University of South Alabama
Department of Cardiorespiratory Care
Written Registry Self-Assessment Exam
(Time limit = 1 hr 45 min)

NOTES: The time limit of 1 hour 45 minutes is accurate for 100 questions. The actual written registry exam has 115 questions with a time limit of 2 hours. The content areas of this exam are not referenced to the 2009 NBRC exam matrices.

Name _____ Date _____

1. The normal systolic and diastolic pulmonary artery pressures for adults are:

A. 10/6 mm Hg.
B. 20/8 mm Hg.
C. 30/12 mm Hg.
D. 40/16 mm Hg.

2. The results of spirometry performed by a patient before and after the administration of an aerosolized albuterol are as follows:

	Before (% predicted)	After (% predicted)
FVC	93	92
FEV_1	63	84
$FEF_{200-1200}$	66	81
$FEF_{25-75\%}$	55	61

Based on these results, the patient has:

A. reversible obstructive defect.
B. non-reversible obstructive defect.
C. reversible obstructive and restrictive defect.
D. non-reversible obstructive and restrictive defect.

3. Mr. Hamm's chest radiography shows diffuse alveolar infiltrates. The hemodynmaic values are: CVP = 7 mm Hg, mean PAP = 15 mm Hg, PCWP = 18 mm Hg, cardiac index = 3.5 $L/min/m^2$. Which of the following data should be used to differentiate cardiac and non-cardiac cause of the infiltrates.

A. CVP
B. Mean PAP
C. PCWP
D. Cardiac index

4. The following hemodynamic results are obtained on a sedated patient who is being mechanically ventilated with pressure controlled ventilation on 15 PEEP and 100% oxygen:

	Day 1	Day 5
PaO_2	58 torr	53 torr
PAP	26/12 mm Hg	46/22 mm Hg
PCWP	8 mm Hg	9 mm Hg
PVR	150 dynes.s.cm^{-5}	315 dynes.s.cm^{-5}

The most likely cause of these changes is:

A. overhydration.
B. mitral valve stenosis.
C. persistent hypoxemia.
D. pulmonary edema.

5. A patient receiving mechanical ventilation has the following measurements: spontaneous minute ventilation = 3 L/min, spontaneous respiratory rate = 30/min. The rapid shallow breathing index is _____ and this result suggests weaning _____.

A. 30; success
B. 100; success
C. 300; failure
D. 1000; failure

6. Mr. Lambert, a 30-year-old 60-Kg post operative patient, is being mechanically ventilated in the assist/control mode with 40% oxygen, set tidal volume 650 ml, set rate 12/min, total rate 20/min. Arterial blood gases show: pH = 7.54, $PaCO_2$ = 25 torr, PaO_2 = 88 torr. The physician asks the respiratory therapist to make adjustment(s) on the ventilator in order to normalize the blood gas values, the therapist should:

A. decrease oxygen to 30%.
B. change to SIMV mode.
C. initiate PEEP of 5 cm H_2O.
D. decrease the set rate to 10/min.

7. The ventilator flow sheet of a patient shows the following data. No settings have been changed when these data are recorded:

Time	Peak pressure (cm H_2O)	Plateau Pressure (cm H_2O)
2 PM	50	44
4 PM	40	35

At 4 PM, the correct interpretation of these data is:

A. The patient's airflow resistance is increasing.
B. The patient's airflow resistance is decreasing.
C. The patient's lung compliance is increasing.
D. The patient's lung compliance is decreasing.

8. During ACLS procedure on a 50-year-old patient, the monitored ventricular heart rate is 200/min. The patient has no palpable pulse. Which of the following should the RCP recommend?

A. Adminster lidocaine at 1 mg/kg.
B. Instill epinephrine 2 mg bolus into the endotracheal tube.
C. Cardiovert at 200 joules.
D. Insert transcutaneous cardiac pacemaker.

9. The RCP has just capped the tracheostomy tube of a patient who is being considered for closing the tracheotomy. Within 20 seconds after capping the tube, the patient's respiratory rate, heart rate and blood pressure are increasing while the SpO_2 drops from 97% to 86%. The most likely cause of this condition is that the RCP has:

A. left the cuff deflated.
B. left the cuff inflated.
C. not capped the tracheostomy completely.
D. not switched to a fenestrated tracheostomy tube.

10. After orally intubating a 30-year-old patient, the therapist notices diminished breath sounds on the left. The ET tube marking shows 25 cm at the patient's lips. The patient's SpO_2 is 98% on 30% oxygen while being mechanically ventilated. At this point, the therapist should _____ the endotracheal tube and _____.

