

Sets and Relations

MCQ Test, Set 04

Time: 30 minutes

Maximum marks: 25

Name: _____ Class: _____ Date: _____

1. There are 25 questions. Each has exactly one correct answer: choose A, B, C or D.
2. Each correct answer carries 1 mark. There is no negative marking.
3. The key sheet and worked solutions are at the end of this test.

1. If $A \times B = \{(c, 2), (c, 4), (p, 2), (p, 4), (q, 2), (q, 4)\}$, then $B =$
A. $\{2, 4\}$ **B.** $\{2\}$ **C.** $\{c, p, q, 2, 4\}$ **D.** $\{c, p, q\}$
2. If $A = \{5, 10\}$, then $A \times A =$
A. $\{(5, 10)\}$ **B.** $\{(5, 5), (5, 10), (10, 5), (10, 10)\}$
C. $\{(5, 5), (10, 10)\}$ **D.** $\{(5, 10), (10, 5)\}$
3. If $A = \{p, z\}$ and $B = \{a, p, x\}$, then $A \times B =$
A. $\{(a, p), (a, z), (p, p), (p, z), (x, p), (x, z)\}$ **B.** $\{(p, a), (z, p)\}$
C. $\{(p, a), (p, p), (p, x)\}$ **D.** $\{(p, a), (p, p), (p, x), (z, a), (z, p), (z, x)\}$
4. If $A = \{b, t\}$ and $B = \{2, 7\}$, then $B \times A =$
A. $\{(2, b), (7, t)\}$ **B.** $\{(b, 2), (b, 7), (t, 2), (t, 7)\}$
C. $\{(2, b), (2, t)\}$ **D.** $\{(2, b), (2, t), (7, b), (7, t)\}$
5. If $n(A \times A) = 256$, then $n(A) =$
A. 256 **B.** 128 **C.** 16 **D.** 32
6. If $n(A) = 10$ and $n(B) = 7$, then $n(A \times B) =$
A. 70 **B.** 80 **C.** 17 **D.** 140
7. If $n(A \times B) = 33$ and $n(B) = 3$, then $n(A) =$
A. 36 **B.** 30 **C.** 11 **D.** 99
8. Every relation from A to B is
A. an element of $A \times B$ **B.** a subset of $A \times B$
C. a subset of $B \times A$ **D.** equal to $A \times B$
9. If $A = \{3, 6, 8\}$ and $B = \{x, y\}$, which of the following is a relation from A to B ?
A. $\{(x, 3), (y, 3)\}$ **B.** $\{(3, y), (8, t)\}$ **C.** $\{(y, 3), (8, y)\}$ **D.** $\{(8, x), (8, y)\}$

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23. If $R = \{(1, x), (11, x), (12, x)\}$, the range of R^{-1} is
- A. $\{1, 11, 12, x\}$ B. $\{x\}$ C. $\{1, 11, 12\}$ D. $\{1, 11\}$
-
24. If $R = \{(c, 5), (p, 8), (p, 12)\}$, which ordered pair belongs to R^{-1} ?
- A. $(c, 5)$ B. $(p, 8)$ C. $(5, a)$ D. $(5, c)$
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25. $R = \{(p, 5), (x, 1), (x, 5)\}$ is a relation from $A = \{p, t, x\}$ to $B = \{1, 5\}$. Then R^{-1} is a relation from
- A. B to B B. B to A C. A to B D. A to A
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Key sheet

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

Solutions

1. If $A \times B = \{(c, 2), (c, 4), (p, 2), (p, 4), (q, 2), (q, 4)\}$, then $B =$

B is the set of second elements of the pairs.

