TERM - 1 MATHS
CLASS: XII
CHAPTER 1 : RELATION AND FUNCTION

WORKSHEET: 1

Q1	The function f : A → B defined by f(x) = 4x + 7, x ∈ R is (a) one-one (b) Many-one (c) Odd (d) Even
Q2	The number of bijective functions from set A to itself when A contains 6 elements is (a) 6 (b) $(6)^2$ (c) 6! (d) 2^6
Q3	Let L denote the set of all straight lines in a plane. Let a relation R be defined by l Rm if and only if l is perpendicular to m ∀ l, m ∈ L. Then R is (a) reflexive only (b) Symmetric only (c) Transitive only (d) Equivalence relation
Q4	Let N be the set of natural numbers and the function f : N → N be defined by f (n) = 2n + 3 ∀ n ∈ N. Then f is (a) injective (b) surjective (c) bijective (d) None of these
Q 5	The function f : R → R defined by f(x) = 3 – 4x is (a) Onto (b) Not onto (c) Not one-one (d) None of these

Q 6	Let f(x)= (x−1)/(x+1), then f(f(x)) is (a) 1/x (b) −1/x (c) 1/(x+1) (d) 1/(x−1)
Q 7	Set A has 3 elements and the set B has 4 elements. Then the number of injective mappings that can be defined from A to B is (a) 144 (b) 12 (c) 24 (d) 64
Q 8	The maximum number of equivalence relations on the set A = {1, 2, 3} are (a) 1 (b) 2 (c) 3 (d) 5
Q 9	Let us define a relation R in R as aRb if a ≥ b. Then R is (a) an equivalence relation (b) reflexive, transitive but not symmetric (c) symmetric, transitive but not reflexive (d) neither transitive nor reflexive but symmetric
Q10	Let A = {1, 2, 3} and consider the relation R = {(1, 1), (2, 2), (3, 3), (1, 2), (2, 3), (1, 3)}. Then R is (a) reflexive but not symmetric (b) reflexive but not transitive (c) symmetric and transitive (d) neither symmetric, nor transitive
Q11	Let A = {1, 2, 3, …. n} and B = {a, b}. Then the number of surjections from A into B is (a) 2^n (b) $2^n - 2$ (c) $2^n - 1$ (d) none of these
Q12	Let f : R → R be defined by f(x) = 1/x, ∀ x ∈ R. Then f is (a) one-one

	(b) onto (c) bijective (d) f is not defined
Q13	Which of the following functions from Z into Z are bijective? (a) $f(x) = x^3$ (b) $f(x) = x + 2$ (c) $f(x) = 2x + 1$ (d) $f(x) = x^2 + 1$
Q14	Let f : R → R be defined by $f(x) = x^2 + 1$. Then, pre-images of 17 and – 3, respectively, are (a) φ, {4, – 4} (b) {3, – 3}, φ (c) {4, –4}, φ (d) {4, – 4}, {2, – 2}
Q15	For real numbers x and y, define xRy if and only if $x - y + \sqrt{2}$ is an irrational number. Then the relation R is (a) reflexive only (b) Symmetric only (c) Transitive only (d) None of these
Q16	Consider the non-empty set consisting of children in a family and a relation R defined as aRb if a is brother of b. Then R is (a) symmetric but not transitive (b) transitive but not symmetric (c) neither symmetric nor transitive (d) both symmetric and transitive
Q17	If a relation R on the set {1, 2, 3} be defined by R = {(1, 2)}, then R is (a) reflexive (b) Symmetric (c) Transitive (d) None of these
Q18	Let R be a relation on the set N of natural numbers denoted by nRm ⇔ n is a factor of m (i.e. n | m). Then, R is