A. insert the tube 2 cm deeper; request a stat chest radiograph.
B. insert the tube 2 cm deeper; reassess bilateral breath sounds.
C. withdraw the tube by 2 cm; request a stat chest radiograph.
D. withdraw the tube by 2 cm; reassess bilateral breath sounds.

11. Which of the following should not be used for peak flow measurements?

A. Fischer peak flow meter.
B. Vortex shedding device.
C. Collins water seal spirometer.
D. Wright respirometer.

12. Mr. Jones has a confirmed tension pneumothorax on the right. The proper treatment is to:

A. position the patient semi-Fowler and perform a needle tap in the 6^{th} or 7^{th} anterior intercostal space, mid-axillary line.
B. position the patient supine and perform a needle tap in the 2^{nd} or 3^{rd} anterior intercostal space, mid-calvicular line.
C. initiate manual ventilation with 100% oxygen.
D. initiate mechanical ventilation with 100% oxygen.

13. While performing endotracheal suctioning, the patient was disconnected from mechanical ventilation. The patient's SpO_2 changes from 96% to 88%. In order to minimize suction-induced desaturation on patient during mechanical ventilation, the RCP should:

A. perform suction no longer than 5 seconds.
B. use close-system suctioning device.
C. irrigate with no more than 5 ml of sterile saline.
D. administer bronchodilator and mucolytic before suctoning.

14. A patient has an arterial PCO_2 reading of 40 torr and a mean expired PCO_2 reading of 30 torr. What is the physiologic dead space volume with a tidal volume of 500 ml?

A. 125 ml.
B. 150 ml.
C. 200 ml.
D. 250 ml.

15. After measuring the PAP and PCWP, the RCP notices aminimally fluctuating waveform with a mean value of 8 mm Hg on the patient's pulmonary artery tracing. Before leaving the patient's room, the RCP should:

A. inflate the catheter balloon.
B .deflate the catheter balloon.
C. record the PCWP as 8 mm Hg.
D. not do anything since this is normal waveform.

16. The main purpose of transtracheal aspiration in a nonintubated patient is to:

A. induce coughing reflex.
B. obtain an uncontaminated sputum sample.
C. avoid damage to vocal cords due to frequent nasotracheal suctioning.
D. remove thick, tenacious secretions.

17. Transthoracic needle aspiration may be useful in diagnosing:

A. bronchogenic carcinoma.
B. bronchiolitis.
C. intrinsic asthma.
D. pneumocystitis pneumonia.

18. In order to verify the accuracy of the inspired oxygen concentration delivered by a Puritan Bennett 7200 ventilator, the RCP should:

A. record the F_IO_2 setting on the ventilator flow sheet every 2 hours.
B. trend the patient's SpO_2 and record on the ventilator flow sheet.
C. use a calibrated oxygen analyzer in line with the ventilator circuit.
D. ensure the system oxygen pressure to be greater than 50 psig.

19. During a preclinical check of an open-circuit high frequency jst ventilator, the RCP discovers abnormally low peak inspiratory airway pressures. The RCP should first check the:

A. expiratory pressure.
B. inlet pressure.
C. exhalation valve.
D. drive pressure.

20. Persistent asystole is present during CPR efforts in a 30-year-old patient. Which of the following should be done immediately?

A. Obtain IV access to administer IV epinephrine.
B. Defibrillate with 200 joules up to three times.
C. Administer lidocaine 1 mg/kg via the endotracheal tube.
D. Administer atropine 1 mg bolus via the endotracheal tube.

21. Which of the following would be most useful to distinguish between asthma and emphysema in a patient with obstructive lung defect?

A. ABG's on room air.
B. chest radiograph.
C. Spirometry before and after bronchodilator.
D. Sputum culture and sensitivity.

22. In the ER, the physician intubates a 40 year-old, 110-lb patient with a size 8.5 endotracheal tube and inflates the cuff with 20 ml of air. To manage the airway properly, the therapist should use a cuff monitor and:

A. inflate the cuff until the pressure is about 35 cm H_2O.
B. inflate the cuff until the pressure is about 25 cm H_2O.
C. deflate the cuff until the pressure is about 35 cm H_2O.
D. deflate the cuff until the pressure is about 25 cm H_2O.

