

1. RELATIONS AND FUNCTIONS

Points to Remember:

- The Cartesian Product of A with B is defined as $A \times B = \{(a, b) \mid \text{for all } a \in A, b \in B\}$
- A relation R from A to B is always a subset of $A \times B$. That is $R \subseteq A \times B$
- A relation R from X to Y is a function if for every $x \in X$ there exists only one $y \in Y$.
- A function can be represented by
 - (i) an arrow diagram
 - (ii) a tabular form
 - (iii) a set of ordered pairs
 - (iv) a graphical form
- Some types of functions
 - (i) One-one function
 - (ii) Onto function
 - (iii) Many-one function
 - (iv) Into function
- Identity function $f(x) = x$
- Reciprocal function $f(x) = \frac{1}{x}$
- Constant function $f(x) = c$
- Linear function $f(x) = ax + b, a \neq 0$
- Quadratic function $f(x) = ax^2 + bx + c, a \neq 0$
- Cubic function $f(x) = ax^3 + bx^2 + cx + d, a \neq 0$
- For three non-empty sets A, B and C , if $f: A \rightarrow B$ and $g: B \rightarrow C$ are two functions, then the composition of f and g is a function $g \circ f: A \rightarrow C$ will be defined as $g \circ f(x) = g(f(x))$ for all $x \in A$.
- If f and g are any two functions, then in general, $f \circ g \neq g \circ f$
- If f, g and h are any three functions, then $f \circ (g \circ h) = (f \circ g) \circ h$