Code Challenge #7 Node Depths (Easy)

Node Depths

The distance between a node in a Binary Tree and the tree's root is called the node's depth.

Write a function that takes in a Binary Tree and returns the sum of its nodes' depths.

Each `BinaryTree` node has an integer `value`, a `left` child node, and a `right` child node. Children nodes can either be `BinaryTree` nodes themselves or `None` / `null`.

Sample Input

```
tree =    1
        /    \
       2      3
     /   \   /   \
    4     5 6     7
  /   \
 8     9
```

Sample Output

```
16
// The depth of the node with value 2 is 1.
// The depth of the node with value 3 is 1.
// The depth of the node with value 4 is 2.
// The depth of the node with value 5 is 2.
// Etc..
// Summing all of these depths yields 16.
```

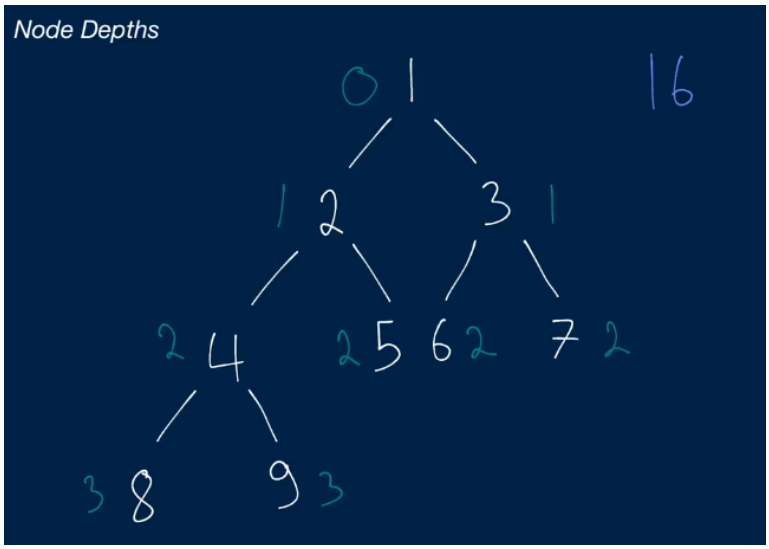
Solution #1

```
1. function nodeDepths(root) {
2.   let sumOfDepths = 0
3.    const stack = [{node: root, depth: 0}];
4.   while (stack.length > 0) {
5.          const {node, depth} = stack.pop();
6.
7.          if (node === null) continue;
8.          sumOfDepths += depth;
9.          stack.push({node: node.left, depth: depth + 1});
10.         stack.push({node: node.right, depth: depth + 1})
11.         }
12.         return sumOfDepths;
13. }
14.
15. // This is the class of the input binary tree.
16. class BinaryTree {
17.   constructor(value) {
```

```
18.       this.value = value;
19.       this.left = null;
20.       this.right = null;
21.     }
22.  }
23.
```

Explanation

This code challenge requires you to add the total number of nodes based on depth of a binary tree. For example, the depth of this binary tree is 16. The depth of a binary tree is the number of levels a node is from the root. The first node is the root node which has a depth of 0 (it is 0 depth from the root since it is the root itself). The second level (depth of 1) contains two items, so we say it is 2 times 1 which is 2. The third level (depth of 2) contains 4 times, so we say it is 4 times 2 which is 8. The fourth level (depth of 3) contains 2 items so we it is 2 times 3 which is 6.



In order to solve this iteratively we will first create a let variable called sumOfDepths = 0. We will then create a const called stack which is an array which initially contains an object where the key value pairs are node: root and depth: 0. We will then create a while loop that runs as long as the stack.length is greater than 0 aka there are items in the stack. Then we will create a const with variables called node and depth using object destructuring and using stack.pop which removes the last item from the stack. If the node === null aka no children node we will continue. We will add depth to the SumOfDepths using +=. We will

then push onto stack an object {node: node.left, depth: depth + 1}) . Followed by pushing onto the stack {node: node.right, depth: depth + 1}). We finally return the sumOfDepths. The code runs in O(n) time.