?

A. An alert patient with an intact gag reflex
B. An unconscious patient with no gag reflex
C. A patient with a clenched jaw from seizures who is awake
D. A conscious patient recovering from sedation

74. Insertion of a nasopharyngeal airway should be avoided in a patient with:

A. Clenched teeth from a seizure
B. Suspected basilar skull fracture
C. An intact gag reflex
D. Need for frequent nasotracheal suction

75. Which method is considered the most reliable bedside confirmation that an endotracheal tube is in the trachea?

A. Continuous waveform capnography
B. Fogging of the tube during exhalation
C. Auscultation over the epigastrium only
D. Improvement in skin color

76. How does the use of a straight (Miller) laryngoscope blade differ from that of a curved (Macintosh) blade?

A. Its tip is placed in the vallecula
B. It is used only for nasal intubation
C. It does not require a light source
D. It lifts the epiglottis directly

77. Before placing a one-way speaking valve on a tracheostomy tube, which step is essential?

A. Fully deflate the tracheostomy cuff
B. Inflate the cuff to 40 cm H2O
C. Remove the inner cannula permanently
D. Increase the oxygen flow to 15 L/min

78. Acetylcysteine is ordered by aerosol to thin thick secretions in a patient with asthma. Which precaution is most appropriate?

A. Give a bronchodilator with or before it
B. Mix it with sterile water at 4 parts to 1
C. Give it only by direct instillation
D. Avoid suctioning after the treatment

79. In an emergency surgical airway, through which structure is the opening made for a cricothyrotomy?

A. Space between the second and third tracheal rings
B. Membrane between thyroid and cricoid cartilages
C. Membrane between hyoid bone and thyroid cartilage
D. Space just above the sternal notch

80. Before planned extubation, a cuff leak test is performed. What is its main purpose?

A. To screen for laryngeal edema
B. To measure lung compliance
C. To estimate dead space volume
D. To evaluate diaphragm strength

Pulmonary Function Testing

81. Post-bronchodilator spirometry shows an FEV1/FVC ratio of 0.58 with a reduced FEV1. Which pattern does this indicate?

A. Restrictive defect
B. Obstructive defect
C. Normal spirometry
D. Neuromuscular weakness only

82. A patient's FEV1 rises from 1.80 L before to 2.16 L after an inhaled bronchodilator. How should this response be interpreted?

A. Not significant: +360 mL, 8%
B. Not significant: +160 mL, 9%
C. Significant response: +360 mL, 20%
D. Significant response: +600 mL, 33%

83. A patient has a vital capacity of 4.2 L and a residual volume of 1.6 L. What is the total lung capacity?

A. 2.6 L
B. 5.8 L
C. 4.2 L
D. 6.4 L

84. The expiratory reserve volume is 1.1 L and the residual volume is 1.4 L. What is the functional residual capacity?

A. 0.3 L
B. 1.4 L
C. 2.5 L
D. 3.6 L

85. Which combination of findings is most consistent with a restrictive lung disorder?

A. Low TLC with a normal or high FEV1/FVC
B. High TLC with a low FEV1/FVC
C. Normal TLC with a low FEV1/FVC
D. High RV with a low FEV1/FVC

86. A smoker has airflow obstruction and a markedly reduced diffusing capacity (DLCO). Which diagnosis is most consistent with this combination?

A. Emphysema
B. Chronic stable asthma
C. Obesity
D. Chronic bronchitis without emphysema

87. Which lung volume cannot be measured by simple spirometry and requires gas dilution, nitrogen washout, or body plethysmography?

