Chapter 2 Ventilation

MULTIPLE CHOICE

1. What instrument is used to measure P_{atm}?
   a. barometer
   b. hygrometer
   c. altimeter
   d. dynameter

ANS: A

	Feedback
A	A barometer is used to measure barometric (P_B) or atmospheric (P_{atm}) pressure.
B	A barometer is used to measure barometric (P_B) or atmospheric (P_{atm}) pressure.
C	A barometer is used to measure barometric (P_B) or atmospheric (P_{atm}) pressure.
D	A barometer is used to measure barometric (P_B) or atmospheric (P_{atm}) pressure.

PTS: 1 DIF: Recall REF: The Airways

2. What is the term for the movement of gas from the external environment to the alveoli ?
   a. ventilation
   b. external respiration
   c. internal respiration
   d. osmosis

ANS: A

	Feedback
A	The movement of gas from the external environment to the alveoli is called ventilation.
B	The movement of gas from the external environment to the alveoli is called ventilation.
C	The movement of gas from the external environment to the alveoli is called ventilation.
D	The movement of gas from the external environment to the alveoli is called ventilation.

PTS: 1 DIF: Recall REF: Introduction OBJ: 1

3. At sea level under standard conditions, what would the P_B equal in mm Hg ?
   a. 760
   b. 1034
   c. 14.7
   d. 29.9

ANS: A

	Feedback
A	At sea level under standard conditions, the normal barometric pressure is 760 mm Hg.
B	At sea level under standard conditions, the normal barometric pressure is 760 mm Hg.
C	At sea level under standard conditions, the normal barometric pressure is 760 mm Hg.
D	At sea level under standard conditions, the normal barometric pressure is 760 mm Hg.

PTS: 1 DIF: Recall REF: Mechanisms of Ventilation
OBJ: 2

4. What is the general term for a pressure difference between two points in a system?
   a. pressure gradient
   b. diffusion
   c. system pressure variation
   d. osmotic gradient

ANS: A

	Feedback
A	A pressure gradient is defined as the difference in pressures occuring between two points.
B	A pressure gradient is defined as the difference in pressures occuring between two points.
C	A pressure gradient is defined as the difference in pressures occuring between two points.
D	A pressure gradient is defined as the difference in pressures occuring between two points.

PTS: 1 DIF: Recall REF: Pressure Gradients
OBJ: 2

5. At sea level, what would the alveolar pressure at end-expiration equal?
a. 760 mm Hg
b. 764 mmHg
c. 756 mm Hg
d. 0 mm Hg

ANS: A

	Feedback
A	Because the alveolar and atmospheric pressure are identical at end-expiration, no air movement occurs.
B	Because the alveolar and atmospheric pressure are identical at end-expiration, no air movement occurs.
C	Because the alveolar and atmospheric pressure are identical at end-expiration, no air movement occurs.
D	Because the alveolar and atmospheric pressure are identical at end-expiration, no air movement occurs.

PTS: 1 DIF: Recall REF: Pressure Gradients
OBJ: 2

6. At what point in the ventilatory cycle would the intra-alveolar pressure be higher than the atmospheric pressure?
a. expiration
b. end-expiration
c. inspiration
d. pre-inspiration

ANS: A

	Feedback
A	For gas to leave the lungs during exhalation, the intra-alveolar pressure must be higher than the atmospheric pressure.
B	For gas to leave the lungs during exhalation, the intra-alveolar pressure must be higher than the atmospheric pressure.
C	For gas to leave the lungs during exhalation, the intra-alveolar pressure must be higher than the atmospheric pressure.
D	For gas to leave the lungs during exhalation, the intra-alveolar pressure must be higher than the atmospheric pressure.

PTS: 1 DIF: Recall REF: Pressure Gradients
OBJ: 2

7. Which gas law states that at constant temperature, a volume of gas varies inversely proportional to its pressure?

a. Boyle's
b. Charles
c. Gay-Lussac's
d. Henry's

ANS: A

	Feedback
A	Boyle's law states that at a constant temperature P_1 x V_1=P_2 x V_2 .
B	Boyle's law states that at a constant temperature P_1 x V_1=P_2 x V_2 .
C	Boyle's law states that at a constant temperature P_1 x V_1=P_2 x V_2 .
D	Boyle's law states that at a constant temperature P_1 x V_1=P_2 x V_2 .

PTS: 1 DIF: Recall
REF: Boyle's Law and Its Relationship to Pressure Gradients OBJ: 2

8. At what point in the respiratory cycle is the equilibrium point reached?

I. Inspiration
II. End-inspiration
III. Expiration
IV. End-expiration

a. II and IV only
b. II only
c. IV only
d. 1 and III only

ANS: A

	Feedback
A	At end-inspiration and end-expiration, no gas movement occurs because the pressure gradient is zero.
B	At end-inspiration and end-expiration, no gas movement occurs because the pressure gradient is zero.
C	At end-inspiration and end-expiration, no gas movement occurs because the pressure gradient is zero.
D	At end-inspiration and end-expiration, no gas movement occurs because the pressure gradient is zero.

PTS: 1 DIF: Recall
REF: The Primary Mechanism of Ventilation Applied to the Human Airways
OBJ: 3

9. What is the general term for the inward movement of tissue between the ribs during inspiration due to increased negative intrapleural pressure generated during respiratory distress?

a. intercostal retractions
b. pectus excavatum
c. dyspnea
d. supraclavicular retractions

ANS: A

	Feedback
A	Intercostal retractions are the inward movement of tissue between ribs during inspiration due the high negative intapleural pressure generated during respiratory distress, especially in newborns and infants.
B	Intercostal retractions are the inward movement of tissue between ribs during

	inspiration due the high negative intapleural pressure generated during respiratory distress, especially in newborns and infants.
C	Intercostal retractions are the inward movement of tissue between ribs during inspiration due the high negative intapleural pressure generated during respiratory distress, especially in newborns and infants.
D	Intercostal retractions are the inward movement of tissue between ribs during inspiration due the high negative intapleural pressure generated during respiratory distress, especially in newborns and infants.

PTS: 1 DIF: Recall
REF: The Primary Mechanism of Ventilation Applied to the Human Airways|Clinical Connection 2-1: Inspiratory Intercostal Retractions OBJ: 4

10. What is the general term for the force required to move gas or fluid through a tube or vessel?
a. driving pressure
b. transmural pressure
c. transpulmonary pressure
d. transthoracic pressure

ANS: A

	Feedback
A	The driving pressure is the pressure difference between two points in a tube or vessel.
B	The driving pressure is the pressure difference between two points in a tube or vessel.
C	The driving pressure is the pressure difference between two points in a tube or vessel.
D	The driving pressure is the pressure difference between two points in a tube or vessel.

PTS: 1 DIF: Recall REF: Driving Pressure
OBJ: 5

11. Which pressure is represented by $P_{rs} = P_B - P_{alv}$?
a. transrespiratory pressure
b. transmural pressure
c. transthoracic pressure
d. transpulmonary pressure

ANS: A

	Feedback
A	Transrespiratory pressure is the difference between the atmospheric pressure and alveolar pressure.
B	Transrespiratory pressure is the difference between the atmospheric pressure and alveolar pressure.
C	Transrespiratory pressure is the difference between the atmospheric pressure and alveolar pressure.
D	Transrespiratory pressure is the difference between the atmospheric pressure and alveolar pressure.

