

Sets and Relations

MCQ Test, Set 06

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 $A = \{t, y\}$, then $A \times A =$
 - $\{(t, y), (y, t)\}$
 - $\{(t, t), (t, y), (y, t), (y, y)\}$
 - $\{(t, t), (y, y)\}$
 - $\{(t, y)\}$
- If $A = \{1, 11, 12\}$ and $B = \{c, p\}$, then $A \times B =$
 - $\{(1, c), (11, p)\}$
 - $\{(c, 1), (c, 11), (c, 12), (p, 1), (p, 11), (p, 12)\}$
 - $\{(1, c), (1, p), (11, c), (11, p)\}$
 - $\{(1, c), (1, p), (11, c), (11, p), (12, c), (12, p)\}$
- If $A = \{7, 9\}$ and $B = \{p, q\}$, then $B \times A =$
 - $\{(7, p), (7, q), (9, p), (9, q)\}$
 - $\{(p, 7), (q, 9)\}$
 - $\{(p, 7), (p, 9), (q, 7), (q, 9)\}$
 - $\{(p, 7), (p, 9)\}$
- If $A = \{3, 5, 9\}$ and $B = \{t, x\}$, which of the following belongs to $A \times B$?
 - (t, x)
 - $(t, 5)$
 - $(5, t)$
 - $(5, 9)$
- If $n(A) = 9$ and $n(B) = 4$, then $n(A \times B) =$
 - 13
 - 45
 - 72
 - 36
- If $n(A \times B) = 20$ and $n(B) = 2$, then $n(A) =$
 - 10
 - 22
 - 40
 - 18
- If $A = \{4, 5\}$ and $B = \{6, 7, 9, 11\}$, then $n(A \times B) =$
 - 16
 - 6
 - 8
 - 256
- If $A = \{3, 10, 11\}$ and $B = \{q, y\}$, which of the following is a relation from A to B ?
 - $\{(y, 10), (11, y)\}$
 - $\{(10, y), (11, y)\}$
 - $\{(q, 11), (y, 10)\}$
 - $\{(10, p), (10, y)\}$
- If $A = \{4, 10\}$ and $B = \{p, q, t\}$, which of the following is NOT a relation from A to B ?
 - $\{(4, q)\}$
 - $\{(4, z), (4, q)\}$
 - $\{(4, p), (4, q), (4, t)\}$
 - $\{(10, p), (10, t)\}$
- If $A = \{b, t, x\}$ and $B = \{4, 8\}$, which of the following is a relation from B to A ?
 - $\{(4, 8), (8, 4)\}$
 - $\{(t, x), (x, b)\}$
 - $\{(b, 4), (t, 8)\}$
 - $\{(4, t), (8, x)\}$

