

Sets and Relations

MCQ Test, Set 08

Time: 30 minutes

Maximum marks: 25

Name: _____ Class: _____ Date: _____

- There are 25 questions. Each has exactly one correct answer: choose A, B, C or D.
- Each correct answer carries 1 mark. There is no negative marking.
- The key sheet and worked solutions are at the end of this test.

- If $A = \{a, q\}$ and $B = \{4, 12\}$, then $A \times B =$
 - $\{(a, 4), (a, 12)\}$
 - $\{(4, a), (4, q), (12, a), (12, q)\}$
 - $\{(a, 4), (a, 12), (q, 4), (q, 12)\}$
 - $\{(a, 4), (q, 12)\}$
- If $A = \{p, t\}$ and $B = \{7, 10\}$, then $B \times A =$
 - $\{(7, p), (7, t), (10, p), (10, t)\}$
 - $\{(p, 7), (p, 10), (t, 7), (t, 10)\}$
 - $\{(7, p), (7, t)\}$
 - $\{(7, p), (10, t)\}$
- If $A = \{b, c, t\}$ and $B = \{8, 10\}$, which of the following belongs to $A \times B$?
 - (b, t)
 - $(10, b)$
 - $(b, 10)$
 - $(10, 8)$
- If $A = \{2, 6\}$ and $B = \{b, q, z\}$, which of the following does NOT belong to $A \times B$?
 - $(2, b)$
 - $(b, 2)$
 - $(6, b)$
 - $(2, q)$
- If $n(A \times B) = 15$ and $n(B) = 5$, then $n(A) =$
 - 10
 - 3
 - 75
 - 20
- If $A = \{a, b, q, t\}$ and $B = \{q, t, y\}$, then $n(A \times B) =$
 - 4096
 - 24
 - 7
 - 12
- If $n(A) = 13$, then $n(A \times A) =$
 - 8192
 - 13
 - 26
 - 169
- If $A = \{2, 4, 7\}$ and $B = \{a, x\}$, which of the following is NOT a relation from A to B ?
 - $\{(4, a), (7, p)\}$
 - $\{(2, a), (7, a), (7, x)\}$
 - $\{(7, a)\}$
 - $\{(4, x), (7, a)\}$
- If $A = \{6, 9, 10\}$ and $B = \{p, y\}$, which of the following is a relation from B to A ?
 - $\{(6, 10), (9, 9)\}$
 - $\{(y, 6), (y, 10)\}$
 - $\{(9, y), (10, p)\}$
 - $\{(y, p), (y, y)\}$
- If $A = \{b, p, y\}$ and $B = \{5, 11\}$, then $R = \{(b, 5), (p, 11), (y, 5)\}$ is a relation from
 - B to B
 - A to B
 - A to A
 - B to A

11. If $A = \{z\}$ and $B = \{6, 9, 11\}$, the number of relations from A to B is
A. 16 **B.** 6 **C.** 8 **D.** 3
-
12. If $A = \{1, 4, 7\}$, the number of relations from A to A is
A. 64 **B.** 9 **C.** 512 **D.** 8
-
13. If $A \times B$ has 3 elements, the number of relations from A to B is
A. 6 **B.** 8 **C.** 9 **D.** 3
-
14. If $R = \{(c, 3), (p, 3), (z, 8)\}$, which of the following is false?
A. $cR3$ **B.** $zR8$ **C.** $pR3$ **D.** $zR3$
-
15. If $R = \{(10, q), (10, t), (12, a), (12, t)\}$, the set of all b with $12Rb$ is
A. $\{a, q, t\}$ **B.** $\{12\}$ **C.** $\{a, t\}$ **D.** $\{q, t\}$
-
16. If $R = \{(2, t), (8, t), (8, x), (12, x)\}$, the set of all a with aRt is
A. $\{2, 8\}$ **B.** $\{t\}$ **C.** $\{2, 8, 12\}$ **D.** $\{8, 12\}$
-
17. If $A = \{t, y\}$ and $B = \{y, z\}$, the null relation from A to B is
A. $\{0\}$ **B.** $\{(t, y)\}$
C. $\{(t, y), (t, z), (y, y), (y, z)\}$ **D.** ϕ
-
18. If $n(A) = 9$ and $n(B) = 7$, the number of ordered pairs in the universal relation from A to B is
A. 63 **B.** 0 **C.** 126 **D.** 16
-
19. If $A = \{c, q, z\}$ and $B = \{8, 12\}$, the number of ordered pairs in the null relation from A to B is
A. 1 **B.** 6 **C.** 64 **D.** 0
-
20. If $A = \{3, 5\}$ and $B = \{q, t\}$, the range of the null relation from A to B is
A. ϕ **B.** $\{0\}$ **C.** $\{3, 5\}$ **D.** $\{q, t\}$
-
21. Which of the following relations has domain $\{1, 2, 4\}$ and range $\{c, y\}$?
A. $\{(2, c), (4, c), (4, y)\}$ **B.** $\{(c, 1), (c, 2), (y, 4)\}$
C. $\{(1, c), (2, c), (4, y)\}$ **D.** $\{(1, c), (2, c)\}$
-
22. $R = \{(p, 2), (y, 7), (z, 7)\}$ is a relation from $A = \{p, x, y, z\}$ to $B = \{2, 7\}$. Which element of A is not in the domain of R ?
A. p **B.** x **C.** y **D.** z
-
23. If $R = \{(3, b), (9, b), (9, p)\}$, the range of R^{-1} is
A. $\{3\}$ **B.** $\{3, 9, b, p\}$ **C.** $\{b, p\}$ **D.** $\{3, 9\}$
-
24. If $R = \{(8, a), (8, b), (10, b)\}$, which ordered pair belongs to R^{-1} ?
A. $(a, 8)$ **B.** $(q, 8)$ **C.** $(8, a)$ **D.** $(8, b)$
-

