

Sets and Relations

MCQ Test, Set 03

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 $A = \{1, 3\}$ and $B = \{t, x, y\}$, then $B \times A =$
 - $\{(t, 1), (t, 3), (x, 1), (x, 3)\}$
 - $\{(1, t), (1, x), (1, y), (3, t), (3, x), (3, y)\}$
 - $\{(t, 1), (x, 3)\}$
 - $\{(t, 1), (t, 3), (x, 1), (x, 3), (y, 1), (y, 3)\}$
- If $A = \{b, c, z\}$ and $B = \{3, 8\}$, which of the following belongs to $A \times B$?
 - $(b, 8)$
 - $(8, b)$
 - $(8, 3)$
 - (b, z)
- If $A = \{6, 11\}$ and $B = \{c, x, y\}$, which of the following does NOT belong to $A \times B$?
 - $(6, x)$
 - $(c, 11)$
 - $(6, c)$
 - $(6, y)$
- If $A \times B = \{(4, t), (4, y), (5, t), (5, y), (9, t), (9, y)\}$, then $A =$
 - $\{t, y\}$
 - $\{4, 5, 9\}$
 - $\{4, 5, 9, t, y\}$
 - $\{4\}$
- If $n(A \times B) = 28$ and $n(B) = 4$, then $n(A) =$
 - 7
 - 32
 - 24
 - 112
- If $A = \{1, 11, 12\}$ and $B = \{3, 5\}$, then $n(A \times B) =$
 - 5
 - 64
 - 12
 - 6
- If $n(A) = 11$, then $n(A \times A) =$
 - 2048
 - 121
 - 22
 - 11
- If $A = \{5, 6\}$ and $B = \{p, y, z\}$, which of the following is NOT a relation from A to B ?
 - $\{(5, p), (5, a)\}$
 - $\{(5, p), (5, z), (6, y)\}$
 - $\{(5, z)\}$
 - $\{(5, p), (6, z)\}$
- If $A = \{5, 7\}$ and $B = \{a, c, p\}$, which of the following is a relation from B to A ?
 - $\{(5, 5), (5, 7)\}$
 - $\{(5, c), (7, p)\}$
 - $\{(a, 7), (c, 5)\}$
 - $\{(a, a), (p, p)\}$
- If $A = \{10, 12\}$ and $B = \{t, x, z\}$, then $R = \{(t, 10), (t, 12), (z, 10)\}$ is a relation from
 - B to A
 - A to A
 - B to B
 - A to B
- If $A = \{c, q\}$ and $B = \{6, 9, 10\}$, the number of relations from A to B is
 - 12
 - 32
 - 64
 - 6

