Date: 18/11/2025

Q1. Find the values of $f(x)$ and $g(x)$ if $\langle f(x), g(x) \rangle = \langle \sin x, \cos x \rangle$.

Q2. If $A = \{1, 2\}$, $B = \{3, 4\}$, find $A \times B$.

Q3. Find the values of x and y if $\langle (x^2 + y^2), (x^2 - y^2) \rangle = (13, 5)$.

Q4. Find the values of a and b if $\langle a + b,\ a - b \rangle = \langle 5, 1 \rangle$.

Q5. Find the values of a and b if $\langle a - 3, 4 \rangle = \langle 7, b + 9 \rangle$.

Q6. If $\langle (a - 3), (b + 6) \rangle = \langle -3, +3 \rangle$. Then find the values of a and b.

Q7. Find the values of P and θ if $\langle \sin P, \sin \theta \rangle = \left(\frac{\pi}{4}, \frac{\pi}{6}\right)$, where P and θ are acute angles.

Q8. Find the values of x and y if $\langle \sin x, \sin y \rangle = \left(\frac{1}{2}, \frac{1}{\sqrt{2}}\right)$.

Q9. Find the values of x and y if $\langle x + 1, x + y \rangle = \langle y, 5 \rangle$.

Q10. If $A = \{a, b\}$, $B = \{c, d\}$, find $A \times B$.

Q11. If $A = \{a, b\}$, find $(A \times A)$.

Q12. If $A = \{\sin x, \cos x\}$, $B = \{\text{cosec } x, \sec x\}$, then find $A \times B$.

Q13. If $A = \{1, 2\}$ and $B = \{2, 3\}$, find $B \times A$.

Q14. If $A \times B = \{(a, b), (c, d), (e, f)\}$, find A and B.

Q15. If $A \times B = \{\langle \sin x, \cos y \rangle, \langle \sin y, \cos x \rangle\}$, find A and B.

Q16. If $A \times B = \{\langle \sin x, \cos x \rangle, \langle \sin y, \cos y \rangle\}$, find the values of A and B.

Q17. If $A = \{1, 2\}$ and $B = \{x, y, z\}$, then find the no. of relations from A to B.

Q18. Determine the domain and range of relation R defined as

$$R = \{a, a^2\} : a \in \{1, 2\}.$$

Q19. If $A = \{1, 2, 3, 4, \ldots 250\}$ and R be the relation "is cube of" in A then find R as subset of $A \times A$. Also find the Domain and Range of R.

Q20. If $A = \{1, 2, 3, 4, 5, 6, \ldots 100\}$ and R be the relation "is square of" in A. Then find R as a subset of $A \times A$. Also find the Domain and Range of R.

Q21. If $A = \{1, 2, 3, 4, 5, \ldots 100\}$, and R be the relation is "square of an even integer" in A. Then find R as a subset of $A \times A$. Also find the domain and Range of R.

Q22. If $A = \{1, 2, 3, 4, 5, \ldots 100\}$ and R be the relation is "square of an odd integer" in A. Then find R as a subset of $A \times A$. Also find the domain and Range of R.

Q23. Define a relation R on the set N of natural numbers by $R = (x, y) : y = x + 5$, x is a natural no less than 4, $x, y \in N$.

Q24. Let $A = \{1, 2, 3, 4\}$ and $S = \{(a, b)$ such that $a \in A$ and $b \in A$, and $ab < 8\}$. Write the elements of S.

Q25. Let $A = \{1, 2, 3, 4\}$ and $S = \{(a, b) : a \in A, b \in A, a$ divides $b\}$. Write the elements of S.

Q26. Let set $A = \{a\}$ then how many relations are possible from $A \times A$.

Q27. Let set $A = \{a, b\}$ and set $B = \{c, d\}$. How many relations are possible from A to B.

Q28. Find x and y if $(x + 3, 5) = (6, 2x + y)$.

Q29. Let $R : A \to B$ where $A = \{3, 5\}$ and $B = \{7, 11\}$ and $R = \{(a, b)\} \in A \times B \,/\, (a + b)$ is square of an integer, write the R.

Q30. Let $R : A \to B$ where $A = \{3, 5\}$ and $B = \{7, 11\}$ and $R = \{(a, b)\} \in A \times B \cdot / \, (a - b)$ is an odd no. write the relation R.