23. The RCP obtains the following measurements during a routine ventilator check: expired V_T = 500 ml, peak inspiratory pressure = 40 cm H_2O, plateau pressure = 25 cm H_2O, PEEP = 5 cm H_2O. The calculated static compliance is:

A. 12.5 ml/cm H_2O.
B. 14.3 ml/cm H_2O.
C. 20 ml/cm H_2O.
D. 25 ml/cm H_2O.

Questions 24 and 25: A child has been admitted to the emergency department of a pediatric hospital for shortness of breath, increased work of breathing, and to rule out epiglottitis.

24. Which of the following tests is most useful for the diagnosis of this condition?

A. PA and lateral chest radiography
B. L/S ratio
C. sweat chloride test
D. PA and lateral neck radiography

25. Following a series of tests, the results are as follows: mild infiltrates in left upper lobe, L/S ratio is pending, sweat chloride is 20 mEq/L, steeple sign on neck radiography. These findings support a diagnosis of:

A. cystic fibrosis.
B. epiglottitis
C. croup
D. L/S ratio is needed to confirm diagnosis

26. In reviewing the patient's chart, the therapist notices the percussion note is "hyperresonant." This characteristic is consistent with excessive:

A. air under the area of percussion (e.g., emphysema).
B. lung tissues under the area of percussion (e.g., atelectasis).
C. fluid in the pleural space (e.g., pleural effusion).
D. fatty tissues under the area of percussion (e.g., obesity).

27. A patient has the following hemodynamic measurements: Systolic PAP = 23 mm Hg, diastolic PAP = 14 mm Hg, CVP = 5 mm Hg, PCWP = 19 mm Hg. The interpretation based on these data is:

A. left-sided heart failure.
B. pulmonary hypertension.
C. hypervolemia.
D. hypovolemia.

Questions 28 and 29. Ms. Jones has an FEV_1 of 2 L (normal 4.2 L) and FVC of 5 L (normal 4.9 L).

28. What is the FEV_1%?

A. 18%
B. 25%
C. 40%
D. Insufficient information to calculate answer.

29. Based on the information above, Ms. Jones is likely to have a(n) _____ lung involvement.

A. restrictive
B. obstrictive
C. restirictive and obstructive
D. Unable to interpret due to insufficient information.

30. Dr. Farrow orders a single-breath nitrogen washout study for her patient. This is done to evaluate the efficiency of:

A. breathing capacity and pulonary reserve.
B. gas distribution.
C. gas diffusion and exchange.
D. muscular strength.

31. While on an SIMV mode of 6/min and pressure support of 10 cm H_2O, the measured minute ventilation is 8 L/min and total frequency is 20/min. What is the rapid shallow breathing index (RSBI) and should this RSBI be used in making weaning decision?

A. 50; Yes.
B. 100; No.
C. 200; Yes.
D. The RSBI using these data is incorrect; No.

32. An outpatient has a peak flow reading of 100 L/min (45% predicted); FEV_1% = 56%, FRC = 138% predicted. The interpretation of this finding is:

A. normal.
B. restrictive impairment.
C. obstructive impairment.
D. restrictive and obstructive impairment.

33. A patient in the ICU has the following findings in the most recent chest radiograph:

cardiac enlargement
interstitial and alveolar infiltrates
Kerley B lines
peribronchial cuffing

These findings are diagnostic of:

A. cardiogenic pulmonary edema.
B. noncardiogenic pulmonary edema.
C. shock lung.
D. pulmonary emphysema.

34. Calculate the inspiratory:expiratory ratio for a time-cycled, pressure-limited ventilator with the following settings:

minute frequency: 40 breaths/mm.
inspiratory flow: 6 L/min.
inspiratory time: 0.5 sec.
F_IO_2: 1.0

A. 1:1
B. 1:2
C. 1:3
D. 1:3.5

35. A transcutaneous oxygen electrode placed on an infant's upper right arm shows a $P_{tc}O_2$ value 20 torr lower than the arterial PO_2 obtained from an umbilical artery catheter. What is a possible explanation for this observation?

A. Persistent pulmonary hypertension is present.
B. Left-to-right shunting through the foreman ovale is present.
C. The sensor temperature is set too high.
D. An error has been made in recording the measurements.

36. A 26 year-old female was hospitalized and recovering from fractures of bone in both legs resulting from a skiing accident. The patient had no history of cardiopulmonary disease or smoking. Four days after surgery to the legs, the patient suddenly became dyspneic, tachypneic, and cyanotic. Crackles and rhonchi were heard bilaterally. The patient also exhibited a diminished sensorium and petechiae on her chest and neck. What is the probable diagnosis?

