

Sets and Relations

MCQ Test, Set 01

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 $A = \{1, 2, 12\}$ and $B = \{a, c\}$, then $A \times B =$
 - $\{(a, 1), (a, 2), (a, 12), (c, 1), (c, 2), (c, 12)\}$
 - $\{(1, a), (1, c), (2, a), (2, c), (12, a), (12, c)\}$
 - $\{(1, a), (2, c)\}$
 - $\{(1, a), (1, c), (2, a), (2, c)\}$
- If $A = \{9, 10, 12\}$ and $B = \{7, 8\}$, then $B \times A =$
 - $\{(7, 9), (8, 10)\}$
 - $\{(7, 9), (7, 10), (7, 12)\}$
 - $\{(7, 9), (7, 10), (7, 12), (8, 9), (8, 10), (8, 12)\}$
 - $\{(9, 7), (9, 8), (10, 7), (10, 8), (12, 7), (12, 8)\}$
- If $A = \{1, 3, 8\}$ and $B = \{q, y\}$, which of the following belongs to $A \times B$?
 - (y, q)
 - $(3, y)$
 - $(3, 1)$
 - $(y, 3)$
- If $A = \{c, x\}$ and $B = \{1, 4, 11\}$, which of the following does NOT belong to $A \times B$?
 - $(c, 11)$
 - $(x, 11)$
 - $(11, x)$
 - $(x, 1)$
- If $n(A) = 4$ and $n(B) = 12$, then $n(A \times B) =$
 - 96
 - 52
 - 48
 - 16
- If $n(A \times B) = 12$ and $n(B) = 6$, then $n(A) =$
 - 72
 - 2
 - 6
 - 18
- If $A = \{5, 8, 9, 10\}$ and $B = \{t, y\}$, then $n(A \times B) =$
 - 6
 - 16
 - 256
 - 8
- If $A = \{a, t\}$ and $B = \{4, 5, 6\}$, which of the following is a relation from A to B ?
 - $\{(t, 4), (6, t)\}$
 - $\{(a, 4), (t, 1)\}$
 - $\{(a, 4), (t, 5)\}$
 - $\{(4, a), (6, t)\}$
- If $A = \{a, q, z\}$ and $B = \{1, 8\}$, which of the following is NOT a relation from A to B ?
 - $\{(a, 1), (q, 1)\}$
 - $\{(a, 8), (8, z)\}$
 - $\{(a, 8)\}$
 - $\{(a, 1), (a, 8), (z, 1)\}$
- If $A = \{1, 5, 7\}$ and $B = \{b, z\}$, which of the following is a relation from B to A ?
 - $\{(b, z), (z, z)\}$
 - $\{(1, b), (5, z)\}$
 - $\{(b, 1), (b, 7)\}$
 - $\{(5, 1), (7, 1)\}$

