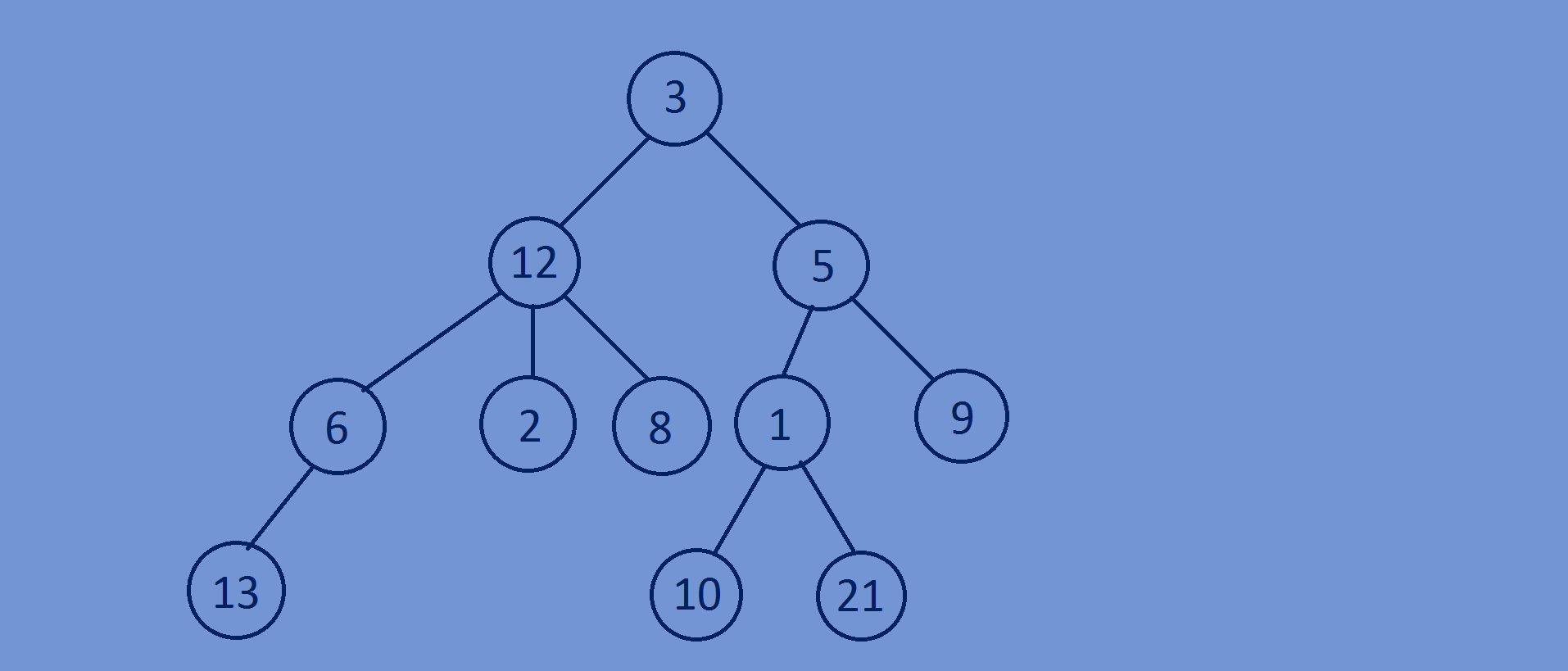
**Data Structures**

Introduction to Trees

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**What is a tree??**

* A tree is a data structure which has a collection of

Nodes organised in a hierarchical structure,here

Collection of nodes are linked together to form

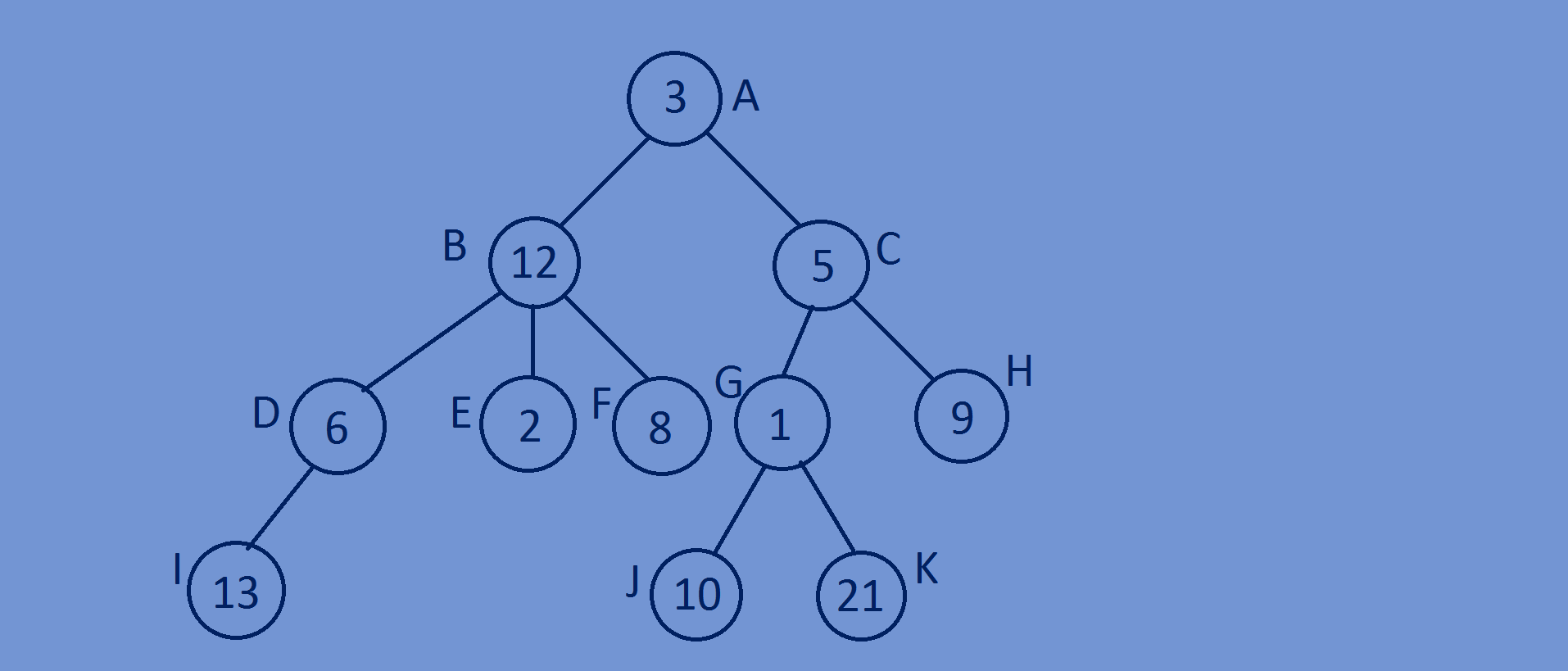
To form a hierarchical structure.

* A tree is a non-linear data structure,here

A node is connected to several other nodes so that there are many possible ways for traversing.

* A node have some data and may contain links to some other nodes.
* Trees are used to represent hierarchical relationships.
* Edge is defined as the connection between two nodes.
* Top most node of a tree is called as root node.
* We can traverse through a tree only in forward traversing=>traversing is not

Bidirectional.

**Tree Vocubalary :**

**Root:** Top most node of tree is called as node.

**Child:**the node which is directly under the other

Node,connected by an edge.two or more than two

Child are called as children.

**Parent:**The node which has an edge from

It to any other node is called as parent.

**Siblings:**Nodes with same parent are called as siblings.

**Leaf:**Node which doesn’t have any child is called as leaf node.

* A tree with n nodes will have n-1 edges.
* Every node will have one incoming edge except the first node.

