بسم الله الرحمن الرحيم

DOPAMINE SCIENTIFIC TEAM

PHYSIOLOGY

FINAL | Past Papers

All Material + Lab

(Book Questions Included)

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﴿ وَلَقَدْ نَعْلَمُ أَنَّكَ يَضِيقُ صَدْرُكَ بِمَا يَقُولُونَ ﴿٩٧﴾ فَسَبِّحْ بِحَمْدِ رَبِّكَ وَكُن مِّنَ السَّاجِدِينَ ﴾

سبحان الله وبحمده، سبحان الله العظيم

Theoretical Material

Q1: If $[O_2]$ in arteries =18, $[O_2]$ in veins =14, CO =6 L/min, Find V_{O2} (mL/min)?

The question had no answers, I added them myself (:

A. 240 mL/min
B. 2400 mL/min
C. 24 mL/min

$$\dot{V}_{O_2} = CO \times (C_a - C_v)$$

Answer: A

Q2: Which of the following has the highest P_{50}?

A. HbA during exercise.
B. HbF.
C. Carboxyhemoglobin.
D. Myoglobin.
E. HbA at rest.

$$Higher\ P50\ =\ lower\ O_2\ affinity\ =\ right\ shift$$

Answer: A

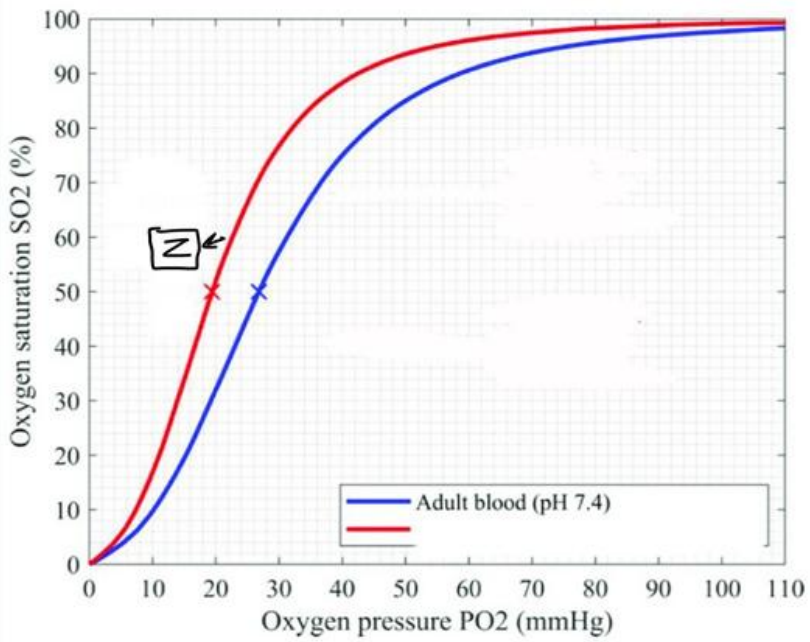
Q3: Which of the following is true regarding gas exchange in alveoli?

A. Exercise increases the total area of capillaries
B. O_2 is perfusion limited, CO_2 is diffusion limited
C. Exchange continues until the end of the capillary

Answer: A

Q4: What does the letter Z in this graph represent?

A. Hemoglobin F
B. Hemoglobin A
C. Hemoglobin S
D. Hemoglobin A during exercise



Answer: A

Q5: Which of the following about CO_2 is correct?

A. When it binds to hemoglobin it is called carboxyhemoglobin.
B. Most of the CO_2 present in the dissolved form.
C. CO_2 binding to hemoglobin increases the affinity for oxygen.
D. Oxygenation of hemoglobin promotes dissociation of H+ and shifts equilibrium toward CO_2 formation.

Answer: D

Q6: Which of the following is correct about gas diffusion?

A. Blood gives up 25% of O_2 in the tissue in normal people
B. In normal people O_2 saturation of hemoglobin is 100% and P_aO_2 is 100 mmHg

Answer: A

Q7: In the lung, when O_2 diffuses from the alveoli to the capillaries, most of it?

A. Remains in solution as O_2
B. Converted to oxyhemoglobin
C. Converted to bicarbonate ions in RBC
D. Combines with plasma proteins
E. Combines with H_2O in plasma to form carbonic acid

Answer: B

Q8: In normal individual, regarding gas exchange across pulmonary capillaries during mild exercise, which of the following statements is TRUE? ?

A. CO_2 crosses the membrane easier than O_2.
B. Diffusing capacity of the lung for O_2 is more than for CO_2; the most important factor is the molecular weight of both gases.
C. The length of capillary required for gas equilibrium is shorter during exercise.
D. ABGs become grossly abnormal.
E. Equilibrium across the respiratory membrane is never achieved.

Answer: A

Q9: Which of the following is true regarding a patient with Anemia?

A. Mixed venous pO_2 is reduced.
B. Arterial pO_2 is reduced.
C. Arterial - venous $[O_2]$ difference decrease

Answer: A

Q10: What limits the maximum VO_2?

A. Lung capacity
B. Mitochondrial enzymes
C. Cardiovascular system
D. Mitochondria number

Answer: C

Q11: A 20-year-old male college student participates in a pulmonary study in his physiology lab. He is healthy and in good physical shape. He is asked to run on a treadmill for 20 minutes at a moderate pace, during which time his arterial PCO_2 is measured. What is his predicted arterial PCO_2 (in mm Hg) ??

A. 20

B. 40

C. 60

D. 80

Answer: B

Q12: For a normal Hb-O_2 dissociation curve, what is the most correct relationship?

A. PaO_2 40 mmHg, SaO_2 40%
B. PaO_2 26 mmHg, SaO_2 26%
C. PaO_2 60 mmHg, SaO_2 90%
D. PaO_2 120 mmHg, SaO_2 120%
E. PaO_2 70 mmHg, SaO_2 40%

Answer: C

Q13: If blood Hb is 10 g/dL, PaO_2 is 100 mm Hg, and hemoglobin is 50% saturated with oxygen, the volume of oxygen contained in 100 ml of blood is approximately?

A. 5.6 ml
B. 6.7 ml
C. 9.5 ml
D. 19.5 ml
E. Cannot be calculated from the above data

Answer: B

Q14: For a normal Hb-O_2 dissociation curve, what is the most correct relationship?

A. PaO_2 40 mmHg, SaO_2 40%
B. PaO_2 26 mmHg, SaO_2 26%
C. PaO_2 60 mmHg, SaO_2 90%
D. PaO_2 120 mmHg, SaO_2 120%
E. PaO_2 70 mmHg, SaO_2 40%

Answer: C

Q15: In normal person at rest, which of the following decreases arterial PO_2?

A. Polycythemia
B. CO poisoning
C. Breathing 50% oxygen
D. Anemia
E. Ascent to an altitude of 3500 m

Answer: E

Q16: If 1 g of hemoglobin has an oxygen capacity of 1.34 mL of oxygen, what is the oxygen content of blood containing 10 g of hemoglobin when the blood PO_2=40 mmHg?

A. ≈ 6 mL/dL

B. ≈ 8 mL/dL

C. ≈ 10 mL/dL

D. ≈ 12 mL/dL

E. Cannot be calculated from the information provided

Answer: C

Q17: Which of the following decreases oxygen content but does not alter P_aO_2 or percentage saturation of hemoglobin?

A. Ascent to an altitude of 3500 m
B. Polycythemia (high RBC count)
C. Breathing 50% oxygen
D. Anemia
E. Development of a large right-to-left shunt

Answer: D

Q18: Decreased arterial PO2 is a consequence of all the following EXCEPT?

A. Breathing at high altitude
B. IRDS
C. Pulmonary edema
D. COPD
E. CO poisoning

Answer: E

Q19: If Hb concentration is 7.5 g/dl, and the arterial blood 02 sat is 98%, what would be the concentration of arterial O2?

A. Arterial [O_2] cannot be calculated.
B. The dissolved O_2 becomes more than the Hb-bound O_2.
C. There is about 15 mL of oxygen per 100 mL of arterial blood.
D. Arterial [O_2] equals 10 mL/dL.
E. When [Hb] equals 7.5 g/dL, automatically O_2 saturation never exceeds 50%.

Answer: D

Q20: A patient with anemia has which of the following?

A. A normal arterial blood O_2 content
B. Arterial PO_2 of 99 mmHg
C. A decreased venous blood PO_2
D. Hyperventilation
E. Cyanosis

It was answered C, and C is a stronger option. However, I believe B is 100% correct too.

Answer: C

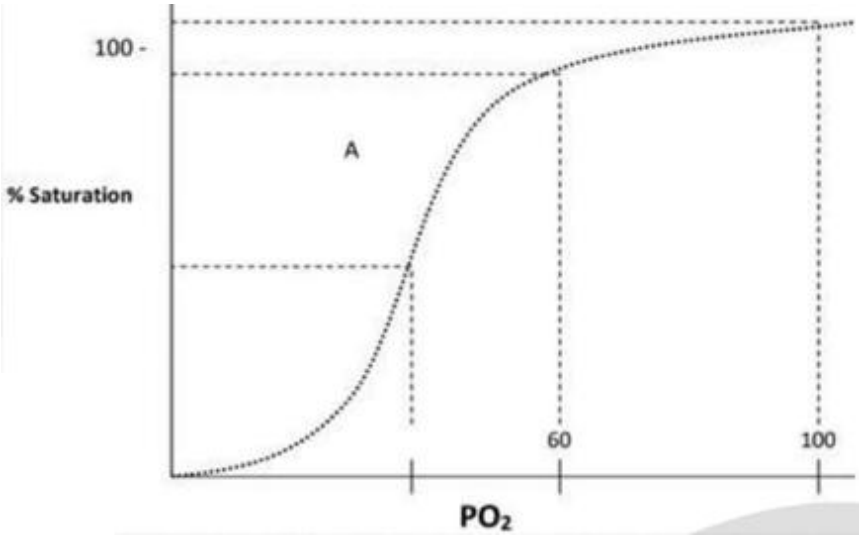
Q21: Which of the following would shift HB-O_2 to the left?

