

Sets and Relations

MCQ Test, Set 10

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 $A = \{6, 11\}$ and $B = \{b, x, z\}$, then $B \times A =$
A. $\{(6, b), (6, x), (6, z), (11, b), (11, x), (11, z)\}$ **B.** $\{(b, 6), (x, 11)\}$
C. $\{(b, 6), (b, 11), (x, 6), (x, 11)\}$ **D.** $\{(b, 6), (b, 11), (x, 6), (x, 11), (z, 6), (z, 11)\}$
- If $A = \{a, t, x\}$ and $B = \{7, 8\}$, which of the following belongs to $A \times B$?
A. (t, a) **B.** $(t, 8)$ **C.** $(8, 7)$ **D.** $(8, t)$
- If $A = \{4, 5\}$ and $B = \{c, x, z\}$, which of the following does NOT belong to $A \times B$?
A. $(c, 5)$ **B.** $(4, z)$ **C.** $(5, z)$ **D.** $(5, c)$
- If $A \times B = \{(6, b), (6, c), (7, b), (7, c)\}$, then $A =$
A. $\{6, 7\}$ **B.** $\{6\}$ **C.** $\{b, c\}$ **D.** $\{6, 7, b, c\}$
- If $A = \{p, t\}$ and $B = \{1, 6, 11\}$, then $n(A \times B) =$
A. 5 **B.** 12 **C.** 6 **D.** 64
- If $n(A) = 10$, then $n(A \times A) =$
A. 1024 **B.** 100 **C.** 20 **D.** 10
- If $n(A \times A) = 196$, then $n(A) =$
A. 98 **B.** 14 **C.** 28 **D.** 196
- If $A = \{2, 10\}$ and $B = \{a, t, y\}$, which of the following is a relation from B to A ?
A. $\{(t, a), (y, t)\}$ **B.** $\{(2, 2), (2, 10)\}$ **C.** $\{(2, y), (10, y)\}$ **D.** $\{(a, 2), (y, 2)\}$
- If $A = \{5, 7, 11\}$ and $B = \{q, y\}$, then $R = \{(q, 5), (q, 7), (q, 11)\}$ is a relation from
A. A to A **B.** B to B **C.** A to B **D.** B to A
- If $A = \{2, 6, 9\}$ and $B = \{a, t\}$, which of the following is a relation from A to B ?
A. $\{(6, t), (9, a)\}$ **B.** $\{(2, q), (6, t)\}$ **C.** $\{(t, 2), (6, t)\}$ **D.** $\{(a, 6), (a, 9)\}$
- If $A = \{5, 9, 10\}$, the number of relations from A to A is
A. 8 **B.** 64 **C.** 512 **D.** 9