A. Tidal volume
B. Inspiratory capacity
C. Expiratory reserve volume
D. Residual volume

88. A flow-volume loop shows flattening of both the inspiratory and expiratory limbs. What is the most likely cause?

A. Fixed upper airway obstruction
B. Emphysema with air trapping
C. Early small airway disease
D. Restrictive interstitial disease

89. A patient with normal baseline spirometry has a 20% fall in FEV1 at a low concentration during a methacholine challenge. This result indicates:

A. Fixed airway obstruction
B. Reduced diffusing capacity
C. Respiratory muscle weakness
D. Airway hyperresponsiveness

90. For an adult forced vital capacity test session, which result meets the usual repeatability standard?

A. Two largest FVC values within 500 mL
B. Any single effort lasting 2 seconds
C. Two largest FVC values within 150 mL
D. Three efforts differing by 20%

91. A patient with asthma has a personal best peak flow of 500 L/min and today measures 300 L/min. Using the common zone system, which zone applies?

A. Green zone (safe)
B. Red zone (danger)
C. Normal zone with no action
D. Yellow zone (caution)

92. Body plethysmography measures thoracic gas volume using which gas law?

A. Boyle's law
B. Charles' law
C. Dalton's law
D. Graham's law

93. Which patient should have routine spirometry postponed because forced maneuvers could be harmful?

A. A stable outpatient with chronic cough
B. A smoker with mild exertional dyspnea
C. A worker screened for dust exposure
D. A patient 3 days after eye surgery

Pulmonary Rehabilitation

94. In a pulmonary rehabilitation program, what does the six-minute walk test primarily assess?

A. Maximal oxygen consumption only
B. Functional exercise capacity
C. Airway hyperresponsiveness
D. Diffusing capacity of the lung

95. A COPD patient is taught pursed-lip breathing. What is the main physiologic benefit of this technique?

A. Increases airway resistance during inspiration
B. Raises arterial $PaCO_2$ levels
C. Strengthens the abdominal muscles
D. Prevents early airway collapse during exhalation

96. During diaphragmatic breathing training, what should the patient observe while inhaling?

A. The upper chest rises while the abdomen pulls in
B. The shoulders elevate with each breath
C. The abdomen rises while the upper chest stays still
D. Both chest and abdomen remain motionless

97. Which patient is the most appropriate candidate to begin outpatient pulmonary rehabilitation?

A. Unstable angina with recent chest pain
B. Acute pneumonia on high-flow oxygen
C. Stable COPD with dyspnea limiting daily activities
D. Severe untreated aortic stenosis

98. A patient rates breathlessness during exercise from 0 (none) to 10 (maximal). Which tool is being used?

A. Glasgow Coma Scale
B. Modified Borg scale
C. Apgar scoring system
D. Silverman-Andersen index

99. Using the Karvonen method, what is the target heart rate for a 60-year-old with a resting heart rate of 80 exercising at 60% intensity?

A. 96 beats per minute
B. 112 beats per minute
C. 144 beats per minute
D. 128 beats per minute

100. Which intervention is most effective in slowing the decline of FEV1 in a patient with COPD who still smokes?

A. Smoking cessation
B. Daily inhaled bronchodilator
C. Chest physiotherapy
D. Nocturnal oxygen therapy

101. When teaching energy conservation, how should a COPD patient breathe while lifting a grocery bag?

A. Hold the breath during the effort
B. Inhale quickly during the effort
C. Pant rapidly before and after lifting
D. Exhale during the lifting effort

102. During a rehabilitation exercise session, supplemental oxygen is usually added or increased when the SpO2 falls below about:

A. 98%
B. 95%
C. 88%
D. 80%

103. Which component is considered the cornerstone of a comprehensive pulmonary rehabilitation program?

A. Exercise training
B. Long-term antibiotic therapy
C. Routine bronchoscopy
D. Mechanical ventilation at night

104. Why is the huff cough (forced expiratory technique) taught to patients with COPD?

A. It raises intrathoracic pressure more than coughing
B. It closes the glottis to build pressure
C. It clears mucus with less airway collapse
D. It replaces the need for bronchodilators

105. A threshold-loaded handheld device that requires a set pressure before inspiratory flow begins is used in rehabilitation for:

