

MHT CET 2026 Mathematics Answer key PDF

Mathematics

1. Option (c) 12

Explanation: The formula for the number of diagonals of an n -sided polygon is $d = \frac{n(n-3)}{2}$. Substituting $d = 54$ yields $108 = n(n-3)$, which has the positive integer solution $n = 12$.

2. Option (a) $-\csc^2 y \cot y$

Explanation: From $y = \cos^{-1} x$, we get $x = \cos y$. Differentiating with respect to x gives $\frac{dy}{dx} = -\csc y$, and a second differentiation gives $\frac{d^2y}{dx^2} = -\csc y \cot y \cdot \frac{dy}{dx} = -\csc^2 y \cot y$.

3. Option (b) $\begin{bmatrix} -1/6 & 5/6 \\ 1/3 & -2/3 \end{bmatrix}$

Explanation: The determinant is $|A| = 4(1) - 5(2) = -6$, and the adjugate is $\begin{bmatrix} 1 & -5 \\ -2 & 4 \end{bmatrix}$. The inverse is $A^{-1} = \frac{1}{|A|} \text{adj } A = \begin{bmatrix} -1/6 & 5/6 \\ 1/3 & -2/3 \end{bmatrix}$.

4. Option (a) -2

Explanation: Applying integration by parts repeatedly yields $\int x^3 e^x dx = e^x(x^3 - 3x^2 + 6x - 6) + C$. Comparing coefficients gives $p = 1$, $q = -3$, $r = 6$, and $s = -6$, so $p + q + r + s = -2$.

5. Option (a) $\frac{13}{\sqrt{21}}$

Explanation: The distance is given by $D = \frac{|\vec{a} \cdot \vec{n} - d|}{|\vec{n}|}$. Substituting $\vec{a} = 2\hat{i} + \hat{j} - \hat{k}$, $\vec{n} = \hat{i} - 2\hat{j} + 4\hat{k}$, and $d = 9$ gives $D = \frac{|2-2-4-9|}{\sqrt{1+4+16}} = \frac{13}{\sqrt{21}}$.

6. Option (c) 9

Explanation: Using the standard vector identity $[\vec{a} \times \vec{b} \quad \vec{b} \times \vec{c} \quad \vec{c} \times \vec{a}] = [\vec{a} \quad \vec{b} \quad \vec{c}]^2$, substituting the given scalar triple product value of 3 yields $3^2 = 9$.

7. Option (b) $-\frac{1}{4} \cos[\tan^{-1}(x^4)] + C$

Explanation: Substituting $t = \tan^{-1}(x^4)$ yields $dt = \frac{4x^3}{1+x^8} dx$. The integral becomes $\frac{1}{4} \int \sin t dt = -\frac{1}{4} \cos t + C = -\frac{1}{4} \cos[\tan^{-1}(x^4)] + C$.

8. Option (b)

Explanation: Using the matrix property $A \text{adj } A = |A|I$, we evaluate $|A| = 8$. Thus, $A(I + \text{adj } A) =$

$$A + |A|I = \begin{bmatrix} 1 & -2 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix} + \begin{bmatrix} 8 & 0 & 0 \\ 0 & 8 & 0 \\ 0 & 0 & 8 \end{bmatrix} = \begin{bmatrix} 9 & -2 & 2 \\ 0 & 10 & -3 \\ 3 & -2 & 12 \end{bmatrix}.$$

9. Option (b) $e^x \sin x + C$

Explanation: This follows the standard integration form $\int e^x(f(x) + f'(x))dx = e^x f(x) + C$. Substituting $f(x) = \sin x$ and $f'(x) = \cos x$ directly yields $e^x \sin x + C$.

10. Option (b) $3/4$

Explanation: Since $A + B = \pi/3$, substituting symmetric angles $A = B = \pi/6$ into the given expression yields $\cos^2(\pi/6) + \cos^2(\pi/6) - \cos(\pi/6)\cos(\pi/6) = (\sqrt{3}/2)^2 = 3/4$.

Chemistry

11. **Option (c) IF₃**

Explanation: Monochlorine fluoride (ClF), bromine monofluoride (BrF), and chlorine trifluoride (ClF₃) exist as gases at 25°C, whereas iodine trifluoride (IF₃) is an unstable solid.

12. **Option (b) 120 g mol⁻¹**

Explanation: Using the formula for osmotic pressure $\pi = \frac{wRT}{M_w V}$, we substitute the given values: $0.82 = \frac{2 \times 0.082 \times 300}{M_w \times 0.5}$. Solving for the molar mass gives $M_w = 120 \text{ g mol}^{-1}$.

13. **Option (c) +6**

Explanation: Marshall's acid (H₂S₂O₈) contains a peroxide linkage (O – O). Writing the equation with oxidation states gives $2(+1) + 2x + 6(-2) + 2(-1) = 0$, which yields $x = +6$.

14. **Option (b) Methyl salicylate**

Explanation: Oil of wintergreen is an organic ester naturally produced by many species of plants, and it is chemically known as methyl salicylate.

15. **Option (d) Chlorine**

Explanation: Group 16 elements (the chalcogens) include oxygen, sulfur, selenium, tellurium, and polonium. Chlorine is a halogen and belongs to Group 17 of the periodic table.