

4. RESPIRATION

TEACHING TASK

SINGLE CORRECT ANSWER TYPE

1. Respiration is the process in which

Answer: (B) energy is released and stored in the form of ATP

Solution: Respiration is a biochemical process where cells break down organic molecules (like glucose) to release energy, which is stored in the form of ATP (adenosine triphosphate), the cell's energy currency. ADP is converted to ATP during this process, not stored as energy (eliminates A). Energy is released, not used up or not released (eliminates C and D).

2. Which of the following is the source of respiration -

Answer: (C) Glucose

Solution: Glucose is the primary substrate for cellular respiration in most organisms, broken down during glycolysis to produce energy. While stored food, fats, and proteins can contribute to respiration, glucose is the primary and direct source in most cases.

3. The form of energy used in respiration is -

Answer: (A) Chemical energy

Solution: Respiration involves breaking chemical bonds in organic molecules (e.g., glucose) to release chemical energy, which is then stored in ATP. It does not involve electrical, mechanical, or radiant energy as the primary form.

4. Which one is anabolic process?

Answer: (C) Photosynthesis

Solution: An anabolic process builds complex molecules from simpler ones, requiring energy. Photosynthesis uses light energy to synthesize glucose from CO₂ and water, an anabolic process. Respiration and digestion are catabolic (breaking down molecules), and ascent of sap is a physical transport process.

5. A catabolic process is -

Answer: (C) Respiration

Solution: A catabolic process breaks down complex molecules into simpler ones, releasing energy. Respiration breaks down glucose into CO₂, water, and energy (ATP). Absorption, ascent of sap, and assimilation are not primarily catabolic.

6. What is wrong about respiration -

Answer: (D) All the above

Solution: Respiration occurs in cells (A is wrong), involves enzymes for oxidation (B is wrong), and releases energy gradually in multiple steps, not in one quick step (C is wrong). Thus, all statements are incorrect.

7. In anaerobic respiration in plants:

Answer: (D) CO₂ is given out

Solution: Anaerobic respiration in plants (e.g., fermentation) breaks down glucose

without oxygen, producing ethanol and CO₂ as byproducts. No oxygen is taken in or given out, and CO₂ is not taken in.

8. Stomata open during day time because the guard cells:

Answer: (D) photosynthesize and produce osmotically active sugars or organic acids

Solution: Guard cells photosynthesize during the day, producing sugars or organic acids that increase osmotic pressure, causing water uptake and stomata opening. Thin walls and bean shape (A, B) are structural features, not the cause. Gaseous exchange (C) is a function, not the mechanism.

9. Which one of the following is the link between glycolysis and Krebs's cycle?

Answer: (D) Acetyl Co-A

Solution: Glycolysis produces pyruvate, which is converted to Acetyl Co-A in the mitochondria, linking glycolysis (in the cytoplasm) to the Krebs cycle (in the mitochondria). The other options are not direct links.

10. Exchange of gases occurs through -

Answer: (D) All the above

Solution: In plants, gas exchange (O₂ and CO₂) occurs through stomata (leaves), lenticels (stems), and root surfaces, depending on the plant part. All are involved in respiration.

11. Exchange of gases involves -

Answer: (B) Diffusion

Solution: Gas exchange in respiration occurs via diffusion, where O₂ and CO₂ move across membranes based on concentration gradients. Osmosis, imbibition, and suction pressure are unrelated to gas exchange.

12. They participate in respiration -

Answer: (D) All living cells

Solution: Respiration occurs in all living cells to produce energy for cellular processes. It is not limited to specific cell types like colorless, colored, or green cells.

13. Respiration is:

Answer: (D) all of the above

Solution: Respiration involves breaking down complex organic substances into simpler ones (A), converting potential energy (stored in chemical bonds) into kinetic energy (usable ATP) (B), and liberating energy (C). All descriptions apply.

14. Krebs's cycle takes place in:

Answer: (A) mitochondria

Solution: The Krebs cycle (citric acid cycle) occurs in the mitochondrial matrix, where Acetyl Co-A is oxidized to produce energy. Chloroplasts, ribosomes, and endoplasmic reticulum are not involved.