25. $R = \{(8, t), (9, t), (12, t)\}$ is a relation from $A = \{8, 9, 12\}$ to $B = \{p, t\}$. Then R^{-1} is a relation from
- A.** A to A **B.** B to B **C.** A to B **D.** B to A
-

Key sheet

1. C	2. A	3. C	4. B	5. B
6. D	7. D	8. A	9. B	10. B
11. C	12. C	13. B	14. D	15. C
16. A	17. D	18. A	19. D	20. A
21. C	22. B	23. D	24. A	25. D

Solutions

1. If $A = \{a, q\}$ and $B = \{4, 12\}$, then $A \times B =$

$$\begin{aligned} A \times B &= \{(a, b) : a \in A, b \in B\} \\ &= \{(a, 4), (a, 12), (q, 4), (q, 12)\} \end{aligned}$$

Ans: (C) $\{(a, 4), (a, 12), (q, 4), (q, 12)\}$

2. If $A = \{p, t\}$ and $B = \{7, 10\}$, then $B \times A =$

$$\begin{aligned} B \times A &= \{(b, a) : b \in B, a \in A\} \\ &= \{(7, p), (7, t), (10, p), (10, t)\} \end{aligned}$$

Ans: (A) $\{(7, p), (7, t), (10, p), (10, t)\}$

3. If $A = \{b, c, t\}$ and $B = \{8, 10\}$, which of the following belongs to $A \times B$?

$(a, b) \in A \times B$ only when $a \in A$ and $b \in B$.

$b \in A$ and $10 \in B$, so $(b, 10) \in A \times B$.

Ans: (C) $(b, 10)$

4. If $A = \{2, 6\}$ and $B = \{b, q, z\}$, which of the following does NOT belong to $A \times B$?

The first element of a pair in $A \times B$ must be in A .

$b \notin A$, so $(b, 2) \notin A \times B$.

Ans: (B) $(b, 2)$

5. If $n(A \times B) = 15$ and $n(B) = 5$, then $n(A) =$

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

$$15 = n(A) \times 5$$

$$n(A) = 15 \div 5 = 3$$

Ans: (B) 3

6. If $A = \{a, b, q, t\}$ and $B = \{q, t, y\}$, then $n(A \times B) =$

$$n(A) = 4, n(B) = 3$$

$$n(A \times B) = 4 \times 3 = 12$$

Ans: (D) 12

7. If $n(A) = 13$, then $n(A \times A) =$

$$n(A \times A) = n(A) \times n(A) = 13 \times 13 = 169$$

Ans: (D) 169

8. If $A = \{2, 4, 7\}$ and $B = \{a, x\}$, which of the following is NOT a relation from A to B ?

A relation from A to B is a subset of $A \times B$.

$p \notin B$, so $(7, p) \notin A \times B$.

Ans: (A) $\{(4, a), (7, p)\}$

9. If $A = \{6, 9, 10\}$ and $B = \{p, y\}$, which of the following is a relation from B to A ?

A relation from B to A is a subset of $B \times A$.