A. acute myocardial infarction
B. tension pneumothorax
C. pulmonary embolism
D. aspiration pneumonitis

37. An automobile mechanic was found unconscious in the garage where he worked. When he entered the emergency department, an RCP placed a pulse oximeter probe on his finger and obtained a saturation of 98%. What should the RCP do at this time?

A. Apply a transcutaneous oxygen electrode to the patient's chest.
B. Measure the patient's end-tidal carbon dioxide tension.
C. Obtain an arterial blood sample and analyze the pH, $PaCO_2$, and PaO_2.
D. Obtain an arterial blood sample and analyze it with a CO-oximeter.

38. A 1,200-gram, 31-week gestation neonate has the following clinical signs:

Ventilatory rate: 80 breaths/mm.
Breathing pattern: paradoxical with grunting, nasal flaring, and sternal retractions
Umbilical blood gases at this time indicate the following:
PH = 7.21; PCO_2 = 62 torr; PO_2 = 45 torr; HCO_3^- = 25 mEq/L

Chest radiography shows reticulogranular densities, air bronchograms, a distinct cardiac shadow, and a "bell-shaped" thorax. What is the most likely diagnosis based on the review of these data?

A. Tetralogoy of Fallot
B. Respiratory distress syndrome
C. Meconium aspiration syndrome
D. Diaphragmatic hernia

39. While a patient is being mechanically ventilated, tension pneumothorax has all of the following signs and symptoms *except*:

A. shift of mediastinum to the affected side.
B. hyperresonant percussion note.
C. decreasing cardiac output.
D. increasing hypoxia.

40. Erroneous SpO_2 readings may result under all of the following conditions *except*:

A. hypothermia.
B. hypertension.
C. cardiac arrest.
D. low perfusion status.

Questions 41 to 43: A 100-lb female patient is receiving controlled mechanical ventilation with a tidal volume of 500 ml at a rate of 16/min. Her oxygen consumption = 250 ml/min, CaO_2 = 20 vol%, CvO_2 = 15 vol%.

41. What is her expired minute ventilation and alveolar minute ventilation?

A. 4 L; 3.6 L.
B. 6 L; 5.0 L.
C. 7 L; 6.2 L.
D. 8 L; 6.4L.

42. What is her cardiac output?

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

43. What is her V/Q ratio?

A. 0.78
B. 0.85
C. 1.15
D. 1.28

44. An RCP sets the tidal volume to 200 ml and allows the ventilator to cycle to inspiration while occluding the patient Y-connector completely. The observed peak inspiratory pressure is 40 cm H_2O. The _____ compliance is therefore _____.

A. patient; 5 ml/cm H_2O.
B. patient; 8 ml/cm H_2O.
C. circuit; 5 ml/cm H_2O.
D. circuit; 8 ml/cm H_2O.

45. During controlled mode of mechanical ventilation, an increased peak flow would cause all of the following changes *except*:

A. a shorter I time.
B. a longer E time.
C. a larger I:E ratio (e.g., from 1:2 to 1:3)
D. a smaller I:E ratio (e.g., from 1:3 to 1:2)

46. Flutter valve, PEP therapy, postural drainage are techniques that are intended for the:

A. removal of secretions.
B. expansion of lungs.
C. improvement of exercise tolerance.
D. All of the above.

47. A patient is using a 35% aerosol mask via a large volume air-entrainment nebulizer. The flow rate is set at 8 LPM. The oxygen air entrainment ratio for this F_IO_2 is about _____ and the total flow is _____ LPM.

A. 1:3.2; 33.6
B. 1:4.6; 44.8
C. 1:6; 56
D. None of the above.

48. Oxygen conserving device is most beneficial to patients in a(n) _____ setting.

A. critical care
B. ambulance transport
C. post-operative
D. home care

49. Which of the following statements is true in regard to a heat and moisture exchanger (HME)?

A. It may be used effectively in ventilator patients with copius amount of secretions.
B. It provides 100% relative humidity without supplemental heat and moisture.
C. It may be used for short–term mechanical ventilation in place of a heated humidifier.
D. It must be cleaned and sterilized before re-use.

50. When bi-level positive airway pressure (BiPAP) is used in patients with exacerbation of COPD, the IPAP provides _____ and the EPAP is mainly used to maintain _____.

A. ventilation; oxygenation
B. ventilaiton; airway patency
C. oxygenation; ventilation
D. oxygenation; airway patency

51. Which of the following statements is true in regard to a fenestrated tracheostomy tube when it is used on a spontaneously breathing patient?

