



# ASSERTION REASON Type Questions

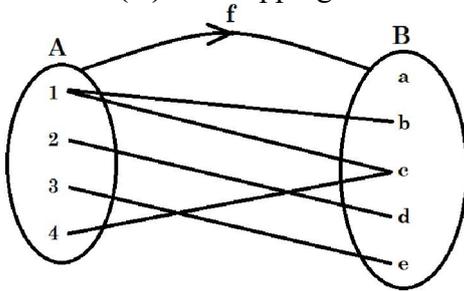
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In the following questions, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct answer out of the following choices.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true and R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

## Unit-I : Sets and Functions

01. **Assertion (A)** : Set  $\{1, 2, 3, 4\}$  and  $\{3, 2, 4, 1\}$  are equal sets.  
**Reason (R)** : Two sets A and B are said to be equal if they have exactly the same elements.
02. **Assertion (A)** : If  $X = \{1, 2, 3\}$ ,  $Y = \{4, 5, 6\}$ , then  $X \cup Y = \{1, 2, 3, 4, 5, 6\}$ .  
**Reason (R)** :  $P \cap Q = \{x : x \in P \text{ and } x \in Q\}$ .
09. **Assertion (A)** : A mapping shown in the following figure is not a function.



**Reason (R)** : A relation  $f$  from a set of A to a set B is said to be a function if every element of set A has one and only one image in B.

13. **Assertion (A)** :  $\sin(-390^\circ) = -\frac{1}{2}$ .  
**Reason (R)** :  $\tan 2x = \frac{2 \tan x}{1 + \tan^2 x}$ .
25. **Assertion (A)** : For  $\left[-\pi, -\frac{\pi}{2}\right)$ , the length of the interval is  $\frac{\pi}{2}$ .  
**Reason (R)** : The number  $(b - a)$  is called the *length* of any of the intervals  $(a, b)$ ,  $[a, b]$ ,  $[a, b)$  or  $(a, b]$ .
36. **Assertion (A)** :  $\sin 2025\pi = 0$ .  
**Reason (R)** :  $\sin(n\pi) = 0, n \in \mathbb{Z}$ .

## Unit-II : Algebra

01. **Assertion (A)** : For  $z = 3 - i\sqrt{2}$ ,  $|z| = \sqrt{11}$ .  
**Reason (R)** :  $|z| = \sqrt{x^2 + y^2}$ , if  $z = x + iy$ .
04. **Assertion (A)** : For  $2(2x + 3) - 10 \leq 6(x - 2)$ ,  $x \in [4, \infty)$ .  
**Reason (R)** : For  $-5 \leq \frac{2 - 3x}{4} \leq 9$ ,  $x \in \left[-\frac{34}{3}, \frac{22}{3}\right]$ .
06. **Assertion (A)** :  ${}^{10}C_3 = 120$ .

**Reason (R) :**  ${}^n C_r = \frac{n!}{(n-r)!}$ .

10. **Assertion (A) :** Third term in  $\left(\frac{x}{3} + \frac{1}{x}\right)^5$ ,  $x \neq 0$  is given by  $\frac{10x}{27}$ .

**Reason (R) :** In the binomial  $(a + b)^n$ ,  $T_{r+1} = {}^n C_r b^r a^{n-r}$ .

14. **Assertion (A) :** 2, 8, 32, ... forms a geometric progression with common ratio of  $\frac{1}{4}$ .

**Reason (R) :** In a geometric progression  $a_1, a_2, a_3, \dots, a_{n-1}, a_n$ , we always have

$\frac{a_2}{a_1} = \frac{a_3}{a_2} = \dots = \frac{a_n}{a_{n-1}} = r$ , where  $r$  is the common ratio of geometric progression.

20. **Assertion (A) :** The infinite geometric progression  $a, ar, ar^2, \dots$  upto  $\infty$ , sum to infinity exists only if  $|r| < 1$ .

**Reason (R) :** In a geometric progression with first term given as 'a' if common ratio  $r > 1$ , then the sum to  $n$  terms of the G.P. is  $S_n = \frac{a(1-r^n)}{1-r}$ .

**Unit-III : Coordinate Geometry**

01. **Assertion (A) :** Slope of line  $y - x - 3 = 0$  is 1.

**Reason (R) :** For the line  $y = mx + c$ , slope is given by  $m$ .

05. **Assertion (A) :** The centre of circle  $x^2 + y^2 - 2x + 4y = 0$  is located at  $(1, -2)$ .

