Footprints

The instructions for a 1-tree:
- Step forward 1 step to make one footprint, go back in your own prints.

When you know how to make a 1-tree, you can learn how to make a 2-tree:
- Step forward 2 steps to make two footprints.
- Turn left and make a 1-tree.
- Turn right and make a 1-tree.
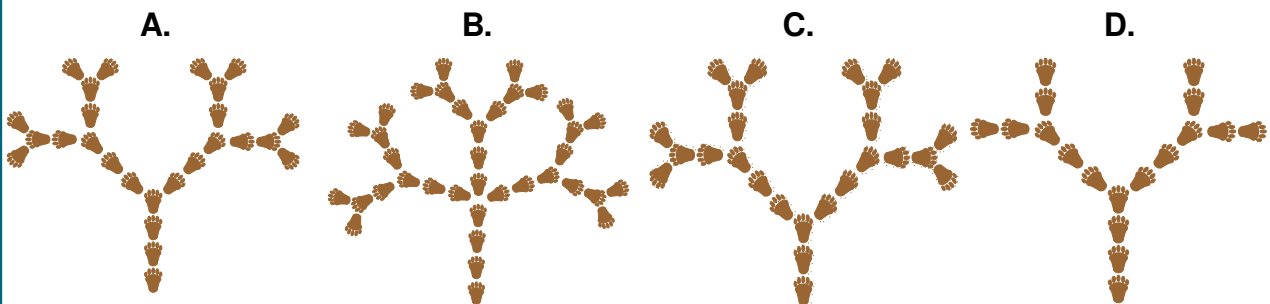- Go back in your own prints.

It is easy to explain how to create a 3-tree because a 3-tree consists of 2-trees:
- Step forward 3 steps to make three footprints.
- Turn left and make a 2-tree.
- Turn right and make a 2-tree.
- Go back in your own prints.

QUESTION

In a similar way you can create a 4-tree.
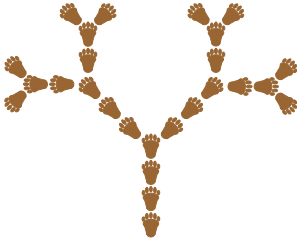**Which of the following trees is a proper 4-tree?**

A. B. C. D.

Maynooth University
National University of Ireland Maynooth

Science Foundation Ireland For what's next

SMART FUTURES

Answer

The correct answer is A

Explanation of the answer

Answer A consists of 4 steps plus two 3-trees. This is a correct 4-tree.

Answer B consists of 4 steps plus three 3-trees. This is too many 3-trees so it is not correct, so, this answer is not correct.

Answer C consists of 3 steps plus two 3-trees. This is too few steps at the beginning, so, this answer is not correct.

Answer D consists of 4 steps and two trees, but they are not real 3-trees because there are no 1-trees at the ends. So, this answer is not correct.

Connection to computational thinking

Decomposition: This task is an example of *recursive decomposition*. Checking if a tree is a proper 4-tree is the same as checking that it is correctly composed of proper 3-trees. Part of solving the original problem requires solving smaller versions of the same problem.