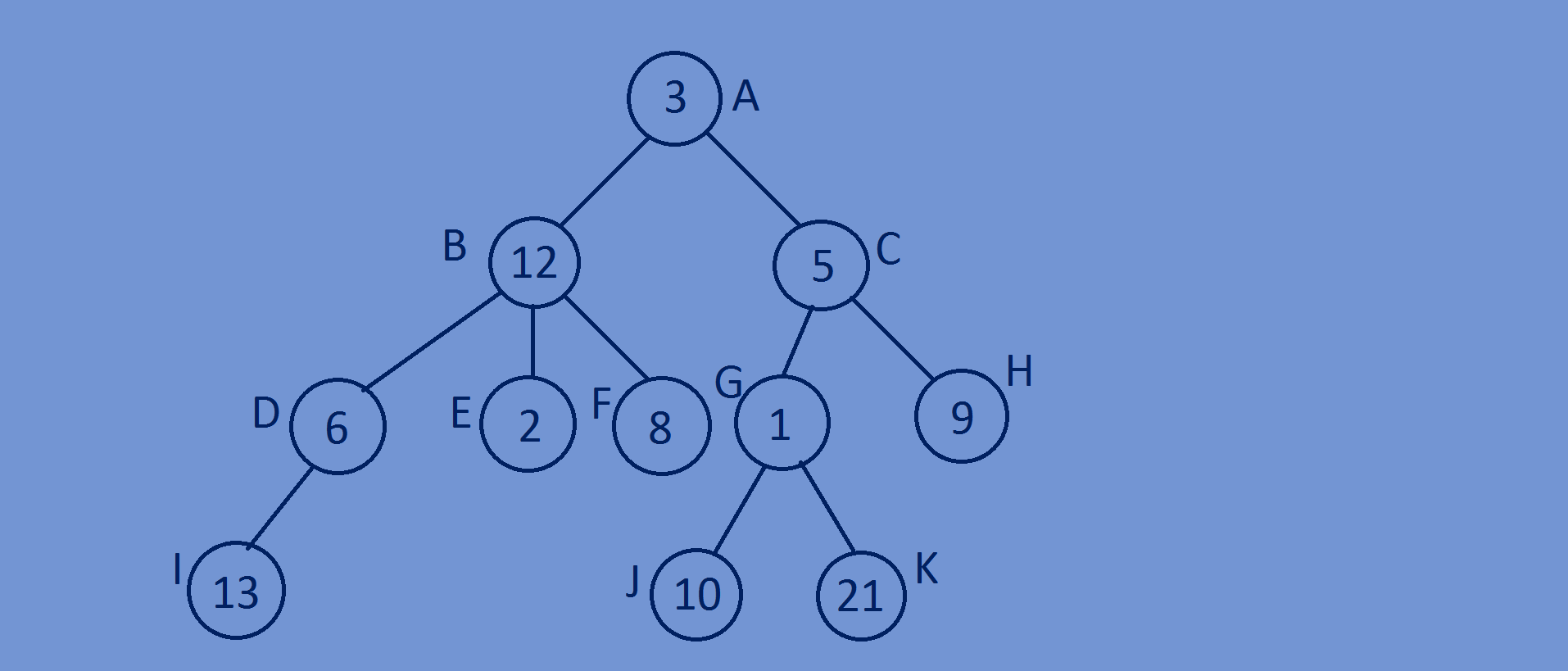
**Path:**Sequence of nodes along the edges of a tree is called as a path.

**Depth:**Depth of a node is defined as The total no of edges from root node to the

Node and the depth of root node is equal to zero.

**Height:** height of a node is equal to the total no of edges in the longest path from node to a leaf ,height of leaf is always zero and height of a tree is equal to height

of the root node.

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* Suppose we are traversing from node A(root node)