**Reason (R) :** For the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ , the eccentricity is always greater than 1.

08. **Assertion (A) :** Distance of the point  $(1, -1, 1)$  from origin is  $\sqrt{3}$  units.

**Reason (R) :** If  $A(x_1, y_1, z_1)$  and  $B(x_2, y_2, z_2)$ , then  $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$ .

25. **Assertion (A) :** For  $\frac{x^2}{36} + \frac{y^2}{9} = 1$ , the distance between foci is  $6\sqrt{3}$ .

**Reason (R) :** The length of minor axis of ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ , ( $a > b$ ) is given by '2a' units.

26. **Assertion (A) :** The point  $(1, -1, 1)$  is at a distance of  $\sqrt{3}$  units from  $(0, 0, 0)$ .

**Reason (R) :** The distance of  $(x, y, z)$  from origin is  $\sqrt{x^2 + y^2 + z^2}$ .

**Unit-IV : Calculus**

01. **Assertion (A) :**  $\frac{d}{dx} [x^5 - 2x^4 + 5] = 5x^4 - 8x^3$ .

**Reason (R) :** Differentiation of  $x^n$  with respect to  $x$  is  $n x^{n-1}$ .

06. **Assertion (A) :**  $\frac{d}{dx} \left[ \left(\frac{x^a}{x^b}\right)^{a+b} \cdot \left(\frac{x^b}{x^c}\right)^{b+c} \cdot \left(\frac{x^c}{x^a}\right)^{c+a} \right] = 0$ .

**Reason (R) :** Derivative of a constant function is zero.

07. **Assertion (A) :**  $\lim_{x \rightarrow 0} \frac{\sin 2x}{x} = 2$ .

**Reason (R) :**  $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$ .

11. **Assertion (A)** : For  $f(x) = 2x^2 + 3x - 5$ , we get  $f'(0) + 3f'(-1) = 0$ .

**Reason (R)** :  $\left(\frac{u}{v}\right)' = \frac{vu' + uv'}{v^2}$ , provided the functions  $u$  and  $v$  both are defined;  $v \neq 0$ .

### Unit-V : Statistics and Probability

01. **Assertion (A)** : The variance of 5, 5, 5, 5 is zero.

**Reason (R)** : Variance  $(\sigma^2) = \frac{1}{n} \sum_{i=1}^n (x_i - \bar{x})^2$ .

03. In the throw of a die, events  $A = \{x : x \text{ is an even number}\}$  and  $B = \{x : x \text{ is an odd number}\}$ .

**Assertion (A)** : Event  $A = \{2, 4, 6\}$  and event  $B = \{1, 3, 5\}$ .

**Reason (R)** : Two events  $A$  and  $B$  are mutually exclusive events if  $A \cap B \neq \phi$ .

08. Let  $P(E) = \frac{3}{7}$ ,  $P(\bar{F}) = \frac{1}{2}$  and  $P(\bar{E} \cap \bar{F}) = \frac{1}{14}$ .

**Assertion (A)** : The events  $E$  and  $F$  are mutually exclusive events.

**Reason (R)** :  $P(E \cap F) = 0$ , with respect to the data mentioned above.

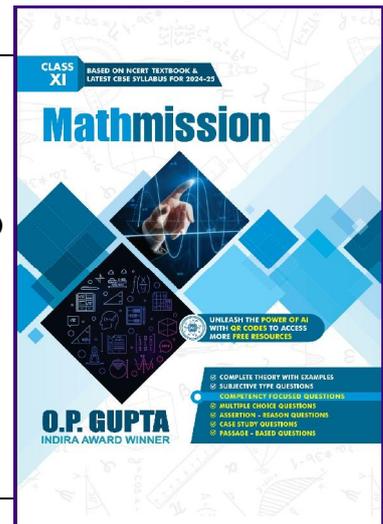
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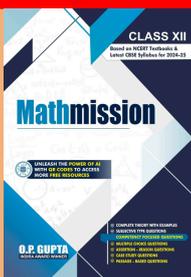
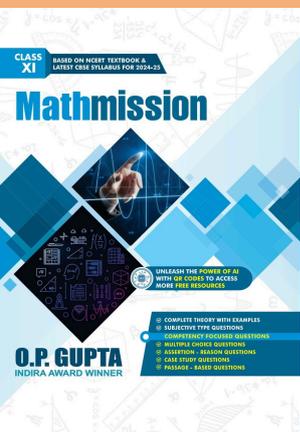
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