

Short Quiz on Trees

6. Children of Node 16.
- Nodes 13, 6, and 60.
7. Parent of Node 1.
- Node 7.
8. Siblings of 23.
- None.
9. Ancestors of 9.
- Nodes 4, 12, 7, and 22.
10. Descendants of 16.
- Nodes 13, 6, 60, 23, and 21.
11. Leaves.
- Nodes 23, 6, 21, 20, 9, and 1.
12. Non-leaves.
- Nodes 13, 16, 60, 7, 12, 4, and 22.
13. Depth of Node 4.
- 3.
14. Degree of the tree.
- 3.
15. Height of the tree.
- 4.
16. Weight of the tree.
- 6.
17. Is the tree a binary tree?
- No, because the degree of the tree is equal to three— it needs to be equal to two.
18. Removing 6, is the tree a full binary tree?
- No, because the degree of other nodes is equal to one.
19. Removing 6, is the tree a complete binary tree?
- No, because the leaves of the tree, 1, 9, 20, 21, and 23, have different depths. Moreover, the non-leaves of the tree, 13, 16, 60, 7, 12, 4, and 22, have different degrees.
20. Is a full binary tree complete?

- No, because although nodes have exactly two degrees, the depth of the leaves can still sometimes vary.

21. Is a complete binary tree full?

- Yes, because the depth are equal, and most importantly, the degree— which is two.

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

- The formula in solving for the number of leaves a complete n-ary tree of height h have is:

$$\text{number of leaves} = n^h$$

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

- The formula in solving for the height of a complete n-ary tree with m leaves is:

$$\text{height} = \log_n m$$

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

- The formula in solving for the number of internal nodes of a complete n-ary tree of height h is:

$$\text{number of internal nodes} = \frac{n^h - 1}{n - 1}$$

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

- The formula in solving for the total number of nodes a complete n-ary tree of height h have is:

$$\text{total number of nodes} = \frac{n^{h+1} - 1}{n - 1}$$