A. This tube has openings along the inner cannula.
B. Opening of this tube may be plugged with the inner cannula in place and cuff inflated.
C. Opening of this tube may be plugged with the inner cannula removed and cuff inflated.
D. This tube should not be used on a spontaneously breathing patient.

52. Laryngeal mask airway is primarily used to provide _____ ventilation since it can withstand airway pressures up to _____ cm H_2O.

A. manual; 20.
B. manual; 40.
C. mechanical; 40.
D. mechanical; 60.

53. A home care patient's "E" size oxygen cylinder reads 1,500 psig. At a flow rate of 1 LPM, how much time will the cylinder take to reach a reading of 500 psig?

A. 2 hr 20 min
B. 4 hr 40 min
C. 9 hr 20 min
D. Insufficient information to calculate answer.

54. Mr. Jones is using 1 LPM of oxygen via nasal cannula. The blood gas report shows pH = 7.43, PCO_2 = 34 torr, PO_2 = 149 torr. At the time of arterial sampling, the respiratory therapist notices the SpO_2 is 89% and Mr. Jones seems to have labored breathing. The respiratory therapist should:

A. post the results in the chart.
B. repeat the ABG procedure.
C. adjust the PO_2 to 60 torr in the blood gas report.
D. discontinue oxygen therapy.

55. "Minimal leak technique" or "maximal occlusion volume" procedure may be used to manage the _____ when a _____ is not readily available.

A. endotracheal tube; suction catheter
B. endotracheal tube; pressure manometer
C. cuff of an endotracheal tube; suction catheter
D. cuff of an endotracheal tube; pressure manometer

56. Ethylene oxide is used to _____ equipment and supplies that _____.

A. decontaminate; are heat-sensitive.
B. decontaminate; have been gamma radiated.
C. sterilize; are heat-sensitive.
D. sterilize; have been gamma radiated.

57. A post-operative patient is using 100% via a non-rebreathing mask (NRM) and the PaO_2 is 400 torr. Dr. Dillard wants to wean the patient to the lowest level of F_IO_2 as quickly as possible. The RCP should switch the NRM to an air-entrainment mask and titrate the patient's F_IO_2 requirement with a(n):

A. oxygen analyzer.
B. pulse oximeter.
C. blood gas analyzer.
D. oxygen flow meter.

58. An RCP is at the bedside of a patient whose radial arterial line catheter shows a backward blood flow in the heparin flush tubing. The most appropriate action would be to check all of the following *except*:

A. ensure heparin flush solution has not been depleted.
B. maintain constant and continuous heparin drip.
C. ensure that heparin pressure is greater than the patient's arterial pressure.
D. turn three-way stop-cock to face the artery.

59. A patient is receiving oxygen from a home liquid oxygen system weighing 100 pounds. The gauge indicates that the system is 1/2 full. At a flow of 2 L/min via a nasal cannula, the oxygen system will last about:.

A. 3 days.
B. 6 days.
C. 12 days
D. 24 days

60. Troubleshooting a blood gas electrode is indicated when the quality control readouts are:

A. within one standard deviation from mean.
B. within two standard deviations from mean.
C. outside one standard deviation from mean.
D. outside two standard deviations from mean.

61. With an IPPB machine, a larger inspired volume may be done by:

A. increasing the peak flow.
B. increasing the pressure limit.
C. decreasing the peak flow.
D. decreasing the expiratory time.

62. An RRT is called to the ICU to assist with the intubation of a patient using a double-lumen ET tube. Which of the following conditions is most likely to require the insertion of this type of artificial airway.

A. Tracheal malacia.
B. Unilateral interstitial fibrosis.
C. Adult respiratory distress syndrome (ARDS).
D. Diffuse idiopathic consolidated pneumonia.

63. Which of the following measurements are available from an indwelling arterial catheter?

I. Systolic, diastolic, and mean arterial pressures.
II. Systemic vascular resistance
III. Arterial blood gases
IV. ventricular afterload

A. I only.
B. I, II, III only.
C. I, III only.
D. II, IV only.

64. Which of the following equipment is necessary during fiberoptic bronchoscopy?

I. Pulse oximeter
II. Maximum inspiratory pressure meter
III. Peak flow meter
IV. Single-lead ECG monitor

A. I only.
B. I, III, IV only.
C. I, IV only
D. All of the above.

65. How will hemodynamic measurements be affected if the PAC transducer, after having been zeroed, is placed below the phlebostatic axis?

