

# GUJCET-ME 2026 Mathematics Question Paper (Memory-Based Questions) with Solutions Pdf

Time Allowed :1 Hours	Maximum Marks :40	Total Questions :40
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## General Instructions

Read the following instructions very carefully and strictly follow them:

- The Mathematics test consists of 40 questions. Each question carries 1 mark. For each correct response, the candidate will get 1 mark. For each incorrect response,  $\frac{1}{4}$  mark will be deducted. The maximum marks are 40.
- This Test is of 1 hour duration.
- Use Black Ball Point Pen only for writing particulars on OMR Answer Sheet and marking answers by darkening the circle “●”.
- Rough work is to be done on the space provided for this purpose in the Test Booklet only.
- On completion of the test, the candidate must handover the Answer Sheet to the Invigilator in the Room / Hall. The candidates are allowed to take away this Test Booklet with them.
- The Set No. for this Booklet is **03**. Make sure that the Set No. printed on the Answer Sheet is the same as that on this Booklet. In case of discrepancy, the candidate should immediately report the matter to the Invigilator for replacement of both the Test Booklet and the Answer Sheet.
- The candidate should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet.
- Do not write your Seat No. anywhere else, except in the specified space in the Test Booklet / Answer Sheet.
- Use of White fluid for correction is not permissible on the Answer Sheet.
- Each candidate must show on demand his/her Admission Card to the Invigilator.
- No candidate, without special permission of the Superintendent or Invigilator, should leave his/her seat.
- Use of Simple (Manual) Calculator is permissible.

## Mathematics

1. If  $f(x) = x^2 + 3x$ , then  $f'(x)$  is:

- (a)  $2x + 3$
- (b)  $x + 3$
- (c)  $2x$
- (d)  $x^2$

**Correct Answer:** (a)  $2x + 3$

**Solution:**

**Step 1: Understanding the Concept:**

To find the derivative  $f'(x)$ , we use the power rule of differentiation:  $\frac{d}{dx}(x^n) = nx^{n-1}$ .

**Step 2: Detailed Explanation:**

Apply the rule to each term of the function  $f(x) = x^2 + 3x$ :

- For  $x^2$ : The derivative is  $2x^{2-1} = 2x$ .
- For  $3x$ : The derivative is  $3x^{1-1} = 3(1) = 3$ .

Combining these, we get  $f'(x) = 2x + 3$ .

**Step 3: Final Answer:**

The correct option is (a).

#### Quick Tip

The derivative of any linear term  $ax$  is simply the coefficient  $a$ . The derivative of a constant is always 0.

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**2. The derivative of  $\sin x$  is:**

- (a)  $\cos x$
- (b)  $-\cos x$
- (c)  $-\sin x$
- (d)  $\tan x$

**Correct Answer:** (a)  $\cos x$

**Solution:**

**Step 1: Understanding the Concept:**

Standard trigonometric derivatives are fundamental formulas in calculus. The derivative represents the rate of change or the slope of the tangent to the curve at any point.

**Step 2: Detailed Explanation:**

By using the first principle of derivatives or standard limits:

$$\frac{d}{dx}(\sin x) = \cos x$$

**Step 3: Final Answer:**

The correct option is (a).

**Quick Tip**

A helpful mnemonic: Derivatives of "Co-" functions (Cosine, Cotangent, Cosecant) always start with a **negative** sign. Since Sine is not a "Co-" function, its derivative is positive.

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**3. Evaluate:**  $\int x \, dx$

- (a)  $x$
- (b)  $\frac{x^2}{2} + C$
- (c)  $\ln x$
- (d)  $x^2 + C$

**Correct Answer:** (b)  $\frac{x^2}{2} + C$

**Solution:**

**Step 1: Understanding the Concept:**

Integration is the reverse process of differentiation. For a power function  $x^n$ , the power rule for integration is:  $\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$  (where  $n \neq -1$ ).