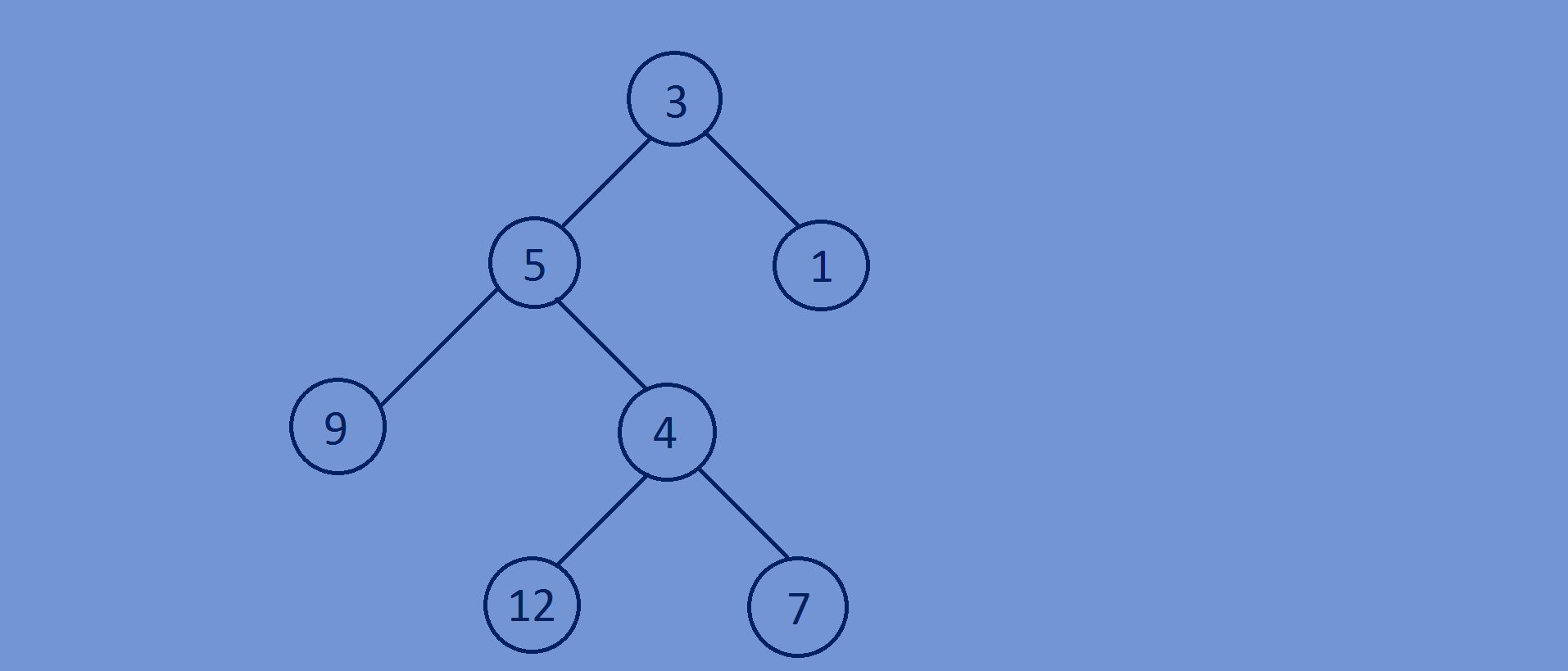
To node D,then node B and node A are called

Ancestor of D and node B and node D are

Called as descendent of A.

* Each child forms a subtree.

**Binary tree:**

* A tree in which each node can have at most two children is called as a binary tree.
* ****The left node below a node is called as left child and the right node is called

Right child.

* Maximum no of nodes at a level is equal to 2i,where

I is the level.