11. If $A = \{2\}$ and $B = \{1, 2, 6, 12\}$, the number of relations from A to B is
A. 8 **B.** 16 **C.** 4 **D.** 32
-
12. If $A = \{1, 7, 11\}$, the number of relations from A to A is
A. 64 **B.** 9 **C.** 512 **D.** 8
-
13. If $n(A) = 4$ and there are 65536 relations from A to B , then $n(B) =$
A. 32768 **B.** 16 **C.** 16384 **D.** 4
-
14. If $R = \{(b, 8), (b, 9), (z, 2)\}$, which of the following is true?
A. $bR9$ **B.** $9Rb$ **C.** $zR8$ **D.** $bR2$
-
15. If $R = \{(y, 5), (y, 8), (y, 10)\}$, which of the following is false?
A. $pR5$ **B.** $yR10$ **C.** $yR5$ **D.** $yR8$
-
16. If $R = \{(a, 1), (a, 12), (z, 1), (z, 4)\}$, the set of all b with zRb is
A. $\{1, 4, 12\}$ **B.** $\{1, 12\}$ **C.** $\{z\}$ **D.** $\{1, 4\}$
-
17. If $A = \{a, c\}$ and $B = \{a, p\}$, the universal relation from A to B is
A. $\{(a, a), (c, p)\}$ **B.** $\{(a, a), (a, p), (c, a), (c, p)\}$
C. $\{(a, a), (a, c), (p, a), (p, c)\}$ **D.** ϕ
-
18. If $A = \{7, 10\}$ and $B = \{c, p, z\}$, the null relation from A to B is
A. ϕ **B.** $\{(7, c), (7, p), (7, z), (10, c), (10, p), (10, z)\}$
C. $\{0\}$ **D.** $\{(7, c)\}$
-
19. If $n(A) = 12$ and $n(B) = 9$, the number of ordered pairs in the universal relation from A to B is
A. 216 **B.** 0 **C.** 108 **D.** 21
-
20. If $A = \{4, 10, 11\}$ and $B = \{a, q\}$, the domain of the null relation from A to B is
A. ϕ **B.** $\{4, 10, 11\}$ **C.** $\{a, q\}$ **D.** $\{0\}$
-
21. Which of the following relations has domain $\{10, 12\}$ and range $\{p, y\}$?
A. $\{(p, 10), (y, 10), (y, 12)\}$ **B.** $\{(7, p), (12, p)\}$
C. $\{(10, p), (10, y), (12, y)\}$ **D.** $\{(7, p), (10, y), (12, y)\}$
-
22. $R = \{(2, c), (2, x), (8, c), (11, c)\}$ is a relation from $A = \{2, 8, 10, 11\}$ to $B = \{c, x\}$. Which element of A is not in the domain of R ?
A. 8 **B.** 10 **C.** 11 **D.** 2
-
23. If $R = \{(2, b), (2, t), (5, b), (8, b)\}$, the range of R^{-1} is
A. $\{b, t\}$ **B.** $\{2, 5\}$ **C.** $\{2, 5, 8, b, t\}$ **D.** $\{2, 5, 8\}$
-
24. If $R = \{(c, 3), (q, 10), (z, 3)\}$, which ordered pair belongs to R^{-1} ?
A. $(10, q)$ **B.** $(q, 10)$ **C.** $(c, 3)$ **D.** $(7, c)$
-

25. $R = \{(2, a), (8, a), (8, b)\}$ is a relation from $A = \{2, 8, 11\}$ to $B = \{a, b, x\}$. Then R^{-1} is a relation from
- A.** A to B **B.** B to B **C.** B to A **D.** A to A
-

Key sheet

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

Solutions

1. If $A = \{t, y\}$, then $A \times A =$

Pair each element of A with every element of A (itself included).

$$A \times A = \{(t, t), (t, y), (y, t), (y, y)\}$$

Ans: (B) $\{(t, t), (t, y), (y, t), (y, y)\}$

2. If $A = \{1, 11, 12\}$ and $B = \{c, p\}$, then $A \times B =$

$$A \times B = \{(a, b) : a \in A, b \in B\}$$

$$= \{(1, c), (1, p), (11, c), (11, p), (12, c), (12, p)\}$$

Ans: (D) $\{(1, c), (1, p), (11, c), (11, p), (12, c), (12, p)\}$

3. If $A = \{7, 9\}$ and $B = \{p, q\}$, then $B \times A =$

$$B \times A = \{(b, a) : b \in B, a \in A\}$$

$$= \{(p, 7), (p, 9), (q, 7), (q, 9)\}$$

Ans: (C) $\{(p, 7), (p, 9), (q, 7), (q, 9)\}$

4. If $A = \{3, 5, 9\}$ and $B = \{t, x\}$, which of the following belongs to $A \times B$?

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

$5 \in A$ and $t \in B$, so $(5, t) \in A \times B$.

Ans: (C) $(5, t)$

5. If $n(A) = 9$ and $n(B) = 4$, then $n(A \times B) =$

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

$$= 9 \times 4 = 36$$

Ans: (D) 36

6. If $n(A \times B) = 20$ and $n(B) = 2$, then $n(A) =$

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

$$20 = n(A) \times 2$$

$$n(A) = 20 \div 2 = 10$$

Ans: (A) 10

7. If $A = \{4, 5\}$ and $B = \{6, 7, 9, 11\}$, then $n(A \times B) =$

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

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

Ans: (C) 8

8. If $A = \{3, 10, 11\}$ and $B = \{q, y\}$, 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 $\{(10, y), (11, y)\}$ has every pair in $A \times B$.