A. Exercise
B. HbF
C. Increase alveolar PCO_2
D. Whenever P50 increases
E. Hypoventilation

Answer: B

Q22: Which of the following is INCORRECT regarding the above oxyhemoglobin curve?

A. Higher P50 than normal means that O_2 binds less tightly to hemoglobin.
B. HbF is normally shifted to the left.
C. An increase in PCO_2 causes a right shift.
D. An increase in blood pH increases P50.
E. An increase in temperature shifts the O_2 uptake curve to the right.



Answer: D

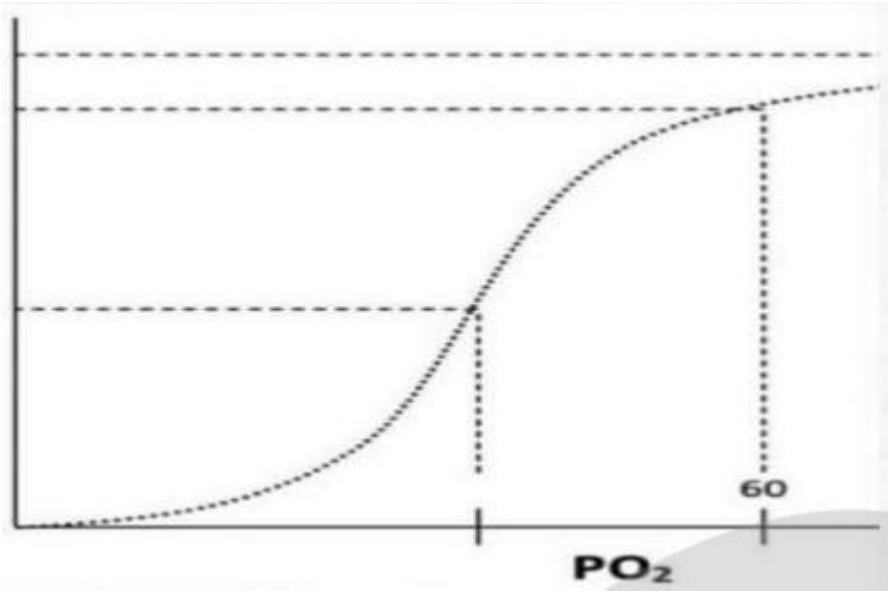
Q23: Regarding carbon monoxide poisoning, which of the following is TRUE?

A. Increases firing rate from the peripheral chemoreceptors to the respiratory center
B. Decreases arterial O_2 concentration
C. Decreases arterial PO_2
D. Can be a self-limited disease
E. As long as arterial PCO is below 1 mmHg, we should not worry

Answer: B

Q24: The below is normal oxyhemoglobin dissociation curve; an increase in P50 is seen in which of the following conditions?

A. Reverse Bohr's effect
B. Decreased local temperature
C. Physical exercise
D. Increase plasma pH
E. Fetal hemoglobin



Answer: C

Q25: Which of the following conditions would result in the highest oxygen content per millimeter blood?

A. Hemoglobin concentration = 5, PaO_2 = 90 mmHg
B. Hemoglobin concentration = 5, PaO_2 = 500 mmHg
C. Hemoglobin concentration = 3, PaO_2 = 90 mmHg
D. Hemoglobin concentration = 10, PaO_2 = 60 mmHg
E. Hemoglobin concentration = 16, PaO_2 = 28 mmHg

Answer: D

Q26: Which of the following statements about the transport of O_2 & CO_2 by the blood is true?

A. Most CO_2 is transported in the dissolved form
B. The % saturation of hemoglobin with O_2 will increase if the arterial PCO_2 is increased
C. A decrease in the % saturation of hemoglobin with O_2 increases CO_2 transport
D. In anemia, both arterial PO_2 and O_2 content are decreased
E. The reduced arterial PO_2 in an individual living at high altitude is due to impairment in O_2 diffusion

Answer: C

Q27: The oxygen dissociation curve of normal adult hemoglobin is most effectively shifted to the right by which of the following?

A. Mixing with fetal hemoglobin
B. Increased 2,3-bisphosphoglycerate (BPG)
C. Cooperative binding of oxygen
D. Increased pH
E. Decreased CO_2

Answer: B

Q28: Which of the following shifts the oxyhemoglobin curve to the left?

A. Increased temperature
B. Exercise
C. Hyperventilation
D. Metabolic acidosis

Answer: C

Q29: All the following is true regarding peripheral chemoreceptors except:

A. Response to low O2
B. Is triggered by CO2.
C. Sensitive to H+ content

CO2 content changes H+ concentration (pH) which is detected or triggered by peripheral receptors

Answer: B

Q29: All the following is true regarding peripheral chemoreceptors except:

A. Response to low O2
B. Is triggered by CO2.
C. Sensitive to H+ content

CO2 content changes H+ concentration (pH) which is detected or triggered by peripheral receptors

Answer: B

Q30:Which one of the following has a direct effect on the central chemoreceptors of the brain?

A. Co2
B. O2
C. Hco3-
D. Hydrogen ions

Answer: D

Q31: Which one of the following is a compensatory mechanism in high altitude :

A. Left shift of the oxygen hemoglobin saturation curve

B. Decrease BPG-2

C. pulmonary resistance

D. Normal PO2

Answer: C

Q32:Which of the following is true regarding respiratory centers:

A. The nervous signal that is transmitted to the inspiratory muscles by DRG is mainly an instantaneous burst of action potentials
B. Inspiratory center receives sensory input from peripheral chemoreceptors via the glossopharyngeal and vagus and phrenic nerves
C. The neurons of the ventral respiratory group are mostly active during normal quiet respiration
D. Stimulation of the apneustic center prolongs the contraction of the diaphragm

Answer: D

Q33: Which of the following statements is correct regarding Peripheral chemoreceptors:

A. Respond only to increased/decreased H+ concentration
B. Respond only to low O2
C. Stimulated by CO
D. Have the lowest arterio-venous O2 difference in our body
E. Aortic bodies are innervated by the glossopharyngeal nerve

Answer: D

Q34: Regarding carbon monoxide poisoning, one of the following is TRUE:

A. Increases firing rate from the peripheral chemoreceptors to the respiratory center
B. Decreases arterial O2 concentration
C. Decreases arterial PO2
D. Can be self-limited disease
E. As long as PCO arterial is below 1 mmHg, we should not worry.

Answer: B

Q35:In an individual the ventilation didn't increase when the inspired pCO_2 was increased, but decreased during increased inspired pO_2. Which of the following is most likely the cause for this response in ventilation:

A. Dysfunctional central chemoreceptors
B. Hypersensitivity of the peripheral chemoreceptors
C. Bronchial muscle spasm
D. Diaphragmatic fatigue
E. Normal functioning of the central and peripheral chemoreceptors

Answer: A

Q36: In diving, divers first hyperventilate before they go into water. This hyperventilation allows one to hold one's breath for a longer period of time, because hyperventilation:

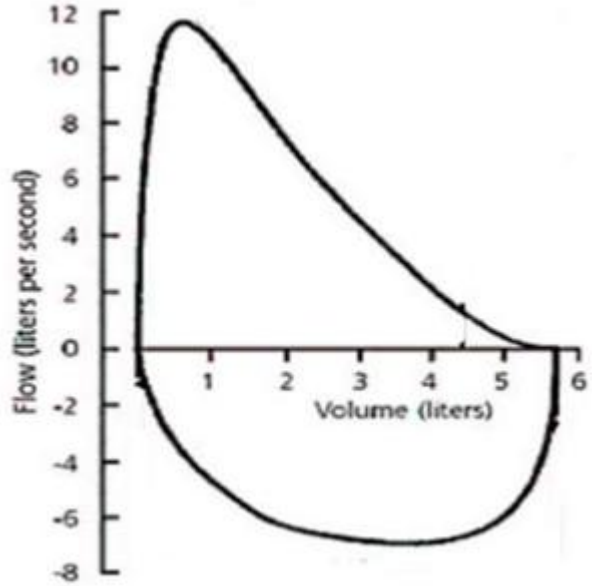
A. Increases the oxygen reserve of systemic arterial blood
B. Decreases the PCO_2 of systemic arterial blood
C. Decreases the pH of systemic arterial blood
D. Increases brain blood flow
E. Make alveolar air full of O_2 which divers can use while diving

Answer:B

The Lab

Q1: Which of the following can be known from this graph?

A. Duration of expiration
B. The reproducibility of the test
C. FVC
D. TLC



Answer: C

Q2: You have a 15-year-old thin and tall male patient who presents with a three month history of dyspnea and wheezes. You perform spirometry, what is the most probable diagnosis based on the spirometry report ?

