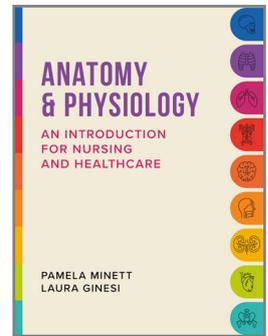




Lantern



Questions to accompany *Anatomy and Physiology*

CHAPTER 6 THE RESPIRATORY SYSTEM

Multiple Choice Questions (MCQs)

Each question consists of a stem statement or question, and 5 options. You must pick the one correct answer.

- Ventilation (breathing) is a regular, rhythmic process which:**
 - moves air into and out of the lungs
 - releases energy from glucose within living cells
 - reduces the surface tension of the lining of the lung
 - protects the airways by clearing them of mucus or irritants
 - moves gases from an area of high concentration to an area of lower concentration
- Which of the following structures is NOT part of the upper respiratory tract?**
 - larynx
 - trachea
 - lung
 - epiglottis
 - pharynx
- The lungs are attached to the walls of the thorax by means of the:**
 - pericardial membrane
 - parietal pleural membrane
 - visceral pleural membrane
 - mesentery
 - diaphragm
- What is the anatomically correct name for the windpipe?**
 - pharynx
 - bronchiole
 - larynx
 - alveolar duct
 - trachea
- Which of the following is the function of the diaphragm in expiration?**
 - production of energy
 - relaxation
 - contraction
 - gaseous exchange
 - helping the lungs to stay inflated
- Which of the following is NOT a characteristic feature of alveoli in the lung?**
 - a large surface area
 - thin walls
 - chemical layer called surfactant
 - poor blood supply
 - moist surface
- Most of the oxygen being transported by blood:**
 - is dissolved in plasma
 - is attached to glucose
 - is reversibly bound to haemoglobin
 - is used to provide energy for the heartbeat
 - is carried in the form of bicarbonate, (HCO_3^-)
- Pulmonary surfactant:**
 - protects the surface of the lungs
 - eliminates small particles and dust
 - is made by bronchioles
 - prevents the alveoli from collapsing
 - can change colour to green or yellow when infected

9. The term glycolysis refers to a cell's ability to:
- export products it has made to other cells
 - enzymatically split a molecule of glucose into two molecules of pyruvic acid
 - produce a steady source of energy in the form of ATP
 - divide and replicate itself
 - communicate with other cells in a different part of the body
10. The cells that make and secrete mucus that protects the lining of the respiratory tract are called:
- squamous epithelium
 - pneumothorax
 - terminal bronchioles
 - alveolar cells
 - goblet cells

Fill in the blanks

Question 11

Complete the following statements.

- As it flows from the atmosphere into the lungs, air is humidified (moistened) and _____ by the mucous lining of the trachea.
- Movement of air from the atmosphere into the lungs is known as _____ and depends on the _____ muscles and diaphragm.
- Deoxygenated blood travels in the _____ arteries to the lungs.
- Most of the oxygen in blood is bound to _____.
- The airways that are located between the bronchi and the alveoli are called the _____.
- The process whereby dissolved gases are exchanged between blood and interstitial fluid is called _____.
- During inspiration, the intercostal muscles contract, lifting the thorax upwards and outwards which _____ intrapulmonary pressure.
- Lung function and volumes can be measured using a _____.
- The airways and other parts of the respiratory system where gaseous exchange does not take place are known as anatomical _____.
- Gaseous exchange can take place rapidly in the millions of alveoli of the lung because they provide _____ surfaces, a _____ surface area, _____ walls and an excellent _____ supply.
- _____ takes place inside living cells to release energy stored in nutrients in food.

Critical thinking: ARQs (assertion reasoning questions)

These questions consist of two statements:

- an assertion, and
- a reason.

You must first determine whether each statement is *TRUE* or *FALSE*.