A. The pressure readings will be accurate due to self-correction.
B. The pressure readings will be erroneously high.
C. The pressure readings will be erroneously low.
D. The pressure readings will fluctuate.

66. How will the accumulation of condensate in the large bore tubing of an air-entrainment aerosol device affect the operation of the system?

A. It will cause the F_IO_2 to decrease.
B. It will increase the delivered flow rate.
C. It will produce a higher F_IO_2.
D. It will produce more aerosol.

67. The F_IO_2 delivered by a molecular sieve-type oxygen concentrator decreases as the:

A. length of oxygen tubing is increased.
B. length of oxygen tubing is decreased.
C. liter flow is increased.
D. liter flow is decreased.

68. A patient who is receiving PEP mask therapy is not producing mucus. The RRT notices the pressure manometer is reading 5 cm H_2O. The most appropriate action needed to obtain the desired effect of PEP therapy would be to:

A. correct for the loss of mask pressure..
B. increase the pressure to 8 cm H_2O.
C. sedate the patient.
D. do nothing because the desired effect is delayed.

69. A patient who has recently been extubated is becoming tachypneic and is using accessory muscles of ventilation. Ventilatory muscle fatigue appears imminent.Which form of therapeutic intervention would be most appropriate at this time?

A. High-frequency jet ventilation.
B. Bi-level positive airway pressure.
C. Mask CPAP.
D. Vibratory PEP therapy.

Questions 70 to 71 refer to the same patient: An RCP is preparing to ventilate a 132-pound (ideal body weight), 16-year-old patient with a Siemen Servo 900C ventilator. Before connecting the patient to the ventilator, the RRT sets the machine in the volume control mode with a minute ventilation of 2 L/min. and a ventilatory rate of 10 breaths/mm. She occludes the Y connector while the ventilator cycles on to inspiration. She observes the PIP reaching 45 cm H_2O in the presence of a PEEP of 5 cm H_2O.

70. Calculate the tubing compliance factor for this ventilator

A. 3 ml/cm H_2O
B. 4 ml/cm H_2O
C. 5 ml/cm H_2O
D. 6 ml/cm H_2O

71. The RCP sets the following parameters on the Siemens Servo 900C.

Minute ventilation: 8 L/rnin
Ventilatory rate: 10 breaths/min
F_IO_2: 0.30
Inspiratory time %: 33%
PEEP: 5 cm H_2O
Mode: SIMV
SIMV rate: 8 breaths/min

When the ventilator cycles to inspiration, the PIP achieved is 55 cm H_2O. Calculate this patient's actual (corrected) tidal volume.

A. 500 ml
B. 550 ml
C. 600 ml
D. 650 ml

72. A Combitube may be inserted into the _____ and _____ should be inflated immediately after insertion into the patient.

A. trachea; cuff number 1.
B. esophagus; cuff number 2.
C. trachea or esophagus; cuff number 1 or 2.
D. trachea or esophagus; both cuffs number1 and 2.

73. Following oral intubation of a patient in the emergency department, the RCP is evaluating proper placement of the endotracheal tube. The cuff has been inflated and the patient is being ventilated with a manual resuscitator. Which of the following is a sign of proper endotracheal intubation?

A. Ability to speak.
B. Vomitting through the endotracheal tube.
C. Oxygen desaturation.
D. Bilateral breath sounds.

74. Mr. Johnson has a cardiac output (C.O.) of 4 L/min and an oxygen consumption of 200 mL/min. What is the calculated arterial-venous oxygen content difference?

A. 2 vol %
B. 5 vol %
C. 6 vol %
D. 8 vol %

75. Determine an appropriate flow rate needed to deliver a tidal volume of 30 ml to an infant breathing 30 breaths per minute while receiving mechanical ventilation at an I:E ratio of 1:3.

A. 30 ml/sec.
B. 60 ml/sec.
C. 90 ml/sec.
D. Insufficient information to calculate answer.

76. Dr. Lowe asks the therapist about the ventilation variables that are determined by the patient during pressure support breaths. In the reply, the therapist should include all of the following *except*:

A. tidal volume.
B. pressure plateau level.
C. peak inspiratory flow.
D. ventilatory rate.

77. Which of the following statements are true concerning pressure-control inverse-ratio ventilation (PC-IRV)?

I. The patient must he sedated and paralyzed.
II. This mode is useful for patients who have dynamic flow limitation.
III. Peak airway pressures are reduced.
IV. The time to wean from mechanical ventilation is reduced.

