1. 1. Which of the following is NOT a function of the lungs?
A. Metabolism
B. Serves as a reservoir of blood for the left ventricle.
C. It is a filter to protect the systemic vasculature
D. Facilitates the exchange of O2 and CO2 between air and blood.
E. All of the above are true.

Show answer

Correct Answer: E

2. Which of the following is in the correct path of CO2 from the tissue to the atmosphere?
A. Reaction with H2O to make H2CO3, dissociation to H+ and HCO3-, H+ combines with imidazole side chain of hemoglobin, carried back to lungs as HHb+ and HCO3-, reverse reaction forms CO2.
B. O2 is metabolized to CO2, reaction with H2O to make H2CO3, H2CO3 combines with imidazole side chain of hemoglobin, H2CO3Hb+ is carried back to the lungs, reverse reaction forms CO2.
C. Reaction with H2O to make H2CO3, dissociation to H+ and HCO3-, HCO3- combines with imidazole side chain of hemoglobin, carried back to the lungs as HCO3-Hb+ and H+, reverse reaction forms CO2.
D. O2 is metabolized to CO2, reaction with H2O to make H2CO3, dissociation to H+ and HCO3-, carried back to lungs in this form, reverse reaction forms CO2.

Show answer

Correct Answer: A

3. Which of the following is NOT an effector of respiration?
A. Heart
B. diaphragm
C. intercostals
D. Trapezius.

Show answer

Correct Answer: D

4. Which of the following is the first branching of the bronchial tree that has gas exchanging capabilities?
A. Terminal bronchioles.
B. Respiratory bronchioles.
C. Alveoli
D. segmental bronchi
E. alveolar ducts.

Show answer

Correct Answer: B

5. Which of the following could NOT be part of an acinus?
A. alveolar sacs
B. Alveolar ducts
C. Terminal bronchioles
D. Respiratory bronchiole

Show answer

Correct Answer: C

6. If you increased the left atrial pressure from 5 mmHg to 15 mmHg, what effect would that have on pulmonary circulation?
A. It would force blood the opposite direction.
B. It would increase the speed at which blood moves through the pulmonary circulation.
C. No change.
D. Blood flow would almost or completely stop.

Show answer

Correct Answer: D

7. Which of the following concerning average lung volumes and capacities of a person at rest is TRUE?
A. TLC>VC>TV>FRC
B. TLC>FRC>VC>TV
C. TLC>VC>FRC>TV
D. TLC>FRC>TV>VC

Show answer

Correct Answer: C

8. Which of the following is NOT a normal occurance with increasing age?
A. Vital capacity of the lung decreases.
B. Residual volume increases.
C. Functional residual capacity increases.
D. Inspiratory capacity decreases.
E. Expiratory reserve volume increases.

Show answer

Correct Answer: E

9. Which of the following spirometry measurements has the greatest sensitivity for detecting early air flow obstruction?
A. FVC
B. FEV1
C. FFE
D. FEF25-75

Show answer

Correct Answer: D

10. Which of the following does NOT happen during inspiration?
A. The ribs move upward.
B. The diaphragm lifts up.
C. The antero-posterior dimensions of the chest are increased.
D. The tranverse dimensions of the thorax are increased.
E. The scalene and sternocleidomastoid muscles can be recruited for inspiration.

Show answer

Correct Answer: B

11. During inspiration, how does alveolar pressure compare to atmospheric pressure?
A. Alveolar pressure is greater than atmospheric.
B. Alveolar pressure is less than atmospheric.
C. Alveolar pressure is the same as atmospheric.
D. Alveolar pressure is one of the few pressures where the reference pressure is not atmospheric.

Show answer

Correct Answer: B

12. Which of the following represents the pressure difference that acts to distend the lungs?
A. Alveolar pressure
B. Airway opening pressure
C. Transthoracic pressure
D. Transpulmonary pressure
E. Esophageal pressure.

Show answer

Correct Answer: D

13. If a patient had a progressive lung disease that required an ever increasing pressure to fill the same volume of lung, how would the lung's compliance be affected?
A. It would increase it.
B. It would stay the same.
C. It would decrease it.
D. These variables do not affect lung compliance.

Show answer

Correct Answer: C

14. An asthma sufferer finds she has to breathe at twice her normal rate. How does that affect her dynamic compliance?
A. It stays the same.
B. It decreases.
C. It increases.
D. Static compliance, not dynamic, is the variable affected by asthma.

