

Relations and Functions

Assertion Reason Questions

Direction: 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 but (R) is not the correct explanation of (A).
- (c) (A) is true but (R) is false.
- (d) (A) is false but (R) is true.

1. Assertion (A): The domain of the relation

$R = \{x + 2, x + 4 : x \in \mathbb{N}, x < 8\}$ is $\{3, 4, 5, 6, 7, 8, 9\}$.

Reason (R): The range of the relation

$R = \{(x + 2, x + 4) : x \in \mathbb{N}, x < 8\}$ is $\{1, 2, 3, 4, 5, 6, 7\}$.

Ans. (c) (A) is true but (R) is false.

Explanation: The given relation is

$R = \{(3, 5), (4, 6), (5, 7), (6, 8), (7, 9), (8, 10), (9, 11)\}$.

Domain = $\{3, 4, 5, 6, 7, 8, 9\}$

Range of $R = \{5, 6, 7, 8, 9, 10, 11\}$.

2. Assertion (A): If $(x - 1, y + 2) = (2, 4)$, then $x = 3$ and $y = 2$.

Reason (R): Two ordered pairs (x, y) and (p, q) equal, if their corresponding elements are equal.

Ans. (a) Both (A) and (R) are true and (R) is the correct explanation of (A).

Explanation: Two ordered pairs are equal, then their corresponding elements are also equal.

So, $x - 1 = 2$

$= x = 3,$

$y + 2 = 4$

$= y = 2$

3. Assertion (A): If $(x, 1)$, $(y, 1)$ and $(z, 2)$ are in $A \times B$ and $n(A) = 3$, $n(B) = 2$, then $A = \{x, y, z\}$ and $B = \{1, 2\}$.

Reason (R): If $n(A) = 3$ and $n(B) = 2$. Then $n(A \times B) = 6$.

Ans. (b) Both (A) and (R) are true but (R) is not the correct explanation of (A).

Explanation: It is given that $n(A) = 3$ and $n(B) = 2$ and $(x, 1)$, $(y, 2)$, $(z, 1)$ are in $A \times B$

We know that, A = set of first elements of the ordered pair elements of $A \times B$

B = Set of second elements of ordered pair elements of $A \times B$

$\therefore x, y$ and z are the elements of A and 1 and 2 are the elements of B .

Since, $n(A) = 3$ and $n(B) = 2$, it is clear that

$A = \{x, y, z\}$ and $B = \{1, 2\}$

$n(A) = 3$, $n(B) = 2$

$\therefore n(A \times B) = n(A) \times n(B)$

$= 3 \times 2 = 6$

4. Assertion (A): Let $A = \{1, 2\}$ and $B = \{3, 4\}$ Then the number of relations from A to B is 16 .

Reason (R): If $n(A) = p$ and $n(B) = q$, then number of a relation is 2^{pq} .

Ans. (a) Both (A) and (R) are true and (R) is the correct explanation of (A).

Explanation: Given, $A = \{1, 2\}$ and $B = \{3, 4\}$

No. of elements in set $A = n(A) = 2$

No. of elements in set $B = n(B) = 2$

No. of relations from A to $B = 2^{n(A) \times n(B)}$

$= 2^2 \times 2^2 = 24 = 16$

5. Let $A = \{1, 2, 3, 4, 5, 6\}$. If R is the relation on A desired by $\{(a, b) : a, b \in A \text{ where } b \text{ is square of } a\}$

Assertion (A): The relations R in roster form is $\{(1, 1), (2, 4), (3, 9), (4, 16), (5, 25), (6, 36)\}$.

Reason (R): The domain and range of R is $\{1, 2, 3, 4, 5, 6\}$.

Ans. (c) (A) is true but (R) is false.

Explanation: $A = \{1, 2, 3, 4, 5, 6\}$



$R = \{(a, b) : a, b \in A, b \text{ is exactly divisible by } a\}$

$R = \{(1, 1) (2, 4) (3, 9) (4, 16) (5, 25) (6, 36) (5, 25)\}$

Domain of $R = \{1, 2, 3, 4, 5, 6\}$

Range of $R = \{1, 4, 9, 16, 25, 36\}$