MHT CET 2026 Biology Answer Key PDF

Biology

1. **Option (b) a straight line**
Explanation:
On a logarithmic scale, the species-area relationship is represented as a straight line described by the equation $\log S = \log C + Z \log A$. This linear relationship was first described by Alexander von Humboldt.

2. **Option (a) Natural selection**
Explanation:
Industrial melanism observed in the peppered moth (*Biston betularia*) in England is a classic demonstration of natural selection, where directional selection favored darker moths due to industrial soot.

3. **Option (d) All i, ii, iii, and iv**
Explanation:
All listed statements accurately describe eukaryotic DNA packaging, including the formation of the nucleosome, the composition of the histone octamer, the base-pair length, and the higher-level solenoid chromatin organization requiring non-histone proteins.

4. **Option (b) i, iii, and iv only**
Explanation:
Statement ii is incorrect because in hypohydrophily, pollination occurs below the water surface, meaning the pollen grains must have the same specific gravity as water to stay submerged, rather than floating.

5. **Option (c) Clones**
Explanation:
Clones refer to a group of genetically identical individuals derived from a single parent organism through asexual reproduction, preserving the exact genetic blueprint of the parent.

6. **Option (d) Tapetum**
Explanation:
The tapetum is the innermost cellular layer of the microsporangium wall that surrounds the sporogenous tissue. It plays a critical role in nourishing the developing pollen grains.

7. **Option (c) Apospory**
Explanation:
Apospory is a form of apomixis where a diploid gametophyte develops directly from somatic cells of the sporophyte (such as the nucellus or integuments) without undergoing meiosis.

8. **Option (a) P-2, Q-1, R-2, S-1**
Explanation:
Strong linkage corresponds to a low recombination frequency (1.3%), as seen in genes for yellow body and white eye, whereas weak linkage displays a high recombination frequency (37.2%), as seen in genes for white body and miniature wing.

9. **Option (b) Monosporic**
Explanation:

Monosporic development refers to the formation of an embryo sac from a single functional megaspore, which undergoes three successive mitotic divisions to form a mature 8-nucleate, 7-celled gametophyte.

10. **Option (d) Test cross**
Explanation:
A test cross is a specific type of back cross where an F_1 individual of unknown genotype or heterozygous nature is crossed with a homozygous recessive parent to determine its genotype.

11. **Option (a) P-2, Q-4, R-1, S-3**
Explanation:
Auxin is chemically derived from tryptophan; gibberellin is a cyclic diterpene; ethylene is a simple gaseous hydrocarbon; and abscisic acid is a 15-carbon sesquiterpenoid.

12. **Option (c) Imbibition**
Explanation:
Imbibition is the adsorption of water by hydrophilic solid particles or colloids, such as fine soil particles or dry seeds, causing them to swell without forming a solution.

Chemistry

13. **Option (c) 3**
Explanation:
Hydrochloric acid is a strong monoprotic acid that dissociates completely in water. Thus, $[H^+] = 0.001\ M = 10^{-3}\ M$, yielding $pH = -\log_{10}(10^{-3}) = 3$.

14. **Option (d) NO_2^-**
Explanation:
An ambidentate ligand contains more than one donor atom but coordinates to the central metal ion through only one atom at a time. The nitrite ion (NO_2^-) can bond via nitrogen or oxygen.

15. **Option (a) 1.5×10^{-5} C**
Explanation:
The torque on a dipole is given by $\tau = q \cdot (2a)E\sin\theta$. Substituting $0.03\ \text{Nm} = q \cdot (0.02\ \text{m}) \cdot (2 \times 10^5\ \text{N/C}) \cdot \sin(30^\circ)$ yields the charge $q = 1.5 \times 10^{-5}$ C.

16. **Option (b) 164 g mol^{-1}**
Explanation:
Using the osmotic pressure equation $\pi = \frac{wRT}{MV}$, we substitute the given values $0.6 = \frac{8 \times 0.082 \times 300}{M \times 2}$ to calculate the molar mass $M = 164\ \text{g mol}^{-1}$.

17. **Option (d) $-2RT$**
Explanation:
The relationship is given by $\Delta H - \Delta U = \Delta n_g RT$. For the reaction, the change in gaseous moles is $\Delta n_g = 1\ (\text{g}) - 3\ (\text{g}) = -2$, which gives $-2RT$.

18. **Option (a) 3.01×10^{12}**
Explanation:
At NTP, 1 mole of gas occupies 22400 cm^3. The number of moles is $\frac{1.12 \times 10^{-7}}{22400} = 5 \times 10^{-12}$ mol, which corresponds to $5 \times 10^{-12} \times 6.02 \times 10^{23} = 3.01 \times 10^{12}$ molecules.

19. **Option (c) 91 nm**
Explanation:
The wavelength is given by $\frac{1}{\lambda} = R\left(\frac{1}{1^2} - \frac{1}{\infty^2}\right) = R$. Thus, the emitted wavelength is $\lambda = \frac{1}{1.097 \times 10^7\ \text{m}^{-1}} \approx 91.1 \times 10^{-9}\ \text{m} = 91\ \text{nm}$.

