# CLASS XI – MATHEMATICS – CHAPTER 02
# RELATIONS AND FUNCTIONS

Name:                                                        Date:

**Q01.** If the ordered Pairs $(x-1, y+3)$ and $(2, 4+x)$ are equal, find x and y.

**Q02.** If, $n(A) = 3$, $n(B)$ A = 2 , A and B are two sets Then no. of relations of $A \times B$ have.

**Q03.** Let $f(x) = -|x|$ then Find Range of function.

**Q04.** A real function f is defined by $f(x) = 2x-5$. Then the Value of $f(-3)$

**Q05.** Let $R = \{(x-y): x, y \in W, 2x+y = 8\}$ then
   (i) Find the domain and the range of R          (ii) Write R as a set of ordered pairs.

**Q06.** Let R be a relation from Q to Q defined by $R = \{(a,b): a,b \in Q$ and $a - b \in z\}$ show that
   (i) $(a,a) \in R$, for all $a \in Q$          (ii) $(a,b) \in R$ implies that ,$(b,a) \in R$
   (iii) $(a,b) \in R$ and $(b,c) \in R$ implies that $(a,c) \in R$

**Q07.** If $f(x) = (x^2-3x+1)/(x-1)$, Find $f(-2) + f(1/3)$

**Q08.** Find the domain and the range of the function $f(x) \ 3x^2 - 5$. Also find $f(-3)$ and the numbers which are associated with the number 43 m its range.

**Q09.** If $f(x) = x^2 -3x +1$, find x such that $f(2x) = f(x)$

**Q10.** Find the domain and the range of the function $f(x) = \sqrt{(x-1)}$

**Q11.** Draw the graphs of the following real functions and hence find their range $f(x) = 1/x$ ,$x \in R$, $x \neq 0$

**Q12.** If $f(x) = x -(1/x)$ , Prove that $[f(x)]^3 = f(x^3) + 3f(1/x)$

**Q13.** If $P = \{a,b,c\}$ and $Q = \{d\}$, form the sets $P \times Q$ and $Q \times P$ are these two Cartesian products equal?

**Q14.** If A and B are finite sets such that $n(A) = m$ and $n(B) = k$. Find the number of relations from A to B

**Q15.** Let $f = \{(1,1),(2,3),(0,-1),(-1,3),......\}$ be a function from z to z defined by , $f(x) = ax + b$ for same integers a and b determine a and b.

**Q16.** Express $\{(x,y): y + 2x = 5, xy \in w\}$ as the set of ordered pairs

**Q17.** Let a relation $R = \{(0,0),(2,4),(1,2),(3,6),(1,2)\}$ then
   (i) write domain of R          (ii) write range of R          (iii) write R the set builder form
   (iv) represent R by an arrow diagram

**Q18.** Let $A = \{1,2,3\}$, $B = \{1,2,3,4\}$ and $R = \{(x,y):x ,y) \in A \times B ,y = x+1$
   (i) find $A \times B$          (ii) write R in roster form   (iii) write domain & range of R
   (iv) represent R by an arrow diagram

**Q19.** The cartesian product $A \times A$ has a elements among which are found $(-1,0)$ and $(0,1)$.find the set and the remaining elements of $A \times A$.

**Q20.** Find the domain and the range of the following functions $f(x) = 1 /\sqrt{(5-x)}$

**Q21.** Let $f(x) = x + 1$ and $g(x) \ x = 2x - 3$ be two real functions. Find the following functions
   (i) f + g          (ii) f – g          (iii) fg          (iv) f/g          (v) $f^2 - 3g$

**Q22.** Find the domain and the range of the following functions

(i) $f(x) = (x - 3)/(2x + 1)$        (ii) $f(x) = x^2/(1 + x^2)$     (iii) $f(x) = 1/(1 - x^2)$

**Q23.** Draw the graphs of the following real functions and hence find their range

(i) $f(x) = (2x - 1)$             (ii) $f(x) = (x^2 - 1)/(x - 1)$

**Q24.** Let f be a function defined by F: $x \to 5x^2 + 2$, $x \in R$

(i) find the image of 3 under f     (ii) find $f(3) + f(2)$       (iii) find x such that $f(x) = 22$

**Q25.** If A ={1,2 } find ( A × A × A)

**Q26.** If A and B are two sets containing m and n elements respectively how many different relations can be defined from A to B ?

**Q27.** A Function f is defined by $f(x) = 2x - 3$ find $f(5)$

**Q28.** Let f = {(0,–5),(1,–2),(2,1),(3,4),(4,7)} be a linear function from z into z find f

**Q29.** If A = {1,2,3}  B = {3,4} and C = {4,5,6} find

(i) A × (B∪C)            (ii) A × (B∩C)         (iii) (A × B)∩(B × C)

**Q30.** For non empty sets A and B prove that (A× B) = (B ×A) ⟺ A = B

**Q31.** Let m be a given fixed positive integer. Let R=[( a,b) : a,b∈ z and is divisible by m] show that R is an equivalence relation on Z.

