

Algorithms

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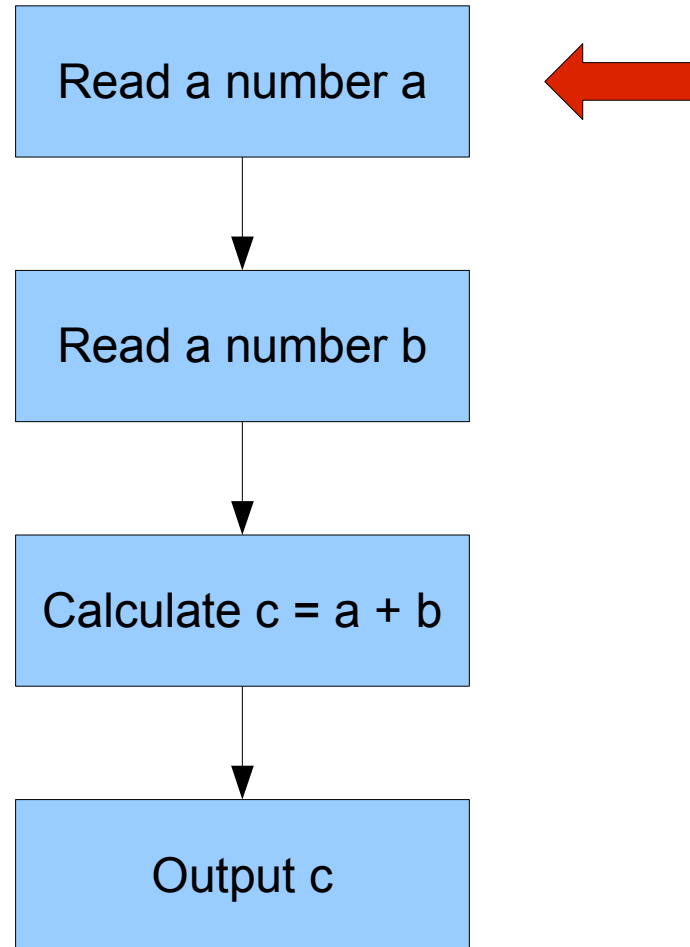
Algorithm

A description of an operation as a sequence of simpler operations.

Examples

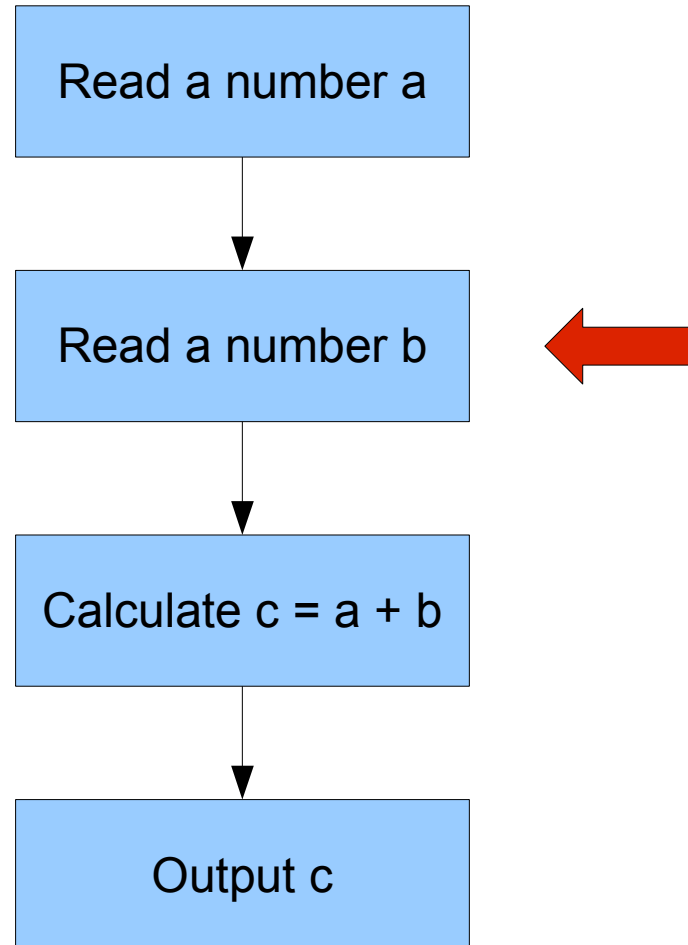
- Recipes in a cookbook
- Directions for getting from one place to another
- Long division