PTS: 1 DIF: Recall REF: Transrespiratory Pressure
OBJ: 5

12. What is the term for the pressure difference that occurs across the airway wall ?
a. Transmural pressure
b. Transrespiratory pressure
c. Transpulmonary pressure
d. Transthoracic pressure

ANS: A

	Feedback

A	The transmural pressure is derived by subtracting the pressure on the inside of the airway from the pressure on the ouside of the airway.
B	The transmural pressure is derived by subtracting the pressure on the inside of the airway from the pressure on the ouside of the airway.
C	The transmural pressure is derived by subtracting the pressure on the inside of the airway from the pressure on the ouside of the airway.
D	The transmural pressure is derived by subtracting the pressure on the inside of the airway from the pressure on the ouside of the airway.

PTS: 1 DIF: Recall REF: Transmural Pressure
OBJ: 5

13. What is the term for the difference between the alveolar pressure and the pleural pressure?
a. transpulmonary pressure
b. transmural pressure
c. transrespiratory pressure
d. transthoracic pressure

ANS: A

	Feedback
A	The transpulmonary pressure is the difference between the alveolar pressure and the pleural pressure.
B	The transpulmonary pressure is the difference between the alveolar pressure and the pleural pressure.
C	The transpulmonary pressure is the difference between the alveolar pressure and the pleural pressure.
D	The transpulmonary pressure is the difference between the alveolar pressure and the pleural pressure.

PTS: 1 DIF: Recall REF: Transpulmonary Pressure
OBJ: 5

14. What is the term for the difference between the alveolar pressure and the body surface pressure?
a. transthoracic pressure
b. transmural pressure
c. transrespiratory pressure
d. transpulmonary pressure

ANS: A

	Feedback
A	Transthoracic pressure is the difference between the alveolar pressure and the body surface pressure.
B	Transthoracic pressure is the difference between the alveolar pressure and the body surface pressure.
C	Transthoracic pressure is the difference between the alveolar pressure and the body surface pressure.
D	Transthoracic pressure is the difference between the alveolar pressure and the body surface pressure.

PTS: 1 DIF: Recall REF: Transthoracic Pressure
OBJ: 5

15. In a flail chest, which pressure gradients are responsible for the inward movement on inspiration of the section of unattached ribs?

I. Transpulmonary
II. Transmural
III. Transthoracic
IV. Transrespiratory

a. I and III only
b. II and IV only
c. I and II only
d. II and III only

ANS: A

	Feedback
A	When a flail chest occurs, the section of unattached ribs moves inward on inspiration due to the transpulmonary and transthoracic pressure gradients.
B	When a flail chest occurs, the section of unattached ribs moves inward on inspiration due to the transpulmonary and transthoracic pressure gradients.
C	When a flail chest occurs, the section of unattached ribs moves inward on inspiration due to the transpulmonary and transthoracic pressure gradients.
D	When a flail chest occurs, the section of unattached ribs moves inward on inspiration due to the transpulmonary and transthoracic pressure gradients.

PTS: 1 DIF: Recall
REF: Lung Compliance|Clinical Connection 2-2: The Harmful Effects of Pressure Gradients When the Thorax is Unstable OBJ: 6

16. Which clinical measurement is used to evaluate the elastic forces of the lungs?
a. lung compliance
b. airway resistance
c. elastance
d. surface tension

ANS: A

	Feedback
A	The elastic forces of the lungs can be evaluated by measuring lung compliance.
B	The elastic forces of the lungs can be evaluated by measuring lung compliance.
C	The elastic forces of the lungs can be evaluated by measuring lung compliance.
D	The elastic forces of the lungs can be evaluated by measuring lung compliance.

PTS: 1 DIF: Recall REF: Elastic Properties of the Lung and Chest Wall
OBJ: 7

17. What of the following is used to calculate lung compliance?
a. $\Delta V / \Delta P$
b. $\Delta P / \Delta V$
c. $P1V1=P2V2$
d. $P=(2ST) / r$

ANS: A

	Feedback
A	Lung compliance is defined as the change in lung volume per unit of pressure change.
B	Lung compliance is defined as the change in lung volume per unit of pressure change.
C	Lung compliance is defined as the change in lung volume per unit of pressure change.
D	Lung compliance is defined as the change in lung volume per unit of pressure change.

PTS: 1 DIF: Recall REF: Lung Compliance
OBJ: 8

18. What would the lung compliance equal if a pressure change of 4 cm H20 resulted in a volume change of 600 mL?
a. 0.15L/cm H20
b. 0.066 L/cm H20
c. 1.5 L/cm H20
d. 0.24 L/cm H20

ANS: A

	Feedback
A	A volume change of 0.6 L from pressure change of 4 cm H20 would result in a lung compliance of 0.15 L/cm H20 (0.6L/4 cm H20).
B	A volume change of 0.6 L from pressure change of 4 cm H20 would result in a lung compliance of 0.15 L/cm H20 (0.6L/4 cm H20).
C	A volume change of 0.6 L from pressure change of 4 cm H20 would result in a lung compliance of 0.15 L/cm H20 (0.6L/4 cm H20).
D	A volume change of 0.6 L from pressure change of 4 cm H20 would result in a lung compliance of 0.15 L/cm H20 (0.6L/4 cm H20).

PTS: 1 DIF: Application REF: Lung Compliance
OBJ: 9

19. How does air trapping and hyperinflation of the lungs affect lung compliance?
a. lung compliance is reduced
b. lung compliance is increased
c. lung compliance is normal
d. lung compliance is unaffected by hyperinflation

ANS: A

	Feedback
A	When air trapping and hyperinflation of the lungs occur, lung compliance decreases.
B	When air trapping and hyperinflation of the lungs occur, lung compliance decreases.
C	When air trapping and hyperinflation of the lungs occur, lung compliance decreases.
D	When air trapping and hyperinflation of the lungs occur, lung compliance decreases.

PTS: 1 DIF: Recall
REF: Lung Compliance|Clinical Connection 2-3: Pulmonary Disorders that Force the Patient to Breathe at the Top Flat Portion of the Volume Pressure Curve OBJ: 10

20. How do obstructive lung diseases that cause air trapping affect lung compliance?
a. Lung compliance is reduced
b. Lung compliance is increased
c. Lung compliance remains normal
d. Lung compliance is unaffected by air trapping

ANS: A

	Feedback
A	Lung compliance is decreased in the presence of obstructive lung diseases that cause air trapping and hyperinflation.
B	Lung compliance is decreased in the presence of obstructive lung diseases that cause air trapping and hyperinflation.
C	Lung compliance is decreased in the presence of obstructive lung diseases that cause air trapping and hyperinflation.
D	Lung compliance is decreased in the presence of obstructive lung diseases that cause air

	trapping and hyperinflation.