Ans: (B) $\{(10, y), (11, y)\}$

9. If $A = \{4, 10\}$ and $B = \{p, q, t\}$, which of the following is NOT a relation from A to B ?

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

$z \notin B$, so $(4, z) \notin A \times B$.

Ans: (B) $\{(4, z), (4, q)\}$

10. If $A = \{b, t, x\}$ and $B = \{4, 8\}$, 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 $\{(4, t), (8, x)\}$ every first element is in B and every second element is in A .

Ans: (D) $\{(4, t), (8, x)\}$

11. If $A = \{2\}$ and $B = \{1, 2, 6, 12\}$, the number of relations from A to B is

$$n(A \times B) = 1 \times 4 = 4$$

$$\text{Number of relations} = 2^4 = 16$$

Ans: (B) 16

12. If $A = \{1, 7, 11\}$, 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 $n(A) = 4$ and there are 65536 relations from A to B , then $n(B) =$

$$2^{4 \times n(B)} = 65536 = 2^{16}$$

$$4 \times n(B) = 16$$

$$n(B) = 4$$

Ans: (D) 4

14. If $R = \{(b, 8), (b, 9), (z, 2)\}$, which of the following is true?

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

$(b, 9) \in R$, so $bR9$.

Ans: (A) $bR9$

15. If $R = \{(y, 5), (y, 8), (y, 10)\}$, which of the following is false?

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

$(p, 5) \notin R$, so $pR5$ is false.

Ans: (A) $pR5$

16. If $R = \{(a, 1), (a, 12), (z, 1), (z, 4)\}$, the set of all b with zRb is

zRb means $(z, b) \in R$.

Such pairs: $(z, 1), (z, 4)$.

Ans: (D) $\{1, 4\}$

17. If $A = \{a, c\}$ and $B = \{a, p\}$, 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.

$$A \times B = \{(a, a), (a, p), (c, a), (c, p)\}$$

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

18. If $A = \{7, 10\}$ and $B = \{c, p, z\}$, 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: (A) ϕ

19. If $n(A) = 12$ and $n(B) = 9$, the number of ordered pairs in the universal relation from A to B is

The universal relation is $A \times B$.

$$n(A \times B) = 12 \times 9 = 108$$

Ans: (C) 108

20. If $A = \{4, 10, 11\}$ and $B = \{a, q\}$, the domain of the null relation from A to B is

The null relation ϕ has no ordered pairs.

So its domain is ϕ .

Ans: (A) ϕ

21. Which of the following relations has domain $\{10, 12\}$ and range $\{p, y\}$?

Domain = first elements, Range = second elements.

For $\{(10, p), (10, y), (12, y)\}$: Domain = $\{10, 12\}$, Range = $\{p, y\}$.

Ans: (C) $\{(10, p), (10, y), (12, y)\}$

22. $R = \{(2, c), (2, x), (8, c), (11, c)\}$ is a relation from $A = \{2, 8, 10, 11\}$ to $B = \{c, x\}$. Which element of A is not in the domain of R ?

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

$$\text{Domain} = \{2, 8, 11\}$$

$10 \in A$ but it is not a first element of any pair.

Ans: (B) 10

23. If $R = \{(2, b), (2, t), (5, b), (8, b)\}$, the range of R^{-1} is

$$R^{-1} = \{(b, 2), (t, 2), (b, 5), (b, 8)\}$$

$$\text{Range of } R^{-1} = \{2, 5, 8\}$$

It is the domain of R .

Ans: (D) $\{2, 5, 8\}$

24. If $R = \{(c, 3), (q, 10), (z, 3)\}$, which ordered pair belongs to R^{-1} ?

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

$(q, 10) \in R$, so $(10, q) \in R^{-1}$.

Ans: (A) $(10, q)$

25. $R = \{(2, a), (8, a), (8, b)\}$ is a relation from $A = \{2, 8, 11\}$ to $B = \{a, b, x\}$. Then R^{-1} is a relation from

$$R^{-1} = \{(a, 2), (a, 8), (b, 8)\}$$

First elements are in B , second elements in A .

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

Ans: (C) B to A