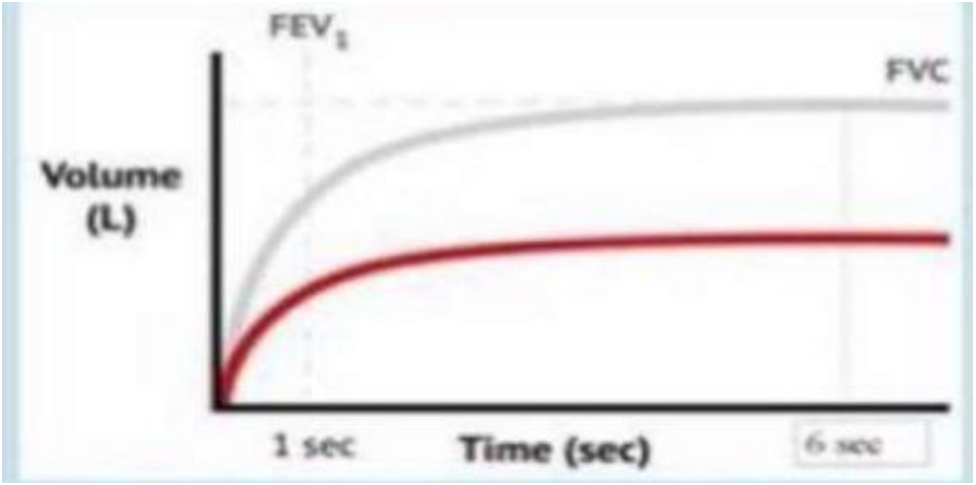
A. Interstitial lung disease
B. Pulmonary hypertension
C. A restrictive pattern due to obesity
D. Normal lung mechanics
E. Asthma

	Predicted	Actual (Measured)
FVC (L)	4.04	3.5
FEV_1 (L)	3.55	2.36
FEV_1/FVC	88%	67%

Answer: E

Q3: What pattern is suggested by the following volume-time graph (red curve)?

A. Chronic obstructive pulmonary disease (COPD)
B. The patient stopped exhaling too early
C. Asthma
D. Restrictive disease
E. The patient re-inhaled some air during the test



Answer: D

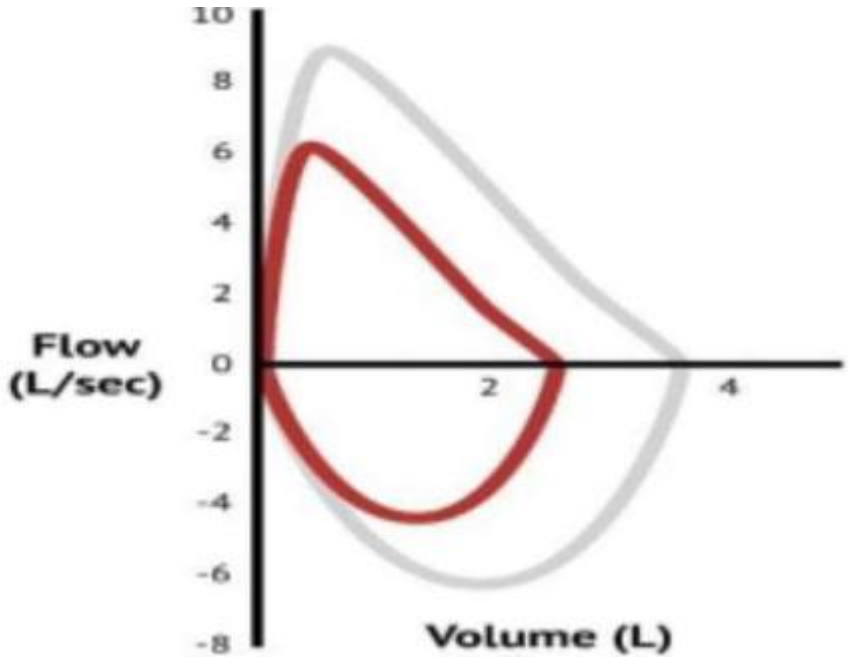
Q4: You did a spirometry test to a patient. The test was reproducible and acceptable and it is done 3 times. A table of results show that FEV_1/FVC=90%, FVC of predicted= 72%. What to do next?

A. Repeat the test again
B. It is normal
C. Give bronchodilator and repeat
D. Do methacholine challenge test
E. Complete pulmonary function test is needed

Answer: E

Q5: What does this flow volume loop represent?

A. COPD
B. Asthma
C. Restrictive lung disease



Answer: C

Q6: A normal person with VC = 3.5L, IC = 2L V_t = 0.5L, FRC = 2.5L, what's his ERV?

A. 1 L

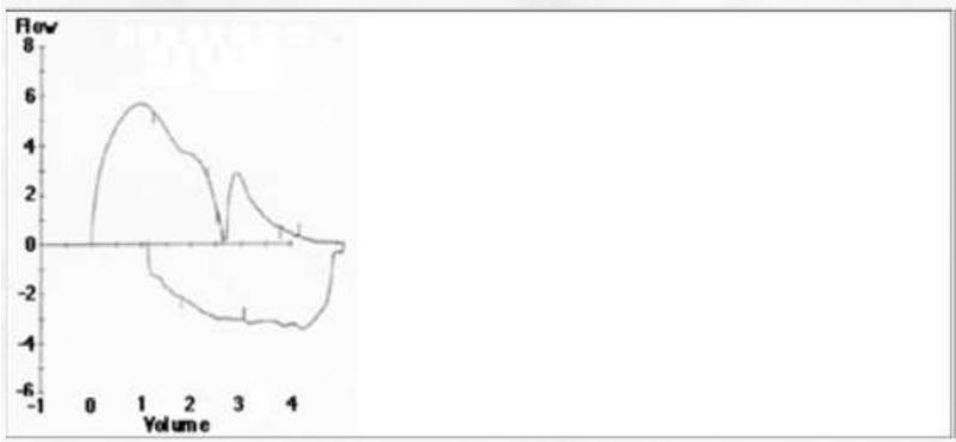
B. 1.5 L

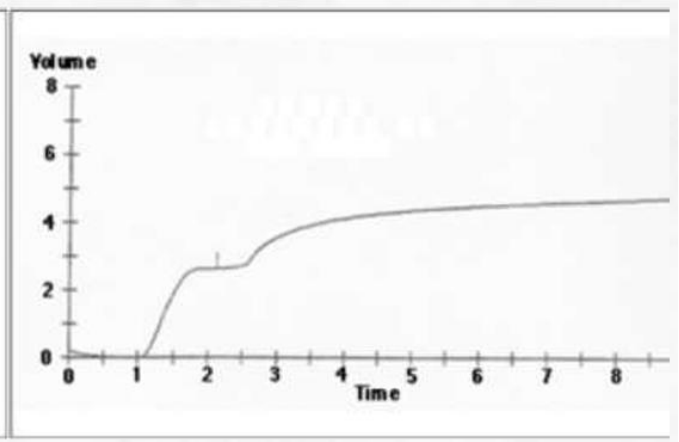
C. 2.5 L

Answer: B

Q7: A 53-year-old female has a history of chest tightness the FEV_1/FVC is 50%, FEV_1 is 74% of predicted value and FVC is 100% of predicted value, based on the results and the shown graphs, what is your diagnosis? ?

A. Uninterpretable, does not meet acceptability criteria
B. Severe obstruction
C. Normal
D. Mild obstruction





Answer: A

Q8: While performing the test the patient should inhale a very deep breath then exhale as forcefully and for as long as he/she can.

A. True

B. False

Answer: A

Q9: If the FVC was 5 liters and the FEV_1/FVC ratio was 60%, what is the value of FEV_1?

A. 2.5 L

B. 3 L

C. Can’t be determined by the given data

Answer: C

Q10: An acceptable spirometry test has the following features?

A. The difference between the two largest FVC measurements is within 200 mL
B. Rapid increase in airflow at the start of exhalation
C. The FVC is within normal limits
D. Exhalation continued for ~6 seconds

Answer: B+D

Q11: If the spirometry report shows an FEV_1/FVC ratio of 90% you can conclude the test result is normal without looking at other parts of the test?

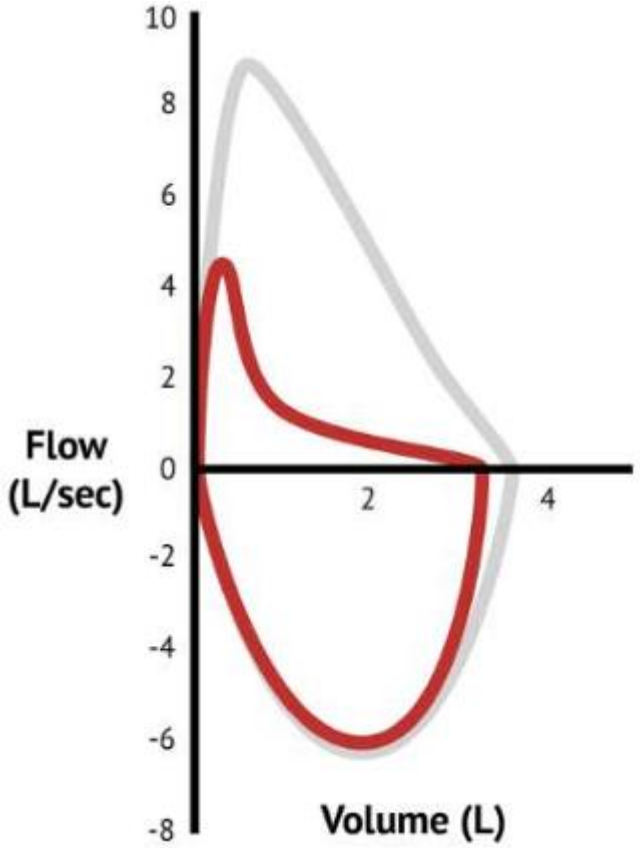
A. True

B. False

Answer: B

Q12: The following flow volume curve is highly suggestive of?