PTS: 1 DIF: Recall
REF: Lung Compliance|Clinical Connection 2-3: Pulmonary Disorders that Force the Patient to Breathe at the Top Flat Portion of the Volume Pressure Curve OBJ: 10

21. What effect do restrictive lung diseases have on lung compliance?
    a. Lung compliance decreases
    b. Lung compliance increases
    c. Lung compliance remains normal
    d. Restrictive lung diseases do not affect lung compliance.

ANS: A

	Feedback
A	Restrictive lung diseases shift the volume-pressure curve to the right so lung compliance is reduced.
B	Restrictive lung diseases shift the volume-pressure curve to the right so lung compliance is reduced.
C	Restrictive lung diseases shift the volume-pressure curve to the right so lung compliance is reduced.
D	Restrictive lung diseases shift the volume-pressure curve to the right so lung compliance is reduced.

PTS: 1 DIF: Recall
REF: Lung Compliance|Clinical Connection 2-4: Pulmonary Disorders that Shift the Pressure Volume Curve to the Right OBJ: 11

22. Which of the following would shift the volume-pressure curve to the right?
    I. Acute asthma episode
    II. Pneumothorax
    III. Pleural effusion
    IV. Pulmonary edema

    a. II, II, and IV only
    b. I, II, and IV only
    c. I. III and IV only
    d. Ii and IV only

ANS: A

	Feedback
A	Restrictive lung conditions, including pneumothorax, pleural effusion, and pulmonary edema shift the volume pressure curve to the right.
B	Restrictive lung conditions, including pneumothorax, pleural effusion, and pulmonary edema shift the volume pressure curve to the right.
C	Restrictive lung conditions, including pneumothorax, pleural effusion, and pulmonary edema shift the volume pressure curve to the right.
D	Restrictive lung conditions, including pneumothorax, pleural effusion, and pulmonary edema shift the volume pressure curve to the right.

PTS: 1 DIF: Recall
REF: Lung Compliance|Clinical Connection 2-4: Pulmonary Disorders that Shift the Pressure Volume Curve to the Right OBJ: 11

23. What is the reciprocal of compliance?

a. elastance
b. resistance
c. surface tension
d. viscosity

ANS: A

	Feedback
A	The reciprocal of compliance is elastance.
B	The reciprocal of compliance is elastance.
C	The reciprocal of compliance is elastance.
D	The reciprocal of compliance is elastance.

PTS: 1 DIF: Recall REF: Hooke's Law
OBJ: 12

24. Which physical law explains elastance?
a. Hooke’s law
b. Boyle’s law
c. Gay-Lussac’s law
d. Charles’ law

ANS: A

	Feedback
A	Hooke’s law explains elastance.
B	Hooke’s law explains elastance.
C	Hooke’s law explains elastance.
D	Hooke’s law explains elastance.

PTS: 1 DIF: Recall REF: Hooke's Law
OBJ: 12

25. When a positive pressure breath is delivered from a mechanical ventilator, how would intra-alveolar and intrapleural pressures be affected during inspiration?
a. Both would increase
b. The intra-alveolar pressure would rise while the intrapleural pressure remains subatmospheric
c. Both would decrease
d. Both would remain constant at their resting levels

ANS: A

	Feedback
A	The intra-alveolar and intrapleural pressures would increase during a positive pressure breath from a mechanical ventilator.
B	The intra-alveolar and intrapleural pressures would increase during a positive pressure breath from a mechanical ventilator.
C	The intra-alveolar and intrapleural pressures would increase during a positive pressure breath from a mechanical ventilator.
D	The intra-alveolar and intrapleural pressures would increase during a positive pressure breath from a mechanical ventilator.

PTS: 1 DIF: Recall
REF: Hooke's Law|Clinical Connection 2-5: Positive Pressure Ventilation
OBJ: 13

26. When a tension pneumothorax occurs during positive pressure ventilation, how will the cardiac output and blood pressure affected?
a. Both will decrease
b. Both will increase
c. The cardiac output will increase but the BP will decrease
d. The BP will increase but the BP will decrease

ANS: A

	Feedback
A	When a tesnion pneumothorax occurs, the cardiac output and blood pressure decrease due to compression of major vessels from accumulated gas in the pleural cavity.
B	When a tesnion pneumothorax occurs, the cardiac output and blood pressure decrease due to compression of major vessels from accumulated gas in the pleural cavity.
C	When a tesnion pneumothorax occurs, the cardiac output and blood pressure decrease due to compression of major vessels from accumulated gas in the pleural cavity.
D	When a tesnion pneumothorax occurs, the cardiac output and blood pressure decrease due to compression of major vessels from accumulated gas in the pleural cavity.

PTS: 1 DIF: Recall
REF: Hooke's Law|Clinical Connection 2-6: Hazards of Positive Pressure Ventilation
OBJ: 14

27. Which law best explains the basic operation of the negative pressure ventilator?
a. Boyle's
b. Dalton's
c. Charles'
d. Hooke's

ANS: A

	Feedback
A	The basic pressure and volume relationships described by Boyle's law are implemented by negative pressure ventilators.
B	The basic pressure and volume relationships described by Boyle's law are implemented by negative pressure ventilators.
C	The basic pressure and volume relationships described by Boyle's law are implemented by negative pressure ventilators.
D	The basic pressure and volume relationships described by Boyle's law are implemented by negative pressure ventilators.

PTS: 1 DIF: Recall
REF: Hooke's Law|Clinical Connection 2-7: Negative Pressure Ventilation
OBJ: 15

28. Which of the following are periods of no gas flow during negative pressure ventilation?
I. Inspiration
II. End inspiration
III. Expiration
IV. End expiration
a. II and IV only
b. II only
c. IV only
d. I and III only

ANS: A

	Feedback

A	During negative pressure ventilation, no gas flow occurs at end-expiration and end-inspiration.
B	During negative pressure ventilation, no gas flow occurs at end-expiration and end-inspiration.
C	During negative pressure ventilation, no gas flow occurs at end-expiration and end-inspiration.
D	During negative pressure ventilation, no gas flow occurs at end-expiration and end-inspiration.

PTS: 1 DIF: Recall
REF: Hooke's Law|Clinical Connection 2-7: Negative Pressure Ventilation
OBJ: 15

29. What is the term for the molecular cohesive force at a liquid-gas interface?
a. surface tension
b. compliance
c. resistance
d. elastance

ANS: A

	Feedback
A	Surface tension is the molecular, cohesive force that occurs at a liquid-gas interface.
B	Surface tension is the molecular, cohesive force that occurs at a liquid-gas interface.
C	Surface tension is the molecular, cohesive force that occurs at a liquid-gas interface.
D	Surface tension is the molecular, cohesive force that occurs at a liquid-gas interface.

PTS: 1 DIF: Recall REF: Surface Tension and its Effect on Lung Expansion
OBJ: 16

30. Who is credited with the following equation : P = (2ST)/r ?
a. LaPlace
b. Hooke
c. Dalton
d. Boyle

ANS: A

	Feedback
A	The equation for LaPlace’s law with one liquid-gas interface is written as P=(2ST)/r.
B	The equation for LaPlace’s law with one liquid-gas interface is written as P=(2ST)/r.
C	The equation for LaPlace’s law with one liquid-gas interface is written as P=(2ST)/r.
D	The equation for LaPlace’s law with one liquid-gas interface is written as P=(2ST)/r.

