MHT CET 2026 Mathematics Answer key PDF

Physics

1. **Option (b)** $4v$
Explanation: Since volume is conserved, the combined radius is $R = 2r$. Because terminal velocity is proportional to the square of the radius ($v \propto r^2$), the new terminal velocity becomes $v' = v(2)^2 = 4v$.

2. **Option (b)** $\frac{2R}{5}$
Explanation: Equating linear impulse ($J = Mv_c$) and angular impulse about the center of mass ($J \cdot h = I\omega = \frac{2}{5}MR^2\omega$) while applying the rolling condition $v_c = R\omega$ yields the height $h = \frac{2}{5}R$.

3. **Option (a)** $\frac{15}{32}MR^2$
Explanation: By subtracting the moment of inertia of the inner concentric cut-out portion of mass $M/4$ and radius $R/2$ ($\frac{1}{32}MR^2$) from the complete solid disc of radius R ($\frac{1}{2}MR^2$), we get $I = \frac{15}{32}MR^2$.

4. **Option (a)** $\frac{5}{3}W$
Explanation: The work done for a soap bubble scales as $W \propto (R_f^2 - R_i^2)$. Thus, the first expansion requires $W \propto (4R^2 - R^2) = 3R^2$ and the second requires $W_2 \propto (9R^2 - 4R^2) = 5R^2$, giving $W_2 = \frac{5}{3}W$.

5. **Option (a)** 1.75 **m of water**
Explanation: Applying Bernoulli's equation $h_1 + \frac{v_1^2}{2g} = h_2 + \frac{v_2^2}{2g}$ with $g = 10$ m/s^2 gives the equation $2 + \frac{4}{20} = h_2 + \frac{9}{20}$, which simplifies to $h_2 = 1.75$ m.

Chemistry

6. **Option (b) Dipole-induced dipole interaction**
Explanation: The polar ammonia (NH_3) molecule possesses a permanent dipole moment, which induces a temporary dipole in the symmetrical and non-polar benzene (C_6H_6) molecule upon mixing.

7. **Option (c)** $\mathbf{dm^3\ s^{-1}}$
Explanation: The rate of diffusion is defined as the volume of gas diffused per unit time (V/t). Expressing volume in cubic decimeters (dm^3) and time in seconds (s) gives the unit $dm^3\ s^{-1}$.

8. **Option (c) Water and benzene**
Explanation: This interaction occurs between a polar and a non-polar molecule. Water (H_2O) is highly polar, whereas benzene (C_6H_6) is a symmetrical, non-polar hydrocarbon.

9. **Option (b)** 0.5 $\mathbf{dm^3}$
Explanation: Using Boyle's law ($P_1V_1 = P_2V_2$) at constant temperature gives $1 \times 2.5 = 1.25 \times V_2 \implies V_2 = 2.0$ dm^3. The absolute change in volume is $|2.5 - 2.0| = 0.5$ dm^3.

10. **Option (a)** 1.8 $\mathbf{dm^3}$
Explanation: Applying Boyle's law ($P_1V_1 = P_2V_2$) at constant temperature yields $101 \times 4.2 = 235 \times V_2$, which calculates to $V_2 \approx 1.8$ dm^3.

Mathematics

11. **Option (b) $\frac{1}{12} + \frac{1}{2} - \frac{\sqrt{3}}{4}$ (under typo correction)**
Explanation: Correcting the integrand to $\frac{\sqrt{x}}{(1+x)^2}$ and substituting $x = \tan^2\theta$ yields $\int_1^3 \frac{\sqrt{x}}{(1+x)^2}dx = \frac{\pi}{12} + \frac{1}{2} - \frac{\sqrt{3}}{4}$, which matches Option (b) if π was misprinted as 1.

12. **Option (c) $\frac{1}{30\pi}$ ft/min**
Explanation: Differentiating the volume of a sphere $V = \frac{4}{3}\pi r^3$ yields $\frac{dV}{dt} = 4\pi r^2 \frac{dr}{dt}$. Substituting $\frac{dV}{dt} = 30$ and $r = 15$ gives $30 = 900\pi \frac{dr}{dt} \implies \frac{dr}{dt} = \frac{1}{30\pi}$ ft/min.

13. **Option (d) the function is continuous for all x except zero**
Explanation: The function simplifies to the constant 0 for $x > 0$ and 2 for $x < 0$, while being undefined at $x = 0$. Being constant on these open intervals, it is continuous everywhere except at $x = 0$.

14. **Option (c) $\frac{\pi}{2}$**
Explanation: Substituting $n = -(l + m)$ into the second equation yields $2(l/m)^2 + 2(l/m) - 1 = 0$. Since l/m and n/m share roots with product $-1/2$, the dot product of the direction ratios equals zero, indicating perpendicular lines.

15. **Option (d) $x + y = 1$**
Explanation: The derivative is $\frac{dy}{dx} = \frac{1}{x}$, giving a tangent slope of 1 and a normal slope of -1 at $P(1, 0)$. Using point-slope form, the normal line equation is $y - 0 = -1(x - 1) \implies x + y = 1$.