A. I and II.
B. I and III.
C. II and III.
D. II and IV.

78. Dr. Busbee is getting ready to administer Exosurf and asks for assistance. The therapist should position the _____ properly to facilitate administration of Exosurf.

A. orogastric feeding tube.
B. intravenous tubing.
C. endotracheal tube.
D. oxyhood.

79. To establish an l:E ratio of 2:1 on a patient who is receiving controlled mechanical ventilation from the Siemens Servo 900C, which of the following settings should be used?

A. 25% inspiratory time %; 30% pause time %.
B. 50% inspiratory time %; 5% pause time %.
C. 50% inspiratory time %; 25% pause time %.
D. 67% inspiratory time %; 0% pause time %.

80. Calculate the pulmonary vascular resistance with the following hemodynamic profile:

Right atrial pressure: 8 mm Hg
Mean arterial pressure: 78 mm Hg
Mean pulmonary artery pressure: 17 mm Hg
Mean pulmonary artery wedge pressure: 7 mm Hg
Stroke volume: 70 ml.
Heart rate: 100/min.

A. 1.4 mm Hg/L/min.
B. 7 mm Hg/L/min.
C. 10 mm Hg/L/min.
D. 14 mm Hg/L/min.

81. In Airway Pressure Release Ventilation (APRV), the tidal volume is determined by the difference between the:

A. release pressure and base line pressure of 0 cm H_2O.
B. release pressure and PIP.
C. plateau and release pressure.
D. CPAP and release pressure.

82. A patient is being discharged from the hospital 42 days following recovery from flail chest and head injury as a result of a moving vehicle crash. The physician has prescribed around-the-clock oxygen at 8 L/min via aerosol trach collar. Which of the following home oxygen delivery systems is most appropriate for this patient?

A. Oxygen cylinder.
B. Oxygen concentrator.
C. Oxygen blender.
D. Stationary liquid oxygen system.

83. Mr. Eisen, a patient in the medical ICU, has been intubated for the last three weeks. Following extubation, he develops inspiratory stridor and speaks with a hoarse voice. What should be done for this condition?

A. Racemic epinephrine via aerosol T-piece.
B. Racemic epinephrine via aerosol mask.
C. Reintubation.
D. Fiberoptic bronchoscopy.

84. When interpreting the values obtained from a capillary blood sample, which of the following measurements is the least accurate when correlated with an arterial blood sample?

A. pH.
B. PO_2.
C. PCO_2.
D. Base excess.

85. Which of the following statements are true concerning positive expiratory pressure (PEP) therapy?

I. It is applied to intubated and mechanically ventilated patients.
II. Between 10 to 20 breaths should be performed before coughing attempts.
III. The patient should achieve an I:E ratio of about 3:1.
IV. The patient should achieve an I:E ratio of about 1:3.

A. I, II, III.
B. I, II, IV.
C. II, III.
D. II, IV.

86. The following ABG results were obtained from a 20 year-old patient who was receiving mechanical ventilation for post-surgical recovery:

pH = 7.50, $PaCO_2$ = 48 torr, PO_2 = 95 torr, HCO_3^- = 30 mEq/L

What is the interpretation?

A. Normal blood gases.
B. Compensated respiratory acidosis.
C. Acute alveolar hypoventilation.
D. The data are erroneous.

87. A patient is receiving BIPAP via a nasal mask at the following settings:

Mode: timed
Inspiratory positive airway pressure (IPAP): 6 cm H_2O
Expiratory positive airway pressure (EPAP): 3 cm H_2O
Ventilatory rate: 14 breaths/mm.
The patient's $PaCO_2$ is 48 torr. Which of the following is the most effective method to lower the $PaCO_2$?

A. Change EPAP to 2 cm H_2O.
B. Change IPAP to 10 cm H_2O.
C. Change the device to spontaneous mode.
D. Increase the ventilatory rate to 16 breaths/min.

88. Ms. Mays, a patient in the medical unit, is being discharged to home care. How should the family or caregivers of Ms. Mays be instructed to clean reusable respiratory therapy supplies?

A. Wash the equipment in soap and water, then immerse it in a vinegar solution as needed.
B. Wash the equipment in warm tap water and immerse it in a commercial disinfectant as needed.
C. Package equipment for transport to the hospital for disinfection periodically.
D. Rinse the equipment in hot water from a faucet weekly.

89. An ECG-monitored, 3-year-old child weighing 40 pounds is experiencing ventricular fibrillation and defibrillation is pending. What energy level should be used for the first defibrillation?