**Step 2: Detailed Explanation:**

In this question,  $x$  can be written as  $x^1$ . Applying the rule:

$$\int x^1 \, dx = \frac{x^{1+1}}{1+1} + C = \frac{x^2}{2} + C$$

**Step 3: Final Answer:**

The correct option is (b).

**Quick Tip**

Never forget to add the constant of integration ( $+C$ ) for indefinite integrals! It represents any constant that might have disappeared during differentiation.

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**4. If a function is increasing, then its derivative is:**

- (a) Negative
- (b) Zero
- (c) Positive
- (d) Undefined

**Correct Answer:** (c) Positive

**Solution:**

**Step 1: Understanding the Concept:**

The derivative  $f'(x)$  represents the slope of the function. The sign of the slope tells us the behavior of the function (increasing or decreasing).

**Step 2: Detailed Explanation:**

- If  $f'(x) > 0$ , the slope is "upward," meaning the function is **increasing**.
- If  $f'(x) < 0$ , the slope is "downward," meaning the function is **decreasing**.
- If  $f'(x) = 0$ , the function is at a stationary point (like a peak or valley).

**Step 3: Final Answer:**

The correct option is (c).

#### Quick Tip

Think of the derivative as the "speedometer" of the function's height. If the speed is positive, you are moving up!

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**5. If  $a + b = 5$  and  $ab = 6$ , find  $a^2 + b^2$ :**

- (a) 25
- (b) 13
- (c) 11
- (d) 17

**Correct Answer:** (b) 13

**Solution:**

**Step 1: Understanding the Concept:**

This problem uses the algebraic identity:  $(a + b)^2 = a^2 + b^2 + 2ab$ .

**Step 2: Detailed Explanation:**

1. We know  $(a + b)^2 = a^2 + b^2 + 2ab$ . 2. Substitute the given values ( $a + b = 5$  and  $ab = 6$ ):

$$(5)^2 = a^2 + b^2 + 2(6)$$

$$25 = a^2 + b^2 + 12$$

3. Subtract 12 from both sides:

$$a^2 + b^2 = 25 - 12 = 13$$

**Step 3: Final Answer:**

The correct option is (b).

**Quick Tip**

You can also solve this by finding the numbers. Two numbers that add to 5 and multiply to 6 are 2 and 3. Then,  $2^2 + 3^2 = 4 + 9 = 13$ .

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6. The value of the determinant  $\begin{vmatrix} 1 & 2 \\ 3 & 4 \end{vmatrix}$  is:

- (a) 10
- (b) -2
- (c) 2
- (d) 0

**Correct Answer:** (b) -2

**Solution:****Step 1: Understanding the Concept:**

For a  $2 \times 2$  matrix  $\begin{vmatrix} a & b \\ c & d \end{vmatrix}$ , the determinant is calculated using the formula:  $(a \times d) - (b \times c)$ .

**Step 2: Detailed Explanation:**

In this determinant:  $a = 1, b = 2, c = 3, d = 4$ . Applying the formula:

$$(1 \times 4) - (2 \times 3)$$

$$4 - 6 = -2$$

**Step 3: Final Answer:**

The correct option is (b).

**Quick Tip**

Think of it as "Main diagonal product minus the off-diagonal product." Always be careful with negative signs if the numbers inside are negative!

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7. If  $\log_a b = 2$ , then  $b = ?$

- (a)  $a^2$
- (b)  $2a$
- (c)  $a/2$
- (d)  $\sqrt{a}$

**Correct Answer:** (a)  $a^2$

**Solution:**

**Step 1: Understanding the Concept:**

The definition of a logarithm is the inverse of exponentiation. If  $\log_{\text{base}}(\text{result}) = \text{exponent}$ , then  $\text{base}^{\text{exponent}} = \text{result}$ .

**Step 2: Detailed Explanation:**

Given:  $\log_a b = 2$  The base is  $a$ . The exponent is 2. The result (argument) is  $b$ . Converting to exponential form:  $a^2 = b$ .