PTS: 1 DIF: Recall REF: Laplace's Law
OBJ: 17

31. Which substance in the alveoli is responsible for lowering the surface tension?
a. pulmonary surfactant
b. mucus
c. saline
d. plasma

ANS: A

	Feedback
A	Surfactant helps to reduce alveolar surface tension and helps prevent alveoli from collapsing.
B	Surfactant helps to reduce alveolar surface tension and helps prevent alveoli from collapsing.

C	Surfactant helps to reduce alveolar surface tension and helps prevent alveoli from collapsing.
D	Surfactant helps to reduce alveolar surface tension and helps prevent alveoli from collapsing.

PTS: 1 DIF: Recall
REF: LaPlace's Law Applied to the Alevolar Fluid Lining OBJ: 18

32. What is the primary surface tension lowering chemical in pulmonary surfactant?
a. DPPC
b. CPPD
c. PCP
d. BPD

ANS: A

	Feedback
A	Dipalmitoyl phospatidycholine (DPPC) is the primary surface tension lowering component of pulmonary surfactant.
B	Dipalmitoyl phospatidycholine (DPPC) is the primary surface tension lowering component of pulmonary surfactant.
C	Dipalmitoyl phospatidycholine (DPPC) is the primary surface tension lowering component of pulmonary surfactant.
D	Dipalmitoyl phospatidycholine (DPPC) is the primary surface tension lowering component of pulmonary surfactant.

PTS: 1 DIF: Recall
REF: How Pulmonary Surfactant Regulates Alveolar Surface Tension
OBJ: 19

33. IWhen the average alveolus is fully distended,, what is the approximate surface tension?
a. 50 dynes/cm
b. 50 cm H20
c. 5-15 dynes/cm
d. 5-15 cm H20

ANS: A

	Feedback
A	When the average alveolus is inflated, the surface tension is approximately 50 dynes/cm.
B	When the average alveolus is inflated, the surface tension is approximately 50 dynes/cm.
C	When the average alveolus is inflated, the surface tension is approximately 50 dynes/cm.
D	When the average alveolus is inflated, the surface tension is approximately 50 dynes/cm.

PTS: 1 DIF: Recall
REF: How Pulmonary Surfactant Regulates Alveolar Surface Tension
OBJ: 19

34. Which of the following can cause pulmonary surfactant deficiency?

I. Pulmonary embolism
II. Pulmonary edema
III. Atelectasis

IV. ARDS

a. I, II, III, and IV
b. II and IV only
c. I , II, and III only
d. II and III only

ANS: A

	Feedback
A	All of the factors listed can cause pulmonary surfactant deficiency.
B	All of the factors listed can cause pulmonary surfactant deficiency.
C	All of the factors listed can cause pulmonary surfactant deficiency.
D	All of the factors listed can cause pulmonary surfactant deficiency.

PTS: 1 DIF: Recall REF: Summary of the Lung's Elastic Properties
OBJ: 20

35. What is the treatment of choice for the early stages of RDS in premature infants?
a. CPAP
b. oxygen therapy
c. steroids
d. long acting bronchodilators

ANS: A

	Feedback
A	CPAP is the treatment for the early stages of RDS.
B	CPAP is the treatment for the early stages of RDS.
C	CPAP is the treatment for the early stages of RDS.
D	CPAP is the treatment for the early stages of RDS.

PTS: 1 DIF: Recall
REF: Summary|Clinical Connection 2-8: Pulmonary Surfactant Deficiency
OBJ: 21

36. What term is used in respiratory care to describe the movement of gas in and out of the lung and the pressure changes required to move the gas?
a. dynamic
b. static
c. passive
d. respiration

ANS: A

	Feedback
A	Dynamic refers to movementof gas in and out of the lungs and the accompanying pressure changes.
B	Dynamic refers to movementof gas in and out of the lungs and the accompanying pressure changes.
C	Dynamic refers to movementof gas in and out of the lungs and the accompanying pressure changes.
D	Dynamic refers to movementof gas in and out of the lungs and the accompanying pressure changes.

PTS: 1 DIF: Recall REF: Dynamic Characteristics of the Lungs
OBJ: 22

37. When Poiseuille’s law is rearranged for flow with pressure remaining constant, what impact would reducing the radius of a tube by 50% have on the gas flow?

a. It would be reduced to 1/16 of the original flow
b. It would increase to 16 times more than the original flow
c. It would increase to 16 times more than the original flow
d. It would be reduced to 1/4 the original flow

ANS: A

	Feedback
A	When the radius of a tube is halved, the flow will decrease to 1/16 of the original output.
B	When the radius of a tube is halved, the flow will decrease to 1/16 of the original output.
C	When the radius of a tube is halved, the flow will decrease to 1/16 of the original output.
D	When the radius of a tube is halved, the flow will decrease to 1/16 of the original output.

PTS: 1 DIF: Application REF: Poiseuille's Law Arranged for Flow
OBJ: 23

38. When Poiseuille’s law is rearranged for pressure, what adjustment must be made in driving pressure to maintain the same flowrate when the radius of the tube is reduced by 50% ?
a. The pressure must be increased to 16 times the original
b. The pressure must be doubled
c. The pressure must be reduced by 50%
d. The pressure must be increased to 4 times the original pressure

ANS: A

	Feedback
A	Pressure is a function of the radius to the fourth power so 16 times the original pressure would be required to restore the flowrate when the radius of the tube is halved.
B	Pressure is a function of the radius to the fourth power so 16 times the original pressure would be required to restore the flowrate when the radius of the tube is halved.
C	Pressure is a function of the radius to the fourth power so 16 times the original pressure would be required to restore the flowrate when the radius of the tube is halved.
D	Pressure is a function of the radius to the fourth power so 16 times the original pressure would be required to restore the flowrate when the radius of the tube is halved.

PTS: 1 DIF: Application REF: Poiseuille's Law Arranged for Pressure
OBJ: 25

39. When the radius of the bronchial airways decreases during exhalation, what change must occur to maintain a constant gas flow?
a. The transthoracic pressure must vary inversely with the fourth power of the radius
b. The transthoracic pressure must vary directly with the fourth power of the radius
c. The transthoracic pressure must remain constant
d. The transthoracic pressure must vary inversely with the second power of the radius

ANS: A

	Feedback
A	As the radius of the bronchial airways decrease during exhalation, the transthoracic pressure must vary inversely with the fourth power of the radius.

B	As the radius of the bronchial airways decrease during exhalation, the transthoracic pressure must vary inversely with the fourth power of the radius.
C	As the radius of the bronchial airways decrease during exhalation, the transthoracic pressure must vary inversely with the fourth power of the radius.
D	As the radius of the bronchial airways decrease during exhalation, the transthoracic pressure must vary inversely with the fourth power of the radius.

