

Sets and Relations

MCQ Test, Set 09

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 $A \times B = \{(3, b), (3, c), (3, p), (11, b), (11, c), (11, p)\}$, then $A =$
A. $\{3\}$ **B.** $\{3, 11\}$ **C.** $\{b, c, p\}$ **D.** $\{3, 11, b, c, p\}$
- If $A \times B = \{(4, a), (4, t), (9, a), (9, t)\}$, then $B =$
A. $\{a, t\}$ **B.** $\{a\}$ **C.** $\{4, 9\}$ **D.** $\{4, 9, a, t\}$
- If $A = \{4, 6\}$, then $A \times A =$
A. $\{(4, 6)\}$ **B.** $\{(4, 4), (4, 6), (6, 4), (6, 6)\}$
C. $\{(4, 4), (6, 6)\}$ **D.** $\{(4, 6), (6, 4)\}$
- If $A = \{3, 4\}$ and $B = \{8, 9\}$, then $A \times B =$
A. $\{(3, 8), (3, 9), (4, 8), (4, 9)\}$ **B.** $\{(8, 3), (8, 4), (9, 3), (9, 4)\}$
C. $\{(3, 8), (4, 9)\}$ **D.** $\{(3, 8), (3, 9)\}$
- If $n(A \times A) = 49$, then $n(A) =$
A. 7 **B.** 14 **C.** 49 **D.** 8
- If $n(A) = 11$ and $n(B) = 2$, then $n(A \times B) =$
A. 33 **B.** 13 **C.** 44 **D.** 22
- If $n(A \times B) = 72$ and $n(B) = 8$, then $n(A) =$
A. 576 **B.** 80 **C.** 64 **D.** 9
- If $A = \{c, x\}$ and $B = \{2, 4, 8\}$, which of the following is a relation from A to B ?
A. $\{(2, x), (4, c)\}$ **B.** $\{(c, 8), (x, 8)\}$ **C.** $\{(c, 3), (x, 2)\}$ **D.** $\{(2, c), (c, 4)\}$
- If $A = \{b, t, y\}$ and $B = \{2, 10\}$, which of the following is NOT a relation from A to B ?
A. $\{(b, 2), (y, 10)\}$ **B.** $\{(b, 2), (y, 2), (y, 10)\}$
C. $\{(b, 10), (2, y)\}$ **D.** $\{(t, 2)\}$
- If $A = \{2, 3, 7\}$ and $B = \{q, x\}$, which of the following is a relation from B to A ?
A. $\{(q, 2), (x, 3)\}$ **B.** $\{(2, 7), (7, 3)\}$ **C.** $\{(q, q), (x, x)\}$ **D.** $\{(2, x), (3, q)\}$