A. This is normal
B. Obstructive lung disease
C. Restrictive lung disease



Answer: B

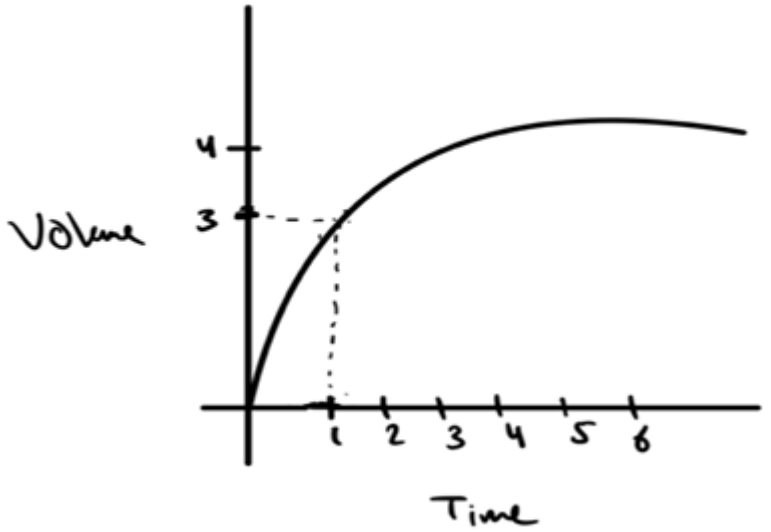
Q13: What test result can be used to distinguish between asthma and chronic obstructive pulmonary disease (COPD)?

A. Reversibility test
B. Methcholine challenge test
C. FEV_1/FVC
D. FEF25–75

Answer: A

Q14: What is true regarding the next graph?

A. Shows an obstructive lung disease.
B. FEV_1/FVC ratio is normal.



Answer: B

Q15: Spirometry can be used to measure one of the following?

A. RV (Residual volume)
B. FRC (Functional residual capacity)
C. TLC (Total lung capacity)
D. VC (Vital capacity)
E. Physiologic dead space volume

Answer: D

Q16: Which of the following concerning average lung volumes and capacities of a person at rest is TRUE ? (TLC = total lung capacity; VC = vital capacity; FRC = functional residual capacity; V_t = Tidal volume)

A. TLC > VC > V_t > FRC
B. TLC > FRC > VC > V_t
C. TLC > VC > FRC > V_t
D. TLC > FRC > V_t > VC
E. VC = TLC > FRC > V_t

Answer: C

Q17: The inspiratory reserve volume measures what?

A. Amount of air remaining in the lung after a maximal exhalation
B. Amount of air that the lung holds
C. Amount of air that can be further exhaled after a normal breath
D. Amount of air that can be further inhaled after a normal breath

Answer: D

Q18: The total lung capacity is calculated using which of the following formulas?

A. Residual volume + tidal volume + inspiratory reserve volume
B. Residual volume + expiratory reserve volume + inspiratory reserve volume
C. Expiratory reserve volume + tidal volume + inspiratory reserve volume
D. Residual volume + expiratory reserve volume + tidal volume + inspiratory reserve volume

Answer: D

Q19: Which of the following is not correct about 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 lung-thorax system is at rest.
E. Pulmonary vascular resistance is the lowest.

Answer: A

Q20: Maximum volume in the lung after forced inspiration is called?

A. RV
B. TLC
C. FRC
D. IRV
E. ERV

Answer: B

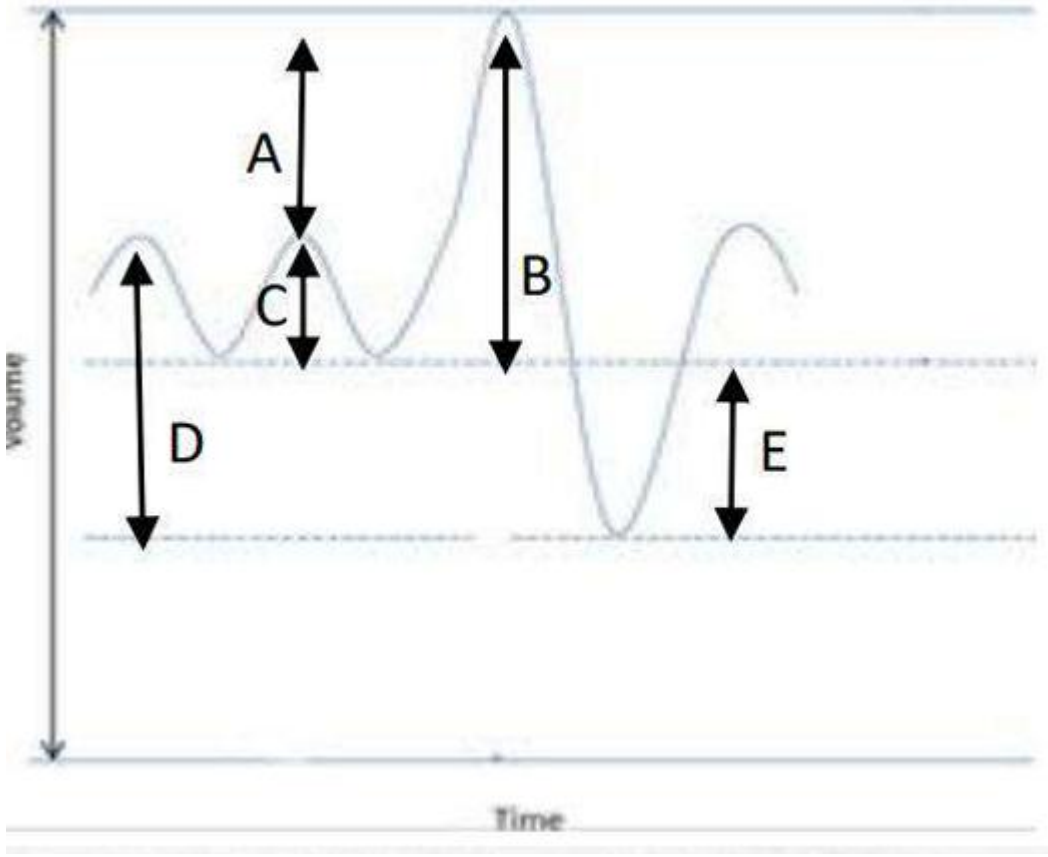
Q21: Which of the following isn't normal finding with aging?

A. Increase in RV
B. Increase in FRC
C. Increase in ERV
D. Increase in closing volume

Answer: C

Q22: In the following figure which point represent the Inspired reserve volume and which represent the expired reserve volume?

A. IRV–A // ERV–E
B. IRV–B // ERV–D
C. IRV–A // ERV–D
D. IRV–E // ERV–A
E. IRV–E // ERV–D



Answer: A

Q23: Which of the following isn't normal finding with aging?

A. Increase in RV
B. Increase in FRC
C. Increase in ERV
D. Increase in closing volume

Answer: C

These questions had no options (answers next slide)

Q1: FEV1 < 80%, FVC < 80%, TLC is decreased, which of the following is expected to be normal?

Q2: Which of the following decreases in obstructive but not in restrictive disease?

Q3: What decreases in emphysema?

Q4: What is incorrect about residual volume?

These questions had no options (The answers)

A1: FEV1/FVC

A2: FEV1/FVC

A3: FEV1

A4: It represents the resting state of the pulmonary-thorax system.

The Book Questions

Q1: A 22-year-old woman inhales as much air as possible and exhales as much air as she can, producing the spirogram shown in the figure. A residual volume of 1.0 liter was determined using the helium dilution technique. What is her FRC (in liters)? (Q8 in the book)

A. 2.0

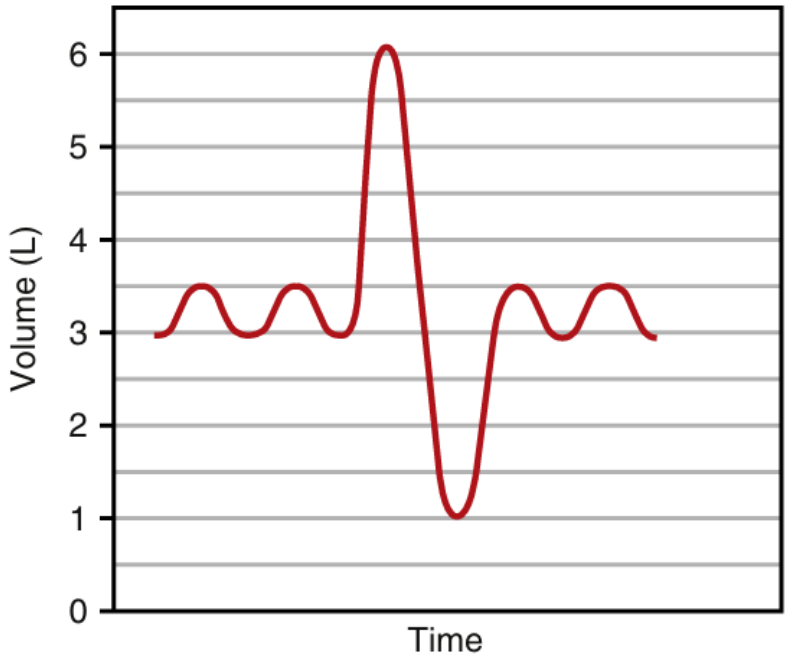
B. 2.5

C. 3.0

D. 3.5

E. 4.0

F. 5.0



Answer: C

Q2: The various lung volumes and capacities include the total lung capacity (TLC), vital capacity (VC), inspiratory capacity (IC), tidal volume (Vt), expiratory capacity (EC), expiratory reserve volume (ERV), inspiratory reserve volume (IRV), functional residual capacity (FRC), and residual volume (RV). Which of the following lung volumes and capacities can be measured using direct spirometry without additional methods? (Q14 in the book)

