

# MHT CET 2026 Mathematics Answer Key PDF

## Mathematics

1. **Option (A)**  $-288$

**Explanation:**

Using the chain rule, we can express the derivative of  $g(x) = (f[4(h(x)) + 3])^2$  as  $g'(x) = 8(4h(x) + 2)h'(x)$ . Substituting the given values  $h(1) = 4$  and  $h'(1) = -2$  yields  $g'(1) = 8(18)(-2) = -288$ .

2. **Option (A)**  $\pi$

**Explanation:**

The given equation represents the upper half of the ellipse  $\frac{x^2}{1} + \frac{y^2}{4} = 1$  with semi-minor axis  $a = 1$  and semi-major axis  $b = 2$ . The area bounded by this curve and the x-axis is half of the total area of the ellipse, which is  $\frac{1}{2}(\pi \times 1 \times 2) = \pi$ .

3. **Option (C)** 9

**Explanation:**

By plotting the constraints, the feasible region has corner points at  $(1, 0)$ ,  $(10, 0)$ ,  $(0, 5)$ , and  $(0, 1)$ . Evaluating  $Z = 3x + 5y$  at these points gives a maximum value of 30 and a minimum of 3, so  $3a = 30 - 3 = 27$ , which yields  $a = 9$ .

4. **Option (C)** 60 minutes

**Explanation:**

According to Newton's Law of Cooling, the rate of temperature change is proportional to the difference with the surroundings. Solving the differential equation with the initial cooling stage gives the cooling constant  $k$ , which indicates it takes 60 minutes to reach  $30^\circ\text{C}$ .

5. **Option (C)** 8

**Explanation:**

For the parabola  $y^2 = 16x$ , the parameter is  $a = 4$ . Since the focus is located at  $(a, 0) = (4, 0)$  and the directrix is the line  $x = -a = -4$ , the distance between them is  $2a = 8$ .

6. **Option (A)**  $(2, 1, -1)$

**Explanation:**

The two vector equations represent straight lines that can be expressed as  $\vec{r} = \vec{b} + \lambda\vec{a}$  and  $\vec{r} = \vec{a} + \mu\vec{b}$ . Setting them equal and using the linear independence of  $\vec{a}$  and  $\vec{b}$  gives the intersection point  $\vec{a} + \vec{b} = 2\hat{i} + \hat{j} - \hat{k}$ .

7. **Option (D)**  $p \leftrightarrow \neg q$

**Explanation:**

The negation of a biconditional statement  $\neg(p \leftrightarrow q)$  is logically equivalent to a biconditional where only one statement is negated. Constructing a truth table confirms that  $\neg(p \leftrightarrow q)$  has the exact same truth values as  $p \leftrightarrow \neg q$ .

8. **Option (D)**  $\pi/3$

**Explanation:**

For the matrix  $A$ , we find  $\text{adj}A$  by swapping diagonal elements and changing signs of off-diagonal elements, yielding  $A + \text{adj}A = 2\sec\theta I$ . Since  $2\sec\theta I = 4I$ , we get  $\sec\theta = 2$ , which gives  $\theta = \pi/3$  in the first quadrant.

9. **Option (A)**  $\frac{2}{\sqrt{5}}$

**Explanation:**

Since  $h(x) = 2x - 3$ , its derivative  $h'(x) = 2$  is constant, making the inner term  $h'(g'(x)) = 2$ . Evaluating  $f'(x) = \frac{x}{\sqrt{x^2+1}}$  at  $x = 2$  directly gives  $f'(2) = \frac{2}{\sqrt{5}}$ .

10. **Option (A)**  $\ln \left| \frac{xe^x}{1+xe^x} \right| + \frac{1}{1+xe^x} + C$

**Explanation:**

Substituting  $u = xe^x$  with  $du = e^x(x+1)dx$  transforms the given integral into the simplified form  $\int \frac{du}{u(1+u)^2}$ . Integrating this using partial fraction decomposition and substituting  $u$  back yields the required expression.

prepp  
Your Personal Exam Guide