**Step 3: Final Answer:**

The correct option is (a).

**Quick Tip**

Just remember: The base of the log stays the base of the power. The number on the other side of the "=" is always the exponent.

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**8. Number of permutations of 5 distinct objects is:**

- (a) 25
- (b) 60
- (c) 120
- (d) 720

**Correct Answer:** (c) 120

**Solution:**

**Step 1: Understanding the Concept:**

A permutation is an arrangement of objects where order matters. For  $n$  distinct objects, the total number of ways to arrange them is given by  $n!$  (n-factorial).

**Step 2: Detailed Explanation:**

Here,  $n = 5$ . Calculation:  $5! = 5 \times 4 \times 3 \times 2 \times 1$ .  $5 \times 4 = 20$   $20 \times 3 = 60$   $60 \times 2 = 120$   $120 \times 1 = 120$

**Step 3: Final Answer:**

The correct option is (c).

**Quick Tip**

Permutations = Arrangements (Order matters). Combinations = Selections (Order doesn't matter). For 5 objects, there is only 1 way to select them all, but 120 ways to arrange them!

9. Distance between points (1,2) and (4,6) is:

- (a) 3
- (b) 4
- (c) 5
- (d) 6

**Correct Answer:** (c) 5

**Solution:**

**Step 1: Understanding the Concept:**

The distance between two points  $(x_1, y_1)$  and  $(x_2, y_2)$  is found using the distance formula:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}.$$

**Step 2: Detailed Explanation:**

Let  $(x_1, y_1) = (1, 2)$  and  $(x_2, y_2) = (4, 6)$ .

$$d = \sqrt{(4 - 1)^2 + (6 - 2)^2}$$

$$d = \sqrt{(3)^2 + (4)^2}$$

$$d = \sqrt{9 + 16} = \sqrt{25}$$

$$d = 5$$

**Step 3: Final Answer:**

The correct option is (c).

#### Quick Tip

This formula is just the Pythagorean theorem in disguise. The distance is the hypotenuse of a right-angled triangle with base 3 and height 4. (3-4-5 is a famous Pythagorean triple).

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10. Equation of line with slope 2 passing through origin:

- (a)  $y = 2x$
- (b)  $x = 2y$
- (c)  $y = x + 2$
- (d)  $y = 2$

**Correct Answer:** (a)  $y = 2x$

**Solution:**

**Step 1: Understanding the Concept:**

The slope-intercept form of a line is  $y = mx + c$ , where  $m$  is the slope and  $c$  is the y-intercept.

**Step 2: Detailed Explanation:**

1. Given slope ( $m$ ) = 2. 2. The line passes through the origin (0,0), which means the y-intercept ( $c$ ) is 0. 3. Substituting these into the formula:  $y = 2x + 0$ . 4. Result:  $y = 2x$ .

**Step 3: Final Answer:**

The correct option is (a).

**Quick Tip**

Any line passing through the origin will never have a constant term added or subtracted (it will always be in the form  $y = mx$ ).

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**11. Direction ratios of x-axis are:**

- (a) (0,1,0)
- (b) (1,0,0)
- (c) (0,0,1)
- (d) (1,1,1)

**Correct Answer:** (b) (1,0,0)

**Solution:**

**Step 1: Understanding the Concept:**

Direction ratios of a line are any three numbers which are proportional to the direction cosines of the line. For the axes, these represent the unit vector components along that specific axis.

**Step 2: Detailed Explanation:**

The x-axis makes an angle of  $0^\circ$  with itself,  $90^\circ$  with the y-axis, and  $90^\circ$  with the z-axis. The direction cosines ( $l, m, n$ ) are:  $l = \cos(0^\circ) = 1$   $m = \cos(90^\circ) = 0$   $n = \cos(90^\circ) = 0$  Any numbers proportional to (1, 0, 0) are direction ratios. The simplest form is (1, 0, 0).

**Step 3: Final Answer:**

The correct option is (b).