PTS: 1 DIF: Recall
REF: Poiseuille's Law Rearranged to Simple Proportionalities OBJ: 25

40. What is derived when the pressure difference between the mouth and alveoli is divided by the flowrate?

a. airway resistance
b. surface tension
c. lung compliance
d. chest wall compliance

ANS: A

	Feedback
A	Airway resistance is defined as the change in transrespiratory pressure divided by flow rate.
B	Airway resistance is defined as the change in transrespiratory pressure divided by flow rate.
C	Airway resistance is defined as the change in transrespiratory pressure divided by flow rate.
D	Airway resistance is defined as the change in transrespiratory pressure divided by flow rate.

PTS: 1 DIF: Recall REF: Airway Resistance
OBJ: 27

41. If an individual generates a flow rate of 4 L/sec by generating a transrespiratory pressure of 6 cm H20, what would Raw equal?

a. 1.5 cm H20/L/sec
b. 0.67 cm H20/L/sec
c. 2.4 L/sec/ cm H20
d. 1.5 L/sec/cm H20

ANS: A

	Feedback
A	Airway resistance would be derived as 6 cm H20/4 L/sec to equal 1.5 cm H2O/L/sec.
B	Airway resistance would be derived as 6 cm H20/4 L/sec to equal 1.5 cm H2O/L/sec.
C	Airway resistance would be derived as 6 cm H20/4 L/sec to equal 1.5 cm H2O/L/sec.
D	Airway resistance would be derived as 6 cm H20/4 L/sec to equal 1.5 cm H2O/L/sec.

PTS: 1 DIF: Application REF: Airway Resistance
OBJ: 28

42. If a patient who generates an intrapleural pressure of -4 mmHg to inhale 450 mL experiences inflammation and bronchospasm that reduce the radius of the bronchial airways to one-half of their original size, what pressure must the patient generate to inhale the same tidal volume?

a. 64 mm Hg
b. 48 mm Hg
c. 20 mm Hg
d. 16 mm Hg

ANS: A

	Feedback
A	To maintain the same tidal volume when the radius of the bronchial airways is reduced by one half, the intrapleural pressure must increase by a factor of 16 so the required pressure would be 4 x 16 or 64 mm Hg.
B	To maintain the same tidal volume when the radius of the bronchial airways is reduced by one half, the intrapleural pressure must increase by a factor of 16 so the required pressure would be 4 x 16 or 64 mm Hg.
C	To maintain the same tidal volume when the radius of the bronchial airways is reduced by one half, the intrapleural pressure must increase by a factor of 16 so the required pressure would be 4 x 16 or 64 mm Hg.
D	To maintain the same tidal volume when the radius of the bronchial airways is reduced by one half, the intrapleural pressure must increase by a factor of 16 so the required pressure would be 4 x 16 or 64 mm Hg.

PTS: 1 DIF: Application
REF: Poiseuille's Law Arranged for Simple Proportionalities|Clinical Connection 2-9: Respiratory Disorders that Decrease the Radius of the Airways OBJ: 26

43. Which flow pattern occurs in airways at low flow rates and low pressure-gradients?
a. laminar flow
b. turbulent flow
c. transitional flow
d. tracheobronchial flow

ANS: A

	Feedback
A	Laminar flow occurs in airways where flow rate and pressure gradients are both low.
B	Laminar flow occurs in airways where flow rate and pressure gradients are both low.
C	Laminar flow occurs in airways where flow rate and pressure gradients are both low.
D	Laminar flow occurs in airways where flow rate and pressure gradients are both low.

PTS: 1 DIF: Recall REF: Laminar Flow
OBJ: 27

44. Which flow pattern occurs in airways at high flow rates and high pressure gradients?
a. turbulent flow
b. laminar flow
c. tracheobronchial flow
d. transitional flow

ANS: A

	Feedback
A	Turbulent flow occurs in airways at high flow rates and high pressure gradients.
B	Turbulent flow occurs in airways at high flow rates and high pressure gradients.
C	Turbulent flow occurs in airways at high flow rates and high pressure gradients.
D	Turbulent flow occurs in airways at high flow rates and high pressure gradients.

PTS: 1 DIF: Recall REF: Turbulent Flow
OBJ: 27

45. What is defined as “the time required to inflate a lung region to 60% of its filling capacity”?
a. time constant
b. dynamic compliance
c. inspiratory time
d. maximum inspiratory time

ANS: A

	Feedback
A	A time constant is the amount of time required to inflate a lung region to 60% its potential filling capacity.
B	A time constant is the amount of time required to inflate a lung region to 60% its potential filling capacity.
C	A time constant is the amount of time required to inflate a lung region to 60% its potential filling capacity.
D	A time constant is the amount of time required to inflate a lung region to 60% its potential filling capacity.

PTS: 1 DIF: Recall REF: Time Constants
OBJ: 29

46. When lung compliance is reduced by half, how will time constants be affected?
    a. The time constant will be reduced by half
    b. The time constants will double
    c. The time constant will be reduced to one-fourth of the original
    d. The time constant will increase to four times the original

ANS: A

	Feedback
A	When lung compliance is halved, the time constant will also be halved.
B	When lung compliance is halved, the time constant will also be halved.
C	When lung compliance is halved, the time constant will also be halved.
D	When lung compliance is halved, the time constant will also be halved.

PTS: 1 DIF: Recall REF: Time Constants
OBJ: 29

47. What effect will increased R_{aw} and increasedC_L have on the time constants in the affected lung regions?
    a. Both factors require more time for the affected region to inflate.
    b. Both factors require less time for the affected lung region to inflate
    c. Time constants are unaffected by R_{aw} but will require less time to inflate due to the increased $C_{L.}$
    d. Time constants are unaffected by $C_{L.}$ but will require more time to inflate in the affected region due to the increased R_{aw}

ANS: A

	Feedback
A	Lung regions with increased airway resistance and increased lung compliance require more time to inflate
B	Lung regions with increased airway resistance and increased lung compliance require more time to inflate
C	Lung regions with increased airway resistance and increased lung compliance require more time to inflate
D	Lung regions with increased airway resistance and increased lung compliance require more time to inflate

PTS: 1 DIF: Recall REF: Time Constants
OBJ: 29

48. What term is defined as “the change in volume of the lungs divided by the change in transpulmonary pressure during the time required for one breath’?

a. dynamic compliance
b. static compliance
c. airway resistance
d. time constant

ANS: A

	Feedback
A	Dynamic compliance is the change in volume of the lungs divided by the change in transpulmonary pressure during the time required for one breath.
B	Dynamic compliance is the change in volume of the lungs divided by the change in transpulmonary pressure during the time required for one breath.
C	Dynamic compliance is the change in volume of the lungs divided by the change in transpulmonary pressure during the time required for one breath.
D	Dynamic compliance is the change in volume of the lungs divided by the change in transpulmonary pressure during the time required for one breath.

PTS: 1 DIF: Recall REF: Dynamic Compliance
OBJ: 30

49. In the presence of restrictive lung disorders, how do patients typically offset the decreased time constants?

a. They adopt an increased respiratory rate
b. They adopt a decreased respiratory rate
c. They adopt a decreased respiratory rate and add a breath hold
d. They adopt a decreased respiratory rate with an increased tidal volume

ANS: A

	Feedback
A	With restrictive lung disorders, patients typically adopt an increased respiratory rate.
B	With restrictive lung disorders, patients typically adopt an increased respiratory rate.
C	With restrictive lung disorders, patients typically adopt an increased respiratory rate.
D	With restrictive lung disorders, patients typically adopt an increased respiratory rate.