Q31. Let R be a relation in N, defined as $R = \{(x, y) \in N, N\} : x + y = z\}$, where $z = 7$, find the Domain and Range of R given that $x > y\}$.

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S1. Two ordered pairs are equal if their corresponding values are equal.

Hence $$f(x) = \sin x, \quad g(x) = \cos x$$

S2.
$$A \times B = \{1, 2\} \times \{3, 4\}$$
$$= \{1, 3\}, \{1, 4\}, \{2, 3\}, \{2, 4\}$$

S3. Since we know that two ordered pairs are equal if their corresponding values are equal.

$\therefore$
$$x^2 + y^2 = 13 \quad \text{... (i)}$$
$$x^2 - y^2 = 5 \quad \text{... (ii)}$$

Adding eq. (i) and (ii),
$$2x^2 = 18 \quad \Rightarrow \quad x^2 = 9 \quad \Rightarrow \quad x = +3, -3$$

Putting these values of x in eq. (i), we get
$$y = +2, -2$$

S4. We know that two ordered pairs are equal if their corresponding values are equal.

$\therefore$
$$a + b = 5 \quad \text{... (i)}$$
$$a - b = 1 \quad \text{... (ii)}$$

After solving these two equations, we get
$$a = 3, b = 2$$

S5. We know that two ordered pairs are equal if their corresponding values are equal.

$\therefore$
$$a - 3 = 7 \quad \Rightarrow \quad a = 10$$
$$4 = b + 9 \quad \Rightarrow \quad b = -5$$

S6. Two ordered pairs are equal if their corresponding values are equal.

Hence,
$$a - 3 = -3 \quad \Rightarrow \quad a = 0$$
$$b + 6 = 3 \quad \Rightarrow \quad b = -3$$

S7. Two ordered pairs are equal if their corresponding values are equal.

$\therefore$
$$\sin P = \frac{\pi}{4} \quad \Rightarrow \quad P = \sin^{-1}\frac{\pi}{4}$$
$$\sin \theta = \frac{\pi}{6} \quad \Rightarrow \quad \theta = \sin^{-1}\frac{\pi}{6}$$

S8. Two ordered pairs are equal if their corresponding value are equal.

Hence, $\sin x = \frac{1}{2} \Rightarrow x = \frac{\pi}{6}$

$\sin y = \frac{1}{\sqrt{2}} \Rightarrow y = \frac{\pi}{4}$

S9. Two ordered pairs are said to be equal if their corresponding values are equal. Hence

$x + 1 = y \Rightarrow x - y = -1$ ... (i)

$x + y = 5 \Rightarrow x + y = 5$ ... (ii)

Solving eq. (i) and (ii), we get

$x = 2, \; y = 3$

S10. Given, $A = \{a, b\}$ and $B = \{c, d\}$.

Hence, $A \times B = \{a, c\}, \{a, d\}, \{b, c\}, \{b, d\}$.

S11. Given, $A = \{a, b\}$

Hence, $A \times A = \{a, b\} \times \{a, b\}$

$= \{a, a\}, \{a, b\}, \{b, a\}, \{b, b\}$.

S12. Given, $A = \{\sin x, \cos x\}$ and $B = \{\operatorname{cosec} x, \sec x\}$

Hence, $A \times B = \{\sin x, \operatorname{cosec} x\}, \{\sin x, \sec x\}, \{\cos x, \operatorname{cosec} x\}, \{\cos x, \sec x\}$

S13. Given, $A = \{1, 2\}$ and $B = \{2, 3\}$

Hence, $B \times A = \{2, 3\} \times \{1, 2\}$

$= \{2, 1\}, \{2, 2\}, \{3, 1\}, \{3, 2\}$

S14. Since A is the collection of all distinct first elements and B is the collection of all distinct second elements in A X B.

Hence, $A = \{a, c, e\}, \quad B = \{b, d, f\}$.

S15. Since A is the collection of all distinct first elements and B is the collection of all distinct second elements in A X B.

Hence, $A = \{\sin x, \sin y\}$

$B = \{\cos y, \cos x\}$.

S16. Since A is the collection of all distinct first elements and B is the collection of all distinct second element in A X B.