	TLC	VC	IC	VT	EC	ERV	IRV	FRC	RV
A)	No	No	Yes	No	Yes	No	Yes	No	No
B)	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No
C)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
D)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
E)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Answer: B

Q3: A person with normal lungs has an oxygen (O2) consumption of 750 ml O2/min. The hemoglobin (Hb) concentration is 15 g/dl. The mixed venous saturation is 25%. What is the cardiac output?
(Q19 in the book)

A. 2500 ml/min
B. 5000 ml/min
C. 7500 ml/min
D. 10,000 ml/min
E. 20,000 ml/min

Answer: B

Q4: Blood gas measurements are obtained in a resting patient who is breathing room air. The patient has an arterial content of 19 ml O2/min with a Po2 of 95. The mixed venous O2 content is 4 ml O2/100 ml blood. Which condition does the patient have?
(Q27 in the book)

A. An increase in physiological dead space
B. Pulmonary edema
C. A low Hb concentration
D. A low cardiac output

Answer: D

Q5: A normal male subject has the following initial conditions (in the steady state):

Arterial PO_2 = 92 mm Hg
Arterial O_2 saturation = 97%
Venous O_2 saturation = 20%
Venous PO_2 = 30 mm Hg
Cardiac output = 5600 ml/min
O_2 consumption = 256 ml/min
Hb concentration = 12 gm/dl

If you ignore the contribution of dissolved O_2 to the O_2 content, what is the venous O_2 content? (Q28 in the book)

A. 2.2 ml O_2/100 ml blood
B. 3.2 ml O_2/100 ml blood
C. 4 ml O_2/100 ml blood
D. 4.6 ml O_2/100 ml blood
E. 6.2 ml O_2/100 ml blood
F. 10.8 ml O_2/100 ml blood
G. 16 ml O_2/100 ml blood

Answer: B

Q6: A man fell asleep in his running car. He was unconscious when he was brought into the emergency department. With carbon monoxide (CO) poisoning, you would expect his alveolar O_2 partial pressure (P_aO_2) would be _____, while his arterial O_2 content (C_aO_2) would be _____. (Q29 in the book)

A. Normal, decreased

B. Decreased, decreased

C. Increased, normal

D. Increased, normal

Answer: A

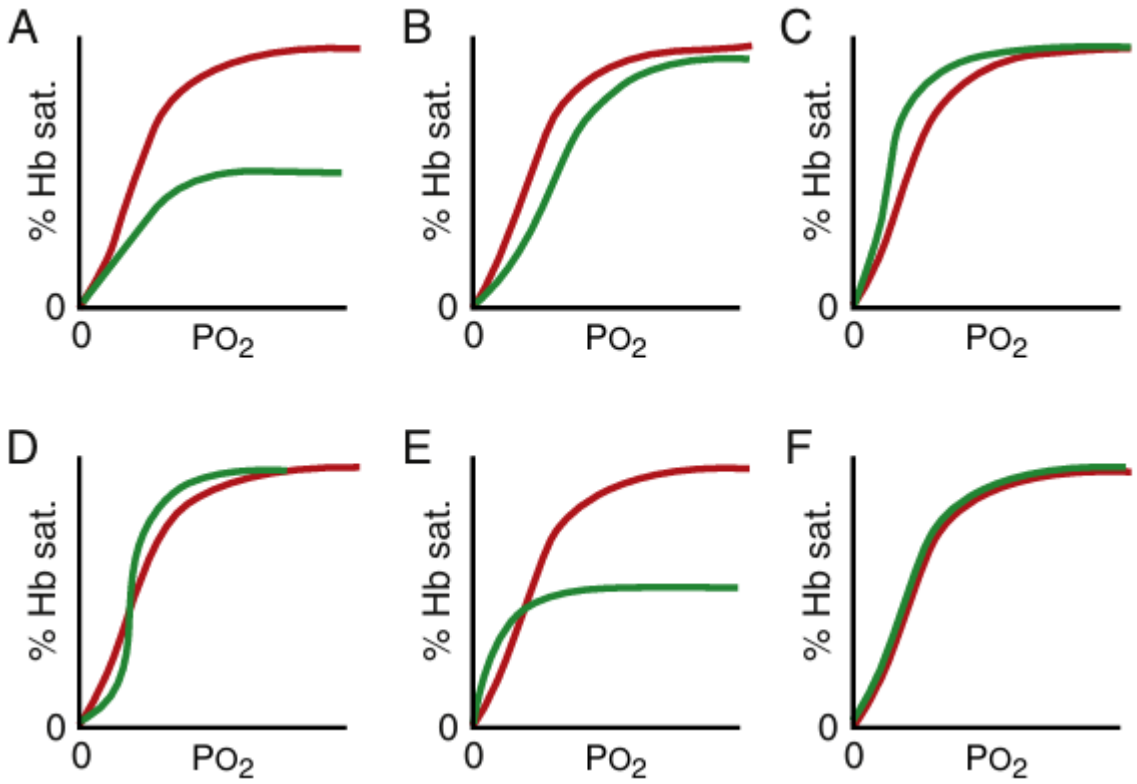
Q7: A person with anemia has an Hb concentration of 12 g/dl. He starts exercising and uses 12 ml O2/dl. What is the mixed venous Po2? (Q49 in the book)

A. 0 mm Hg
B. 10 mm Hg
C. 20 mm Hg
D. 40 mm Hg
E. 100 mm Hg

Answer: C

Q8: Which of the above O2-Hb dissociation curves corresponds to normal blood (red line) and blood containing CO (green line)? (Q52 in the book)

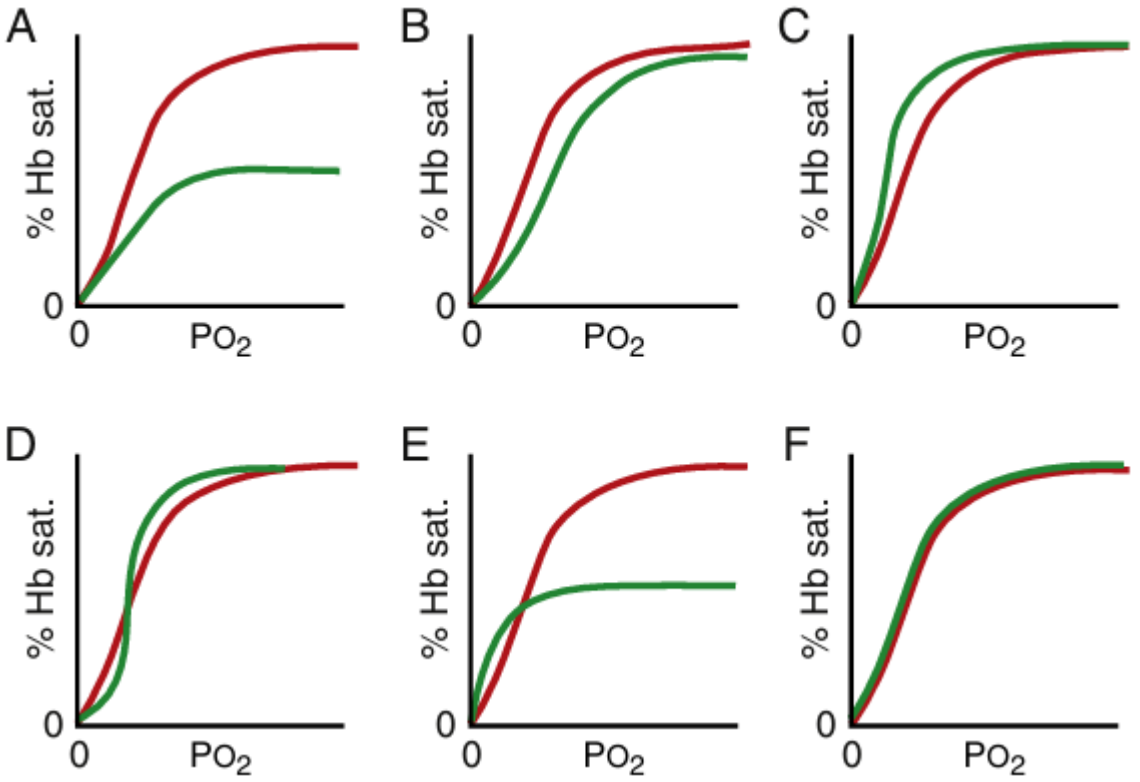
A. A
B. B
C. C
D. D
E. E
F. F



Answer: E

Q9: Which of the above O2-Hb dissociation curves corresponds to blood during resting conditions (red line) and blood during exercise (green line)?
(Q53 in the book)