A. Inspiratory muscle training
B. Incentive spirometry only
C. Aerosol medication delivery
D. Peak expiratory flow monitoring

106. Which preventive measures are routinely recommended for patients with COPD to reduce exacerbations?

A. Monthly prophylactic chest x-rays
B. Influenza and pneumococcal vaccination
C. Routine daily oral corticosteroids
D. Annual bronchoscopy with lavage

Oxygen Therapy

107. A patient receives oxygen by nasal cannula at 4 L/min. Using the common estimate, what is the approximate FiO2?

A. About 24%
B. About 44%
C. About 36%
D. About 60%

108. An air-entrainment mask is set to deliver 40% oxygen with an oxygen flow of 8 L/min. What is the approximate total flow delivered?

A. About 16 L/min
B. About 25 L/min
C. About 48 L/min
D. About 33 L/min

109. What is the approximate air-to-oxygen entrainment ratio for an air-entrainment device set at 35% oxygen?

A. 1:1
B. 3:1
C. 10:1
D. 5:1

110. An E cylinder (factor 0.28 L/psi) reads 2,000 psi. How long will it last at an oxygen flow of 4 L/min?

A. 70 minutes
B. 140 minutes
C. 200 minutes
D. 560 minutes

111. Why should a simple oxygen mask be run at a flow of at least 5 L/min?

A. To keep the reservoir bag inflated
B. To deliver an exact FiO2 of 50%
C. To flush exhaled CO2 from the mask
D. To prevent drying of the nasal mucosa

112. A patient on a nonrebreathing mask has a reservoir bag that collapses completely on each inspiration. What is the correct action?

A. Remove the one-way valves
B. Increase the oxygen flow rate
C. Switch to a nasal cannula at 2 L/min
D. Decrease the oxygen flow rate

113. Pulmonary oxygen toxicity becomes a major concern when a patient breathes which of the following?

A. FiO2 of 0.28 for one week
B. FiO2 of 0.40 for two hours
C. Room air at high altitude
D. FiO2 above 0.60 for more than 24 to 48 hours

114. For a patient with COPD and chronic CO2 retention who presents with hypoxemia, what SpO2 range is usually targeted during oxygen therapy?

A. 94 to 98%
B. 98 to 100%
C. 88 to 92%
D. 80 to 84%

115. A patient rescued from a house fire has a pulse oximeter reading of 99% but is confused and has a headache. What is the best initial oxygen therapy?

A. 100% oxygen by nonrebreathing mask
B. Nasal cannula at 2 L/min
C. Air-entrainment mask at 28%
D. Room air while awaiting a chest film

116. A patient has hemoglobin 12 g/dL, SaO2 90%, and PaO2 60 mmHg. What is the arterial oxygen content?

A. About 10.8 mL/dL
B. About 16.1 mL/dL
C. About 14.7 mL/dL
D. About 19.8 mL/dL

117. Breathing a very high FiO2 can cause absorption atelectasis. What is the mechanism?

A. Oxygen directly destroys surfactant at once
B. Nitrogen washout leaves alveoli prone to collapse
C. Carbon dioxide accumulates in the alveoli
D. High flow dries and blocks the bronchi

118. Which feature is a key advantage of heated, humidified high-flow nasal cannula over a standard nasal cannula?

A. Complete elimination of the need for intubation
B. Delivery of a fixed FiO2 of 24%
C. Flows that can meet inspiratory demand
D. No need for humidification

119. A stable COPD outpatient breathing room air at rest qualifies for long-term oxygen therapy when which finding is present?

A. PaO2 of 75 mmHg
B. SpO2 of 94% at rest
C. PaCO2 of 40 mmHg
D. PaO2 of 55 mmHg or less

120. When attaching a regulator to an oxygen cylinder, which practice must be avoided because it creates a fire hazard?

A. Cracking the valve before attaching
B. Checking the washer for damage
C. Securing the cylinder in a stand
D. Applying oil or grease to the fittings

Answer key

Respiratory Therapy

1. A. Right-sided tension pneumothorax

Hyperresonance with absent breath sounds and tracheal shift away from the affected side, plus hypotension, indicates tension pneumothorax on the right.