	(a) Reflexive and symmetric (b) Transitive and symmetric (c) Equivalence (d) Reflexive, transitive but not symmetric
Q19	Let S = {1, 2, 3, 4, 5} and let A = S × S. Define the relation R on A as follows: (a, b) R (c, d) iff ad = cb. Then, R is (a) reflexive only (b) Symmetric only (c) Transitive only (d) Equivalence relation
Q20	Let R be the relation "is congruent to" on the set of all triangles in a plane is (a) reflexive (b) symmetric (c) symmetric and reflexive (d) equivalence
Q21	Total number of equivalence relations defined in the set S = {a, b, c} is (a) 5 (b) 3! (c) 23 (d) 33
Q22	The relation R is defined on the set of natural numbers as {(a, b) : 2a =b}. Then, R is given by (a) {(2, 1), (4, 2), (6, 3),….} (b) {(1, 2), (2, 4), (3, 6), ……..} (c) R is not defined (d) None of these
Q23	Let X = {-1, 0, 1}, Y = {0, 2} and a function f : X → Y defined by $y = 2x^4$, is (a) one-one onto (b) one-one into (c) many-one onto (d) many-one into

Q 24	Let $g(x) = x^2 - 4x - 5$, then (a) g is one-one on R (b) g is not one-one on R (c) g is bijective on R (d) None of these
Q 25	The mapping f : N → N is given by $f(n) = 1 + n^2$, n ∈ N when N is the set of natural numbers is (a) one-one and onto (b) onto but not one-one (c) one-one but not onto (d) neither one-one nor onto
Q 26	The function f : R → R given by $f(x) = x^3 - 1$ is (a) a one-one function (b) an onto function (c) a bijection (d) neither one-one nor onto
Q 27	Let A = {x : -1 ≤ x ≤ 1} and f : A → A is a function defined by f(x) = x |x| then f is (a) a bijection (b) injection but not surjection (c) surjection but not injection (d) neither injection nor surjection
Q 28	The domain of the function $f(x)=\frac{1}{\sqrt{\{\sin x\}+\{\sin(\pi+x)\}}}$ where { } denotes fractional part, is (a) [0, π] (b) (2n + 1) π/2, n ∈ Z (c) (0, π) (d) None of these
Q 29	Range of $f(x)=\sqrt{(1-\cos x)\sqrt{(1-\cos x)\sqrt{(1-\cos x)\ \ldots\ldots\infty}}}$ (a) [0, 1] (b) (0, 1) (c) [0, 2] (d) (0, 2)

Q 30	The greatest integer function f(x) = [x] is (a) One-one (b) Many-one (c) Both (a) & (b) (d) None of these
	CASE STUDY : 1 Anu and Chhutki are playing Ludo at home during Covid-19. While rolling the dice, Anu's sister Nikki observed and noted that the possible outcomes of the throw every time belong to set {1,2,3,4,5,6}. Let A be the set of players while B be the set of all possible outcomes.  A = {A, C}, B = {1,2,3,4,5,6}
Q 1	Let $R : B \to B$ be defined by R = $\{(x, y): y \text{ is divisible by } x\}$ is a. Reflexive and transitive but not symmetric b. Reflexive and symmetric and not transitive c. Not reflexive but symmetric and transitive d. Equivalence
Q 2	Nikki wants to know the number of functions from A to B. How many number of functions are possible?

	a. 6^2 b. 2^6 c. 6! d. 2^{12}
Q 3	Let R be a relation on B defined by R = {(1,2), (2,2), (1,3), (3,4), (3,1), (4,3), (5,5)}.Then R is a. Symmetric b. Reflexive c. Transitive d. None of these
Q 4	Nikki wants to know the number of relations possible from A to B. How many numbers of relations are possible? a. 6^2 b. 2^6 c. 6! d. 2^{12}
Q 5	Let $R: B \rightarrow B$ be defined by R={(1,1),(1,2), (2,2), (3,3), (4,4), (5,5),(6,6)}, then R is a. Symmetric b. Reflexive and Transitive c. Transitive and symmetric d. Equivalence
	CASE STUDY : 2 An organization conducted bike race under 2 different categories-boys and girls. Totally there were 250 participants. Among all of them finally three from Category 1 and two from Category 2 were selected for the final race. Ravi forms two sets B and G with these participants for his college project. Let B = {b1,b2,b3} G={g1,g2} where B represents the set of boys selected and G the set of girls who were selected for the final race. Ravi decides to explore these sets for various types of relations and functions