Show answer

Correct Answer: B

15. According to the Law of Laplace, air should flow from the smaller alveoli to the larger, collapsing them. In the lungs, several factors counter that tendency, and stabilize the alveolar structures. Which of the following is NOT one of them?
A. Surfactant lowers surface tension to a greater degree when it is on a smaller surface area, allowing the smaller alveoli to stay open.
B. Mechanical stability is given by surrounding alveoli.
C. Transpulmonary pressure is lower for smaller alveoli, allowing them to stabilize in comparison to the bigger ones.
D. Surface tension at the gas-liquid interface increases as alveolar surface area increases.

Show answer

Correct Answer: C

16. Which of the following is FALSE concerning the production and role of lung surfactant?
A. It is part of a lipoprotein called dipalmitoyl phosphatidyl-choline.
B. It is synthesized by alveolar type II cells.
C. As the alveolar surface area decreases during the compression curve, the surfactant decreases the surface tension at a constant rate.
D. When surfactant density is decreased during expansion, surface tension initially rises rapidly, then slows down until it reaches the starting point.

Show answer

Correct Answer: C

17. Which of the following is NOT true concerning respiratory distress syndrome in premature infants?
A. Their ability to synthesize DPPC is limited.
B. Higher pressures are required to ventilate the lungs.
C. Lung compliance is low.
D. Positive pressure respirators are often used to assist them in breathing.
E. Alveoli tend to overexpand and sometimes burst at the end of inspiration.

Show answer

Correct Answer: E

18. Which of the following is NOT true at FRC?
A. It is about 75% TLC.
B. The elastic recoil of the chest wall is outward.
C. The elastic recoil of the lung is inward.
D. The relaxation pressure of the lung and chest wall combined is at atmospheric pressure.

Show answer

Correct Answer: A

19. If the lung were punctured, which of the following would happen?
A. The lung would collapse on the side of the puncture.
B. Both the lung and the chest wall would collapse on the side of the puncture.
C. The relaxation pressure of the chest wall would increase until it surpassed the atmospheric.
D. The relaxation pressure of the chest wall would increase, but stop before it reached atmospheric pressure.

Show answer

Correct Answer: A

20. Which of the following is FALSE concerning the airflow in the lungs?
A. During inspiration and expiration, the flow in the trachea and larger bronchi is turbulent.
B. Towards the middle of the bronchial tree, the flow is turbulent at the branches and laminar in between.
C. Near the end of the bronchial tree, the flow is laminar.
D. The acini have very small radii which significantly increases the total air flow resistance of the bronchial tree.

Show answer

Correct Answer: D

21. Which of the following is FALSE concerning airway resistance?
A. Up to 50% is in the nose.
B. The maximum resistance in the bronchial tree occurs at the fourth generation.
C. In the later generations, the radii are smaller, increasing the total resistance at each successive generation.
D. Airway resistance can be increased by loss of tissue elasticity and contraction of bronchial smooth muscles.

Show answer

Correct Answer: C

22. Which of the following is FALSE concerning the effect of effort on airflow and volume during inspiration and expiration?
A. During inspiration, greater effort always results in greater flow.
B. Peak expiratory flow occurs at the beginning of expiration.
C. At low and moderate lung volumes, the greater the effort above threshold, the greater the airflow in expiration.
D. Portions of the expiration curve are effort independent.

Show answer

Correct Answer: C

23. If the equal pressure point during expiration is in the lobar bronchi, which of the following is TRUE?
A. Expiratory flow would be effort dependent.
B. Expiratory flow would be effort independent.
C. The bronchi beyond the equal pressure point would compress.
D. This situation would only occur during medium and low lung volumes.

Show answer

Correct Answer: A

24. Which of the following does NOT apply to the alveoli at the base of the lungs?
A. They are less elastic than the alveoli at the apex.
B. The pleural pressure is lower.
C. At FRC they are less inflated than the alveoli at the apex.
D. They are closed at RV.
E. They have a greater volume change than alveoli at the apex during inspiration from FRC.

Show answer

Correct Answer: A

25. Which of the following is FALSE concerning the closing volume for the lung?
A. Comes between Phase 3 and Phase 4 on the single breath N2 washout curve.
B. Marks the point where the alveoli at the apex close.
C. Marks a sudden increase in nitrogen concentration in the expelled breath.
D. Marks when the overinflated, poorly ventilated alveoli at the apex expel their air with high N2 concentrations.

Show answer

Correct Answer: B

26. Which of the following is TRUE if a patient breathes slower than normal with increased tidal volumes?
A. More resistive work is done.
B. The total work done decreases.
C. More elastic work is done.
D. Compliance is decreased.