A. 25 joules.
B. 36 joules.
C. 50 joules.
D. 80 joules.

90. Ms. Warren, a 40 year-old patient on SIMV mode of mechanical ventilation, has suddenly developed the following signs and symptoms: tachypnea, tachycardia, hypotension, oxygen desaturation, normal breath sound on right but absence on left, and consistent triggering of the high pressure limit alarm. Which of the following is the likely condition?

A. Kinking of ventilation circuit.
B. Aspiration pneumonia.
C. Tension pneumothorax.
D. Atelectasis.

91. A resident asks the respiratory therapist about the physiologic effects associated with PEEP? The answer may include:

I. Increased intracranial pressure.
II. Decreased urinary output.
III. Decreased CO.
IV. Decreased pulmonary vascular resistance.

A. I, II, III.
B. I, III, IV.
C. II, III.
D. II, III, IV.

92. An RCP working in the emergency department of a 100-bed community hospital sees an 18-year-old smoke-inhalation victim. En route to the hospital. the EMTs administered oxygen to this patient with a simple mask at 8 L/min. ABGs drawn upon arrival indicate the following:

pH: 7.46
PCO_2: 28 torr
PO_2: 110 torr
Hb: 13 g%
COHb%: 35%
Vital signs taken at this time show:

Arterial blood pressure: 130/85 torr
Heart rate: 80 beats/mm.
Spontaneous respiratory rate: 20 breaths/mm.

What would be the appropriate strategy to provide respiratory care for this patient?

A. Continue with 8 L/min of oxygen via simple mask.
B. Change to non-rebreathing mask.
C. Change to 50% air-entrainment mask.
D. Change to 40% aerosol T-piece.

93. Dr. Panola wants to initiate a therapeutic modality to reduce air trapping and to mobilize secretions for a COPD patient. Which of the following should the RCP recommend?

A. IPPB.
B. Incentive spirometer.
C. Positive expiratory pressure device.
D. metered-dose inhaler.

94. An RCP is monitoring the intracuff pressure of a size 8 tracheostomy tube in a 40-year-old 60-Kg patient who is receiving mechanical ventilation. The cuff pressure manometer shows 20 cm H_2O. What should be done at this time?

A. Do nothing because the cuff pressure reading is acceptable.
B. Add air into the cuff.
C. Remove air from cuff.
D. Change to a size 7 tracheostomy tube.

Questions 95 to 97 refer to the same patient. An automobile accident victim is admitted to the emergency department. Clinical examination of the victim reveals massive head injury with cerebral hemorrhage. The victim presents as comatose with an irregular ventilatory pattern, a spontaneous ventilatory rate of 7/min and a V_T of 270 ml. The victim weighs approximately 65 kg and is 20 years of age.

95. What therapeutic intervention is immediately recommended for this patient?

A. CPAP.
B. BiPAP.
C. Non-rebreathing mask.
D. Mechanical ventilation.

96. How should intracranial pressure be managed for this patient?

I. Maintain an adequate PaO_2 to reduce cerebral vasodilatation.
II. Maintain a low PCO_2.
III. Reduce the resistance of the cerebral vasculature to enhance cerebral blood flow.
IV. Avoid inducing coughing, gagging, and excessive inspiratory pressure.

A. I, II.
B. I, II, IV.
C. I, IV.
D. III, IV.

97. The patient's $PaCO_2$ should be maintained in the range of:

A. 5 to 10 torr.
B. 10 to 15 torr.
C. 20 to 25 torr.
D. 30 to 35 torr.

Questions 98 to 99 refer to the same patient. A 4-year-old boy presents in the emergency department with an axillary temperature of 39.7 ºC. The boy appears to be anxious and frightened. He complains of dyspnea and dysphagia. Drooling, inspiratory and expiratory stridors are noted. A lateral neck radiograph indicates an obliterated vallecula, a ballooning hypopharynx, and the thumb sign.

98. Which diagnosis can be made based on these clinical data?

A. Subglottic stenosis.
B. Laryngotracheohronchitis.
C. Epiglottitis.
D. Tracheal malacia.

99. Which therapeutic or diagnostic procedure is most appropriate at this time?

A. Aerosol mist tent with oxygen.
B. Proventil aerosol treatment.
C. Endotracheal intubation.
D. Racemic epinephrine aerosol treatment.

100. When a patient is receiving mechanical ventilation, the pulmonary artery and wedge pressures should be taken at the _____ phase of the breathing cycle.

A. beginning-inspiration
B. mid-inspiration
C. end-inspiration
D. end-expiration