11. If $A \times B$ has 5 elements, the number of relations from A to B is
A. 5 **B.** 32 **C.** 10 **D.** 25
-
12. If $A = \{p, q, t\}$ and $B = \{2, 4\}$, the number of relations from A to B is
A. 64 **B.** 12 **C.** 6 **D.** 32
-
13. If $A = \{b, p, z\}$, the number of relations from A to A is
A. 8 **B.** 9 **C.** 64 **D.** 512
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14. If $R = \{(c, 1), (c, 2), (p, 1)\}$, which of the following is true?
A. $1Rc$ **B.** $bR1$ **C.** $cR1$ **D.** $bR2$
-
15. If $R = \{(5, a), (5, b), (12, a)\}$, which of the following is false?
A. $5Rb$ **B.** $5Ra$ **C.** $12Ra$ **D.** $5Rp$
-
16. If $R = \{(1, a), (1, y), (4, q), (4, y)\}$, the set of all b with $4Rb$ is
A. $\{a, y\}$ **B.** $\{a, q, y\}$ **C.** $\{q, y\}$ **D.** $\{4\}$
-
17. If $A = \{1, 4, 5\}$ and $B = \{a, y\}$, then $R = \{(4, y), (1, a), (5, a), (5, y), (4, a), (1, y)\}$ is
A. a relation from B to A **B.** not a relation from A to B
C. the null relation from A to B **D.** the universal relation from A to B
-
18. If $A = \{4, 5, 8\}$ and $B = \{4, 7\}$, the universal relation from A to B is
A. $\{(4, 4), (5, 7)\}$ **B.** $\{(4, 4), (4, 5), (4, 8), (7, 4), (7, 5), (7, 8)\}$
C. $\{(4, 4), (4, 7), (5, 4), (5, 7), (8, 4), (8, 7)\}$ **D.** ϕ
-
19. If $A = \{3, 7\}$ and $B = \{7, 8, 12\}$, the null relation from A to B is
A. $\{(3, 7), (3, 8), (3, 12), (7, 7), (7, 8), (7, 12)\}$ **B.** ϕ
C. $\{(3, 7)\}$ **D.** $\{0\}$
-
20. $R = \{(b, q), (c, q), (p, t)\}$ is a relation from $A = \{b, c, p, y\}$ to $B = \{q, t\}$. The domain of R is
A. $\{b, c, p\}$ **B.** $\{b, c, p, y\}$ **C.** $\{b, c, p, q, t\}$ **D.** $\{q, t\}$
-
21. $R = \{(c, b), (c, z), (t, y)\}$ is a relation from $A = \{b, c, t, x\}$ to $B = \{b, y, z\}$. The range of R is
A. $\{c, t\}$ **B.** $\{b, y, z\}$ **C.** $\{b, c, t, x\}$ **D.** $\{b, c, t, y, z\}$
-
22. If $A = \{11, 12\}$ and $B = \{p, x\}$, the domain of the universal relation from A to B is
A. ϕ **B.** $\{(11, p), (11, x), (12, p), (12, x)\}$
C. $\{11, 12\}$ **D.** $\{p, x\}$
-
23. If $R = \{(4, q), (4, y), (11, q)\}$, then $R^{-1} =$
A. $\{(4, q), (4, y), (11, q)\}$ **B.** $\{(q, 4), (y, 11), (q, 4)\}$
C. $\{(q, 4), (y, 4), (q, 11)\}$ **D.** $\{(q, 4), (y, 4), (11, q)\}$
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24. If $R^{-1} = \{(12, x), (3, y), (8, y)\}$, then $R =$

A. $\{(x, 3), (y, 8), (y, 12)\}$

B. $\{(12, x), (3, y), (8, y)\}$

C. $\{(x, 12), (y, 3), (8, y)\}$

D. $\{(x, 12), (y, 3), (y, 8)\}$

25. If $R = \{(2, c), (2, x), (11, x)\}$, the domain of R^{-1} is

A. $\{2, 11\}$

B. $\{c, x\}$

C. $\{c\}$

D. $\{2, 11, c, x\}$

Key sheet

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

Solutions

1. If $A \times B = \{(3, b), (3, c), (3, p), (11, b), (11, c), (11, p)\}$, then $A =$
 A is the set of first elements of the pairs.
 $A = \{3, 11\}$
Ans: (B) $\{3, 11\}$
-
2. If $A \times B = \{(4, a), (4, t), (9, a), (9, t)\}$, then $B =$
 B is the set of second elements of the pairs.
 $B = \{a, t\}$
Ans: (A) $\{a, t\}$
-
3. If $A = \{4, 6\}$, then $A \times A =$
Pair each element of A with every element of A (itself included).
 $A \times A = \{(4, 4), (4, 6), (6, 4), (6, 6)\}$
Ans: (B) $\{(4, 4), (4, 6), (6, 4), (6, 6)\}$
-
4. If $A = \{3, 4\}$ and $B = \{8, 9\}$, then $A \times B =$
 $A \times B = \{(a, b) : a \in A, b \in B\}$
 $= \{(3, 8), (3, 9), (4, 8), (4, 9)\}$
Ans: (A) $\{(3, 8), (3, 9), (4, 8), (4, 9)\}$
-
5. If $n(A \times A) = 49$, then $n(A) =$
 $n(A \times A) = n(A) \times n(A) = 49$
 $7 \times 7 = 49$
 $\therefore n(A) = 7$
Ans: (A) 7
-
6. If $n(A) = 11$ and $n(B) = 2$, then $n(A \times B) =$
 $n(A \times B) = n(A) \times n(B) = mn$
 $= 11 \times 2 = 22$
Ans: (D) 22
-
7. If $n(A \times B) = 72$ and $n(B) = 8$, then $n(A) =$
 $n(A \times B) = n(A) \times n(B)$
 $72 = n(A) \times 8$
 $n(A) = 72 \div 8 = 9$
Ans: (D) 9
-
8. If $A = \{c, x\}$ and $B = \{2, 4, 8\}$, 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 $\{(c, 8), (x, 8)\}$ has every pair in $A \times B$.
Ans: (B) $\{(c, 8), (x, 8)\}$
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9. If $A = \{b, t, y\}$ and $B = \{2, 10\}$, which of the following is NOT a relation from A to B ?