12. If $A = \{1, 6, 8\}$, the number of relations from A to A is
A. 9 **B.** 8 **C.** 512 **D.** 64
-
13. If $n(A) = 2$ and there are 16384 relations from A to B , then $n(B) =$
A. 8 **B.** 14 **C.** 8192 **D.** 7
-
14. If $R = \{(p, 12), (t, 2), (z, 2)\}$, which of the following is false?
A. $pR7$ **B.** $zR2$ **C.** $pR12$ **D.** $tR2$
-
15. If $R = \{(a, 2), (a, 10), (y, 2), (y, 8)\}$, the set of all b with yRb is
A. $\{2, 8\}$ **B.** $\{2, 8, 10\}$ **C.** $\{y\}$ **D.** $\{2, 10\}$
-
16. If $R = \{(4, p), (7, c), (11, c), (11, p)\}$, the set of all a with aRc is
A. $\{4, 7, 11\}$ **B.** $\{4, 11\}$ **C.** $\{c\}$ **D.** $\{7, 11\}$
-
17. If $A = \{7, 11\}$ and $B = \{3, 7, 8\}$, the null relation from A to B is
A. $\{(7, 3), (7, 7), (7, 8), (11, 3), (11, 7), (11, 8)\}$ **B.** $\{(7, 3)\}$
C. $\{0\}$ **D.** ϕ
-
18. If $n(A) = 6$ and $n(B) = 3$, the number of ordered pairs in the universal relation from A to B is
A. 9 **B.** 0 **C.** 18 **D.** 36
-
19. If $A = \{3, 9, 10\}$ and $B = \{2, 11\}$, the number of ordered pairs in the null relation from A to B is
A. 6 **B.** 0 **C.** 64 **D.** 1
-
20. $R = \{(a, t), (p, t), (x, c)\}$ is a relation from $A = \{a, c, p, x\}$ to $B = \{c, t, y\}$. The domain of R is
A. $\{c, t\}$ **B.** $\{a, p, x\}$ **C.** $\{a, c, p, x\}$ **D.** $\{a, c, p, t, x\}$
-
21. $R = \{(10, 1), (11, 3), (11, 10)\}$ is a relation from $A = \{6, 10, 11\}$ to $B = \{1, 3, 10\}$. The range of R is
A. $\{1, 3, 10, 11\}$ **B.** $\{10, 11\}$ **C.** $\{1, 3, 10\}$ **D.** $\{6, 10, 11\}$
-
22. If $A = \{8, 10\}$ and $B = \{b, c\}$, the range of the universal relation from A to B is
A. $\{(8, b), (8, c), (10, b), (10, c)\}$ **B.** ϕ
C. $\{b, c\}$ **D.** $\{8, 10\}$
-
23. If $R = \{(3, t), (12, a), (12, q)\}$, then $R^{-1} =$
A. $\{(t, 3), (a, 12), (q, 12)\}$ **B.** $\{(t, 12), (a, 12), (q, 3)\}$
C. $\{(t, 3), (a, 12), (12, q)\}$ **D.** $\{(3, t), (12, a), (12, q)\}$
-
24. If $R^{-1} = \{(7, b), (2, y), (7, y)\}$, then $R =$
A. $\{(7, b), (2, y), (7, y)\}$ **B.** $\{(b, 7), (y, 2), (y, 7)\}$
C. $\{(b, 7), (y, 2), (7, y)\}$ **D.** $\{(b, 2), (y, 7), (y, 7)\}$
-

25. If $R = \{(6, c), (6, t), (7, c)\}$, the domain of R^{-1} is

A. $\{6, 7, c, t\}$

B. $\{c\}$

C. $\{6, 7\}$

D. $\{c, t\}$

Key sheet

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

Solutions

1. If $A = \{1, 3\}$ and $B = \{t, x, y\}$, then $B \times A =$

$$B \times A = \{(b, a) : b \in B, a \in A\}$$
$$= \{(t, 1), (t, 3), (x, 1), (x, 3), (y, 1), (y, 3)\}$$

Ans: (D) $\{(t, 1), (t, 3), (x, 1), (x, 3), (y, 1), (y, 3)\}$

2. If $A = \{b, c, z\}$ and $B = \{3, 8\}$, 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 $8 \in B$, so $(b, 8) \in A \times B$.

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

3. If $A = \{6, 11\}$ and $B = \{c, x, y\}$, 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 .

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

Ans: (B) $(c, 11)$

4. If $A \times B = \{(4, t), (4, y), (5, t), (5, y), (9, t), (9, y)\}$, then $A =$

A is the set of first elements of the pairs.

$$A = \{4, 5, 9\}$$

Ans: (B) $\{4, 5, 9\}$

5. If $n(A \times B) = 28$ and $n(B) = 4$, then $n(A) =$

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

$$28 = n(A) \times 4$$

$$n(A) = 28 \div 4 = 7$$

Ans: (A) 7

6. If $A = \{1, 11, 12\}$ and $B = \{3, 5\}$, then $n(A \times B) =$

$$n(A) = 3, n(B) = 2$$

$$n(A \times B) = 3 \times 2 = 6$$

Ans: (D) 6

7. If $n(A) = 11$, then $n(A \times A) =$

$$n(A \times A) = n(A) \times n(A) = 11 \times 11 = 121$$

Ans: (B) 121

8. If $A = \{5, 6\}$ and $B = \{p, y, z\}$, which of the following is NOT a relation from A to B ?

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

$a \notin B$, so $(5, a) \notin A \times B$.