$$B = \{2, 4\}$$

Ans: (A) $\{2, 4\}$

2. If $A = \{5, 10\}$, then $A \times A =$

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

$$A \times A = \{(5, 5), (5, 10), (10, 5), (10, 10)\}$$

Ans: (B) $\{(5, 5), (5, 10), (10, 5), (10, 10)\}$

3. If $A = \{p, z\}$ and $B = \{a, p, x\}$, then $A \times B =$

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

$$= \{(p, a), (p, p), (p, x), (z, a), (z, p), (z, x)\}$$

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

4. If $A = \{b, t\}$ and $B = \{2, 7\}$, then $B \times A =$

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

$$= \{(2, b), (2, t), (7, b), (7, t)\}$$

Ans: (D) $\{(2, b), (2, t), (7, b), (7, t)\}$

5. If $n(A \times A) = 256$, then $n(A) =$

$$n(A \times A) = n(A) \times n(A) = 256$$

$$16 \times 16 = 256$$

$$\therefore n(A) = 16$$

Ans: (C) 16

6. If $n(A) = 10$ and $n(B) = 7$, then $n(A \times B) =$

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

$$= 10 \times 7 = 70$$

Ans: (A) 70

7. If $n(A \times B) = 33$ and $n(B) = 3$, then $n(A) =$

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

$$33 = n(A) \times 3$$

$$n(A) = 33 \div 3 = 11$$

Ans: (C) 11

8. Every relation from A to B is

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

Ans: (B) a subset of $A \times B$

9. If $A = \{3, 6, 8\}$ and $B = \{x, y\}$, 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 $\{(8, x), (8, y)\}$ has every pair in $A \times B$.

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

10. If $A = \{3, 4, 10\}$ and $B = \{y, z\}$, which of the following is NOT a relation from A to B ?

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

$z \notin A$, so $(z, 3) \notin A \times B$.

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

11. If $A \times B$ has 6 elements, the number of relations from A to B is

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

$$2^6 = 64$$

Ans: (A) 64

12. If $n(A) = 2$ and $n(B) = 1$, the number of relations from A to B is

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

$$= 2^{2 \times 1} = 2^2 = 4$$

Ans: (C) 4

13. If $A = \{1\}$ and $B = \{2, 7, 8, 11\}$, 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: (D) 16

14. For a relation R , $qR7$ means

If $(a, b) \in R$ then it is written aRb .

So $qR7$ means $(q, 7) \in R$.

Ans: (A) $(q, 7) \in R$

15. If $R = \{(b, 2), (q, 7), (x, 11)\}$, which of the following is true?

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

$(q, 7) \in R$, so $qR7$.

Ans: (C) $qR7$

16. If $R = \{(5, p), (5, t), (6, p)\}$, which of the following is false?

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

$(6, t) \notin R$, so $6Rt$ is false.

Ans: (A) $6Rt$

17. If $A = \{7, 10\}$ and $B = \{b, q, y\}$, then $R = \{(10, y), (7, b), (7, q), (10, b), (10, q), (7, y)\}$ 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: (B) the universal relation from A to B

18. If $A = \{7, 9, 11\}$ and $B = \{x, z\}$, 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.

$$A \times B = \{(7, x), (7, z), (9, x), (9, z), (11, x), (11, z)\}$$

Ans: (B) $\{(7, x), (7, z), (9, x), (9, z), (11, x), (11, z)\}$

19. If $A = \{3, 6, 12\}$ and $B = \{q, y\}$, 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

20. If $A = \{c, y\}$ and $B = \{4, 6, 8\}$, the range of the null relation from A to B is

The null relation ϕ has no ordered pairs.

So its range is ϕ .

Ans: (D) ϕ

21. Which of the following relations has domain $\{c, q\}$ and range $\{4, 5\}$?

Domain = first elements, Range = second elements.

For $\{(c, 4), (q, 4), (q, 5)\}$: Domain = $\{c, q\}$, Range = $\{4, 5\}$.

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

22. $R = \{(1, a), (1, x), (2, x), (6, a)\}$ is a relation from $A = \{1, 2, 6, 8\}$ to $B = \{a, x\}$. Which element of A is not in the domain of R ?

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

$$\text{Domain} = \{1, 2, 6\}$$

$8 \in A$ but it is not a first element of any pair.

Ans: (D) 8

23. If $R = \{(1, x), (11, x), (12, x)\}$, the range of R^{-1} is

$$R^{-1} = \{(x, 1), (x, 11), (x, 12)\}$$

$$\text{Range of } R^{-1} = \{1, 11, 12\}$$

It is the domain of R .

Ans: (C) $\{1, 11, 12\}$

24. If $R = \{(c, 5), (p, 8), (p, 12)\}$, which ordered pair belongs to R^{-1} ?

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

$(c, 5) \in R$, so $(5, c) \in R^{-1}$.

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

25. $R = \{(p, 5), (x, 1), (x, 5)\}$ is a relation from $A = \{p, t, x\}$ to $B = \{1, 5\}$. Then R^{-1} is a relation from $R^{-1} = \{(5, p), (1, x), (5, x)\}$

First elements are in B , second elements in A .

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

Ans: (B) B to A