11. If $n(A) = 4$ and $n(B) = 2$, the number of relations from A to B is
A. 64 **B.** 8 **C.** 256 **D.** 16
-
12. If $A = \{4, 6, 8\}$ and $B = \{3\}$, the number of relations from A to B is
A. 16 **B.** 6 **C.** 3 **D.** 8
-
13. If $A = \{2, 7, 8\}$, the number of relations from A to A is
A. 8 **B.** 512 **C.** 9 **D.** 64
-
14. If $R = \{(5, c), (5, x), (12, c)\}$, which of the following is true?
A. $5Rx$ **B.** $12Rp$ **C.** $12Rx$ **D.** $xR5$
-
15. If $R = \{(4, a), (4, y), (11, z)\}$, which of the following is false?
A. $4Rz$ **B.** $4Ry$ **C.** $4Ra$ **D.** $11Rz$
-
16. If $R = \{(c, 1), (c, 12), (p, 1), (p, 10)\}$, the set of all b with pRb is
A. $\{1, 10, 12\}$ **B.** $\{1, 10\}$ **C.** $\{1, 12\}$ **D.** $\{p\}$
-
17. If $A = \{1, 9\}$ and $B = \{1, 5, 8\}$, the universal relation from A to B is
A. $\{(1, 1), (1, 5), (1, 8), (9, 1), (9, 5), (9, 8)\}$ **B.** ϕ
C. $\{(1, 1), (9, 5)\}$ **D.** $\{(1, 1), (1, 9), (5, 1), (5, 9), (8, 1), (8, 9)\}$
-
18. If $A = \{3, 10\}$ and $B = \{b, q, x\}$, the null relation from A to B is
A. $\{(3, b)\}$ **B.** ϕ
C. $\{(3, b), (3, q), (3, x), (10, b), (10, q), (10, x)\}$ **D.** $\{0\}$
-
19. If $n(A) = 8$ and $n(B) = 11$, the number of ordered pairs in the universal relation from A to B is
A. 88 **B.** 19 **C.** 0 **D.** 176
-
20. $R = \{(p, a), (x, y), (y, t)\}$ is a relation from $A = \{c, p, x, y\}$ to $B = \{a, t, y\}$. The domain of R is
A. $\{a, p, t, x, y\}$ **B.** $\{a, t, y\}$ **C.** $\{c, p, x, y\}$ **D.** $\{p, x, y\}$
-
21. $R = \{(2, b), (2, c), (10, x)\}$ is a relation from $A = \{2, 3, 9, 10\}$ to $B = \{b, c, x\}$. The range of R is
A. $\{2, 3, 9, 10\}$ **B.** $\{2, 10, b, c, x\}$ **C.** $\{2, 10\}$ **D.** $\{b, c, x\}$
-
22. If $A = \{3, 5\}$ and $B = \{t, x\}$, the domain of the universal relation from A to B is
A. $\{3, 5\}$ **B.** $\{(3, t), (3, x), (5, t), (5, x)\}$
C. ϕ **D.** $\{t, x\}$
-
23. If $R = \{(5, b), (9, b), (12, b)\}$, then $R^{-1} =$
A. $\{(b, 5), (b, 9), (b, 12)\}$ **B.** $\{(b, 9), (b, 12)\}$
C. $\{(5, b), (9, b), (12, b)\}$ **D.** $\{(b, 5), (b, 9), (12, b)\}$
-

24. If $R^{-1} = \{(a, 1), (a, 2), (t, 2)\}$, then $R =$

A. $\{(1, a), (2, a), (t, 2)\}$

B. $\{(2, a), (2, t)\}$

C. $\{(a, 1), (a, 2), (t, 2)\}$

D. $\{(1, a), (2, a), (2, t)\}$

25. If $R = \{(1, b), (5, b), (9, b), (9, y)\}$, the domain of R^{-1} is

A. $\{1, 5, 9\}$

B. $\{b\}$

C. $\{1, 5, 9, b, y\}$

D. $\{b, y\}$

Key sheet

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

Solutions

1. If $A = \{1, 2, 12\}$ and $B = \{a, c\}$, then $A \times B =$

$$\begin{aligned} A \times B &= \{(a, b) : a \in A, b \in B\} \\ &= \{(1, a), (1, c), (2, a), (2, c), (12, a), (12, c)\} \end{aligned}$$

Ans: (B) $\{(1, a), (1, c), (2, a), (2, c), (12, a), (12, c)\}$

2. If $A = \{9, 10, 12\}$ and $B = \{7, 8\}$, then $B \times A =$

$$\begin{aligned} B \times A &= \{(b, a) : b \in B, a \in A\} \\ &= \{(7, 9), (7, 10), (7, 12), (8, 9), (8, 10), (8, 12)\} \end{aligned}$$

Ans: (C) $\{(7, 9), (7, 10), (7, 12), (8, 9), (8, 10), (8, 12)\}$

3. If $A = \{1, 3, 8\}$ and $B = \{q, y\}$, which of the following belongs to $A \times B$?

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

$3 \in A$ and $y \in B$, so $(3, y) \in A \times B$.

Ans: (B) $(3, y)$

4. If $A = \{c, x\}$ and $B = \{1, 4, 11\}$, 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 .

$11 \notin A$, so $(11, x) \notin A \times B$.

Ans: (C) $(11, x)$

5. If $n(A) = 4$ and $n(B) = 12$, then $n(A \times B) =$

$$\begin{aligned} n(A \times B) &= n(A) \times n(B) = mn \\ &= 4 \times 12 = 48 \end{aligned}$$

Ans: (C) 48

6. If $n(A \times B) = 12$ and $n(B) = 6$, then $n(A) =$

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

$$12 = n(A) \times 6$$

$$n(A) = 12 \div 6 = 2$$

Ans: (B) 2

7. If $A = \{5, 8, 9, 10\}$ and $B = \{t, y\}$, then $n(A \times B) =$

$$n(A) = 4, n(B) = 2$$

$$n(A \times B) = 4 \times 2 = 8$$

Ans: (D) 8

8. If $A = \{a, t\}$ and $B = \{4, 5, 6\}$, which of the following is a relation from A to B ?

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

Only $\{(a, 4), (t, 5)\}$ has every pair in $A \times B$.