2. D. Lobar consolidation

Consolidated lung transmits vibration and sound better, giving increased fremitus and bronchial breath sounds with a dull percussion note.

3. C. 100 beats per minute

Heart rate = 1500 / number of small boxes between R waves = 1500 / 15 = 100 beats per minute.

4. B. Atrial flutter with 2:1 conduction

Sawtooth flutter waves near 300 per minute are characteristic of atrial flutter; conducting every second wave gives a ventricular rate near 150.

5. C. Second-degree AV block, Mobitz type I

Progressive PR lengthening ending in a dropped beat is the Wenckebach pattern of Mobitz type I block.

6. B. Hyperkalemia

Peaked T waves are an early ECG sign of high serum potassium, which is common when renal patients miss dialysis.

7. A. Upper airway obstruction

Inspiratory stridor arises from narrowing of the larynx or trachea, so it points to upper airway obstruction.

8. D. Diaphragmatic fatigue or weakness

When the diaphragm fails, negative chest pressure pulls it upward, drawing the abdomen in during inspiration; this warns of impending ventilatory failure.

9. D. Bronchiectasis

Clubbing is linked to chronic suppurative and hypoxemic diseases such as bronchiectasis, cystic fibrosis, and lung cancer, not to uncomplicated asthma.

10. B. 9

Eye opening to pain = 2, inappropriate words = 3, withdrawal from pain = 4; total 2 + 3 + 4 = 9.

11. A. Inferior wall

Leads II, III and aVF view the inferior surface of the heart, usually supplied by the right coronary artery.

12. C. Pulsus paradoxus

An inspiratory fall in systolic pressure greater than 10 mmHg is pulsus paradoxus, seen in severe asthma and cardiac tamponade.

13. B. Metabolic acidosis

Kussmaul respirations increase ventilation to blow off CO2 and offset the metabolic acidosis of diabetic ketoacidosis.

14. D. Alpha-1 antitrypsin deficiency

Early-onset panlobular emphysema concentrated in the lung bases is the classic pattern of alpha-1 antitrypsin deficiency.

15. C. Cardiogenic pulmonary edema

A wedge pressure above about 18 mmHg indicates high left atrial pressure, so the edema is cardiogenic rather than due to increased permeability.

16. C. Moderate ARDS

PaO2/FiO2 = 75 / 0.50 = 150, which falls in the moderate range of more than 100 up to 200.

17. D. Cor pulmonale

Cor pulmonale is right heart enlargement or failure secondary to a disorder of the lungs or pulmonary circulation.

18. D. Increased alveolar dead space

A pulmonary embolus blocks perfusion to ventilated alveoli, producing ventilation without perfusion, which is dead space.

19. D. Ziehl-Neelsen acid-fast stain

Mycobacterium tuberculosis has a waxy cell wall and is identified as acid-fast bacilli with the Ziehl-Neelsen method.

20. A. Obstructive apnea

Absent airflow with continued respiratory effort means the drive is intact but the upper airway is blocked, which defines obstructive apnea.

21. A. Guillain-Barre syndrome

Ascending paralysis after an infection is typical of Guillain-Barre syndrome; falling vital capacity signals the need for ventilatory support.

22. B. Chloride

The CFTR protein is a chloride channel; its defect produces thick secretions and a high sweat chloride level.

23. A. Exudate

Pleural/serum protein = 4.2 / 6.0 = 0.7, which exceeds 0.5 and meets an exudate criterion of Light's criteria.

24. C. Largely reversible airflow obstruction

Both may wheeze and produce mucus, but asthma typically shows substantial reversibility of obstruction, while COPD obstruction is persistent.