15. Respiration takes place:

Answer: (B) in all the living cells of the plants

Solution: Respiration occurs in all living plant cells to provide energy for metabolic processes, not just in green parts, dead cells, or above-soil parts.

16. Evolution of CO₂ is more than intake of oxygen when:

Answer: (D) organic acids are respired

Solution: When organic acids (e.g., malic acid) are respired, they release more CO₂ relative to O₂ consumed due to their high oxygen content, leading to a higher respiratory quotient (RQ > 1).

17. Respiratory structures in the insects are -

Answer: (D) Trachea

Solution: Insects have a tracheal system, a network of tubes that deliver oxygen directly to tissues. Gills, skin, and lungs are not used for respiration in insects.

18. The narrowest and most numerous tubes of lungs are termed as -

Answer: (C) Alveoli

Solution: Alveoli are the smallest, most numerous structures in mammalian lungs, where gas exchange occurs. Bronchi and bronchioles are larger and less numerous.

19. A normal man respire in a minute -

Answer: (B) 14-18 times

Solution: The normal respiratory rate for a healthy adult at rest is approximately 14–18 breaths per minute.

20. In anaerobic respiration -

Answer: (B) CO₂ is given out

Solution: Anaerobic respiration (e.g., fermentation) produces CO₂ as a byproduct (e.g., in yeast or muscles). Oxygen is neither taken in nor given out, and CO₂ is not taken in.

21. The exchange of gases (O₂ and CO₂) in a mammal takes place in -

Answer: (D) Alveoli

Solution: In mammals, gas exchange occurs in the alveoli, where O₂ enters the blood and CO₂ is expelled. Trachea, bronchi, and bronchioles are conduits, not exchange sites.

22. During inspiration muscles of diaphragm -

Answer: (A) Contracts

Solution: During inspiration, the diaphragm contracts, flattening and increasing the thoracic cavity volume, allowing air to enter the lungs.

23. Expiration involves -

Answer: (A) Relaxation of diaphragm and intercostal muscles

Solution: Expiration is a passive process at rest, involving relaxation of the diaphragm and intercostal muscles, reducing thoracic volume and expelling air.

24.The structure which prevents the entry of food into respiratory tracts is -

Answer: (D) Epiglottis

Solution: The epiglottis is a flap that closes the trachea during swallowing, preventing food from entering the respiratory tract. The pharynx, larynx, and glottis are not primarily responsible for this function.

25.In fever breathing rate -

Answer: (A) Increase

Solution: During fever, metabolic rate increases, raising oxygen demand and causing an increased breathing rate to supply more O₂ and remove CO₂.

26.Mammalian lungs are -

Answer: (C) Spongy

Solution: Mammalian lungs are spongy due to the presence of numerous alveoli, which provide a large surface area for gas exchange. They are not hollow or solid.

27.Haemoglobin is -

Answer: (D) Respiratory pigment

Solution: Haemoglobin is a protein in red blood cells that binds oxygen, facilitating its transport in the blood, making it a respiratory pigment. It is not a vitamin, skin pigment, or general blood carrier.

28.If CO₂ concentration increases in blood then breathing will-

Answer: (A) Increases

Solution: Increased CO₂ in the blood lowers pH, stimulating chemoreceptors in the brain to increase breathing rate to expel excess CO₂ and restore pH balance.

29.In respiration, air passes through -

Answer: (B) Nasal cavity, Pharynx, Larynx, Trachea, Bronchi, Bronchiole, Lungs

Solution: Air follows this path during respiration: enters through the nasal cavity, passes through the pharynx, larynx, trachea, bronchi, bronchioles, and reaches the alveoli in the lungs for gas exchange.

LEARNERS TASK

30. In which of the following animals does respiration occur without a respiratory organ?

Answer: (D) Earthworm

Solution: Earthworms lack specialized respiratory organs such as lungs, gills, or tracheae. They rely on cutaneous respiration, where oxygen diffuses through their moist skin directly into the bloodstream, and carbon dioxide is expelled similarly. Frogs use lungs and skin (but lungs are a respiratory organ), fish use gills, and cockroaches use a tracheal system, all of which are specialized respiratory organs.

