

## Short Quiz on Trees (cont'd.)

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

6. Children of node 16.

7. Parent of node 1.

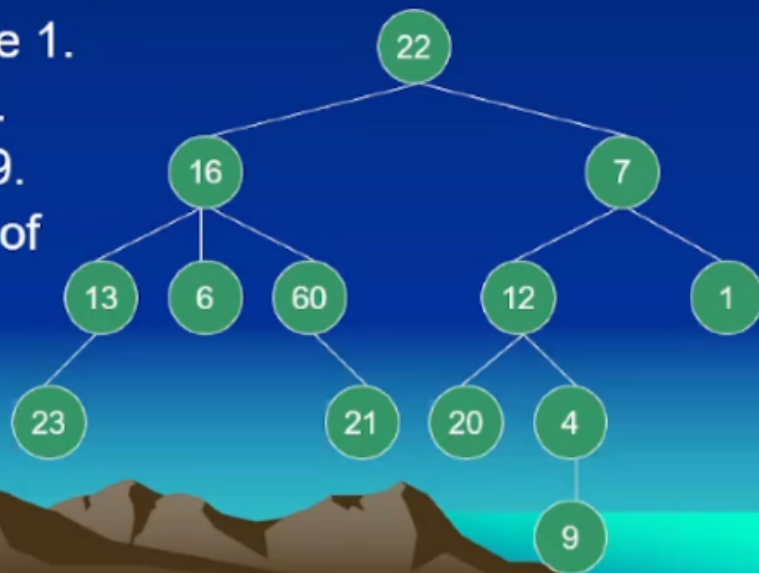
8. Siblings of 23.

9. Ancestors of 9.

10. Descendants of  
16.

11. Leaves.

12. Non-leaves.



6. Children of node 16.

13,6,60

7. Parent of node 1.

7

8. Siblings of 23

none

9. Ancestors of 9.

4,12,7,22

10. Descendants of 16.

13,6,60,23,21

11. Leaves.

23,6,21,20,9,1

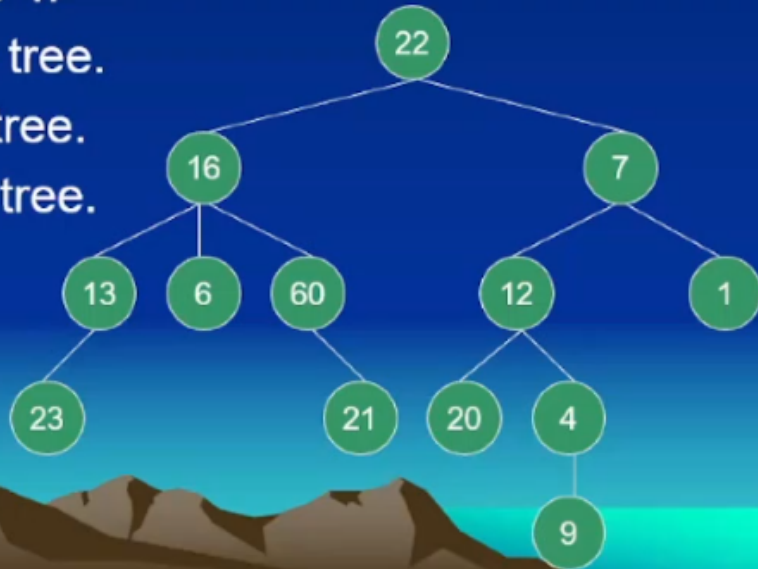
12. Non-leaves.

22,16,7,13,60,12,1,4

## Short Quiz on Trees (cont'd.)

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

- 13. Depth of node 4.
- 14. Degree of the tree.
- 15. Height of the tree.
- 16. Weight of the tree.
- 17. Is the tree a binary tree?



- 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

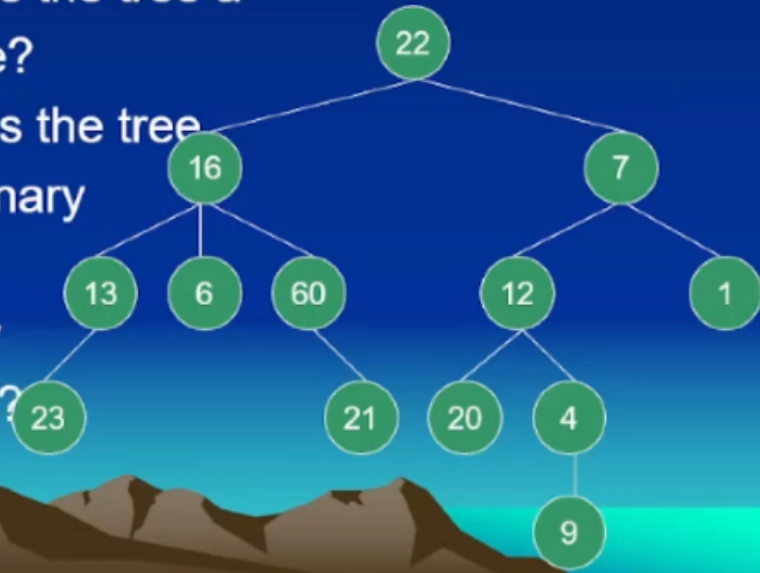
## Short Quiz on Trees (cont'd.)

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

18. Removing 6, is the tree a full binary tree?

19. Removing 6, is the tree a complete binary tree?

20. Is a full binary tree complete?



18. Removing 6, is the tree a full binary tree?

NO

19. Removing 6, is the tree a complete binary tree?

NO

20. Is a full binary tree complete?

NO, since the left portion of the tree is not entirely filled and the nodes occasionally only have 0 or 2 offstrings (making it binary).

## Short Quiz on Trees (cont'd.)

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

21. Is a complete binary tree full?
22. How many leaves does a complete  $n$ -ary tree of height  $h$  have?
23. What is the height of a complete  $n$ -ary tree with  $m$  leaves?
24. What is the number of internal nodes of a complete  $n$ -ary tree of height  $h$ ?
25. What is the total number of nodes a complete  $n$ -ary tree of height  $h$  have?

21. Is a complete binary tree full?

A complete binary can either be full or it can't.

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

$n^h$

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

$\log_n m$

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

$2^h - 1$

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

$T = n^h + \frac{n^h - 1}{n - 1}$ ; where  $T$  = total number of nodes in a complete  $n$ -ary trees.