25. B. Primary spontaneous pneumothorax

Primary spontaneous pneumothorax typically occurs in tall, thin young men, often smokers, from rupture of apical blebs.

26. D. Idiopathic pulmonary fibrosis

Pulmonary fibrosis stiffens the lungs and reduces lung volumes, while the others are obstructive diseases.

27. B. 6

Heart rate over 100 = 2, slow irregular breathing = 1, some flexion = 1, grimace = 1, acrocyanosis = 1; total = 6.

28. C. Deficiency of pulmonary surfactant

Neonatal respiratory distress syndrome in preterm infants is caused by surfactant deficiency, producing diffuse atelectasis and the ground-glass pattern.

29. B. Laryngotracheobronchitis (croup)

The steeple sign of subglottic narrowing with a barking cough is typical of viral croup.

30. B. Avoid throat examination and prepare to secure the airway

These signs suggest epiglottitis; agitating the child or depressing the tongue can cause complete obstruction, so the airway is secured by skilled personnel.

31. A. Transient tachypnea of the newborn

Cesarean birth without labor delays clearance of fetal lung fluid, causing transient tachypnea that usually resolves within 24 to 72 hours.

32. C. Persistent pulmonary hypertension of the newborn

Meconium aspiration causes airway obstruction, chemical pneumonitis, and hypoxemia that commonly triggers persistent pulmonary hypertension.

33. C. Respiratory syncytial virus

Respiratory syncytial virus is the leading cause of bronchiolitis in infants and young children.

34. A. Right hand

The right subclavian artery branches before the ductus, so the right hand is preductal; the feet are postductal.

35. B. Begin positive-pressure ventilation

Apnea, gasping, or a heart rate below 100 after initial steps is the indication for positive-pressure ventilation, the key intervention in newborn resuscitation.

36. A. 3 compressions to 1 breath

Newborn CPR uses a 3:1 ratio, giving about 90 compressions and 30 breaths per minute.

37. D. 5.5 mm

Tube size = (6 / 4) + 4 = 1.5 + 4 = 5.5 mm internal diameter.

38. D. To reduce the risk of retinopathy of prematurity

Hyperoxia in preterm infants promotes abnormal retinal vessel growth, so oxygen is titrated to avoid excessive saturations.

39. C. Bronchopulmonary dysplasia

Bronchopulmonary dysplasia is diagnosed in preterm infants who still require oxygen or respiratory support at 36 weeks postmenstrual age.

40. C. 7.2 L/min

Minute ventilation = VT x f = 0.45 L x 16 = 7.2 L/min.

41. B. 4.2 L/min

Alveolar ventilation = (VT - VD) x f = (500 - 150) mL x 12 = 4,200 mL/min = 4.2 L/min.

42. D. 25 mL/cm H2O

Static compliance = VT / (Pplat - PEEP) = 500 / (30 - 10) = 25 mL/cm H2O.

43. C. 12 cm H2O/L/s

Flow 60 L/min = 1 L/s. Raw = (PIP - Pplat) / flow = (40 - 28) / 1 = 12 cm H2O/L/s.

44. C. Suction the airway

A wider PIP-Pplat difference with a stable plateau means increased airway resistance; with rhonchi, secretions are likely and suctioning is indicated.

45. D. Decreased lung or chest wall compliance

When peak and plateau rise together, the added pressure is needed to distend the lungs, pointing to reduced compliance such as pneumothorax, atelectasis, or edema.

46. A. About 420 mL

PBW = 50 + 0.91 x (175 - 152.4) = 70.6 kg; 6 mL/kg x 70.6 = about 424 mL, so about 420 mL.

47. A. 21 breaths per minute

New rate = current rate x current PaCO2 / desired PaCO2 = 14 x 60 / 40 = 21 breaths per minute.

48. D. End-expiratory pause (hold)

An end-expiratory hold lets alveolar and circuit pressures equilibrate, revealing pressure above the set PEEP as auto-PEEP.