**Strict Binary Tree:**

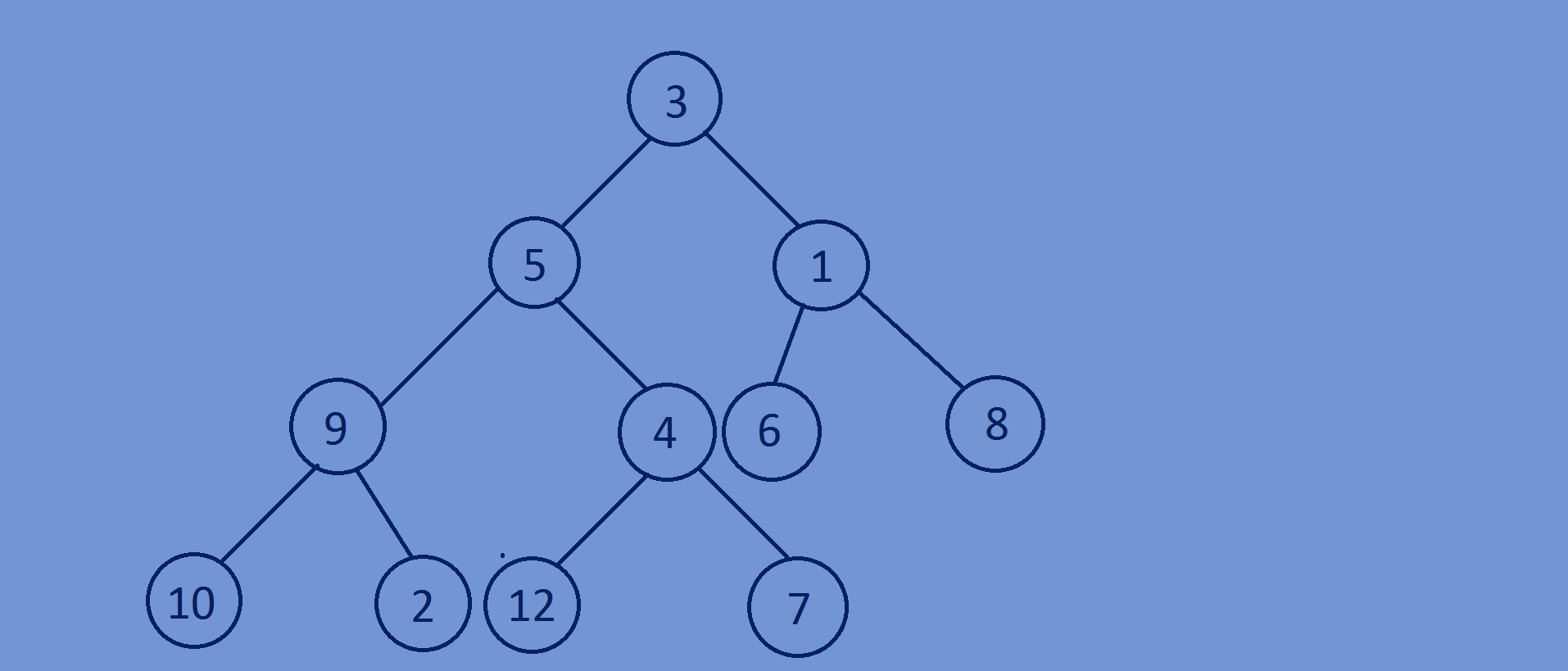
* A binary tree is said to be a strict

Binary tree if each node of a tree

Has two or zero children.

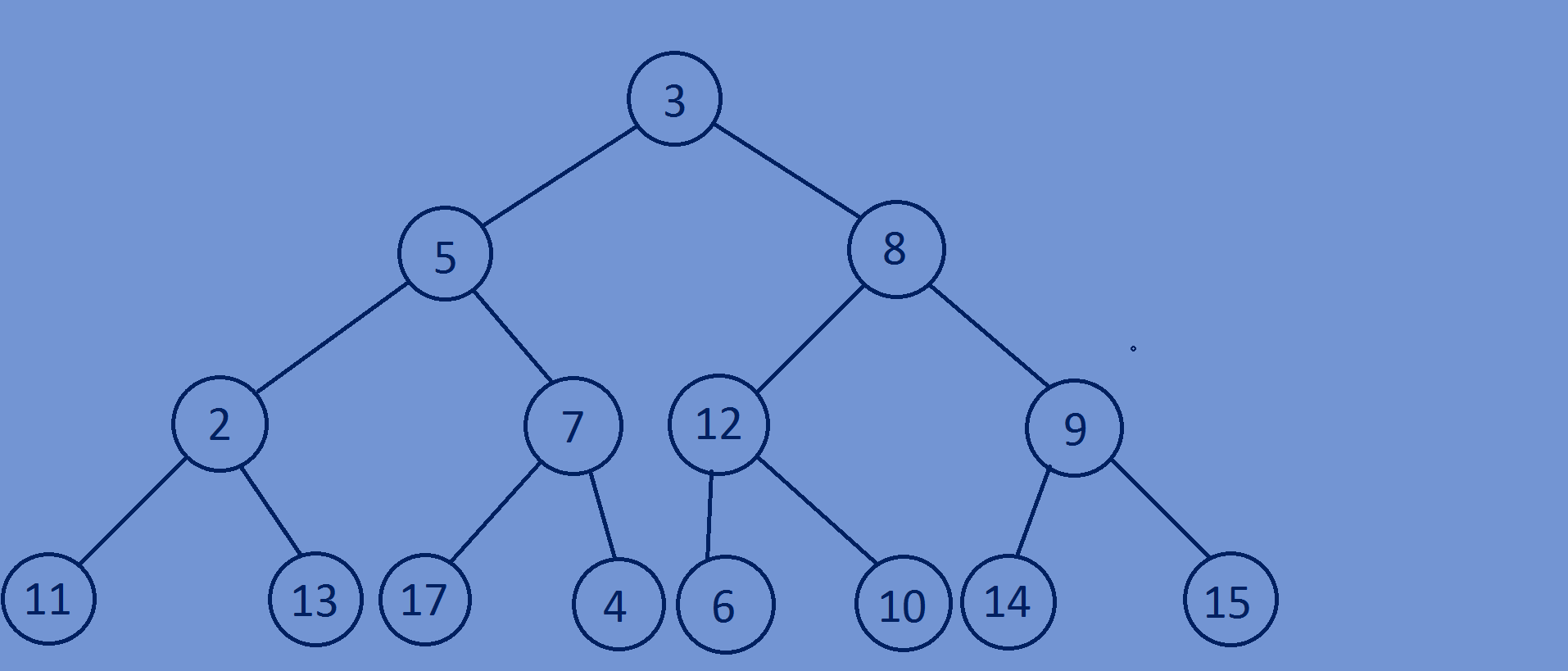
**Complete Binary Tree:**

* A binary is said to be a complete binary tree if all levels except the last level are completely filled and all nodes are left as possible.