12. If $A \times B$ has 12 elements, the number of relations from A to B is
A. 12 **B.** 24 **C.** 144 **D.** 4096
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13. If $A = \{10\}$ and $B = \{p, q, t\}$, the number of relations from A to B is
A. 8 **B.** 16 **C.** 3 **D.** 6
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14. If $R = \{(c, 1), (q, 5), (y, 5), (y, 9)\}$, the set of all b with yRb is
A. $\{y\}$ **B.** $\{1, 5\}$ **C.** $\{1, 5, 9\}$ **D.** $\{5, 9\}$
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15. If $R = \{(4, x), (7, b), (7, x), (9, b)\}$, the set of all a with aRb is
A. $\{4, 7, 9\}$ **B.** $\{4, 7\}$ **C.** $\{7, 9\}$ **D.** $\{b\}$
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16. If $R = \{(2, c), (2, x), (10, c)\}$, which of the following is true?
A. $1Rx$ **B.** $10Rx$ **C.** $cR2$ **D.** $2Rc$
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17. If $n(A) = 5$ and $n(B) = 4$, the number of ordered pairs in the universal relation from A to B is
A. 20 **B.** 0 **C.** 40 **D.** 9
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18. If $A = \{3, 4, 5\}$ and $B = \{p, q, z\}$, the number of ordered pairs in the null relation from A to B is
A. 9 **B.** 0 **C.** 512 **D.** 1
-
19. If $A = \{4, 7\}$ and $B = \{b, p, t\}$, then $R = \{(4, b), (7, t), (4, t), (7, p), (4, p), (7, b)\}$ is
A. not a relation from A to B **B.** a relation from B to A
C. the universal relation from A to B **D.** the null relation from A to B
-
20. If $A = \{b, p, x\}$ and $B = \{1, 9\}$, the domain of the null relation from A to B is
A. $\{0\}$ **B.** $\{b, p, x\}$ **C.** ϕ **D.** $\{1, 9\}$
-
21. Which of the following relations has domain $\{2, 5\}$ and range $\{b, z\}$?
A. $\{(b, 2), (z, 2), (z, 5)\}$ **B.** $\{(2, b), (2, z), (5, z)\}$
C. $\{(2, b), (2, z), (4, z)\}$ **D.** $\{(4, b), (5, z)\}$
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22. $R = \{(2, 10), (10, 6), (10, 10), (11, 6), (11, 10)\}$ is a relation from $A = \{2, 5, 10, 11\}$ to $B = \{6, 10\}$. Which element of A is not in the domain of R ?
A. 2 **B.** 5 **C.** 11 **D.** 10
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23. If $R = \{(1, z), (2, b), (10, b)\}$, the range of R^{-1} is
A. $\{1, 2, 10\}$ **B.** $\{b, z\}$ **C.** $\{1, 2\}$ **D.** $\{1, 2, 10, b, z\}$
-
24. If $R = \{(t, 1), (y, 1), (y, 4)\}$, which ordered pair belongs to R^{-1} ?
A. $(t, 1)$ **B.** $(1, t)$ **C.** $(y, 1)$ **D.** $(1, p)$
-
25. $R = \{(c, 10), (y, 3), (y, 10)\}$ is a relation from $A = \{b, c, y\}$ to $B = \{3, 6, 10\}$. Then R^{-1} is a relation from
A. A to B **B.** B to B **C.** B to A **D.** A to A
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Key sheet

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

Solutions

1. If $A = \{6, 11\}$ and $B = \{b, x, z\}$, then $B \times A =$

$$B \times A = \{(b, a) : b \in B, a \in A\}$$
$$= \{(b, 6), (b, 11), (x, 6), (x, 11), (z, 6), (z, 11)\}$$

Ans: (D) $\{(b, 6), (b, 11), (x, 6), (x, 11), (z, 6), (z, 11)\}$

2. If $A = \{a, t, x\}$ and $B = \{7, 8\}$, which of the following belongs to $A \times B$?

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

$t \in A$ and $8 \in B$, so $(t, 8) \in A \times B$.

Ans: (B) $(t, 8)$

3. If $A = \{4, 5\}$ and $B = \{c, x, z\}$, 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 .

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

Ans: (A) $(c, 5)$

4. If $A \times B = \{(6, b), (6, c), (7, b), (7, c)\}$, then $A =$

A is the set of first elements of the pairs.

$$A = \{6, 7\}$$

Ans: (A) $\{6, 7\}$

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

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

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

Ans: (C) 6

6. If $n(A) = 10$, then $n(A \times A) =$

$$n(A \times A) = n(A) \times n(A) = 10 \times 10 = 100$$

Ans: (B) 100

7. If $n(A \times A) = 196$, then $n(A) =$

$$n(A \times A) = n(A) \times n(A) = 196$$

$$14 \times 14 = 196$$

$$\therefore n(A) = 14$$

Ans: (B) 14

8. If $A = \{2, 10\}$ and $B = \{a, t, y\}$, 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 $\{(a, 2), (y, 2)\}$ every first element is in B and every second element is in A .

