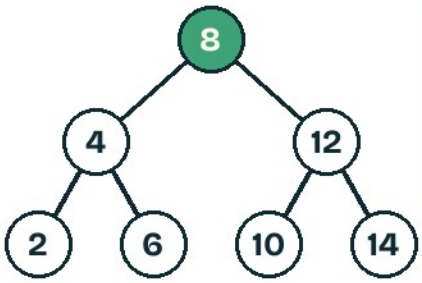
# Algorithms and Computer Science

## Step-by-step problem solving

### WHAT IS IT?

Computer science is about solving problems with clear steps a machine can follow. An algorithm is such a list of steps, and good ones stay fast even when the data gets large.



search by halving: go left or right

### THE BIG IDEAS

1. Break a big problem into small steps.
2. Searching a sorted list by halving it beats checking every item.
3. Data structures such as lists and trees organize information.
4. Test with small examples first, then bigger ones.

### YOU SEE IT WHEN ...

- Maps finding the quickest route
- Sorting your music or photos
- Search boxes and spell-checkers

### WORDS YOU WILL MEET

**Algorithm**
a list of steps that solves a problem

**Data structure**
a way to organize data, like a list or tree

**Sorting**
putting items in order

**Binary search**
finding an item by halving a sorted list

**Recursion**
a function that uses itself on a smaller problem

**Efficiency**
how the work grows as the data grows

### GOOD TO KNOW FIRST

Basic programming: variables, loops and functions.

### IN YOUR COURSE YOU WILL ...

- Trace algorithms by hand
- Use lists, stacks and trees
- Compare searching and sorting methods
- Judge how fast an algorithm is

**Start tip: Trace the algorithm on paper with five items before writing code.**

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