Types of relation -

Reflexive relation - A relation R on X is called reflexive if $(x,x) \in R$, $\forall x \in R$

i.e, $x R x$, $\forall x \in R$.

Note : The total number of reflexive relation on a set containing n elements $= 2^{n^2-n}$

Ex -

Let $X = \{a, b, c\}$ then

$R = \{(a,a), (b,b), (c,c)\}$ is reflexive relation on X.

Ex -

Let X be a set of all straight lines in a plane. The relation R on X defined by 'x is $\parallel^{del}$ to y' is reflexive because every straight lines is $\parallel^{del}$ to itself.

$X = \{x, y, z\}$ then $R = \{(x,x), (y,y), (z,z)\}$

Symmetric relation -

A relation R on X is called symmetric relation iff $(x,y) \in R \Rightarrow (y,x) \in R$

i.e. $xRy \Rightarrow yRx$, $\forall x, y \in X$

Note: The number of symmetric relation on a set containing n elements $= 2^{(n^2+n)/2}$

Ex -

Let $X = \{a, b, c\}$ then $R = \{(a,b), (b,a), (a,c), (c,a),\}$ is Symmetric relation on X.

Ex - Let P be a set of all straight lines in a plane. The relation R defined by 'x' is $\perp$ to y' is symmetric because $x \perp y \Rightarrow y \perp x$

Transitive relation -

A relation R on X is called transitive iff $(x,y), (y,z) \in R \Rightarrow (x,z) \in R$

i.e, $xRy, yRz \Rightarrow xRz$, $\forall x, y, z \in X$

Ex -

A relation "greater than" defined on the set of natural numbers N is transitive because

$\forall x, y, z \in N$

if $x > y, y > z \Rightarrow x > z$