Ans: (A) $\{(5, p), (5, a)\}$

9. If $A = \{5, 7\}$ and $B = \{a, c, p\}$, 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 $\{(a, 7), (c, 5)\}$ every first element is in B and every second element is in A .

Ans: (C) $\{(a, 7), (c, 5)\}$

10. If $A = \{10, 12\}$ and $B = \{t, x, z\}$, then $R = \{(t, 10), (t, 12), (z, 10)\}$ is a relation from

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

$\therefore R \subseteq B \times A$

Ans: (A) B to A

11. If $A = \{c, q\}$ and $B = \{6, 9, 10\}$, the number of relations from A to B is

$$n(A \times B) = 2 \times 3 = 6$$

$$\text{Number of relations} = 2^6 = 64$$

Ans: (C) 64

12. If $A = \{1, 6, 8\}$, 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 $n(A) = 2$ and there are 16384 relations from A to B , then $n(B) =$

$$2^{2 \times n(B)} = 16384 = 2^{14}$$

$$2 \times n(B) = 14$$

$$n(B) = 7$$

Ans: (D) 7

14. If $R = \{(p, 12), (t, 2), (z, 2)\}$, which of the following is false?

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

$(p, 7) \notin R$, so $pR7$ is false.

Ans: (A) $pR7$

15. If $R = \{(a, 2), (a, 10), (y, 2), (y, 8)\}$, the set of all b with yRb is

yRb means $(y, b) \in R$.

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

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

16. If $R = \{(4, p), (7, c), (11, c), (11, p)\}$, the set of all a with aRc is

aRc means $(a, c) \in R$.

Such pairs: $(7, c), (11, c)$.

Ans: (D) $\{7, 11\}$

17. If $A = \{7, 11\}$ and $B = \{3, 7, 8\}$, 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 $n(A) = 6$ and $n(B) = 3$, the number of ordered pairs in the universal relation from A to B is

The universal relation is $A \times B$.

$$n(A \times B) = 6 \times 3 = 18$$

Ans: (C) 18

19. If $A = \{3, 9, 10\}$ and $B = \{2, 11\}$, 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: (B) 0

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

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

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

Ans: (B) $\{a, p, x\}$

21. $R = \{(10, 1), (11, 3), (11, 10)\}$ is a relation from $A = \{6, 10, 11\}$ to $B = \{1, 3, 10\}$. The range of R is

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

$$\text{Range} = \{1, 3, 10\}$$

Ans: (C) $\{1, 3, 10\}$

22. If $A = \{8, 10\}$ and $B = \{b, c\}$, the range of the universal relation from A to B is

The universal relation is $A \times B$.

Its second elements are all the elements of B .

Ans: (C) $\{b, c\}$

23. If $R = \{(3, t), (12, a), (12, q)\}$, then $R^{-1} =$

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

$$R^{-1} = \{(t, 3), (a, 12), (q, 12)\}$$

Ans: (A) $\{(t, 3), (a, 12), (q, 12)\}$

24. If $R^{-1} = \{(7, b), (2, y), (7, y)\}$, then $R =$

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

$$R = \{(b, 7), (y, 2), (y, 7)\}$$

Ans: (B) $\{(b, 7), (y, 2), (y, 7)\}$

25. If $R = \{(6, c), (6, t), (7, c)\}$, the domain of R^{-1} is

$$R^{-1} = \{(c, 6), (t, 6), (c, 7)\}$$

$$\text{Domain of } R^{-1} = \{c, t\}$$

It is the range of R .

Ans: (D) $\{c, t\}$