- If both statements are true, you must next determine whether the reason correctly explains the assertion. The answer will be option 1 or option 2.
- If one statement is true and the other is false then the answer is option 3 or option 4, depending on which of the statements is correct.
- If both statements are false, then the answer is option 5.

There is one option for each possible outcome.

Question 12

A = the Assertion	R = the Reason
Living cells need a continuous supply of oxygen	Living cells use oxygen to produce energy in the form of ATP during aerobic respiration
Options	
1) Both A and R are true and R is the correct explanation of A	
2) Both A and R are true but R is NOT the correct explanation of A	
3) A is true but R is false	
4) A is false but R is true	
5) Both A and R are false	

Question 13

A = the Assertion	R = the Reason
Most of the carbon dioxide in blood is transported in the form of bicarbonate (HCO_3^-)	Homeostatic regulation of breathing is closely linked to acid-base balance in the body
Options	
1) Both A and R are true and R is the correct explanation of A	
2) Both A and R are true but R is NOT the correct explanation of A	
3) A is true but R is false	
4) A is false but R is true	
5) Both A and R are false	

Question 14

A = the Assertion	R = the Reason
When the diaphragm and intercostal muscles contract during expiration, the lung volume is reduced	During expiration, the diaphragm flattens and the ribcage enlarges, lowering the pressure in the lungs
Options	
1) Both A and R are true and R is the correct explanation of A	
2) Both A and R are true but R is NOT the correct explanation of A	
3) A is true but R is false	
4) A is false but R is true	
5) Both A and R are false	

Deepening your learning

Question 15

Anatomy and physiology

Create a labelled drawing of a terminal bronchiole and several alveoli.

Explain, in your own words, how and why oxygen and carbon dioxide are exchanged rapidly in alveoli.

Include the role of:

- inspiratory muscles
- haemoglobin, and
- cell respiration

in your explanation.

Question 16

Applying theory to practice

Martina is a 24-year-old woman with allergic rhinitis who tells you she has a two-year history of episodes of coughing, feeling of tightness in her chest and shortness of breath. Although she normally feels completely well, these episodes have been happening more frequently in the last three months and sometimes wake her up during the night.

- a) Using a hand-held office spirometer, Martina's respiratory rate is 15 breaths per minute and her tidal volume is 370 cm³ per breath. Calculate her total pulmonary ventilation (minute volume).
Further investigation reveals the presence of mild hyper-responsive airways and Martina is diagnosed with asthma.
- b) Draw and label a sketch that compares and contrasts the physiological characteristics of a normal bronchiole with one affected by asthma.
- c) Carry out some independent research to find out about possible triggers for an asthma attack.

Answers to questions

Answers are supplied to most, but not all questions. Some may require you to carry out further research using the book.

Multiple Choice Questions (MCQs)

Each question consists of a stem statement or question, and 5 options. You must pick the one correct answer.

- Ventilation (breathing) is a regular, rhythmic process which:**
 - moves air into and out of the lungs
- Which of the following structures is NOT part of the upper respiratory tract?**
 - lung
- The lungs are attached to the walls of the thorax by means of the:**
 - parietal pleural membrane
- What is the anatomically correct name for the windpipe?**
 - trachea
- Which of the following is the function of the diaphragm in expiration?**
 - relaxation
- Which of the following is NOT a characteristic feature of alveoli in the lung?**
 - poor blood supply
- Most of the oxygen being transported by blood:**
 - is reversibly bound to haemoglobin
- Pulmonary surfactant:**
 - prevents the alveoli from collapsing
- The term glycolysis refers to a cell's ability to:**
 - enzymatically split a molecule of glucose into two molecules of pyruvic acid
- The cells that make and secrete mucus that protects the lining of the respiratory tract are called:**
 - goblet cells

Fill in the blanks

Question 11

Complete the following statements.