Flowchart



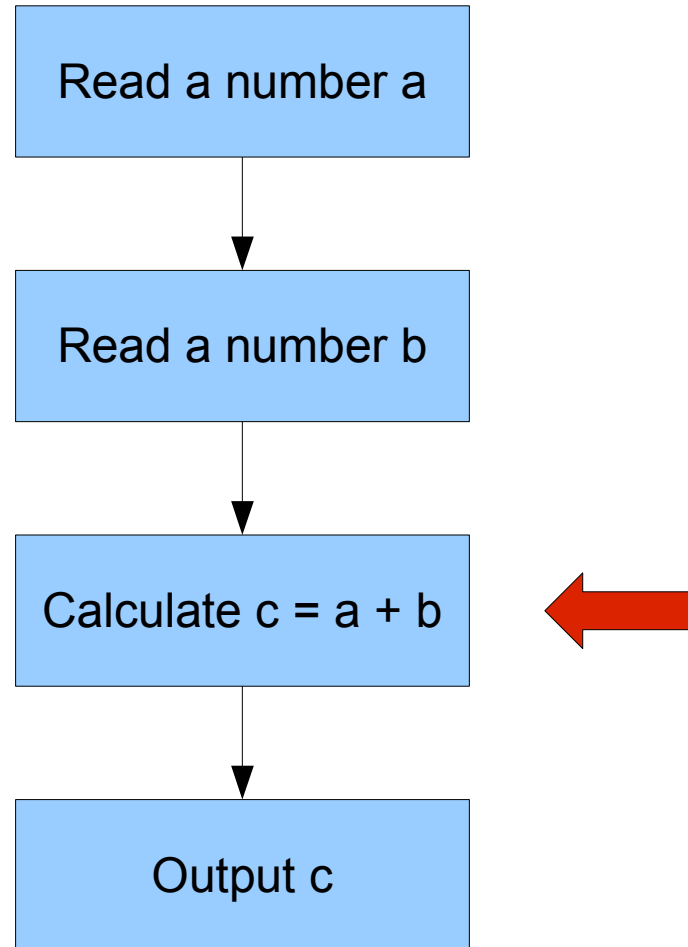
Flowchart

Memory:
 $a = 3$



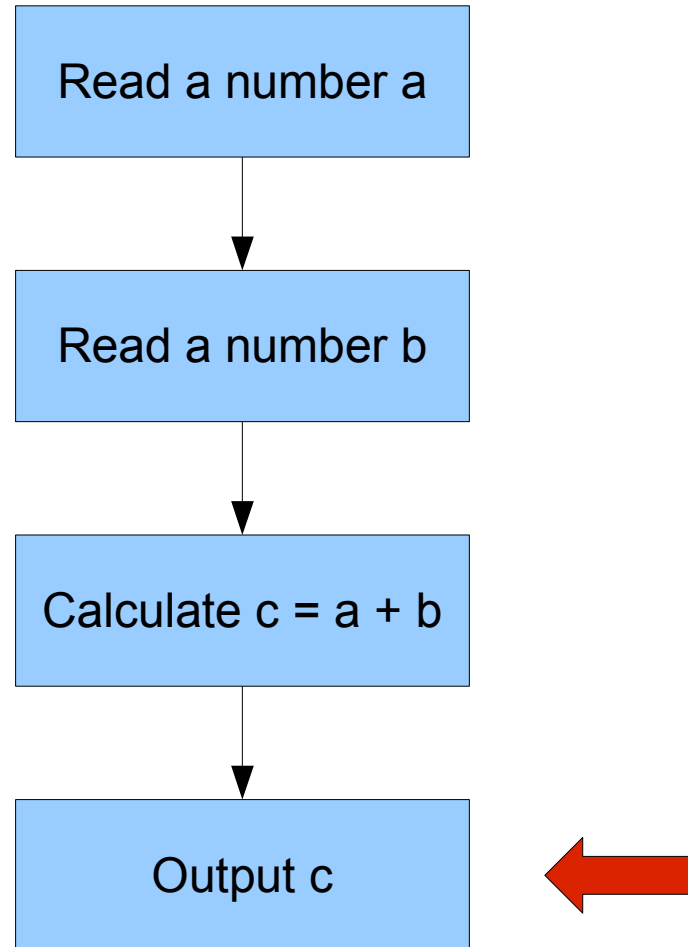
Flowchart

Memory:
 $a = 3$
 $b = 5$