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

9. If $A = \{5, 7, 11\}$ and $B = \{q, y\}$, then $R = \{(q, 5), (q, 7), (q, 11)\}$ is a relation from First elements are in B , second elements are in A .
 $\therefore R \subseteq B \times A$
Ans: (D) B to A
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10. If $A = \{2, 6, 9\}$ and $B = \{a, t\}$, 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 $\{(6, t), (9, a)\}$ has every pair in $A \times B$.
Ans: (A) $\{(6, t), (9, a)\}$
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11. If $A = \{5, 9, 10\}$, the number of relations from A to A is
 $n(A \times A) = 3 \times 3 = 9$
Number of relations $= 2^9 = 512$
Ans: (C) 512
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12. If $A \times B$ has 12 elements, the number of relations from A to B is
Relations are the subsets of $A \times B$.
 $2^{12} = 4096$
Ans: (D) 4096
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13. If $A = \{10\}$ and $B = \{p, q, t\}$, the number of relations from A to B is
 $n(A \times B) = 1 \times 3 = 3$
Number of relations $= 2^3 = 8$
Ans: (A) 8
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14. If $R = \{(c, 1), (q, 5), (y, 5), (y, 9)\}$, the set of all b with yRb is
 yRb means $(y, b) \in R$.
Such pairs: $(y, 5), (y, 9)$.
Ans: (D) $\{5, 9\}$
-

15. If $R = \{(4, x), (7, b), (7, x), (9, b)\}$, the set of all a with aRb is
 aRb means $(a, b) \in R$.
Such pairs: $(7, b), (9, b)$.
Ans: (C) $\{7, 9\}$
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16. If $R = \{(2, c), (2, x), (10, c)\}$, which of the following is true?
 aRb means $(a, b) \in R$.
 $(2, c) \in R$, so $2Rc$.
Ans: (D) $2Rc$
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17. If $n(A) = 5$ and $n(B) = 4$, the number of ordered pairs in the universal relation from A to B is

The universal relation is $A \times B$.

$$n(A \times B) = 5 \times 4 = 20$$

Ans: (A) 20

18. If $A = \{3, 4, 5\}$ and $B = \{p, q, z\}$, 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

19. If $A = \{4, 7\}$ and $B = \{b, p, t\}$, then $R = \{(4, b), (7, t), (4, t), (7, p), (4, p), (7, b)\}$ 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: (C) the universal relation from A to B

20. If $A = \{b, p, x\}$ and $B = \{1, 9\}$, 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: (C) ϕ

21. Which of the following relations has domain $\{2, 5\}$ and range $\{b, z\}$?

Domain = first elements, Range = second elements.

For $\{(2, b), (2, z), (5, z)\}$: Domain = $\{2, 5\}$, Range = $\{b, z\}$.

Ans: (B) $\{(2, b), (2, z), (5, z)\}$

22. $R = \{(2, 10), (10, 6), (10, 10), (11, 6), (11, 10)\}$ is a relation from $A = \{2, 5, 10, 11\}$ to $B = \{6, 10\}$.

Which element of A is not in the domain of R ?

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

$$\text{Domain} = \{2, 10, 11\}$$

$5 \in A$ but it is not a first element of any pair.

Ans: (B) 5

23. If $R = \{(1, z), (2, b), (10, b)\}$, the range of R^{-1} is

$$R^{-1} = \{(z, 1), (b, 2), (b, 10)\}$$

$$\text{Range of } R^{-1} = \{1, 2, 10\}$$

It is the domain of R .

Ans: (A) $\{1, 2, 10\}$

24. If $R = \{(t, 1), (y, 1), (y, 4)\}$, which ordered pair belongs to R^{-1} ?

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

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

Ans: (B) $(1, t)$

25. $R = \{(c, 10), (y, 3), (y, 10)\}$ is a relation from $A = \{b, c, y\}$ to $B = \{3, 6, 10\}$. Then R^{-1} is a relation from

$$R^{-1} = \{(10, c), (3, y), (10, y)\}$$

First elements are in B , second elements in A .

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

Ans: (C) B to A