49. C. 30 cm H2O

Limiting plateau pressure to 30 cm H2O or less, along with low tidal volumes, reduces ventilator-induced lung injury.

50. B. Patient triggered, pressure limited, flow cycled

Pressure support is a spontaneous mode: the patient starts the breath, pressure is held at the set level, and the breath ends when flow falls to a set threshold.

51. C. 128; weaning failure is likely

RSBI = f / VT in liters = 32 / 0.25 = 128, above the usual threshold of about 105, which predicts failure.

52. D. Circuit disconnection or leak

Loss of pressure with loss of returned volume means gas is escaping, most often from a disconnection or circuit or cuff leak.

53. B. Increase the PEEP

PEEP keeps alveoli open at end-expiration, increasing functional residual capacity and mean airway pressure, which improves oxygenation.

54. A. Acute (uncompensated) respiratory acidosis

Low pH with high PaCO2 is respiratory acidosis; HCO3 is still near normal, so compensation has not yet occurred.

55. B. Acute respiratory alkalosis

High pH with low PaCO2 is respiratory alkalosis, and the near-normal HCO3 indicates an acute, uncompensated process.

56. A. 27 to 31 mmHg

Expected PaCO2 = 1.5 x HCO3 + 8 +/- 2 = 1.5 x 14 + 8 = 29, so 27 to 31 mmHg.

57. B. 28 mEq/L, elevated

Anion gap = Na - (Cl + HCO3) = 140 - (100 + 12) = 28 mEq/L, well above the normal of about 8 to 12.

58. D. Partially compensated metabolic alkalosis

High pH with high HCO3 is metabolic alkalosis from loss of gastric acid; the raised PaCO2 shows partial respiratory compensation.

59. A. 7.40

pH = 6.1 + log[30 / (0.03 x 50)] = 6.1 + log(20) = 6.1 + 1.30 = 7.40.

60. A. 7.24

In acute respiratory changes pH falls about 0.08 for each 10 mmHg rise in PaCO2: 7.40 - (2 x 0.08) = 7.24.

61. D. 40 mmHg

PAO2 = 0.21 x (760 - 47) - 40 / 0.8 = 149.7 - 50 = about 100 mmHg; A-a gradient = 100 - 60 = 40 mmHg, which is widened.

62. C. Adequate collateral flow through the ulnar artery

The test confirms that the ulnar artery can supply the hand if the radial artery becomes occluded after puncture.

63. B. PaO2 rises and PaCO2 falls

Room air has a PO2 near 150 mmHg and almost no CO2, so the sample PO2 moves upward and PCO2 moves downward.

64. D. PaO2 decreases and PaCO2 increases

Leukocytes and other cells keep consuming oxygen and producing carbon dioxide, lowering PO2 and raising PCO2 over time.

65. B. Compensated respiratory acidosis

High PaCO2 is the primary problem; renal retention of HCO3 has brought pH back to the normal range, and the slightly acidic pH shows the primary process is acidosis.

66. C. Moderate

In adults, PaO2 of 60 to 79 is mild, 40 to 59 is moderate, and below 40 mmHg is severe hypoxemia.

67. B. Severe diarrhea

Diarrhea loses bicarbonate, which is replaced by chloride, so the gap stays normal; the others add unmeasured acids and widen the gap.

68. A. 20 to 30 cm H2O

Cuff pressures of about 20 to 30 cm H2O prevent leaks and aspiration while staying below tracheal capillary perfusion pressure.

69. B. 12 Fr

Catheter size = 8.0 x 3 / 2 = 12 Fr, keeping the catheter at about half the tube lumen.

70. C. 15 seconds or less

Limiting each pass to 15 seconds or less reduces hypoxemia, arrhythmias, and atelectasis from suctioning.

71. A. About 3 to 5 cm above the carina

A tip several centimeters above the carina allows for head and neck movement without entering a mainstem bronchus or the larynx.