	
Q 1	Ravi wishes to form all the relations possible from B to G. How many such relations are possible? a. 2^5 b. 2^6 c. 0 d. 2^3
Q 2	Let R: B→B be defined by R = $\{(x, y)$: x and y are students of same sex$\}$, Then this relation R is________ a. Equivalence b. Reflexive only c. Reflexive and symmetric but not transitive d. Reflexive and transitive but not symmetric
Q 3	Ravi wants to know among those relations, how many functions can be formed from B to G? a. 2^2 b. 2^{12} c. 3^2 d. 2^3

Q 4	Let $R: B \to G$ be defined by R = { (b1,g1), (b2,g2),(b3,g1)}, then R is___________ a. Injective b. Surjective c. Neither Surjective nor Injective d. Surjective and Injective
Q 5	Ravi wants to find the number of injective functions from B to G. How many numbers of injective functions are possible? a. 0 b. 2! c. 3! d. 0!
	CASE STUDY : 3 Raji visited the Exhibition along with her family. The Exhibition had a huge swing, which attracted many children. Raji found that the swing traced the path of a Parabola as given by $y = x^2$. Answer the following questions using the above information.
Q 1	Let $f: R \to R$ be defined by $f(x) = x^2$ is__________ a. Neither Surjective nor Injective b. Surjective c. Injective d. Bijective
Q 2	Let $f: N \to N$ be defined by $f(x) = x^2$ is _________ a. Surjective but not Injective b. Surjective c. Injective d. Bijective
Q 3	Let f: {1,2,3,….}→{1,4,9,….} be defined by $f(x) = x^2$ is __________ a. Bijective

	b. Surjective but not Injective c. Injective but Surjective d. Neither Surjective nor Injective
Q 4	Let : $N \rightarrow R$ be defined by $f(x) = x^2$. Range of the function among the following is __________ a. {1, 4, 9, 16,…} b. {1, 4, 8, 9, 10,…} c. {1, 4, 9, 15, 16,…} d. {1, 4, 8, 16,…}
Q 5	The function f: Z→Z defined by $f(x) = x^2$ is___________ a. Neither Injective nor Surjective b. Injective c. Surjective d. Bijective

Answers

1. Answer:
   (a) one-one
2. Answer:
   (c) 106!
3. Answer:
   (b) Symmetric only
4. Answer:
   (a) injective
5. Answer:
   (a) Onto
6. Answer:
   (b) −1/x
7. Answer:
   (c) 24
8. Answer:
   (d) 5

9. Answer:
(b) reflexive, transitive but not symmetric
10. Answer:
(a) reflexive but not symmetric
11. Answer:
(b) $2^n - 2$
12. Answer:
(d) f is not defined
13. Answer:
(b) f(x) = x + 2
14. Answer:
(c) {4, −4}, φ
15. Answer:
(a) reflexive only
16. Answer:
(d) both symmetric and transitive
17. Answer:
(a) transitive
18. Answer:
(d) Reflexive, transitive but not symmetric
19. Answer:
(d) Equivalence relation
20. Answer:
(d) equivalence
21. Answer:
(a) 5
22. Answer:
(b) {(1, 2), (2, 4), (3, 6), ……..}
23. Answer:
(c) many-one onto
24. Answer:
(b) g is not one-one on R
25. Answer:
(c) one-one but not onto
26. Answer:
(c) a bijection
27. Answer:
(a) a bijection
28. Answer:
(d) None of these

29. Answer:
(c) [0, 2]

30. Answer:
(b) Many-one

Case Study 1

ANSWERS

1. (a) Reflexive and transitive but not symmetric

2. (a) 62

3. (d) None of these three

4. (d) 212

5. (b) Reflexive and Transitive

Case Study 2

ANSWERS

1. (a) 26

2. (a) Equivalence

3. (d) 23

4. (b) Surjective

5. (a) 0

Case Study 3

ANSWERS

1. (a) Neither Surjective nor Injective

2. (C) Injective

3. (a) Bijective

4. (a) {1, 4, 9, 16,…}

5. (a) Neither Injective nor Surjective