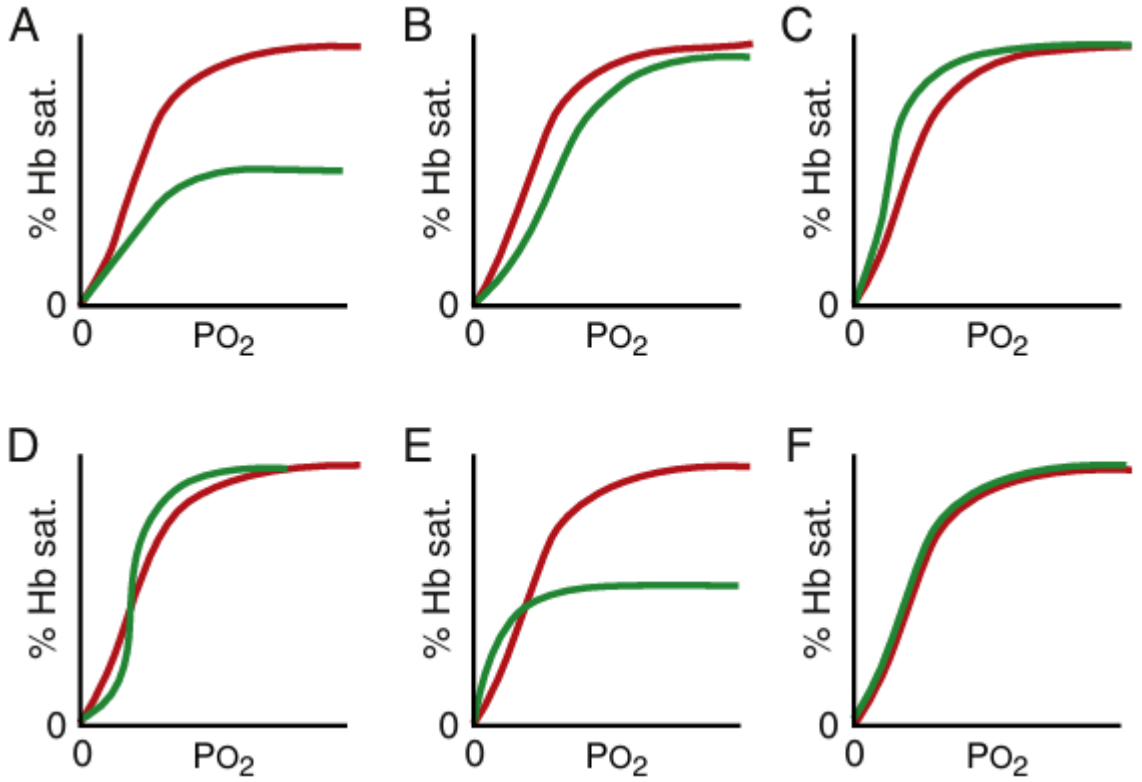
A. A
B. B
C. C
D. D
E. E
F. F



Answer: B

Q10: Which of the above O2-Hb dissociation curves corresponds to blood from an adult (red line) and blood from a fetus (green line)? (Q54 in the book)

A. A
B. B
C. C
D. D
E. E
F. F



Answer: C

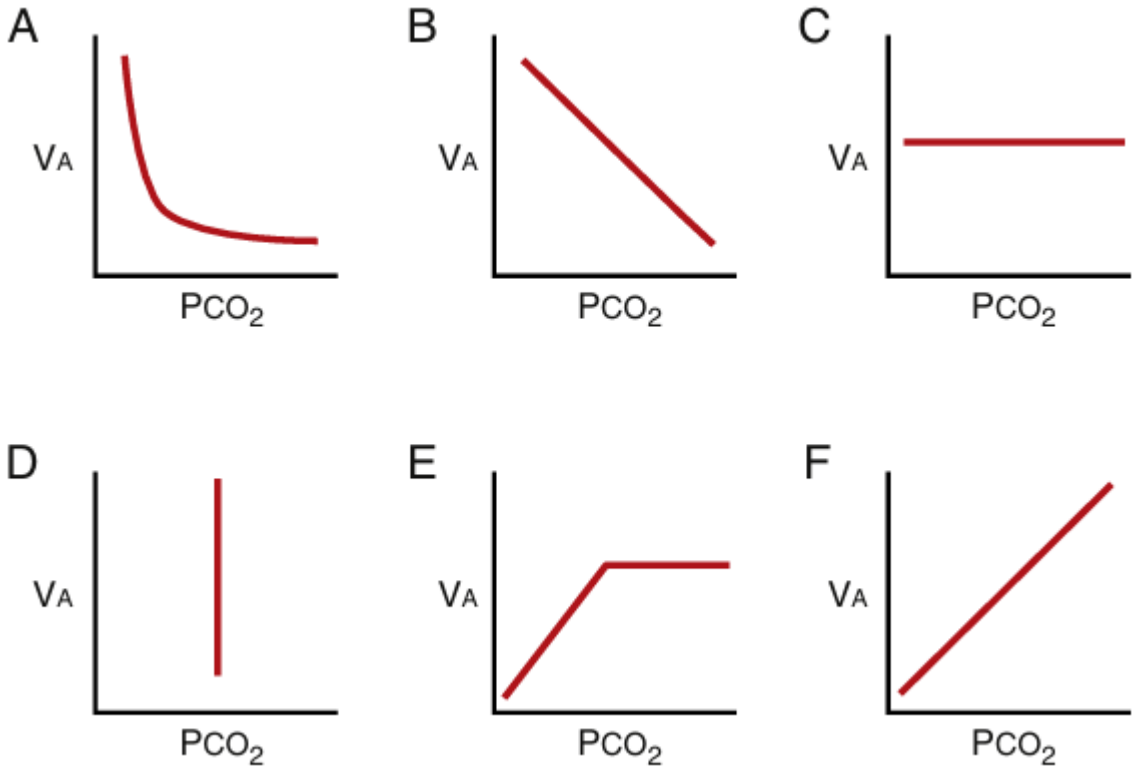
Q11: A 26-year-old medical student on a normal diet has a respiratory exchange ratio of 0.8. How much O2 and CO2 are transported between the lungs and tissues of this student (in ml gas/100 ml blood)? (Q59 in the book)

	O_2	CO_2
A)	4	4
B)	5	3
C)	5	4
D)	5	5
E)	6	3
F)	6	4

Answer: C

Q12: Which diagram in the above figure best describes the relationship between Va and arterial CO_2 tension (PCO_2) when the PCO_2 is changed acutely over a range of 35 to 75 mm Hg? (Q64 in the book)

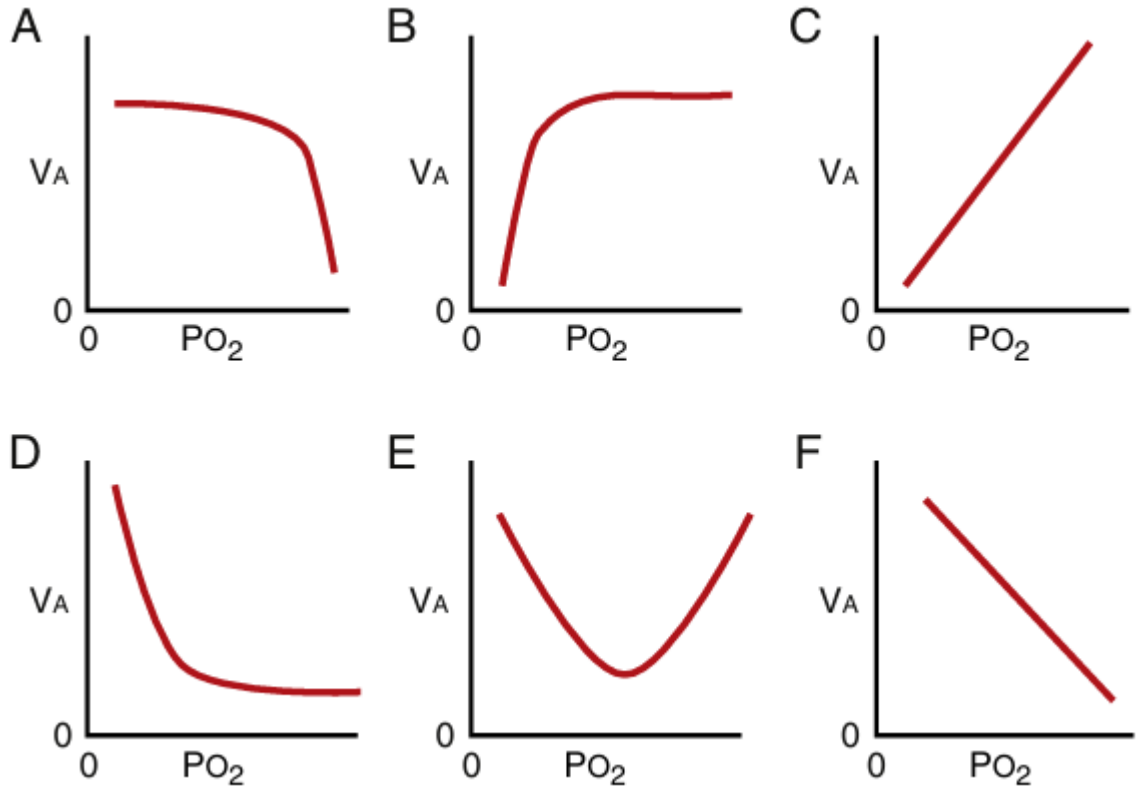
A. A
B. B
C. C
D. D
E. E
F. F



Answer: F

Q13: Which diagram in the above figure best describes the relationship between Va and arterial O_2 tension (PO_2) when the PO_2 is changed acutely over a range of 0 to 160 mm Hg and the arterial PCO_2 and H+ concentration remain normal? (Q65 in the book)

A. A
B. B
C. C
D. D
E. E
F. F



Answer: D

Q14: At a fraternity party a 17-year-old male places a paper bag over his mouth and breathes in and out of the bag. As he continues to breathe into this bag, his rate of breathing continues to increase. Which of the following is responsible for the increased ventilation? (Q66 in the book)

A. Increased alveolar Po2
B. Increased alveolar Pco2
C. Decreased arterial Pco2
D. Increased pH

Answer: B

Q15: A 45-year-old man inhaled as much air as possible and then expired with a maximum effort until no more air could be expired. This action produced the maximum expiratory flow-volume (MEFV) curve shown in the above figure. What is the forced vital capacity (FVC) of this man (in liters)? (Q71 in the book)