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

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

Ans: (C) $\{(b, 10), (2, y)\}$

10. If $A = \{2, 3, 7\}$ and $B = \{q, x\}$, 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 $\{(q, 2), (x, 3)\}$ every first element is in B and every second element is in A .

Ans: (A) $\{(q, 2), (x, 3)\}$

11. If $A \times B$ has 5 elements, the number of relations from A to B is

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

$$2^5 = 32$$

Ans: (B) 32

12. If $A = \{p, q, t\}$ and $B = \{2, 4\}$, the number of relations from A to B is

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

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

Ans: (A) 64

13. If $A = \{b, p, z\}$, 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: (D) 512

14. If $R = \{(c, 1), (c, 2), (p, 1)\}$, which of the following is true?

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

$(c, 1) \in R$, so $cR1$.

Ans: (C) $cR1$

15. If $R = \{(5, a), (5, b), (12, a)\}$, which of the following is false?

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

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

Ans: (D) $5Rp$

16. If $R = \{(1, a), (1, y), (4, q), (4, y)\}$, the set of all b with $4Rb$ is

$4Rb$ means $(4, b) \in R$.

Such pairs: $(4, q), (4, y)$.

Ans: (C) $\{q, y\}$

17. If $A = \{1, 4, 5\}$ and $B = \{a, y\}$, then $R = \{(4, y), (1, a), (5, a), (5, y), (4, a), (1, y)\}$ is
 R contains every pair of $A \times B$.
 $\therefore R = A \times B$
So R is the universal relation from A to B .
Ans: (D) the universal relation from A to B

18. If $A = \{4, 5, 8\}$ and $B = \{4, 7\}$, 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.
 $A \times B = \{(4, 4), (4, 7), (5, 4), (5, 7), (8, 4), (8, 7)\}$
Ans: (C) $\{(4, 4), (4, 7), (5, 4), (5, 7), (8, 4), (8, 7)\}$

19. If $A = \{3, 7\}$ and $B = \{7, 8, 12\}$, 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

20. $R = \{(b, q), (c, q), (p, t)\}$ is a relation from $A = \{b, c, p, y\}$ to $B = \{q, t\}$. The domain of R is
Domain of R = set of first elements of the pairs in R .
Domain = $\{b, c, p\}$
Ans: (A) $\{b, c, p\}$

21. $R = \{(c, b), (c, z), (t, y)\}$ is a relation from $A = \{b, c, t, x\}$ to $B = \{b, y, z\}$. The range of R is
Range of R = set of second elements of the pairs in R .
Range = $\{b, y, z\}$
Ans: (B) $\{b, y, z\}$

22. If $A = \{11, 12\}$ and $B = \{p, x\}$, 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: (C) $\{11, 12\}$

23. If $R = \{(4, q), (4, y), (11, q)\}$, then $R^{-1} =$
 R^{-1} : interchange the two elements of every pair of R .
 $R^{-1} = \{(q, 4), (y, 4), (q, 11)\}$
Ans: (C) $\{(q, 4), (y, 4), (q, 11)\}$

24. If $R^{-1} = \{(12, x), (3, y), (8, y)\}$, then $R =$
Interchanging the elements of each pair of R^{-1} gives back R .
 $R = \{(x, 12), (y, 3), (y, 8)\}$
Ans: (D) $\{(x, 12), (y, 3), (y, 8)\}$

25. If $R = \{(2, c), (2, x), (11, x)\}$, the domain of R^{-1} is

$$R^{-1} = \{(c, 2), (x, 2), (x, 11)\}$$

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

It is the range of R .

Ans: (B) $\{c, x\}$
