

MATHEMATICS • CLASS 11

CHAPTER 2

Relations and Functions

NCERT SOLUTIONS



EXERCISE 2.1 — QUESTIONS 1-2

Q1. Find x and y if

$$\left(\frac{x}{3} + 1, y - \frac{2}{3}\right) = \left(\frac{5}{3}, \frac{1}{3}\right).$$

Equal ordered pairs have equal corresponding coordinates.

$$\frac{x}{3} + 1 = \frac{5}{3}$$

$$\frac{x}{3} = \frac{5}{3} - 1 = \frac{2}{3}$$

$$x = 2.$$

$$y - \frac{2}{3} = \frac{1}{3}$$

$$y = \frac{1}{3} + \frac{2}{3} = 1.$$

Answer: $x = 2$, $y = 1$.

Q2. A has 3 elements and $B = \{3, 4, 5\}$.
How many elements are in $A \times B$?

Each element of A pairs with every element of B .

$$\begin{aligned} n(A \times B) &= n(A) \times n(B) \\ &= 3 \times 3 \\ &= 9. \end{aligned}$$

Answer: 9 ordered pairs.

EXERCISE 2.1 — QUESTION 3

Q3. If $G = \{7, 8\}$ and $H = \{5, 4, 2\}$, find $G \times H$ and $H \times G$.

$G \times H$:

First coordinate from G ; second coordinate from H .

$$G \times H = \{ (7, 5), (7, 4), (7, 2), (8, 5), (8, 4), (8, 2) \}.$$

$H \times G$:

First coordinate from H ; second coordinate from G .

$$H \times G = \{ (5, 7), (5, 8), (4, 7), (4, 8), (2, 7), (2, 8) \}.$$

Each product contains $2 \times 3 = 6$ ordered pairs.

The coordinate order matters, so $G \times H \neq H \times G$.

EXERCISE 2.1 — QUESTION 4

Q4. State true or false. Correct each false statement.

(i) $P = \{m, n\}$, $Q = \{n, m\}$.

Claim: $P \times Q = \{(m, n), (n, m)\}$.

False. Include every choice of first and second coordinate.

Correct: $P \times Q = \{(m, m), (m, n), (n, m), (n, n)\}$.

(ii) For nonempty A and B , $A \times B$ is a nonempty set of ordered pairs (x, y) , with $x \in A$ and $y \in B$.

True. At least one element can be chosen from each set.

(iii) $A = \{1, 2\}$, $B = \{3, 4\}$.

Claim: $A \times (B \cap \emptyset) = \emptyset$.

True. $B \cap \emptyset = \emptyset$, so $A \times (B \cap \emptyset) = A \times \emptyset = \emptyset$.

No element can be selected from the empty set.

EXERCISE 2.1 – QUESTIONS 5–6

Q5. If $A = \{-1, 1\}$, find $A \times A \times A$.

Choose each of the three coordinates from A .

$$A \times A \times A = \{(-1, -1, -1), (-1, -1, 1), (-1, 1, -1), (-1, 1, 1), (1, -1, -1), (1, -1, 1), (1, 1, -1), (1, 1, 1)\}.$$

There are $2^3 = 8$ ordered triples.

Q6. Find A and B if

$$A \times B = \{(a, x), (a, y), (b, x), (b, y)\}.$$

Collect the different first coordinates for A and the different second coordinates for B .

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

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

All four possible pairs are present, so these sets give the stated product.

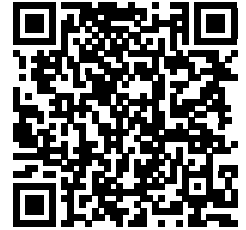


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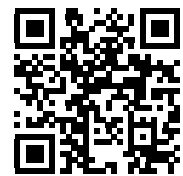


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