72. A. Withdraw the tube slightly and reassess

These findings suggest right mainstem intubation; pulling the tube back a little usually restores bilateral ventilation.

73. B. An unconscious patient with no gag reflex

Oropharyngeal airways can trigger gagging and vomiting in patients with an intact gag reflex, so they are reserved for unconscious patients.

74. B. Suspected basilar skull fracture

With a basilar skull fracture, a nasal device could pass through the fractured cribriform plate into the cranial vault.

75. A. Continuous waveform capnography

Sustained exhaled CO2 waveforms over several breaths confirm tracheal placement; fogging and color changes are unreliable.

76. D. It lifts the epiglottis directly

The straight blade picks up the epiglottis directly, while the curved blade tip sits in the vallecula and lifts the epiglottis indirectly.

77. A. Fully deflate the tracheostomy cuff

The valve blocks exhalation through the tube, so air must pass around the tube; an inflated cuff would leave the patient unable to exhale.

78. A. Give a bronchodilator with or before it

Acetylcysteine can irritate the airways and cause bronchospasm, especially in asthmatics, so a bronchodilator is given with it.

79. B. Membrane between thyroid and cricoid cartilages

Cricothyrotomy enters the cricothyroid membrane, which is superficial and relatively avascular, between the thyroid and cricoid cartilages.

80. A. To screen for laryngeal edema

A small or absent leak around the deflated cuff suggests airway swelling and a higher risk of post-extubation stridor.

81. B. Obstructive defect

A post-bronchodilator FEV1/FVC below 0.70 indicates airflow obstruction.

82. C. Significant response: +360 mL, 20%

Change = 2.16 - 1.80 = 0.36 L; 0.36 / 1.80 = 20%. This exceeds the 12% and 200 mL criteria for a significant response.

83. B. 5.8 L

TLC = VC + RV = 4.2 + 1.6 = 5.8 L.

84. C. 2.5 L

FRC = ERV + RV = 1.1 + 1.4 = 2.5 L.

85. A. Low TLC with a normal or high FEV1/FVC

Restriction is defined by reduced lung volumes, especially TLC, while the FEV1/FVC ratio is preserved or increased.

86. A. Emphysema

Emphysema destroys alveolar-capillary surface area and lowers DLCO, whereas asthma usually has a normal or high DLCO.

87. D. Residual volume

Residual volume stays in the lungs after maximal exhalation, so it never passes through the spirometer.

88. A. Fixed upper airway obstruction

A fixed lesion such as tracheal stenosis limits flow equally in both phases, producing plateaus on both limbs.

89. D. Airway hyperresponsiveness

A positive methacholine challenge shows bronchial hyperresponsiveness, supporting a diagnosis of asthma.

90. C. Two largest FVC values within 150 mL

Spirometry standards require the two largest FVC and FEV1 values to agree within 150 mL in adults.

91. D. Yellow zone (caution)

300 / 500 = 60% of personal best, within the 50 to 79% yellow zone.

92. A. Boyle's law

At constant temperature, pressure and volume changes in the sealed box and lungs are related by Boyle's law (P1V1 = P2V2).

93. D. A patient 3 days after eye surgery

Recent eye surgery is a contraindication because forced exhalation raises intraocular pressure.

94. B. Functional exercise capacity

The distance walked in six minutes reflects functional capacity for daily activities and response to rehabilitation.

95. D. Prevents early airway collapse during exhalation

The back-pressure created by pursed lips splints small airways open, reducing air trapping and slowing the breathing rate.

96. C. The abdomen rises while the upper chest stays still

Diaphragmatic breathing emphasizes outward abdominal movement, reducing the use of accessory muscles.

97. C. Stable COPD with dyspnea limiting daily activities

Stable chronic lung disease with symptoms that limit function is the main indication; unstable cardiac or acute illness is an exclusion.