**Q32.** Let A = {1,2,3,4,5} and B = {1,3,4} let R be the relation, is greater than from A to B. Write R as a set of ordered pairs.  find domain (R)  and range (R) .

**Q33.** Define modulus function Draw graph.

**Q34.** Let f(x) = {$x^2$,when 0 ≤ x ≤3;  3x,when 3 ≤ x ≤10} & g(x) ={$x^2$,0 ≤ x ≤ 3;  2x, 3 ≤ x ≤ 10} Show that f is a function, while g is not a function.

**Q35.** The function $f(x) = (9x/5) + 32$ is the formula to connect x⁰C to Fahrenheit units find

(i)  f(0)      (ii) f(–10)    (iii) the value of x ,if f(x) = 212  interpret the result is each case

**Q36.** Draw the graph of the greatest integer function, $f(x) =[ x ]$.

**Q37.** If the ordered pairs (x – 2,2y + 1) and ( y – 1, x+2) are equal, find x & y .

**Q38.** Let A = {1,2,5,8} , B ={0,1,3,6,7} and R be the relation, is one less than from A to B then find domain and Range R .

**Q39.** Let R be a relation from N to N define by R=[( a,b) : a,b∈ N and a = $b^2$]. Is the following true,a b ∈ R implies (b,a) ∈ R

**Q40.** Let N be the set of natural numbers and the relation R be define in N by R =[( x,y) : y= 2x, x,y∈ N]. What is the domain, co domain and range of R ? Is this relation a function?

**Q41.** Let A = {1,2} and B = {3,4} write A × B how many subsets will A × B have? List them.

**Q42.** Let A = {1,2}, B = {1,2,3,4}, C = {5,6}, D = { 5,6,7,8,}  verify that

(i) A × (B∩C) = (A × B) ∩ (A × C)         (ii) A × C is subset of B × D

**Q43.** Find the domain and the range of the relation R defined by R =[( x + 1,x + 3) : x ∈ (0,1,2,3,4,5)].

**Q44.** Find the linear relation between the components of the ordered pairs of the relation R where R = {(2,1),(4,7),(1,–2)........}

**Q45.** A relation 'f' is defined by f : $x \to x^2 - 2$  where x ∈ {–1,–2,0,2}

(i) list the elements of f                 (ii) is f a function?

**Q46.** Let A ={1,2,3,4,5,6} define a relation R from A to A by R ={( x,y) : y = (x + 1), x,y∈ A}.

(i) write R in the roaster form      (ii) write down the domain co domain and range of R

(iii) Represent R by an arrow diagram

**Q47.** Find the domain and the range of the following functions:

(i) $f(x) = \sqrt{(x^2 - 4)}$          (ii) $f(x) = \sqrt{(16 - x^2)}$          (iii) $f(x) = 1/\sqrt{(9 - x^2)}$

**Q48.** Draw the graphs of the following real functions and hence find range: $f(x) = x^2$

**Q49.** Let R ={( x,y) : y = x + 1} and y ∈ {0,1,2,3,4,5} list the element of R [1]

**Q50.** If $f(x) = x^3 - (1/x^3)$ Prove that f(x) + f(1/x) = 0 .

**Q51.** If y = (6x − 5)/(5x -6). Prove that f(y)= x , x ≠ 6/5

**Q52.** Let f: X → Y be defined by $f(x) = x^2$ for all x ∈ X where X = {-2,-1,0,1,2,3} and y = { 0,1,4,7,9,10} write the relation f in the roster form. If f is a function?

**Q53.** Determine a quadratic function `f ' defined by f if $f(x) = ax^2 + bx + c$ if f(0) = 6, f(2) = 11 and f(-3) =6

**Q54.** Find the domain and the range of the function f defined by f(x) = (x +2)/Ix + 2I

**Q55.** Find the domain and the range of $f(x) = x^2/(1 + x^2)$

**Q56.** A = {1,2,3} , B = {1,2,3,4,} and If R ={( x,y) : (x,y) ∈ A×B, y= x + 1 } then (i) find A×B (ii) write domain and Range

**Q57.** Define polynomial function. Draw the graph of $f(x) = x^3$ find domain and range

**Q58.** (a) If , A B are two sets such that n(A × B) = 6 and some elements of A × B are (−1,2) , (2,3) , (4,3),then find (A × B) and (B × A)

(b) Find domain of the function f(x) = 1/√(x + [x])