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**Perfect Binary Tree:**

* A binary tree is said to be a perfect binary tree, if all the levels are completely filled (complete binary tree with all the leaf nodes at same level).

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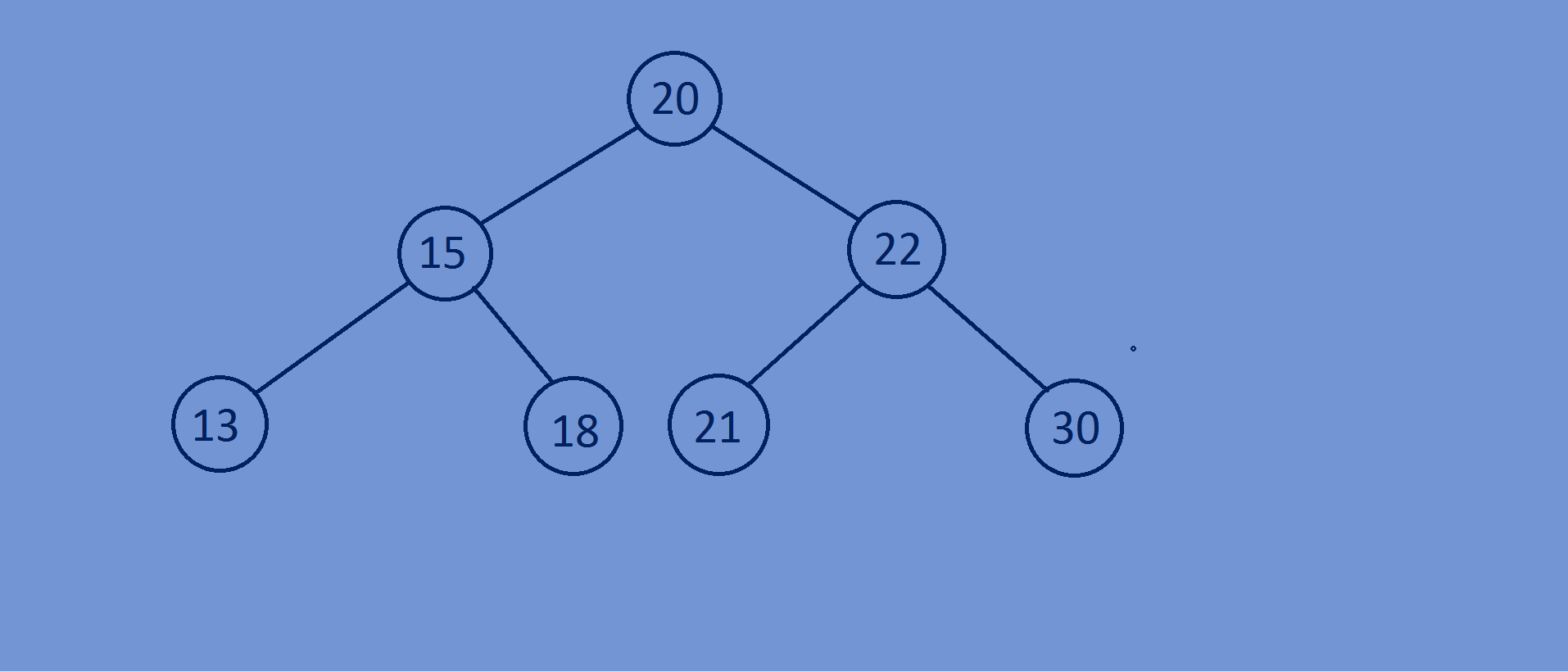
**Binary Search Tree:**

* A Binary Search tree is a binary tree in which value of left sub-tree node is

Less than or equal to its parent nodes value and the value of right sub-tree

Node is greater than its parent nodes value,here for each node,value of all

the nodes in left subtree is lesser and value of all the nodes in right subtree

****is greater.