31. Rate of respiration is directly affected by -

Answer: (A) CO₂ concentration

Solution: The rate of respiration (breathing) is primarily regulated by the concentration of carbon dioxide (CO₂) in the blood. Elevated CO₂ levels increase blood acidity (lowering pH), which is detected by chemoreceptors in the medulla oblongata and blood vessels. This triggers an increase in breathing rate to expel CO₂. While low oxygen levels can also influence respiration, CO₂ concentration is the primary driver under normal physiological conditions.

32. The maximum bonding of haemoglobin is with -

Answer: (A) Carbon monoxide

Solution: Haemoglobin, the oxygen-carrying protein in red blood cells, has the highest affinity for carbon monoxide (CO), binding to it approximately 200-250 times more strongly than oxygen. This strong binding is why CO poisoning is life-threatening, as it prevents haemoglobin from transporting oxygen. Haemoglobin also binds oxygen and carbon dioxide, but its affinity for CO is significantly higher

33. Most of the carbon dioxide is carried in the blood as -

Answer: (A) Bicarbonates

Solution: Approximately 70-80% of carbon dioxide (CO₂) in the blood is transported as bicarbonate ions (HCO₃⁻). In red blood cells, CO₂ reacts with water, catalyzed by carbonic anhydrase, to form carbonic acid (H₂CO₃), which quickly dissociates into bicarbonate and hydrogen ions. Bicarbonate is then transported in the plasma to the lungs, where it is converted back to CO₂ for exhalation. Carbon monoxide is not a form of CO₂ transport, and only small amounts of CO₂ are carried as carbonic acid or bound to haemoglobin.

34. The exchange of gases between the external air and the blood occurs in the

Answer: (D) Alveoli

Solution: Gas exchange in the lungs occurs in the alveoli, small air sacs with thin walls surrounded by capillaries. Oxygen from inhaled air diffuses across the alveolar membrane into the blood, while carbon dioxide diffuses from the blood into the alveoli to be exhaled. The bronchus, bronchiole, and trachea are part of the conducting zone of the respiratory system, which directs air to the alveoli but does not participate in gas exchange.

35. Anaerobic respiration is likely to occur in -

Answer: (D) Tapeworms

Solution: Tapeworms, being parasitic flatworms living in the oxygen-poor environment of a host's intestines, rely on anaerobic respiration to produce energy. They break down glucose without oxygen, often producing lactic acid or ethanol as byproducts. Ants, earthworms, and echinoderms typically have access to oxygen and use aerobic respiration, as they possess mechanisms (tracheae, skin, or gills) to facilitate oxygen uptake.

36. In human lungs, the lobes are -

Answer: (A) 2 in left and 3 in right lungs

Solution: The human right lung has three lobes (superior, middle, and inferior), while the left lung has two lobes (superior and inferior) to accommodate the heart's

position in the thoracic cavity. This anatomical arrangement is standard in humans.

37. Oxygen is transported in vertebrates as -

Answer: (B) Combined with haemoglobin

Solution: In vertebrates, approximately 97-98% of oxygen is transported in the blood bound to haemoglobin, a protein within red blood cells (erythrocytes). Haemoglobin binds oxygen in the lungs and releases it in tissues. Only a small fraction (1-2%) of oxygen is dissolved in plasma, and “absorbed over the RBC” is not a standard term. The cytoplasm of erythrocytes contains haemoglobin, so option (C) is less accurate than

38. Respiration is controlled by -

Answer: (C) Medulla oblongata

Solution: The medulla oblongata, located in the brainstem, contains the respiratory center that regulates breathing by monitoring blood CO₂, O₂, and pH levels. It adjusts the rate and depth of breathing accordingly. The cerebrum is involved in higher functions like thinking, the cerebellum coordinates movement, and the olfactory lobe processes smell, none of which control respiration.

39. Respiration by lungs is called as -

Answer: (A) Pulmonary respiration

Solution: Respiration that occurs through the lungs, involving gas exchange in the alveoli, is called pulmonary respiration. Cutaneous respiration refers to gas exchange through the skin (e.g., in earthworms or frogs). “Cutical respiration” is not a standard term (likely a typo for cutaneous), and “bronchial respiration” is not a recognized process.