PTS: 1 DIF: Recall
REF: Dynamic Compliance|Clinical Connection: Restrictive Lung Disorders, Time Constants, and Breathing Pattern Relationships OBJ: 31

50. What changes in breathing patterns do patients with obstructive pulmonary disorders with increased R_{aw} and increased time constants typically adopt?

a. They decrease their respiratory rate and increase their tidal volume
b. The decrease their respiratory rate and tidal volume
c. They increase their respiratory rate and tidal volume
d. They increase their respiratory rate and decrease their tidal volume

ANS: A

	Feedback
A	Patients with obstructive pulmonary disorders with increased R_{aw} and increased time constants typically decrease their respiratory rates and increase their tidal volumes.
B	Patients with obstructive pulmonary disorders with increased R_{aw} and increased time constants typically decrease their respiratory rates and increase their tidal volumes.

C	Patients with obstructive pulmonary disorders with increased R_{aw} and increased time constants typically decrease their respiratory rates and increase their tidal volumes.
D	Patients with obstructive pulmonary disorders with increased R_{aw} and increased time constants typically decrease their respiratory rates and increase their tidal volumes.

PTS: 1 DIF: Recall
REF: Dynamic Compliance|Clinical Connection 2-11: Obstructive Lung Disorders. Time Constants and Breathing Pattern Relationships OBJ: 32

51. When rapid ventilatory rates occur, what is the term for the condition in which positive pressure remains in the alveoli during exhalation due to the insufficient expiratory time?
a. auto-PEEP
b. WOB
c. pendulluft
d. frequency dependence

ANS: A

	Feedback
A	Auto-PEEP is the condition in which positive pressure remains in the alveoli during exhalation due to insufficient expiratory time.
B	Auto-PEEP is the condition in which positive pressure remains in the alveoli during exhalation due to insufficient expiratory time.
C	Auto-PEEP is the condition in which positive pressure remains in the alveoli during exhalation due to insufficient expiratory time.
D	Auto-PEEP is the condition in which positive pressure remains in the alveoli during exhalation due to insufficient expiratory time.

PTS: 1 DIF: Recall
REF: Dynamic Compliance|Clinical Connection 2-12: Auto-PEEP and its Relationship to Raw During Rapid Ventilatory Rates OBJ: 33

52. What is the term for the volume of gas that is typically measured during exhalation of one quiet breath?
a. tidal volume
b. expiration
c. minute volume
d. expiratory reserve volume

ANS: A

	Feedback
A	The amount of gas exhaled from one quiet breath is the tidal volume.
B	The amount of gas exhaled from one quiet breath is the tidal volume.
C	The amount of gas exhaled from one quiet breath is the tidal volume.
D	The amount of gas exhaled from one quiet breath is the tidal volume.

PTS: 1 DIF: Recall REF: The Normal Ventilatory Patterns
OBJ: 34

53. What is the average respiratory rate for an adult at rest?
a. 12-18 breaths/min
b. 5-12 breaths/min
c. 14-24 breath/min
d. 19-26 breaths/min

ANS: A

	Feedback
A	The average respiratory rate for an adult at rest is 12-18 breaths/min.

B	The average respiratory rate for an adult at rest is 12-18 breaths/min.
C	The average respiratory rate for an adult at rest is 12-18 breaths/min.
D	The average respiratory rate for an adult at rest is 12-18 breaths/min.

PTS: 1 DIF: Recall REF: The Normal Ventilatory Patterns
OBJ: 34

54. With the end expiratory pause is factored in, what is the normal I:E ratio for an adult at rest?
a. 1 : 2
b. 1 : 3
c. 1 : 1
d. 1 : 2.5

ANS: A

	Feedback
A	When the end expiratory pause is included, the normal I:E ratio for an adult at rest is 1:2.
B	When the end expiratory pause is included, the normal I:E ratio for an adult at rest is 1:2.
C	When the end expiratory pause is included, the normal I:E ratio for an adult at rest is 1:2.
D	When the end expiratory pause is included, the normal I:E ratio for an adult at rest is 1:2.

PTS: 1 DIF: Recall REF: The Normal Ventilatory Patterns
OBJ: 34

55. What is the average respiratory rate for a healthy toddler at rest?
a. 25 - 40 breaths/min
b. 15-24 breaths/min
c. 30-60 breaths/min
d. 12-20 breaths/min

ANS: A

	Feedback
A	The average respiratory rate for a healthy toddler at rest is 25-40 breaths/min.
B	The average respiratory rate for a healthy toddler at rest is 25-40 breaths/min.
C	The average respiratory rate for a healthy toddler at rest is 25-40 breaths/min.
D	The average respiratory rate for a healthy toddler at rest is 25-40 breaths/min.

PTS: 1 DIF: Recall
REF: The Normal Ventilatory Patterns|Clinical Connection 2-13: Normal Respiratory Rates for Different Age Groups OBJ: 35

56. A 5 ft tall female who weighs 300 lb requires mechanical ventilation. If the prescribed tidal volume for this patient’s condition is 6 mL/kg IBW, where should the set tidal volume be set?
a. approximately 290 mL
b. approximately 380 mL
c. approximately 520 mL
d. approximately 820 mL

ANS: A

	Feedback
A	A 5 ft tall female’s IBW would be approximately 100-105 pounds or 47 kg, so 47 x 6mL/kg would equal approximately 290 mL.
B	A 5 ft tall female’s IBW would be approximately 100-105 pounds or 47 kg, so 47 x 6mL/kg would equal approximately 290 mL.

C	A 5 ft tall female's IBW would be approximately 100-105 pounds or 47 kg, so 47 x 6mL/kg would equal approximately 290 mL.
D	A 5 ft tall female's IBW would be approximately 100-105 pounds or 47 kg, so 47 x 6mL/kg would equal approximately 290 mL.

PTS: 1 DIF: Application
REF: The Normal Ventilatory Patterns|Clinical Connection 2-14: Tidal Volume and Breathing Rate Strategies for Mechanical Ventilation OBJ: 36

57. What are the boundaries of anatomic dead space?
a. nose and mouth through the terminal bronchioles
b. nose and mouth to the alveolar sacs
c. nose and mouth to the segmental bronchi
d. nose and moth to the bronchioles

ANS: A

	Feedback
A	Anatomic deadspace extends from the nose and mouth through the terminal bronchioles.
B	Anatomic deadspace extends from the nose and mouth through the terminal bronchioles.
C	Anatomic deadspace extends from the nose and mouth through the terminal bronchioles.
D	Anatomic deadspace extends from the nose and mouth through the terminal bronchioles.