Show answer

Correct Answer: C

27. Which of the following is INCORRECT concerning the efficiency of breathing and the oxygen consumption of the respiratory muscles?
A. Efficiency is defined as the ratio of mechanical work done to move air to the amount of metabolic energy used by the respiratory muscles.
B. The respiratory system uses less than 3% of the body's total oxygen consumption at rest.
C. Respiratory muscles are more efficient than large muscle groups.
D. Emphysema increases the oxygen requirement for respiratory muscles.
E. Hyperventilation can increase the oxygen consumption of respiratory muscles to 30%.

Show answer

Correct Answer: C

28. If the FIO2 is .21, the FEO2 is .16, the VT is 0.5 L, and the frequency of breathing is 12. What is the VO2? The equations are VO2=VI \* (FIO2 - FEO2) and VI = VT \* f.
A. 3.0 L/min
B. 0.75 L/min
C. -0.75 L/min
D. 0.3 L/min

Show answer

Correct Answer: D

29. In what situation would the gas exchange ratio be decreased compared to the respiratory quotient?
A. During slowed breathing.
B. Holding your breath.
C. During hyperventilation.
D. Impossible. The two are always equivalent.

Show answer

Correct Answer: C

30. A 140 lb woman would have approximately how much dead space in her lungs?
A. 140 ml.
B. 70 ml.
C. 280 ml.
D. 35 ml.

Show answer

Correct Answer: A

31. How do you calculate how much inspired air actually ventilates the alveoli during one minute?
A. Subtract the volume of dead space from the tidal volume.
B. Subtract both the dead space volume that was already in the lungs plus the dead space of the inspired air that won't reach the alveoli from the tidal volume.
C. Subtract the volume of dead space from the tidal volume and multiply it by the number of breaths per minute.
D. It is equal to the tidal volume times the frequency of breathing.

Show answer

Correct Answer: C

32. Which of the following is NOT a function of dead space?
A. Warms expired air to body temperature.
B. Saturates inspired air with water vapor.
C. Removes bacteria and other particulate matter.
D. Conducts the warmed air to the respiratory membranes.

Show answer

Correct Answer: A

33. Calculate PAO2 for a person at sea level for R = 0.82 and PACO2 = 40 Torr.
A. 110 Torr.
B. 95 Torr
C. 80 Torr
D. 101 Torr

Show answer

Correct Answer: D

34. To which of the following is alveolar PCO2 directly proportional?
A. Rate of CO2 production and alveolar ventilation.
B. Rate of CO2 production and rate of O2 consumption.
C. Alveolar ventilation and rate of O2 consumption.
D. Alveolar ventilation, rate of O2 consumption, and rate of CO2 production.

Show answer

Correct Answer: B

35. If a patient's blood carries 10 grams of Hb per deciliter, what is the O2 carrying capacity of his blood?
A. 18 milliliters per deciliter.
B. 20 milliliters per deciliter.
C. 10 milliliters per deciliter.
D. 13 millliliters per deciliter.

Show answer

Correct Answer: D

36. Which of the following definitions is FALSE?
A. O2 content of blood is the actual amount of O2 in one deciliter of blood.
B. O2 saturation of blood is the ratio of O2 content to its O2 capacity.
C. The O2 uptake curve of blood is the functional relationship between O2 content and PO2.
D. The O2 content of blood depends completely on the amount of Hb in the blood.

Show answer

Correct Answer: D

37. Which of the following statements about Hb is FALSE?
A. A higher P50 than normal means that the O2 binds less tightly to Hb.
B. An increase in 2,3-DPG shifts the O2 uptake curve to the left.
C. An increase in PCO2 causes a right shift of the O2 uptake curve.
D. An decrease in pH increases P50.
E. An increase in temperature shifts the O2 uptake curve to the right.

Show answer

Correct Answer: B

38. Which of the following is NOT a form by which CO2 can be transported in the blood?
A. As bicarbonate
B. Dissolved in the blood.
C. Bound to the amino end groups in proteins.
D. Bound to the imidazole ring of glutamate.

Show answer

Correct Answer: D

39. Which of the following in FALSE concerning CO2 uptake?
A. If PO2 = PCO2, then there will be more total CO2 in the blood.
B. Oxygenation moves the CO2 uptake curve downward.
C. The CO2 uptake curve is generated by comparing the total CO2 per unit volume of blood, and the PCO2.
D. Deoxygenated blood carries less CO2 than oxygenated.

