Introduction to Problem Solving

Why Learn Problem Solving?

- improve critical thinking
- explore, understand, and analyze problems
- think creatively about multiple possible solutions
- develop techniques that can be applied to real-world problems

Computer Programming

- problem solving skills are critical to understanding and writing programs
- the types of problems solved in software are constantly changing and evolving
  - the programmer must also be flexible in their thinking to handle new problems
- even with constant change, there are often patterns in problems and their solutions
  - practising problem solving increases ability to see patterns and try variations on solutions

Bridge Problem

- four people come to a river in the night
- there is a narrow bridge that can only hold two people at a time
- they have a single flashlight that must be used whenever a crossing is made
- each person takes a different amount of time to cross the bridge:
  - A=1, B=2, C=5, and D=8 minutes
- when two people cross together, they must move at the slowest pace

Bridge Problem

- how can we get everybody across?
- is there more than one way to accomplish this?
- what do you think is the **real** problem you are being asked to solve here?

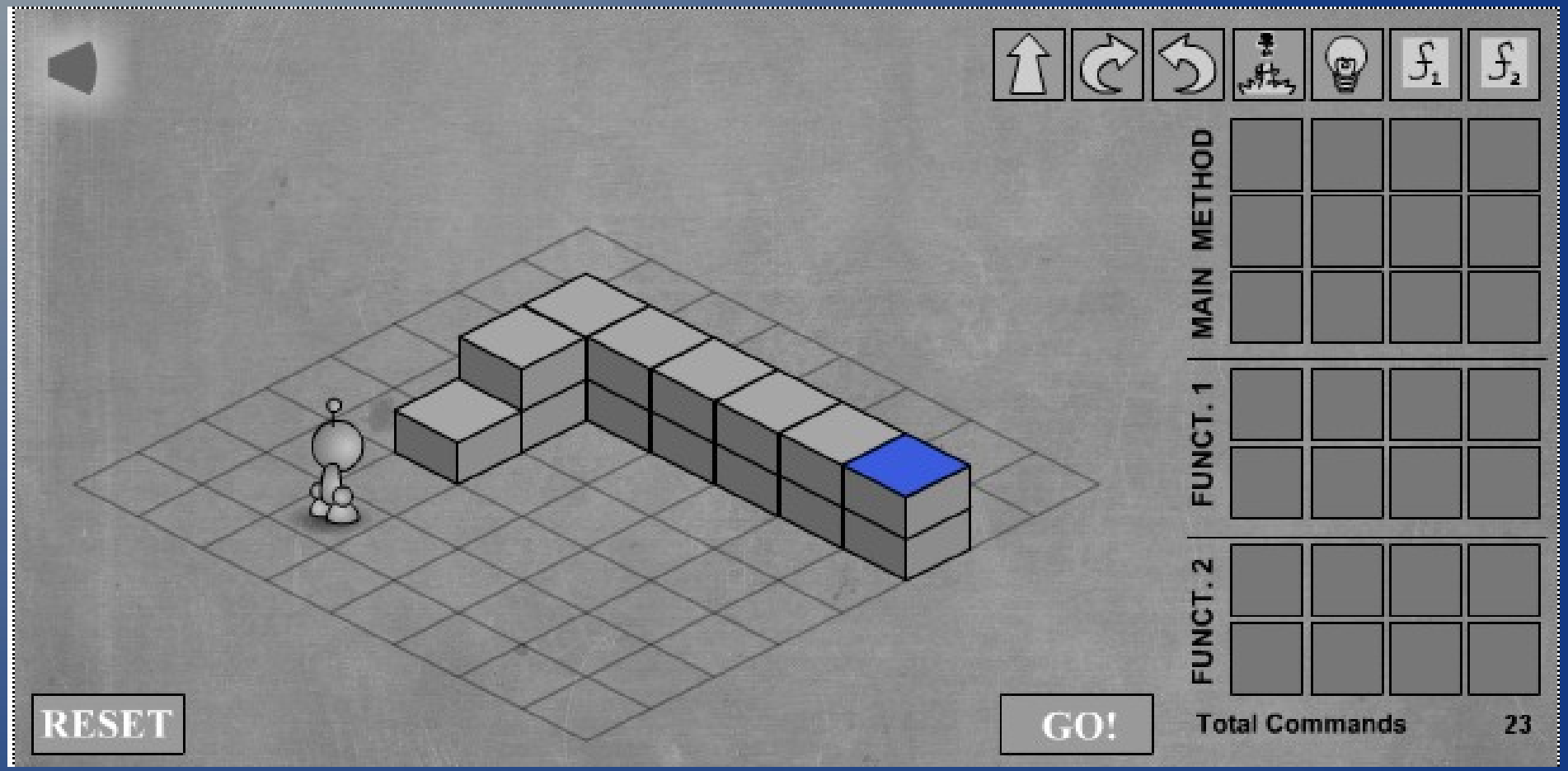
Bridge Problem

- how can we get everybody across?
- is there more than one way to accomplish this?
  - there are many ways to solve this problem
  - this is called an open solution (many acceptable solutions)
- what do you think is the **real** problem you are being asked to solve here?
  - we really want to know **the best** (fastest) way to cross the bridge
  - this is called the optimized solution
  -

Problem Solving in Video Games!

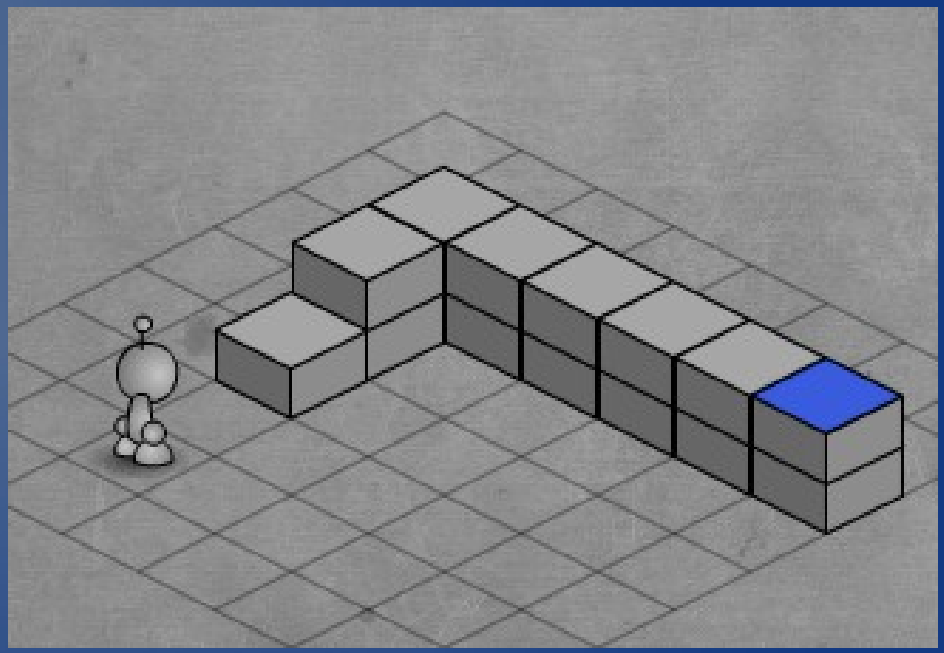
- many video games involve a problem solving component
- players will try various solutions, sometimes for hours on end
  - it may involve refining a promising strategy
  - a strategy may be an obvious failure, requiring a completely new strategy

Lightbot



Lightbot

- possible movements
  - forward
  - left
  - right
  - jump (+ forward)
  - toggle light on/off



Lightbot

- possible solutions?
  - one or many?
  - is there an optimized, or most efficient, solution?