A. 1.5

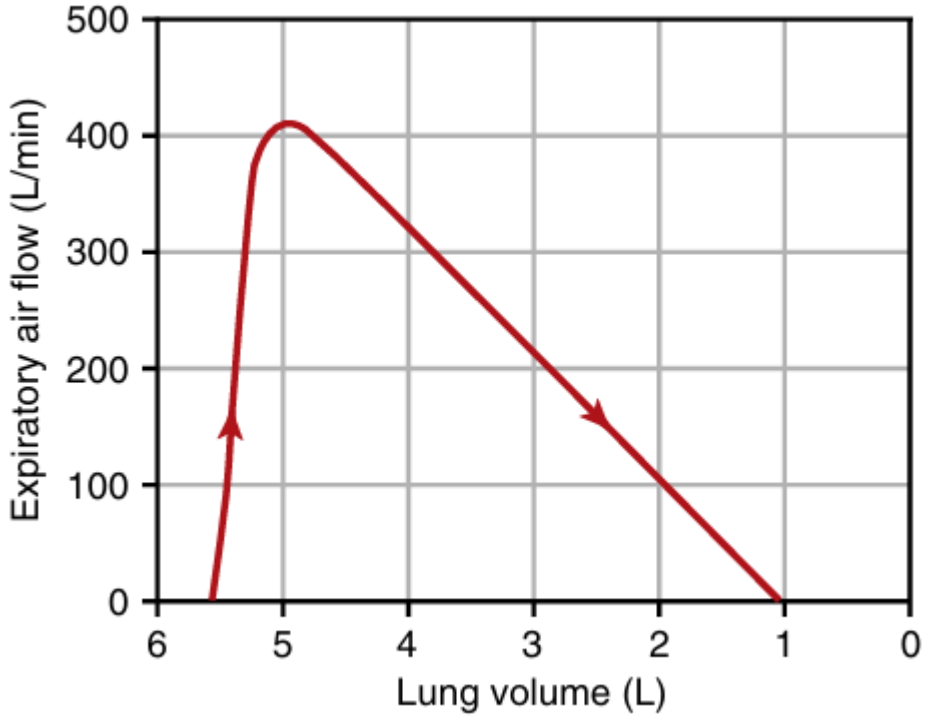
B. 2.5

C. 3.5

D. 4.5

E. 5.5

F. 6.5



Answer: D

Q16: The MEFV curve shown in the above figure is used as a diagnostic tool for identifying obstructive and restrictive lung diseases. At which point on the curve does airway collapse limit maximum expiratory air flow? (Q72 in the book)

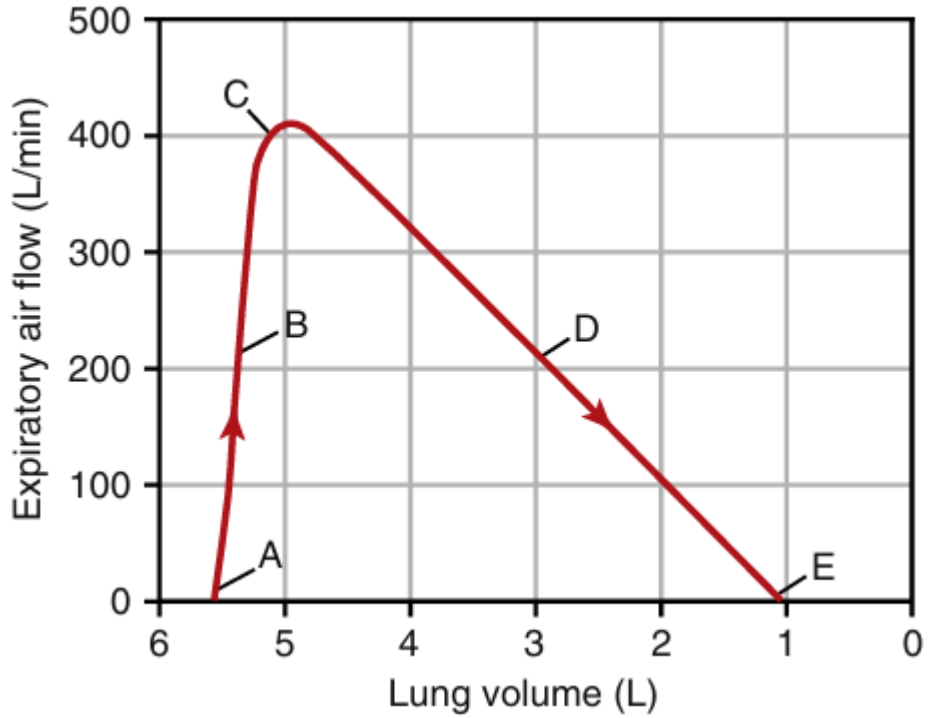
A. A

B. B

C. C

D. D

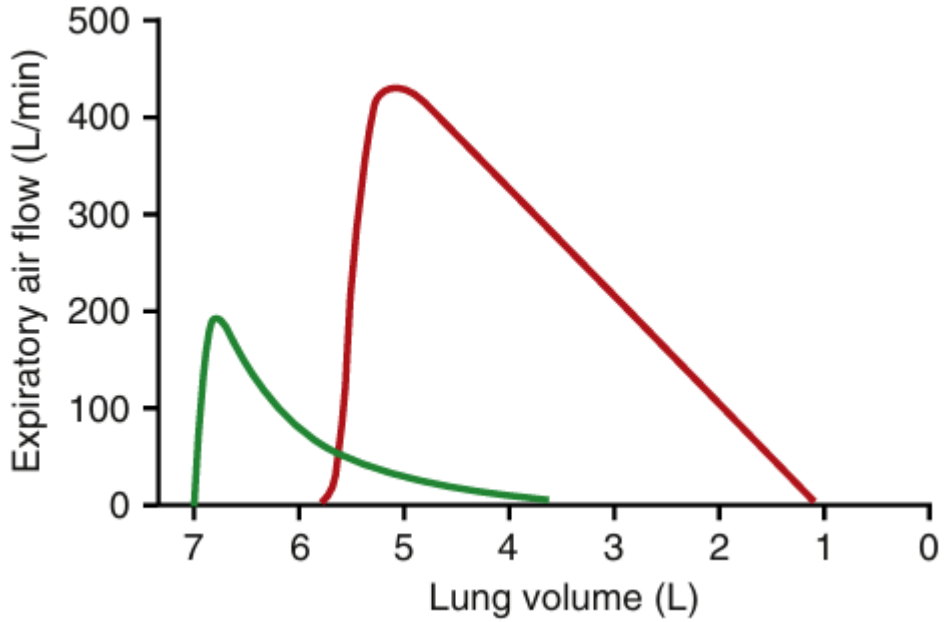
E. E



Answer: D

Q17: The MEFV curves shown in the above figure were obtained from a healthy person (red curve) and a 57-year-old man with shortness of breath (green curve). The man with shortness of breath likely has which disorder?
(Q73 in the book)

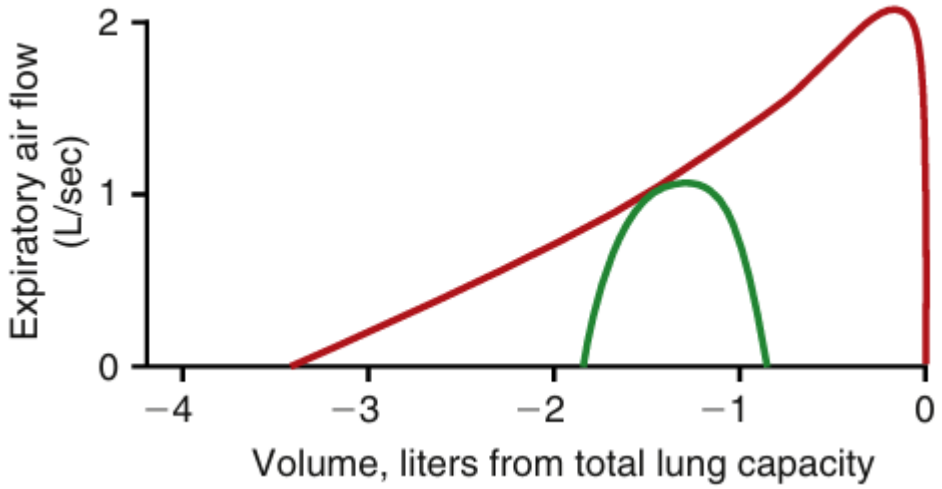
A. Asbestosis
B. Emphysema
C. Kyphosis
D. Scoliosis
E. Silicosis
F. Tuberculosis



Answer: B

Q18: The MEFV curve shown in the above figure (red line) was obtained from a 75-year-old man who smoked 40 cigarettes per day for 60 years. The green flow-volume curve was obtained from the man during resting conditions. Which set of changes is most likely to apply to this man? (Q75 in the book)

	Exercise Tolerance	TLC	RV
A)	Decreased	Decreased	Decreased
B)	Decreased	Increased	Increased
C)	Decreased	Normal	Normal
D)	Increased	Increased	Increased
E)	Normal	Decreased	Decreased



Answer: B

Q19: A man fell asleep in his running car. He was unconscious when he was brought into the emergency department. With carbon monoxide (CO) poisoning, you would expect his alveolar O2 partial pressure (PaO2) would be _____, while his arterial O2 content (CaO2) would be _____. (Q29 in the book)

A. Normal, decreased
B. Decreased, decreased
C. Increased, normal
D. Increased, normal

Answer: A

Q19:A person with normal lungs at sea level (760 mm Hg) is breathing 50% O2. What is the approximate alveolar PO2 (Q32 in the book)