Ans: (C) $\{(a, 4), (t, 5)\}$

9. If $A = \{a, q, z\}$ and $B = \{1, 8\}$, which of the following is NOT a relation from A to B ?

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

$8 \notin A$, so $(8, z) \notin A \times B$.

Ans: (B) $\{(a, 8), (8, z)\}$

10. If $A = \{1, 5, 7\}$ and $B = \{b, z\}$, 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 $\{(b, 1), (b, 7)\}$ every first element is in B and every second element is in A .

Ans: (C) $\{(b, 1), (b, 7)\}$

11. If $n(A) = 4$ and $n(B) = 2$, the number of relations from A to B is

Number of relations from A to B = number of subsets of $A \times B = 2^{mn}$.

$$= 2^{4 \times 2} = 2^8 = 256$$

Ans: (C) 256

12. If $A = \{4, 6, 8\}$ and $B = \{3\}$, the number of relations from A to B is

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

Number of relations $= 2^3 = 8$

Ans: (D) 8

13. If $A = \{2, 7, 8\}$, the number of relations from A to A is

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

Number of relations $= 2^9 = 512$

Ans: (B) 512

14. If $R = \{(5, c), (5, x), (12, c)\}$, which of the following is true?

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

$(5, x) \in R$, so $5Rx$.

Ans: (A) $5Rx$

15. If $R = \{(4, a), (4, y), (11, z)\}$, which of the following is false?

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

$(4, z) \notin R$, so $4Rz$ is false.

Ans: (A) $4Rz$

16. If $R = \{(c, 1), (c, 12), (p, 1), (p, 10)\}$, the set of all b with pRb is

pRb means $(p, b) \in R$.

Such pairs: $(p, 1), (p, 10)$.

Ans: (B) $\{1, 10\}$

17. If $A = \{1, 9\}$ and $B = \{1, 5, 8\}$, the universal relation from A to B is

$A \times B \subseteq A \times B$, so $A \times B$ is a relation from A to B : the universal relation.

$$A \times B = \{(1, 1), (1, 5), (1, 8), (9, 1), (9, 5), (9, 8)\}$$

Ans: (A) $\{(1, 1), (1, 5), (1, 8), (9, 1), (9, 5), (9, 8)\}$

18. If $A = \{3, 10\}$ and $B = \{b, q, x\}$, 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: (B) ϕ

19. If $n(A) = 8$ and $n(B) = 11$, the number of ordered pairs in the universal relation from A to B is

The universal relation is $A \times B$.

$$n(A \times B) = 8 \times 11 = 88$$

Ans: (A) 88

20. $R = \{(p, a), (x, y), (y, t)\}$ is a relation from $A = \{c, p, x, y\}$ to $B = \{a, t, y\}$. The domain of R is

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

$$\text{Domain} = \{p, x, y\}$$

Ans: (D) $\{p, x, y\}$

21. $R = \{(2, b), (2, c), (10, x)\}$ is a relation from $A = \{2, 3, 9, 10\}$ to $B = \{b, c, x\}$. The range of R is

Range of R = set of second elements of the pairs in R .

$$\text{Range} = \{b, c, x\}$$

Ans: (D) $\{b, c, x\}$

22. If $A = \{3, 5\}$ and $B = \{t, x\}$, the domain of the universal relation from A to B is

The universal relation is $A \times B$.

Its first elements are all the elements of A .

Ans: (A) $\{3, 5\}$

23. If $R = \{(5, b), (9, b), (12, b)\}$, then $R^{-1} =$

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

$$R^{-1} = \{(b, 5), (b, 9), (b, 12)\}$$

Ans: (A) $\{(b, 5), (b, 9), (b, 12)\}$

24. If $R^{-1} = \{(a, 1), (a, 2), (t, 2)\}$, then $R =$

Interchanging the elements of each pair of R^{-1} gives back R .

$$R = \{(1, a), (2, a), (2, t)\}$$

Ans: (D) $\{(1, a), (2, a), (2, t)\}$

25. If $R = \{(1, b), (5, b), (9, b), (9, y)\}$, the domain of R^{-1} is

$$R^{-1} = \{(b, 1), (b, 5), (b, 9), (y, 9)\}$$

$$\text{Domain of } R^{-1} = \{b, y\}$$

It is the range of R .

Ans: (D) $\{b, y\}$