**Quick Tip**

To remember: The "1" always stays in the position of the axis named. X-axis is (1,0,0), Y-axis is (0,1,0), and Z-axis is (0,0,1).

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**12. Probability of getting a head in a fair coin toss:**

- (a) 0
- (b) 1

- (c)  $1/2$
- (d) 2

**Correct Answer:** (c)  $1/2$

**Solution:**

**Step 1: Understanding the Concept:**

Probability is defined as the number of favorable outcomes divided by the total number of possible outcomes in the sample space.

**Step 2: Detailed Explanation:**

For a fair coin, the sample space  $S = \{H, T\}$ . Total number of outcomes  $n(S) = 2$ . Event  $E$  of getting a head =  $\{H\}$ . Number of favorable outcomes  $n(E) = 1$ .  $P(E) = \frac{n(E)}{n(S)} = \frac{1}{2}$ .

**Step 3: Final Answer:**

The probability is  $1/2$ .

#### Quick Tip

The sum of probabilities of all elementary events in an experiment is always 1. Here,  $P(H) + P(T) = 0.5 + 0.5 = 1$ .

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**13. Mean of first 5 natural numbers:**

- (a) 2
- (b) 3
- (c) 4
- (d) 5

**Correct Answer:** (b) 3

**Solution:**

**Step 1: Understanding the Concept:**

The Arithmetic Mean (Average) is the sum of all observations divided by the total number of observations.

**Step 2: Detailed Explanation:**

The first 5 natural numbers are: 1, 2, 3, 4, 5. Sum =  $1 + 2 + 3 + 4 + 5 = 15$ . Total count = 5. Mean =  $\frac{15}{5} = 3$ .

**Step 3: Final Answer:**

The mean is 3.

### Quick Tip

For any sequence of numbers with a constant gap (like 1, 2, 3, 4, 5), the mean is always the middle term!

14. Value of  $\sin^2 \theta + \cos^2 \theta$ :

- (a) 0
- (b) 1
- (c) 2
- (d) -1

**Correct Answer:** (b) 1

**Solution:**

**Step 1: Understanding the Concept:**

This is the fundamental Pythagorean identity in trigonometry. It holds true for any real value of the angle  $\theta$ .

**Step 2: Detailed Explanation:**

In a right-angled triangle with sides  $a, b$  and hypotenuse  $c$ :  $\sin \theta = a/c$  and  $\cos \theta = b/c$ .  $\sin^2 \theta + \cos^2 \theta = (a/c)^2 + (b/c)^2 = \frac{a^2+b^2}{c^2}$ . By Pythagoras theorem,  $a^2 + b^2 = c^2$ . So,  $\frac{c^2}{c^2} = 1$ .

**Step 3: Final Answer:**

The value is always 1.

### Quick Tip

No matter how complex the angle is (e.g.,  $\sin^2(5x + 3) + \cos^2(5x + 3)$ ), as long as the angles are identical, the result is always 1.

15. If  $\tan \theta = 1$ , then  $\theta =$ :

- (a)  $30^\circ$
- (b)  $45^\circ$
- (c)  $60^\circ$
- (d)  $90^\circ$

**Correct Answer:** (b)  $45^\circ$

**Solution:**

**Step 1: Understanding the Concept:**

We refer to the standard trigonometric table for values of circular functions at specific angles.

**Step 2: Detailed Explanation:**

The ratio  $\tan \theta$  is defined as  $\frac{\text{Opposite}}{\text{Adjacent}}$ . For an angle of  $45^\circ$ , the opposite and adjacent sides of a right triangle are equal, making the ratio  $1/1 = 1$ . Therefore,  $\tan 45^\circ = 1$ .

**Step 3: Final Answer:**

The value of  $\theta$  is  $45^\circ$ .

**Quick Tip**

At  $45^\circ$ ,  $\sin \theta$  and  $\cos \theta$  are also equal ( $1/\sqrt{2}$ ), which is why their ratio ( $\tan \theta$ ) becomes 1.

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