A)100

B) 159

C) 306

D) 330

E) 380

Answer: C

Q20:. The figure below shows a lung with a large shunt in which mixed venous blood bypasses the O2 exchange areas of the lung. Breathing room air produces the O2 partial pressures shown on the diagram. What is the O2 tension of the arterial blood (in mm Hg) when the person breathes 100% O2 and the inspired O2 tension is greater than 600 mm Hg? (Q43 in the book)

A) 40

B) 55

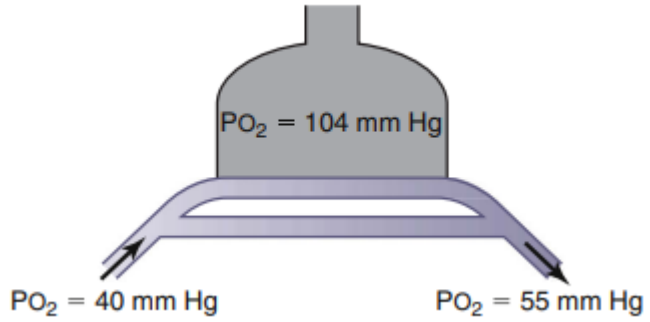
C) 60

D) 175

E) 200

F) 400

G) 600



Answer: C

Q21:When the respiratory drive for increased pulmonary ventilation becomes greater than normal, a special set of respiratory neurons that are inactive during normal quiet breathing then becomes active, contributing to the respiratory drive. #ese neurons are located in which structure? (Q58 in the book)

A) Apneustic center

B) Dorsal respiratory group

C) Nucleus of the tractus solitarius

D) Pneumotaxic center

E) Ventral respiratory group

Answer: E

Q22:What is the most important pathway for the respiratory response to systemic arterial CO2 (PCO2)? (Q56 in the book)

A) CO2 activation of the carotid bodies

B) Hydrogen ion (H+) activation of the carotid bodies

C) CO2 activation of the chemosensitive area of the medulla

D) H+ activation of the chemosensitive area of the medulla

E) CO2 activation of receptors in the lungs

Answer: D

Q23:The basic rhythm of respiration is generated by neurons located in the medulla. What limits the duration of inspiration and increases respiratory rate? (Q57 in the book)

A) Apneustic center

B) Dorsal respiratory group

C) Nucleus of the tractus solitarius

D) Pneumotaxic center

E) Ventral respiratory group

Answer: D

Q24: An anesthetized man is breathing with no assistance. He then undergoes artificial ventilation for 10 minutes at his normal VT but at twice his normal frequency.
He undergoes ventilation with a gas mixture of 60% O2 and 40% nitrogen. The artificial ventilation is stopped, and he fails to breathe for several minutes. This apneic episode is due to which of the following? (Q62 in the book)

A) High arterial PO2 suppressing the activity of the peripheral chemoreceptors

B) Decrease in arterial pH suppressing the activity of the peripheral chemoreceptors

C) Low arterial PCO2 suppressing the activity of the medullary chemoreceptors

D) High arterial PCO2 suppressing the activity of the medullary chemoreceptors

E) Low arterial PCO2 suppressing the activity of the peripheral chemoreceptors

Answer:C

Q25: At a fraternity party a 17-year-old male places a paper bag over his mouth and breathes in and out of the bag. As he continues to breathe into this bag, his rate of breathing continues to increase. Which of the following is responsible for the increased ventilation? (Q66 in the book)

A) Increased alveolar PO2

B) Increased alveolar PCO2

C) Decreased arterial PCO2

D) Increased pH

Answer: B

Q26: Va increases severalfold during strenuous exercise. Which factor is most likely to stimulate ventilation during strenuous exercise? (Q67 in the book)

A) Collateral impulses from higher brain centers

B) Decreased mean arterial pH

C) Decreased mean arterial PO_2

D) Decreased mean venous PO_2

E) Increased mean arterial PCO_2

Answer:A

Q27: A stroke that destroys the respiratory area of the medulla would be expected to lead to which of the following? (51Q in the book)

A) Immediate cessation of breathing

B) Apneustic breathing

C) Ataxic breathing

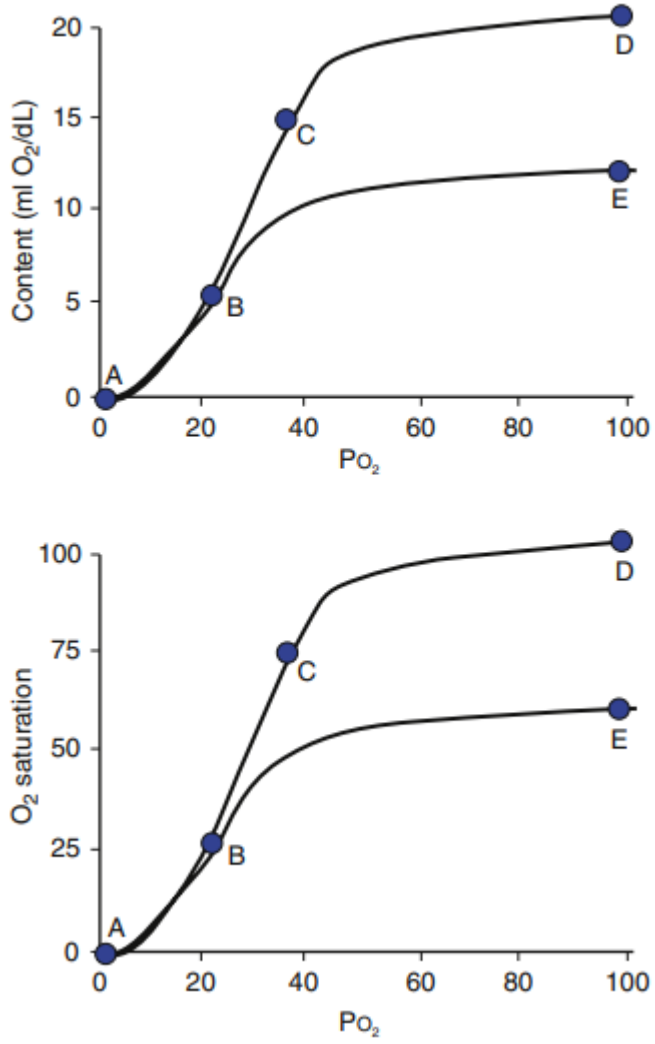
D) Rapid breathing (hyperpnea)

E) None of the above (breathing would remain normal)

Answer: A

Q28: Which points on the adjacent figure represent arterial blood in a severely anemic person? (Q50 in the book)

	Top Graph	Bottom Graph
A)	D	D
B)	E	E
C)	D	E
D)	E	D



Answer: D

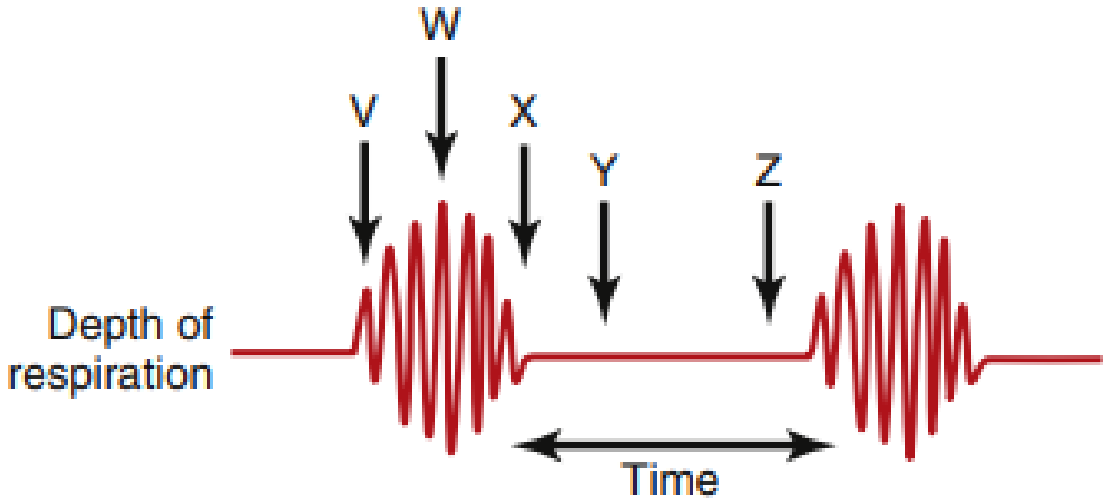
Q29:A 45-year-old man at sea level has an inspired O2 tension of 149 mm Hg, nitrogen tension of 563 mm Hg, and water vapor pressure of 47 mm Hg. A small tumor pushes against a pulmonary blood vessel, completely blocking the blood flow to a small group of alveoli. What are the O2 and carbon dioxide (CO2) tensions of the alveoli that are not perfused (in mm Hg)? (Q 36 in the book)

	CO_2	O_2
A)	0	0
B)	0	149
C)	40	104
D)	47	149
E)	45	149

Answer: B

Q30: Cheyne-Stokes breathing is an abnormal breathing pattern characterized by a gradual increase in the depth of breathing, followed by a progressive decrease in the depth of breathing that occurs again and again approximately every minute. Which time points on the below figure (V-Z) are associated with the highest PCO2 of lung blood and highest PCO2 of the neurons in the respiratory center (Q70 in the book)

	Lung Blood	Respiratory Center
A)	V	V
B)	V	W
C)	W	W
D)	X	Z
E)	Y	Z



Answer: B

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Corrections from previous versions:

Versions	Slide #	Before Correction	After Correction
V0 → V1	5 86 87	A Missing A	A (total area; more accurate) C C
V1 → V2			