



RAMAGYA SCHOOL, NOIDA
XI/MATHEMATICS/2017-18
OLYMPIAD PRACTICE WORKSHEET

CONCEPT BASED

1. If $R = \{(x, y) : x, y \in \mathbb{Z}, x^2 + y^2 \leq 4\}$ is a relation in \mathbb{Z} , then domain of R is
 - (a) $\{0, 1, 2\}$
 - (b) $\{-2, -1, 0\}$
 - (c) $\{-2, -1, 0, 1, 2\}$
 - (d) none of these

2. If $A = \{1, 2, 3\}$ then the relation $R = \{(2, 3)\}$ in A is
 - (a) symmetric and transitive only
 - (b) symmetric only
 - (c) transitive only
 - (d) not transitive

3. Let X be a family of sets and R be a relation in X , defined by 'A is disjoint from B'. then R is
 - (a) reflexive
 - (b) symmetric
 - (c) anti-symmetric
 - (d) transitive

4. R is a relation defined in \mathbb{Z} by aRb if and only if $ab \geq 0$, then R is
 - (a) reflexive
 - (b) symmetric
 - (c) transitive
 - (d) equivalence

5. R is a relation on \mathbb{N} given by $N = \{(x, y) : 4x + 3y = 20\}$. Which of the following belongs to R ?
 - (a) $(-4, 12)$
 - (b) $(5, 0)$
 - (c) $(3, 4)$
 - (d) $(2, 4)$

6. The relation R defined on the set of natural numbers as $\{(a, b) : a \text{ differs from } b \text{ by } 3\}$ is given
 - (a) $\{(1, 4), (2, 5), (3, 6), \dots\}$
 - (b) $\{(4, 1), (5, 2), (6, 3), \dots\}$
 - (c) $\{(4, 1), (5, 2), (6, 3), \dots\}$
 - (d) none of the above

7. Let X and Y be the sets of all positive divisors of 400 and 1000 respectively (including 1 and the number). Then $n(X \cap Y)$ is equal to

- (a) 4
- (b) 6
- (c) 8
- (d) 12

APPLICATION BASED

8. The relation R defined in $A = \{1,2,3\}$ by aRb , if $|a^2 - b^2| \leq 5$. Which of the following is false?

- (a) $R = \{(1,1), (2,2), (3,3), (2,1), (1,2), (2,3), (3,2)\}$
- (b) $R^{-1} = R$
- (c) Domain of $R = \{1,2,3\}$
- (d) range of $R = \{5\}$

9. The relation R defined on the set $A = \{1,2,3,4,5\}$ by $R = \{(x, y) : |x^2 - y^2| < 16\}$ is given by

- (a) $\{(1,1), (2,1), (3,1), (4,1), (2,3)\}$
- (b) $\{(2,2), (3,2), (4,2), (2,4)\}$
- (c) $\{(3,3), (4,3), (5,4), (3,4)\}$
- (d) none of these

10. If R be relation ' $<$ ' from $A = \{1, 2, 3, 4\}$ to $B = \{1, 3, 5\}$ ie, $(a, b) \hat{=} R$ iff $a < b$, then $R \circ R^{-1}$ is

- (a) $\{(1, 3), (1, 5), (2, 3), (2, 5), (3, 5), (4, 5)\}$
- (b) $\{(3, 1), (5, 1), (3, 2), (5, 2), (5, 3), (5, 4)\}$
- (c) $\{(3, 3), (3, 5), (5, 3), (5, 5)\}$
- (d) $\{(3, 3), (3, 4), (4, 5)\}$

11. R is a relation from $\{11,12,13\}$ to $\{8,10,12\}$ defined by $y = x - 3$. The relation R^{-1} is

- (a) $\{(11,8), (13,10)\}$
- (b) $\{(8,11), (10,13)\}$
- (c) $\{(8,11), (9,12), (10,13)\}$
- (d) none of the above

12. Two finite sets A and B have m and n elements respectively. If the total number of subsets of A is 112 more than the total number of subsets of B, then the value of m is

- (a) 7
- (b) 9
- (c) 10
- (d) 12

HOTS (High order thinking skills)

13. Let a relation R in the set R of real numbers be defined as $(a, b) \hat{=} R$ if and only if $1 + ab > 0$ for all $a, b \in R$. The relation R is

- (a) Reflexive and Symmetric
- (b) Symmetric and Transitive
- (c) Only transitive function
- (d) An equivalence relation

14. The range of the function $f(x) = \frac{x-2}{2-x}$ when $x \neq 2$ is

- (a) \mathbb{R}
- (b) $\mathbb{R} - \{1\}$
- (c) $\{-1\}$
- (d) $\mathbb{R} - \{-1\}$

15. Let $n(A) = m$ and $n(B) = n$, then the total number of non-empty relations that can be defined from A to B is

- (a) m^n
- (b) n^{m-1}
- (c) $mn - 1$
- (d) $2^{mn} - 1$

16. Domain of $\sqrt{a^2 - x^2}$ ($a > 0$) is

- (a) $(-a, a)$
- (b) $[-a, a]$
- (c) $[0, a]$
- (d) $(-a, 0]$

17. If $[x]^2 - 5[x] + 6 = 0$, where $[.]$ denotes the greatest integer function, then

- (a) $x \in [3, 4]$
- (b) $x \in [2, 3]$
- (c) $x \in (2, 3]$
- (d) $x \in [2, 4)$

VALUE BASED

18. If $f(x) = |x - 1|$ then

- (a) $f(x^2) = [f(x)]^2$
- (b) $f(x + y) = f(x) + f(y)$
- (c) $f(|x|) = |f(x)|$
- (d) none of these

19. Let $f(x) = \sqrt{1 + x^2}$, then

- (a) $f(x) = f(x).f(y)$
- (b) $f(xy) \geq f(x).f(y)$
- (c) $f(xy) \leq f(x).f(y)$
- (d) none of these

20. Let $f(x) = ax + b$, where a and b are integers, $f(-1) = -5$ and $f(3) = 3$, then a and b are equal to

- (a) 2, 3
- (b) 2, -3
- (c) 2, 2
- (d) 3, -3