

Worksheet

Relations and Functions

Very short answer/objective questions (1 to 6)

1. If A and B are two sets such that $n(A) = 2$ and $n(B) = 3$, find the number of relations from
(i) A to B
(ii) B to A
(iii) A to A.
2. Let $A = \{1, 2\}$ and $B = \{3, 4\}$. Find
(i) $A \times B$
(ii) number of relations from A to B.
3. If a relation $R = \{(-2, 1), (0, 2), (3, 1), (0, -1), (4, 2), (5, 1)\}$, then write its domain and range.
4. If $A = \{2, 3, 5\}$, $B = \{2, 4, 6\}$ and R is the relation from A to B defined by
 $R = \{(x, y) : x \in A, y \in B \text{ and } x < y\}$,
then write R in the roster form.
5. If $A = \{1, 3, 5, 7, 8\}$ and $B = \{2, 3, 4, 6, 8, 10\}$ and R be the relation 'is one less than' from A to B, write R in the roster form.
6. If $A = \{2, 3, 4\}$, $B = \{4, 6, 9, 10\}$ and
 $R = \{(x, y) : (x, y) \in A \times B \text{ such that } x \text{ is a factor of } y\}$,
then write R in roster form.

Short answer questions (7 to 11)

7. If $A = \{1, 2, 3, \dots, 17\}$ and R is a relation on A defined by
 $R = \{(x, y) : 3x - y = 0, x, y \in A\}$,
then write R in the roster form.
8. Write the following relations in the roster form:
(i) $R = \{(x, x^3) : x \text{ is a prime number less than } 10\}$.
(ii) $R = \{(x - 2, x^2) : x \text{ is a prime number less than } 10\}$.
9. Let a relation $R = \{(1, -1), (2, 0), (3, 1), (4, 2), (5, 3)\}$, then
(i) write the domain and the range of R.
(ii) write R in the builder form.
10. Let $A = \{2, 4, 6\}$, $B = \{4, 6, 18\}$ and R be the relation 'is a factor of' from A to B. Find R as a set of ordered pairs and represent it by an arrow diagram.
11. If $R_1 = \{(x, |x|) : x \text{ is a real number}\}$, then find the domain and the range of the relation R_1 . (Exemplar)

Long answer questions (12 to 22)

12. Determine the domain and the range of the relation R defined by
 $R = \{(x, x + 5) : x \in \{0, 1, 2, 3, 4, 5\}\}$.
13. The adjoining diagram shows a relationship between the sets P and Q. Write this relation in
(i) roster form
(ii) set builder form.
What is its domain and range?

14. Let R be the relation on $\mathbb{N}$ defined by
 $R = \{(a, b) : a \in \mathbb{N}, b \in \mathbb{N} \text{ and } a + 3b = 12\}$,
then

- (i) list the elements of R
- (ii) find the domain of R
- (iii) find the range of R .

15. If $R = \{(x, y) : x, y \in \mathbb{W}, x^2 + y^2 = 100\}$, then find the domain and the range of R . Also write R in roster form.

16. If R is the relation on $\mathbb{N}$ defined by
 $R = \{(x, y) : y = x + 12/x, x, y \in \mathbb{N}\}$,
then find

- (i) R in roster form
- (ii) domain of R
- (iii) range of R .

17. Write the domain and the range of the relation $(x, y) : x = 3y$, where x and y are natural numbers less than 10.

18. Let $A = \{-2, -1, 0, 1, 2\}$. List the ordered pairs satisfying each of the following relations on A :

- (i) 'is greater than'
- (ii) 'is the square of'
- (iii) 'is the negative of'.

19. If $A = \{1, 3, 5, 6\}$ and $B = \{3, 4, 5\}$, write the relation R as a set of ordered pairs if

- (i) $R = \{(x, y) : (x, y) \in A \times B : x + y \text{ is even}\}$
- (ii) $R = \{(x, y) : (x, y) \in A \times B : xy \text{ is odd}\}$.

20. Let $R = \{(x, y) : x, y \in \mathbb{Z}, y = 2x - 4\}$. If $(a, -2)$ and $(4, b^2)$ belong to R , find the values of a and b .

21. Find the linear relation between the components of the ordered pairs of the relation R .