Show answer

Correct Answer: D

40. Which of the following is INCORRECT concerning the O2 / CO2 movement and processing through the lungs and tissues?
A. Binding of O2 to Hb changes its configuration so that CO2 and H+ ions are more likely to dissociate.
B. When CO2 diffused into the alveoli, the PaCO2 is lowered.
C. Carbonic acid is an intermediate in the reaction combining H+ with HCO3- to form H2O and CO2.
D. Arterial blood flows to the tissues where H+ ions combine with HCO3- to form H2O and CO2.

Show answer

Correct Answer: D

41. Which of the following can cause stagnant hypoxia?
A. COPD
B. Shock or heart failure.
C. Cyanide poisoning.
D. Carbon monoxide poisoning.

Show answer

Correct Answer: B

42. If you blocked the blood supply to an alveolus, which of the following would NOT occur as a result?
A. The ventilation perfusion ratio would be 0.
B. The PAO2 would be greater than normal.
C. The PACO2 would be 0.
D. All of the above are true.

Show answer

Correct Answer: A

43. Which of the following is FALSE concerning the ventilation and perfusion of different regions of the lung?
A. Alveoli at the top of the lung have a smaller dynamic compliance.
B. The Hb moving through the base of the lung is less saturated than that at the apex of the lung.
C. PAO2 at the apex of the lung is higher than that at the base of the lung.
D. Regional variation in ventilation-perfusion is more efficient for oxygenating blood than is uniform ventilation-perfusion.
E. Variation of the ventilation/perfusion ratio in the lungs only becomes significant when lung function begins to degrade.

Show answer

Correct Answer: D

44. Which of the following is FALSE concerning the relationships of the variables in diffusion of O2 across a membrane?
A. Doubling the thickness of the membrane would cut the total flow of O2 in half.
B. Doubling the area of the membrane would double the total flow of O2 .
C. If you increased the alveolar concentration of O2, you would increase the total flow of O2 across the alveolar membrane.
D. The lower the diffusion coefficient, the higher the total flow.
E. Increasing the arterial concentration of O2 would decrease the total flow of O2.

Show answer

Correct Answer: D

45. If the blood moved slower than normal through the alveolar capillaries, which of the following would have an increased uptake?
A. Carbon dioxide.
B. Carbon monoxide.
C. Oxygen
D. None of the above.

Show answer

Correct Answer: B

46. Which of the following is FALSE concerning diffusion in the lungs?
A. CO is used to measure diffusing capacity because its uptake is diffusion limited.
B. Actual diffusion time includes time required for an O2 molecule to diffuse from the alveolus, through the membrane, the plasma, and into a RBC.
C. Reaction time is the time it takes the O2 molecule to react with Hb.
D. The diffusion time is greater than the reaction time of an O2 molecule.

Show answer

Correct Answer: D

47. Which of the following pairs is INCORRECT concerning central nervous systems and a factor they respond to by affecting respiration?
A. Cerebellum: Mechanoreceptor input
B. Limbic system: emotional states
C. Cerebral cortex: voluntary control
D. Cerebral motor cortex: exercise

Show answer

Correct Answer: A

48. Which of the following will NOT increase the minute ventilation?
A. An increase in arterial pH.
B. An increase in arterial partial pressure of carbon dioxide.
C. Increase in alveolar pressure of carbon dioxide.
D. Exercise.
E. Hypoxia.

Show answer

Correct Answer: A

49. Which of the following is the primary regulating variable of the central chemoreceptors?
A. PaO2.
B. PaCO2
C. arterial pH
D. Input from stretch receptors.

Show answer

Correct Answer: B

50. In which situation would the response to hypoxia be limited?
A. In a patient with obstructed airways.
B. When hypoxia is accompanied by hypercapnea.
C. In the hypoxia induced by high altitude.
D. During hypoventilation.

Show answer

Correct Answer: C

51. Which of the following is FALSE concerning chemoreceptor input to the respiratory centers?
A. CSF is a poor buffer and a drop in PCO2 produces a large change in pH initiating a change in respiration.
B. The body can adjust to chronic hypercapnea by using an active HCO3- transport process in the choroid plexus.
C. The carotid and aortic bodies detect increases in PaCO2 and pH, and decreases in PaO2 .
D. 75% of ventilatory response is regulated by chemoreceptors in the CSF and 25% by the carotid and aortic bodies.
E. Central chemoreceptors tend to respond slowly over time, while carotid bodies react quickly to immediate needs.

Show answer

Correct Answer: C

52. Which of the following pairs is NOT a pulmonary mechanoreceptor paired to a possible stimulus?
A. Stretch receptor: inflation
B. Irritant receptor: inhaled dust
C. Juxtacapillary receptors: decreases interstitial fluid volume in alveolar walls.
D. Bronchial C receptors: large inflations.

Show answer

Correct Answer: C