Hence, $A = \{\sin x, \sin y\}$

$B = \{\cos x, \cos y\}$

S17. Since no. of relations from A to B is $2^{n(A \times B)}$

Hence, $A \times B = \{\langle 1, x\rangle, \langle 1, y\rangle, \langle 1, z\rangle, \langle 2, x\rangle, \langle 2, y\rangle, \langle 2, z\rangle\}$

$\because \quad n(A \times B) = 6$

Hence, no. of relations from A to B is $2^6 = 64$

S18. The collection of first elements of all ordered pairs is domain and the collection of second elements of all ordered pairs is range of a relation.

$\therefore$ $R = \{a, a^2\} : a \in \{1, 2\}$

$\therefore$ $R = \{1, 1\}, \{2, 4\}$

Hence, Domain of $R = \{1, 2\}$.

Range of $R = \{1, 4\}$

S19. Since R is the relation is cube of in A.

$\therefore$ $R = \{(1, 1), (8, 2), (27, 3), (64, 4)\ (125, 5), (216, 6)\}$.

$\therefore$ Domain of $R = \{1, 8, 27, 64, 125, 216\}$

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

S20. Since R is the relation "is square of" in A.

$\therefore$ $R = \{(1, 1), \{4, 2\}, \{9, 3\}, \{16, 4\}, \{25, 5\}, \{36, 6\}, \{49, 7\}, \{64, 8\}, \{81, 9\}, \{100, 10\}\}$.

$\therefore$ Domain of $R = \{1, 4, 9, 16, 25, 36, 49, 64, 81, 100\}$

Range of $R = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

S21. Since R is the relation is "square of an even integer" in A.

$\therefore$ $R = \{4, 2\}, \{16, 4\}, \{36, 6\}, \{64, 8\}, \{100, 10\}$.

$\therefore$ Domain of $R = \{4, 16, 36, 64, 100\}$

$\therefore$ Range of $R = \{2, 4, 6, 8, 10\}$

S22. Since R is the relation is square of an odd integer

$\therefore$ $R = \{(1, 1), (9, 3), (25, 5), (49, 7), (81, 9)\}$

$\therefore$ Domain of $R = \{1, 9, 25, 49, 81\}$

Range of $R = \{1, 3, 5, 7, 9\}$

S23. Since x is a natural no. less than 4. Hence relation R is

$R = \{1, 6\}, \{2, 7\}, \{3, 8\}$.

S24. Since relation is $ab < 8$.

Hence elements of S are $\{(1, 1), (1, 2), (2, 1), (1, 3), (3, 1)\ (1, 4), (4, 1), (2, 2), (2 ,3), (3, 2)\}$

S25. Since relation is a divides b such that $a \in A$, $b \in A$.

Hence elements of S are $\{(1, 2), (1, 1), (1, 3), (1, 4), (2, 4), (4, 4), (2, 2), (3, 3)\}$.

S26. Given, $A = \{a\}$

$$A \times A = \{a\} \times \{a\}$$
$$= \{(a, a)\}$$

$\because$ $n(A \times A) = 1$

Hence no. of relations from A to A is $2^1 = 2$.

S27. Given, set $A = \{a, b\}$ and set $B = \{c, d\}$

$$(A \times B) = \{a, b\} \times \{c, d\}$$
$$= \{(a, c), (a, d), (b, c) (b, d)\}$$

$\because$ $n(A \times B) = 4$

Hence no. of relations from A to B is $2^4 = 16$

S28. Two ordered pairs are equal if their corresponding elements are equal

$\therefore$ $x + 3 = 6 \quad \Rightarrow \quad x = 3$

$5 = 2x + y$

$\therefore$ $2x + y = 5 \quad \Rightarrow \quad 2 \times 3 + y = 5$

$\Rightarrow$ $y = -1$

Hence, $x = 3, \; y = -1$.

S29. $A \times B = \{(3, 7), (3, 11), (5, 7), (5, 11)\}$

$\because$ $R = \{(5, 11)\}$.

S30. Given, $A \times B = \{3, 5\} \times \{7, 11\}$

$$= \{(3, 7), (3, 11), (5, 7), (5, 11)\}.$$

$\because$ Difference of any individual ordered pairs does not yields odd integer hence R is null set.

S31. Since $z = 7, \; x + y = z$

Hence, $R = \{(6, 1), (5, 2), (4, 3)\}$

Hence Domain of R is $\{6, 5, 4\}$ and Range of R is $\{1, 2, 3\}$.