PTS: 1 DIF: Recall REF: Anatomic Deadspace
OBJ: 37

58. What is the approximate volume of anatomic deadspace?
a. 1 mL/lb of ideal body weight
b. 2.2 mL/lb of ideal body weight
c. 2.2 mL/kg actual body weight
d. 1 mL/kg of ideal body weight

ANS: A

	Feedback
A	The volume of anatomic deadspace is approximately 1mL/lb of ideal body weight.
B	The volume of anatomic deadspace is approximately 1mL/lb of ideal body weight.
C	The volume of anatomic deadspace is approximately 1mL/lb of ideal body weight.
D	The volume of anatomic deadspace is approximately 1mL/lb of ideal body weight.

PTS: 1 DIF: Recall REF: Anatomic Deadspace
OBJ: 37

59. What does frequency multiplied by (V_T-V_D) equal?
a. minute alveolar ventilation
b. minute ventilation
c. physiologic deadspace ventilation
d. alveolar deadspace

ANS: A

	Feedback
A	The minute alveolar ventilation equals the frequency multiplied by (tidal volume minus anatomic deadspace).
B	The minute alveolar ventilation equals the frequency multiplied by (tidal volume minus anatomic deadspace).
C	The minute alveolar ventilation equals the frequency multiplied by (tidal volume minus anatomic deadspace).

D	The minute alveolar ventilation equals the frequency multiplied by (tidal volume minus anatomic deadspace).

PTS: 1 DIF: Recall REF: Anatomic Deadspace
OBJ: 37

60. What is the term for alveolar ventilation without pulmonary capillary perfusion?
a. alveolar deadspace
b. anatomic deadspace
c. physiologic deadspace
d. minute alveolar ventilation

ANS: A

	Feedback
A	Alveolar deadspace is alveolar ventilation without pulmonary capillary perfusion
B	Alveolar deadspace is alveolar ventilation without pulmonary capillary perfusion
C	Alveolar deadspace is alveolar ventilation without pulmonary capillary perfusion
D	Alveolar deadspace is alveolar ventilation without pulmonary capillary perfusion

PTS: 1 DIF: Recall REF: Anatomic Deadspace
OBJ: 37

61. What does the sum of anatomic deadspace and alveolar deadspace equal?
a. physiologic deadspace
b. minute ventilation
c. alveolar ventilaion
d. total gas exchange

ANS: A

	Feedback
A	Anatomic deadspace plus alveolar deadspace equals physiologic deadspace.
B	Anatomic deadspace plus alveolar deadspace equals physiologic deadspace.
C	Anatomic deadspace plus alveolar deadspace equals physiologic deadspace.
D	Anatomic deadspace plus alveolar deadspace equals physiologic deadspace.

PTS: 1 DIF: Recall REF: Physiologic Deadspace
OBJ: 37

62. How would the addition of a length of tubing between a ventilator and the endotracheal tube affect on dead space?
a. It would increase the deadspace
b. It would decrease the deadspace
c. It would have no effect on deadspace
d. It would have no effect on deadspace but would increase the tidal volume

ANS: A

	Feedback
A	When a length of tubing is added between the ventilator and endotracheal tube, the deadspace increases.
B	When a length of tubing is added between the ventilator and endotracheal tube, the deadspace increases.
C	When a length of tubing is added between the ventilator and endotracheal tube, the deadspace increases.
D	When a length of tubing is added between the ventilator and endotracheal tube, the deadspace increases.

PTS: 1 DIF: Recall
REF: Physiologic Deadspace|Clinical Connection 2-15: A Giraffe's Neck: Alveolar Ventilation vs Deadspace Ventilation OBJ: 40

63. Which of the following can cause pulmonary emboli?

I. Prolonged inactivity
II. Pregnancy and childbirth
III. Obesity
IV. Hypercoagulation disorders

a. I, II, III, and IV
b. I and IV only
c. I, III, and IV only
d. I, II, and III only

ANS: A

	Feedback
A	Pulmonary emboli can result from prolonged inactivity, pregnancy and childbirth, obseity, and hypercoagulation disorders.
B	Pulmonary emboli can result from prolonged inactivity, pregnancy and childbirth, obseity, and hypercoagulation disorders.
C	Pulmonary emboli can result from prolonged inactivity, pregnancy and childbirth, obseity, and hypercoagulation disorders.
D	Pulmonary emboli can result from prolonged inactivity, pregnancy and childbirth, obseity, and hypercoagulation disorders.

PTS: 1 DIF: Recall
REF: Physiologic Deadspace|Clinical Connection 2-16: Pulmonary Embolus and Deadspace Ventilation OBJ: 41

64. What would the minute alveolar ventilation equal if a 6 ft tall, 170 lb male has a VT of 550 mL and a respiratory rate of 11 breaths/min?
a. (550-170) x 11 = 4.18 L
b. (550 + 170) x 11 = 7.9 L
c. 550 + (170 x 11) = 1.87 L
d. 550 - (170/2.2) x 11= 4.65 L

ANS: A

	Feedback
A	The alveolar ventilation would be [550 mL tidal volume-170 anatomic dead space volume) x 11 breaths/min = 4.18 L /min .
B	The alveolar ventilation would be [550 mL tidal volume-170 anatomic dead space volume) x 11 breaths/min = 4.18 L /min .
C	The alveolar ventilation would be [550 mL tidal volume-170 anatomic dead space volume) x 11 breaths/min = 4.18 L /min .
D	The alveolar ventilation would be [550 mL tidal volume-170 anatomic dead space volume) x 11 breaths/min = 4.18 L /min .

PTS: 1 DIF: Application REF: Anatomic Deadspace
OBJ: 39

65. In the upright position, which portion of the lungs has the most negative pleural pressure?
a. apex
b. base

c. hilum
d. intrapleural pressure is uniform throughout all lung areas

ANS: A

	Feedback
A	In the upright postion the apex of the lung has a more negative pleural pressure than at the bases.
B	In the upright postion the apex of the lung has a more negative pleural pressure than at the bases.
C	In the upright postion the apex of the lung has a more negative pleural pressure than at the bases.
D	In the upright postion the apex of the lung has a more negative pleural pressure than at the bases.

PTS: 1 DIF: Recall
REF: How Normal Pleural Pressure Differences Cause Regional Differences in Normal Lung Ventilation OBJ: 42

66. In the upright lung, how does compliance vary across the lung?
a. The compliance in the apices is lower than in the bases
b. The compliance in the bases is lower than in the apices
c. The compliance is uniform in all regions of the lung
d. The compliance is higher at the hilum than in the apices or bases.

ANS: A

	Feedback
A	The compliance in the apices of the lungs is lower than the compliance in the bases.
B	The compliance in the apices of the lungs is lower than the compliance in the bases.
C	The compliance in the apices of the lungs is lower than the compliance in the bases.
D	The compliance in the apices of the lungs is lower than the compliance in the bases.

PTS: 1 DIF: Recall
REF: How Normal Pleural Pressure Differences Cause Regional Differences in Normal Lung Ventilation OBJ: 42

67. In a healthy adult at rest, what portion of the total energy output is required for the work of breathing?
a. 5%
b. 15 %
c. 25%
d. 35%

ANS: A

	Feedback
A	In a healthy adult at rest, the work of breathing consumes 5% of the total energy output.
B	In a healthy adult at rest, the work of breathing consumes 5% of the total energy output.
C	In a healthy adult at rest, the work of breathing consumes 5% of the total energy output.
D	In a healthy adult at rest, the work of breathing consumes 5% of the total energy output.