- As it flows from the atmosphere into the lungs, air is humidified (moistened) and warmed by the mucous lining of the trachea.
- Movement of air from the atmosphere into the lungs is known as ventilation (breathing) and depends on the intercostal muscles and diaphragm.
- Deoxygenated blood travels in the pulmonary arteries to the lungs.
- Most of the oxygen in blood is bound to haemoglobin.
- The airways that are located between the bronchi and the alveoli are called the bronchioles.
- The process whereby dissolved gases are exchanged between blood and interstitial fluid is called diffusion.
- During inspiration, the intercostal muscles contract, lifting the thorax upwards and outwards which reduces intrapulmonary pressure.
- Lung function and volumes can be measured using a spirometer.
- The airways and other parts of the respiratory system where gaseous exchange does not take place are known as anatomical dead space.

- J. Gaseous exchange can take place rapidly in the millions of alveoli of the lung because they provide moist surfaces, a large surface area, thin walls and an excellent blood supply.
- K. Cellular respiration takes place inside living cells to release energy stored in nutrients in food.

Critical thinking: ARQs (assertion reasoning questions)

These questions consist of two statements:

- an assertion, and
- a reason.

You must first determine whether each statement is *TRUE* or *FALSE*.

- If both statements are true, you must next determine whether the reason correctly explains the assertion. The answer will be option 1 or option 2.
- If one statement is true and the other is false then the answer is option 3 or option 4, depending on which of the statements is correct.
- If both statements are false, then the answer is option 5.

There is one option for each possible outcome.

Question 12

A = the Assertion	R = the Reason
Living cells need a continuous supply of oxygen	Living cells use oxygen to produce energy in the form of ATP during aerobic respiration
1. Both A and R are true and R is the correct explanation of A	
<p><i>Explanation</i></p> <p>The Assertion (A) is <i>TRUE</i>. Oxygen from alveolar air continually diffuses into blood where it binds to haemoglobin. It is transported to capillaries where it is released and diffuses into the tissues.</p> <p>The Reason (R) is <i>TRUE</i>. During aerobic respiration – which means respiration in the presence of air – energy in the form of adenosine triphosphate (ATP) is generated through the breakdown of glucose by mitochondria.</p> <p>Option 1 is the correct answer.</p>	

Question 13

A = the Assertion	R = the Reason
Most of the carbon dioxide in blood is transported in the form of bicarbonate (HCO_3^-)	Homeostatic regulation of breathing is closely linked to acid–base balance in the body
2. Both A and R are true but R is NOT the correct explanation of A	
<p><i>Explanation</i></p> <p>The Assertion (A) is <i>TRUE</i>. Carbon dioxide is produced by cells and diffuses into the blood. A small amount is transported in solution or bound to haemoglobin but the majority of CO_2 diffuses into red cells where it is converted into bicarbonate ions (HCO_3^-) and hydrogen ions (H^+); the reaction reverses in the lungs, where CO_2 is exhaled into alveolar air and breathed out.</p> <p>The Reason (R) is <i>TRUE</i>. Specialised cells known as chemoreceptors in the brainstem and major arteries detect changes in partial pressure of CO_2 through the altered levels of H^+. The respiratory control centres respond to rising concentrations of H^+, adjusting the rate and depth of ventilation to match the body's needs.</p> <p>However, the two statements are independent of each other and R is not a correct explanation of A. Option 2 is the correct answer.</p>	

Question 14

A = the Assertion	R = the Reason
When the diaphragm and intercostal muscles contract during expiration, the lung volume is reduced	During expiration, the diaphragm flattens and the ribcage enlarges, lowering the pressure in the lungs
5. Both A and R are false	
<p><i>Explanation</i></p> <p>The Assertion (A) is <i>FALSE</i>. The diaphragm and intercostal muscles contract during inspiration, increasing the volume of the thorax and lowering pressure in the lungs, so air flows into them.</p> <p>The Reason (R) is <i>FALSE</i>. The diaphragm rises to form a dome when it relaxes (during expiration). When the intercostal muscles relax, the ribcage is lowered and pressure increases in the lungs, so air is breathed out.</p> <p>Since both statements are false, the correct option is 5.</p>	