

MHT CET 2024 Biology Answer Key PDF

Answer Key

Biology

Question 1 Correct Answer – (a) Phenylalanine hydroxylase (PAH)

Explanation: Phenylketonuria (PKU) is an autosomal recessive metabolic disorder caused by a deficiency of the hepatic enzyme phenylalanine hydroxylase (PAH), which catalyzes the conversion of phenylalanine to tyrosine.

Question 2 Correct Answer – (b) Dura mater, Arachnoid, Pia mater

Explanation: The cranial meninges are composed of three protective membranes. From the outermost layer to the innermost layer, they are the tough Dura mater, the middle web-like Arachnoid mater, and the thin, delicate Pia mater.

Question 3 Correct Answer – (b) Cholecystokinin (CCK) and secretin

Explanation: Secretin acts on the exocrine pancreas to stimulate the secretion of water and bicarbonate ions, while cholecystokinin (CCK) stimulates the secretion of pancreatic enzymes.

Question 4 Correct Answer – (c) Menstruation, Follicular phase, Ovulation, Luteal phase

Explanation: The standard chronological sequence of the phases in a menstrual cycle is the menstrual phase (menstruation), followed by the follicular (proliferative) phase, the ovulatory phase (ovulation), and the luteal (secretory) phase.

Question 5 Correct Answer – (c) Oxygen (O_2)

Explanation: In aerobic respiration, molecular oxygen (O_2) acts as the terminal (last) electron acceptor at the end of the electron transport system, combining with protons to form water.

Question 6 Correct Answer – (b) Cytokinin

Explanation: Apical dominance is promoted by auxin synthesized in the shoot apex. Cytokinins act antagonistically to auxins by promoting lateral bud growth, thereby reversing apical dominance.

Question 7 Correct Answer – (d) Microspore mother cell

Explanation: The female gametophyte (embryo sac) develops from the functional megaspore, which is derived from the megaspore mother cell. The microspore mother cell gives rise to pollen grains (male gametophyte).

Question 8 Correct Answer – (a) Glycolysis

Explanation: In glycolysis, inorganic phosphate (P_i) is directly used in the energy-payoff phase during the conversion of glyceraldehyde-3-phosphate to 1,3-bisphosphoglycerate, catalyzed by glyceraldehyde-3-phosphate dehydrogenase.

Physics

Question 1 Correct Answer – (a) $3^{1/4}\pi^{1/2}r$

Explanation: According to Torricelli's theorem, the velocities of efflux are $v_A = \sqrt{2gh}$ and $v_B = \sqrt{6gh}$. Equating the flow rates $Q_A = Q_B \Rightarrow L^2\sqrt{2gh} = \pi r^2\sqrt{6gh}$ gives $L^2 = \sqrt{3}\pi r^2$, yielding $L = 3^{1/4}\pi^{1/2}r$.

Question 2 Correct Answer – (b) 747.9 J

Explanation: At STP, 1 mole of an ideal gas occupies 22.4 L, so $n = \frac{67.2}{22.4} = 3$ moles. Since the volume is constant, the heat needed is

$$Q = nC_v\Delta T = 3 \times \frac{3}{2}(8.31 \text{ J/mol} \cdot \text{K}) \times 20 \text{ K} = 747.9 \text{ J}.$$

Chemistry

Question 1 Correct Answer – (c) $\text{CO}_2 < \text{O}_2 < \text{CO}$

Explanation: Hemoglobin possesses an exceptionally high binding affinity for carbon monoxide (CO), which is hundreds of times greater than its affinity for oxygen (O_2). Oxygen, in turn, binds with a significantly higher affinity than carbon dioxide (CO_2).

Question 2 Correct Answer – (b) 19%

Explanation: Let the fractional abundance of the lighter isotope (B-10) be x . Solving the average atomic mass relation $[10x + 11(1-x) = 10.81]$ yields $[11 - x = 10.81 \Rightarrow x = 0.19]$, which corresponds to an abundance of 19%.