20. **Option (d) 4, 0**
Explanation:
In the resonance hybrid of the nitrate ion (NO_3^-), the central nitrogen atom forms four covalent bonds (one double bond and two single bonds) and has zero lone pairs of electrons in its valence shell.

21. **Option (c) $KMnO_4$**
Explanation:
In potassium permanganate ($KMnO_4$), the oxidation state of manganese is +7. This is the maximum possible oxidation state for manganese, compared to +2 in MnO and +4 in MnO_2.

22. **Option (d) their ionisation energies are low**
Explanation:
Alkali metals possess a single electron in their outermost shell and have large atomic radii. Consequently, their ionization energies are very low, allowing them to easily lose electrons and act as powerful reducing agents.

23. **Option (b) $-16°C$**
Explanation:
By Charles's Law, $\frac{V_1}{T_1} = \frac{V_2}{T_2}$ under constant pressure. Substituting the values gives $\frac{3}{308} = \frac{2.5}{T_2} \implies T_2 \approx 256.7$ K, which converted to Celsius is $-16.3°C \approx -16°C$.

Physics

24. **Option (b) $4v$**
Explanation:
When 8 drops of radius r coalesce to form a single drop of radius R, volume conservation yields $R = 2r$. Since terminal velocity is proportional to the square of the radius ($v \propto r^2$), the new terminal velocity is $4v$.

25. **Option (b) $2R/5$**
Explanation:
Equating the linear impulse $J = Mv$ and the angular impulse $Jh = I\omega$ using the rolling condition $v = \omega R$ gives $Mvh = \frac{2}{5}MR^2\left(\frac{v}{R}\right)$, which simplifies to $h = \frac{2}{5}R$ above the center.

26. **Option (a) 15/32 MR^2**
Explanation:
The moment of inertia of the complete disc is $\frac{1}{2}MR^2$. Subtracting the moment of inertia of the removed concentric portion of radius $R/2$ (mass $M/4$) yields $I = \frac{1}{2}MR^2 - \frac{1}{2}\left(\frac{M}{4}\right)\left(\frac{R}{2}\right)^2 = \frac{15}{32}MR^2$.

27. **Option (a) 5/3 W**
Explanation:
The work done for a soap bubble is $8\pi T(R_f^2 - R_i^2)$. Thus, $W = 8\pi T(4R^2 - R^2) = 24\pi TR^2$. For the second expansion, $W' = 8\pi T(9R^2 - 4R^2) = 40\pi TR^2 = \frac{5}{3}W$.

28. **Option (a) 1.75 m of water**
Explanation:
Using Bernoulli's equation for a horizontal pipe, $h_1 + \frac{v_1^2}{2g} = h_2 + \frac{v_2^2}{2g}$. Substituting $2 + \frac{4}{20} = h_2 + \frac{9}{20}$ and solving for the pressure head yields $h_2 = 1.75$ m of water.

29. **Option (a) 4800 K**
Explanation:
The rms velocity is $v = \sqrt{\frac{3RT}{M}}$. For the velocities to be equal, we set $\frac{300}{2} = \frac{T_{O_2}}{32}$, which solves to $T_{O_2} = 4800$ K (equivalent to 4527°C).

30. **Option (b) Positive**
Explanation:
On a $P-V$ diagram, the cyclic process traces a clockwise loop because isothermal expansion moves rightward, and the subsequent adiabatic compression returns leftward along a lower path. Thus, the net work done is positive.

31. **Option (a) Increase**
Explanation:
The efficiency of a Carnot engine is $\eta = 1 - \frac{T_2}{T_1}$. Increasing the source temperature T_1 and decreasing the sink temperature T_2 both decrease the ratio $\frac{T_2}{T_1}$, thereby increasing the engine's efficiency.

32. **Option (c)** $T/12$
Explanation:
Using the displacement equation $x = A\sin(\omega t)$, we set $A/2 = A\sin\left(\frac{2\pi}{T}t\right) \implies \frac{2\pi}{T}t = \frac{\pi}{6}$. Solving for time yields $t = T/12$.

33. **Option (a)** 10.4 **s**
Explanation:
The fractional change in time period is $\frac{\Delta T}{T} = \frac{1}{2}\alpha\Delta\theta$. The time lost per day is $\Delta t = \frac{1}{2}(1.2\times10^{-5})(20)\times 86400 = 10.368$ s ≈ 10.4 s.

34. **Option (b) 340 m/s**
Explanation:
The distance between two consecutive nodes in a standing wave is $\lambda/2$. Thus, $\lambda = 2\times34$ cm $= 0.68$ m. Using the relation $v = f\lambda$, the velocity of sound is $500\times0.68 = 340$ m/s.

35. **Option (a) 680 Hz**
Explanation:
By the Doppler effect formula for an approaching source, the apparent frequency is $f' = f\left(\frac{v}{v-v_s}\right)$. Substituting the values yields $f' = 640\left(\frac{340}{340-20}\right) = 640\left(\frac{340}{320}\right) = 680$ Hz.