PTS: 1 DIF: Recall
REF: The Effect of Airway Resistance and Lung Compliance on Ventilatory Pressure
OBJ: 43

68. What is the term for alteration of the ventilatory pattern to minimize dead space ventilation?

a. ventilatory efficiency
b. metabolic efficiency
c. hyperventilation
d. Hyperefficiency

ANS: A

	Feedback
A	Alteration of the ventilatory pattern to minimize dead space ventilation is called ventilatory efficiency.
B	Alteration of the ventilatory pattern to minimize dead space ventilation is called ventilatory efficiency.
C	Alteration of the ventilatory pattern to minimize dead space ventilation is called ventilatory efficiency.
D	Alteration of the ventilatory pattern to minimize dead space ventilation is called ventilatory efficiency.

PTS: 1 DIF: Recall
REF: The Effect of Airway Resistance and Lung Compliance on Ventilatory Pressure
OBJ: 43

69. How does the normal adult's respiratory pattern change when lung compliance decreases?
a. respiratory rate increases and tidal volume decreases
b. respiratory rate decreases and tidal volume increase
c. respiratory rate and tidal volume increase
d. respiratory rate and tidal volume decrease.

ANS: A

	Feedback
A	When lung compliance decrease, the respiratory rate increases and tidal volume decreases.
B	When lung compliance decrease, the respiratory rate increases and tidal volume decreases.
C	When lung compliance decrease, the respiratory rate increases and tidal volume decreases.
D	When lung compliance decrease, the respiratory rate increases and tidal volume decreases.

PTS: 1 DIF: Recall
REF: The Effect of Airway Resistance and Lung Compliance on Ventilatory Patterns|Clinical Connection 2-17: How the Adopted Breathing Pattern Changes in COPD when Compromised by a Restrictive Disorder OBJ: 44

70. How does the breathing pattern change when a patient with COPD develops a secondary restrictive lung condition such as pneumonia?
a. respiratory rate increases
b. respiratory rate decreases and tidal volume increase
c. respiratory rate and tidal volume decrease.
d. no breathing pattern changes would occur.

ANS: A

	Feedback
A	When a patient with COPD develops pneumonia, one would expect hyperventilation to occur.

B	When a patient with COPD develops pneumonia, one would expect hyperventilation to occur.
C	When a patient with COPD develops pneumonia, one would expect hyperventilation to occur.
D	When a patient with COPD develops pneumonia, one would expect hyperventilation to occur.

PTS: 1 DIF: Recall
REF: The Effect of Airway Resistance and Lung Compliance on Ventilatory Patterns|Clinical Connection 2-17: How the Adopted Breathing Pattern Changes in COPD when Compromised by a Restrictive Disorder OBJ: 44

71. Which ventilatory pattern is defined as the complete absence of spontaneous breathing?
a. apnea
b. apneusis
c. eupnea
d. dyspnea

ANS: A

	Feedback
A	The absence of spontaneous breathing is called apnea.
B	The absence of spontaneous breathing is called apnea.
C	The absence of spontaneous breathing is called apnea.
D	The absence of spontaneous breathing is called apnea.

PTS: 1 DIF: Recall REF: Overview of Specific Breathing Conditions
OBJ: 45

72. What is the term for the breathing condition in which short episodes of rapid, uniform deep breaths are followed by 10-30 seconds of apnea?
a. Biot’s
b. Cheyne-Stokes
c. Kussmaul’s
d. Levy’s

ANS: A

	Feedback
A	Biot’s breathing is characterized by short episodes of uniform, rapid deep breaths followed by 10-30 seconds of apnea.
B	Biot’s breathing is characterized by short episodes of uniform, rapid deep breaths followed by 10-30 seconds of apnea.
C	Biot’s breathing is characterized by short episodes of uniform, rapid deep breaths followed by 10-30 seconds of apnea.
D	Biot’s breathing is characterized by short episodes of uniform, rapid deep breaths followed by 10-30 seconds of apnea.

PTS: 1 DIF: Recall REF: Overview of Specific Breathing Conditions
OBJ: 45

73. What is the term for a rapid respiratory rate?
a. tachypnea
b. hyperpnea
c. hyperventilation
d. eupnea

ANS: A

	Feedback

A	A rapid respiratory rate is called tachpnea.
B	A rapid respiratory rate is called tachpnea.
C	A rapid respiratory rate is called tachpnea.
D	A rapid respiratory rate is called tachpnea.

PTS: 1 DIF: Recall REF: Overview of Specific Breathing Conditions
OBJ: 45

74. What is the term for the breathing pattern in which the depth of breathing increases?
a. hyperpnea
b. tachypnea
c. hyperventilation
d. Kussmaul's

ANS: A

	Feedback
A	Hyperpnea is an increase in the depth of breathing.
B	Hyperpnea is an increase in the depth of breathing.
C	Hyperpnea is an increase in the depth of breathing.
D	Hyperpnea is an increase in the depth of breathing.

PTS: 1 DIF: Recall REF: Overview of Specific Breathing Conditions
OBJ: 45

75. In which breathing pattern is an individual only able to breathe comfortably in the upright position?
a. orthopnea
b. tachypnea
c. eupnea
d. hyperpnea

ANS: A

	Feedback
A	When one can only breathe comfortably while in the upright position, it is called orthopnea.
B	When one can only breathe comfortably while in the upright position, it is called orthopnea.
C	When one can only breathe comfortably while in the upright position, it is called orthopnea.
D	When one can only breathe comfortably while in the upright position, it is called orthopnea.

PTS: 1 DIF: Recall REF: Overview of Specific Breathing Conditions
OBJ: 45

76. Which abnormal breathing pattern is most commonly associated with ketoacidosis?
a. Kussmaul's
b. Biot's
c. Cheyne Stokes
d. Hypopnea

ANS: A

	Feedback
A	Kussmaul's breathing is most often associated with ketoacidosis.
B	Kussmaul's breathing is most often associated with ketoacidosis.
C	Kussmaul's breathing is most often associated with ketoacidosis.
D	Kussmaul's breathing is most often associated with ketoacidosis.

PTS: 1 DIF: Recall REF: Overview of Specific Breathing Conditions
OBJ: 45

77. What is the only absolute way of confirming hyperventilation?
a. monitor the $PaCO_2$
b. assess the respiratory rate
c. assess the tidal volume
d. ask the patient

ANS: A

	Feedback
A	The absolute confirmation of hyperventilation is made by assessing the $PaCO_2$
B	The absolute confirmation of hyperventilation is made by assessing the $PaCO_2$
C	The absolute confirmation of hyperventilation is made by assessing the $PaCO_2$
D	The absolute confirmation of hyperventilation is made by assessing the $PaCO_2$

PTS: 1 DIF: Recall
REF: Overview of Specific Breathing Conditions|Clinical Connection 2-18: The Arterial Carbon Dioxide Level and its Relationship to the Clinical Verification of Hyperventilation and Hypoventilation