In $\{(y, 6), (y, 10)\}$ every first element is in B and every second element is in A .

Ans: (B) $\{(y, 6), (y, 10)\}$

10. If $A = \{b, p, y\}$ and $B = \{5, 11\}$, then $R = \{(b, 5), (p, 11), (y, 5)\}$ is a relation from

First elements are in A , second elements are in B .

$\therefore R \subseteq A \times B$

Ans: (B) A to B

11. If $A = \{z\}$ and $B = \{6, 9, 11\}$, the number of relations from A to B is

$$n(A \times B) = 1 \times 3 = 3$$

$$\text{Number of relations} = 2^3 = 8$$

Ans: (C) 8

12. If $A = \{1, 4, 7\}$, the number of relations from A to A is

$$n(A \times A) = 3 \times 3 = 9$$

$$\text{Number of relations} = 2^9 = 512$$

Ans: (C) 512

13. If $A \times B$ has 3 elements, the number of relations from A to B is

Relations are the subsets of $A \times B$.

$$2^3 = 8$$

Ans: (B) 8

14. If $R = \{(c, 3), (p, 3), (z, 8)\}$, which of the following is false?

aRb means $(a, b) \in R$.

$(z, 3) \notin R$, so $zR3$ is false.

Ans: (D) $zR3$

15. If $R = \{(10, q), (10, t), (12, a), (12, t)\}$, the set of all b with $12Rb$ is

$12Rb$ means $(12, b) \in R$.

Such pairs: $(12, a), (12, t)$.

Ans: (C) $\{a, t\}$

16. If $R = \{(2, t), (8, t), (8, x), (12, x)\}$, the set of all a with aRt is

aRt means $(a, t) \in R$.

Such pairs: $(2, t), (8, t)$.

Ans: (A) $\{2, 8\}$

17. If $A = \{t, y\}$ and $B = \{y, z\}$, the null relation from A to B is

$\phi \subseteq A \times B$, so ϕ is a relation from A to B : the null (void) relation.

Ans: (D) ϕ

18. If $n(A) = 9$ and $n(B) = 7$, the number of ordered pairs in the universal relation from A to B is

The universal relation is $A \times B$.

$$n(A \times B) = 9 \times 7 = 63$$

Ans: (A) 63

19. If $A = \{c, q, z\}$ and $B = \{8, 12\}$, the number of ordered pairs in the null relation from A to B is

The null relation is ϕ .

ϕ has no ordered pairs, so the number is 0.

Ans: (D) 0

20. If $A = \{3, 5\}$ and $B = \{q, t\}$, the range of the null relation from A to B is

The null relation ϕ has no ordered pairs.

So its range is ϕ .

Ans: (A) ϕ

21. Which of the following relations has domain $\{1, 2, 4\}$ and range $\{c, y\}$?

Domain = first elements, Range = second elements.

For $\{(1, c), (2, c), (4, y)\}$: Domain = $\{1, 2, 4\}$, Range = $\{c, y\}$.

Ans: (C) $\{(1, c), (2, c), (4, y)\}$

22. $R = \{(p, 2), (y, 7), (z, 7)\}$ is a relation from $A = \{p, x, y, z\}$ to $B = \{2, 7\}$. Which element of A is not in the domain of R ?

Domain of R = set of first elements of the pairs in R .

Domain = $\{p, y, z\}$

$x \in A$ but it is not a first element of any pair.

Ans: (B) x

23. If $R = \{(3, b), (9, b), (9, p)\}$, the range of R^{-1} is

$$R^{-1} = \{(b, 3), (b, 9), (p, 9)\}$$

$$\text{Range of } R^{-1} = \{3, 9\}$$

It is the domain of R .

Ans: (D) $\{3, 9\}$

24. If $R = \{(8, a), (8, b), (10, b)\}$, which ordered pair belongs to R^{-1} ?

R^{-1} : interchange the two elements of every pair of R .

$(8, a) \in R$, so $(a, 8) \in R^{-1}$.

Ans: (A) $(a, 8)$

25. $R = \{(8, t), (9, t), (12, t)\}$ is a relation from $A = \{8, 9, 12\}$ to $B = \{p, t\}$. Then R^{-1} is a relation from

$$R^{-1} = \{(t, 8), (t, 9), (t, 12)\}$$

First elements are in B , second elements in A .

$$\therefore R^{-1} \subseteq B \times A$$

Ans: (D) B to A
