TREES

1. Name the three properties of a tree.
   A tree contains no cycles, is an undirected graph, and is connected.

2. Is a tree a forest?
   Yes, a tree is a forest.

3. What do you call the special designated node in a tree?
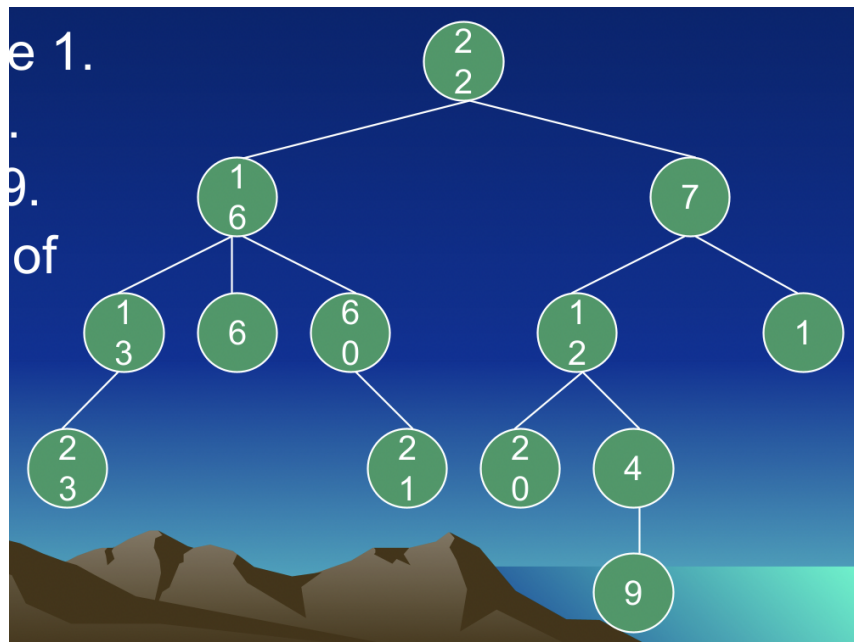   A root node.

4. What is the minimum number of nodes in a tree?
   A tree must have a minimum of 1 node.

5. Can a tree have no subtrees at all?
   Yes, a tree can be just one node containing no subtrees.

Given the tree to the right, identify the ff.:

6. Children of node 16. Node 13, node 6, and node 60.

7. Parent of node 1. Node 7.

8. Siblings of 23. Node 23 has no siblings.

9. Ancestors of 9. Node 4, node 12, node 7, and node 22

10. Descendants of 16. Node 13, node, 6, node 20, node 23, and node 21.

11. Leaves. Node 23, node 6, node, 21, node 20, node 9, and node 1.

12. Non-leaves. Node 22, node 16, node 7, node 13, node 60, node 12, and node 4.

13. Depth of node 4. Depth of 3

14. Degree of the tree. Degree of 3

15. Height of the tree. Height of 3

16. Weight of the tree. Weight of 6

17. Is the tree a binary tree?
    No, the tree contains a maximum degree of 3.

18. Removing 6, is the tree a full binary tree?
    No, nodes 4, 23, and 21 have a degree of 1.

19. Removing 6, is the tree a complete binary tree?
    No, each internal node does not contain the same degree.

20. Is a full binary tree complete?
    Yes, a full binary tree would be made up of all nodes having a degree of 2 which makes all the internal nodes have an equal amount of degree making it a complete tree.

21. Is a complete binary tree full?
    Yes, a complete binary tree means that the tree contains internal nodes with degrees of 2, thus, making it a full binary tree.

22. How many leaves does a complete n-ary tree of height h have?

The no. of leaves $= n^h$

23. What is the height of a complete n-ary tree with m leaves?

The height of the tree $= \log_n m$

24. What is the number of internal nodes of a complete n-ary tree of height h?

The number of internal nodes $= \dfrac{n^h - 1}{n - 1}$

25. What is the total number of nodes a complete n-ary tree of height h have?

The total number of nodes $= \dfrac{n^h - 1}{n - 1} + n^h$