40. During expiration, the diaphragm becomes

Answer: (D) Dome-shaped

Solution: During expiration, the diaphragm relaxes and moves upward, returning to its dome-shaped resting position. This reduces the volume of the thoracic cavity, forcing air out of the lungs. During inspiration, the diaphragm contracts and flattens to increase thoracic volume. “Normal” and “oblique” are not precise terms for diaphragm shape in this context.

41. In the human body, blood is oxygenated and purified in the -

Answer: (D) Lungs

Solution: The lungs are the site where blood is oxygenated through gas exchange in the alveoli, where oxygen diffuses into the blood and carbon dioxide is removed. This process is often referred to as “purifying” the blood by replenishing oxygen and removing CO₂. The heart pumps blood, the liver processes nutrients and toxins, and the kidneys filter waste, but none oxygenate the blood.

42. In mammals, the body cavity is partitioned into thoracic and abdominal parts by -

Answer: (D) Diaphragm

Solution: The diaphragm is a muscular sheet that separates the thoracic cavity (containing the heart and lungs) from the abdominal cavity (containing organs like the liver, stomach, and intestines) in mammals. This division allows independent movement and function of thoracic and abdominal organs. Ribs form the thoracic cage but do not partition the cavities.

43. Which function is not performed by lungs?

Answer: (D) Removal of nitrogenous waste

Solution: The lungs eliminate carbon dioxide and provide oxygen through gas exchange in the alveoli, contributing to blood “purification” by oxygenating it and removing CO₂. However, the removal of nitrogenous waste (e.g., urea, ammonia) is a function of the kidneys via urine formation, not the lungs.

44. The end product of anaerobic respiration is -

Answer: (D) A and C both

Solution: Anaerobic respiration, which occurs without oxygen, produces different end products depending on the organism. In yeast and some microorganisms, alcoholic fermentation produces carbon dioxide (CO₂) and ethyl alcohol (ethanol). In muscle cells, lactic acid is produced, but since lactic acid is not an option, CO₂ and ethyl alcohol (as in fermentation) are correct end products, making (D) the best choice.

45. Amount of which of the following components in air does not change in the process of respiration -

Answer: (C) Nitrogen

Solution: During respiration, oxygen is consumed, and carbon dioxide is produced, altering their concentrations in exhaled air compared to inhaled air. Water vapor levels may vary due to moisture added in the lungs. Nitrogen, which constitutes about 78% of air, is not involved in the respiratory process and remains unchanged in concentration.

46. Which one of the following alternatives is correct?

Answer: (A) a is true, b is false

Solution:

True: Aerobic respiration requires oxygen to break down glucose, producing energy, CO₂, and water.

False: Water is essential for photosynthesis, as it is split to provide electrons and hydrogen ions, releasing oxygen as a byproduct.

True: Gymnosperms (e.g., pines) are vascular plants that produce seeds but not fruits, as their seeds are not enclosed in an ovary (unlike angiosperms).

False: Root hairs increase surface area for absorption of water and nutrients, but gas exchange in plants occurs primarily in leaves via stomata, not roots.

Thus, option (A) is correct because statement (a) is true, and (b) is false.

47. Glottis is a passage for -

Answer: (B) Air

Solution: The glottis is the opening between the vocal cords in the larynx, serving as a passage for air to enter the trachea during breathing. The epiglottis prevents food

from entering the glottis by covering it during swallowing, directing food to the esophagus. Thus, the glottis is exclusively for air.

48. The common phase between aerobic and anaerobic respiration is called -

Answer: (A) Glycolysis

Solution: Glycolysis is the first stage of both aerobic and anaerobic respiration, occurring in the cytoplasm. It breaks down glucose into pyruvate, producing ATP and NADH. In aerobic respiration, pyruvate enters the Krebs cycle (also called the tricarboxylic acid cycle) in the mitochondria, but in anaerobic respiration, pyruvate is fermented (e.g., into lactic acid or ethanol). Thus, glycolysis is the common phase.

49. Breathing rate in man is controlled by a part of the brain called -

Answer: (C) Medulla oblongata

Solution: The medulla oblongata, located in the brainstem, contains the respiratory center that controls the rate and depth of breathing by responding to changes in blood CO₂, O₂, and pH levels. The thalamus relays sensory information, the hypothalamus regulates homeostasis (e.g., temperature), and the cerebellum coordinates movement, none of which directly control breathing.