98. B. Modified Borg scale

The modified Borg scale rates perceived dyspnea or exertion from 0 to 10 and helps set exercise intensity.

99. D. 128 beats per minute

Max HR = 220 - 60 = 160; reserve = 160 - 80 = 80; target = 80 + 0.60 x 80 = 128 beats per minute.

100. A. Smoking cessation

Stopping smoking is the only intervention shown to slow the accelerated loss of lung function in COPD.

101. D. Exhale during the lifting effort

Exhaling during exertion avoids breath holding, reduces dyspnea, and limits the strain of a Valsalva effort.

102. C. 88%

Exercise desaturation below about 88% is the usual threshold for supplemental oxygen during training.

103. A. Exercise training

Exercise training, especially of the lower extremities, produces the largest gains in endurance and symptoms; education and support complement it.

104. C. It clears mucus with less airway collapse

Huffing with an open glottis moves secretions with lower pressures than a forceful cough, so unstable airways are less likely to collapse.

105. A. Inspiratory muscle training

Threshold devices open only after a preset inspiratory pressure is generated, providing resistance training for the inspiratory muscles.

106. B. Influenza and pneumococcal vaccination

Vaccination against influenza and pneumococcus lowers the risk of respiratory infections that trigger COPD exacerbations.

107. C. About 36%

A common estimate adds about 4% per L/min to room air: roughly 20% + 4 x 4 = 36%.

108. D. About 33 L/min

Air:O2 ratio = (100 - 40) / (40 - 21) = 3.16:1; total flow = 8 x (1 + 3.16) = about 33 L/min.

109. D. 5:1

Ratio = (100 - 35) / (35 - 21) = 65 / 14 = 4.6, which rounds to about 5:1.

110. B. 140 minutes

Duration = pressure x factor / flow = 2,000 x 0.28 / 4 = 140 minutes.

111. C. To flush exhaled CO2 from the mask

Flows below about 5 L/min allow exhaled gas to accumulate in the mask, causing CO2 rebreathing.

112. B. Increase the oxygen flow rate

The bag should stay at least partly inflated throughout inspiration; collapse means flow is not meeting inspiratory demand.

113. D. FiO2 above 0.60 for more than 24 to 48 hours

Prolonged exposure to FiO2 above about 0.60 produces oxygen free radical injury to the lung.

114. C. 88 to 92%

A target of 88 to 92% corrects dangerous hypoxemia while lowering the risk of worsening hypercapnia.

115. A. 100% oxygen by nonrebreathing mask

Standard pulse oximetry cannot tell carboxyhemoglobin from oxyhemoglobin; the highest available FiO2 shortens carbon monoxide half-life.

116. C. About 14.7 mL/dL

CaO2 = (1.34 x 12 x 0.90) + (0.003 x 60) = 14.47 + 0.18 = about 14.7 mL O2/dL.

117. B. Nitrogen washout leaves alveoli prone to collapse

Nitrogen normally keeps alveoli inflated; when it is replaced by oxygen that is absorbed into the blood, poorly ventilated alveoli collapse.

118. C. Flows that can meet inspiratory demand

High flows match or exceed the patient's inspiratory flow, giving a more stable FiO2, washing out dead space, and adding slight positive pressure.

119. D. PaO2 of 55 mmHg or less

Long-term oxygen is indicated for resting PaO2 of 55 mmHg or less (or SpO2 of 88% or less), which improves survival in COPD.

120. D. Applying oil or grease to the fittings

Oils and greases can ignite violently in high-pressure oxygen, so they must never be used on cylinder valves or regulators.

Topics to review

• Cardiopulmonary anatomy and physiology

- Blood gas and pulmonary function interpretation
- Oxygen delivery and mechanical ventilation concepts
- Equipment safety and infection prevention

Online question banks and study resources

Respiratory Therapy - Pass Harbor (Question bank)

Official PRC board information

Current PRC exam programs

Independent study material prepared by Board Exam Desk.