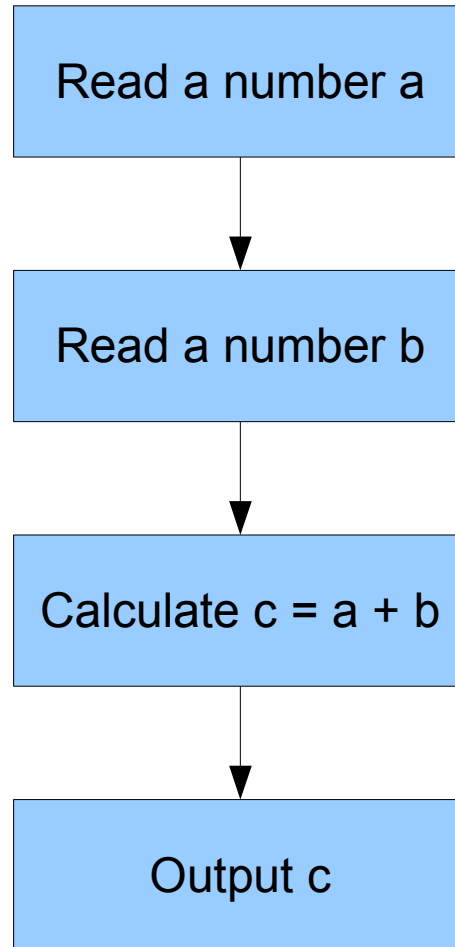
Flowchart

Memory:
 $a = 3$
 $b = 5$
 $c = 8$



Flowchart

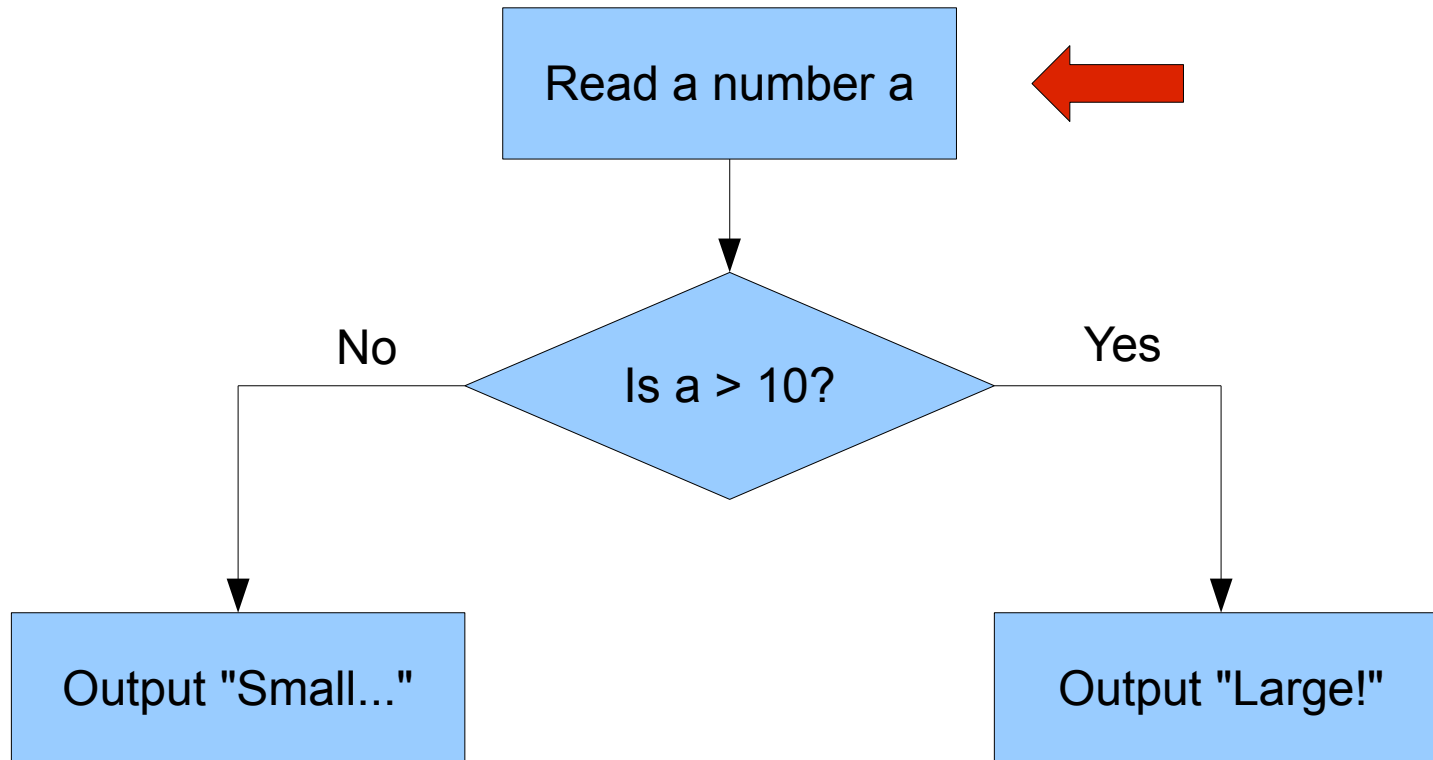
Memory:
 $a = 3$
 $b = 5$
 $c = 8$



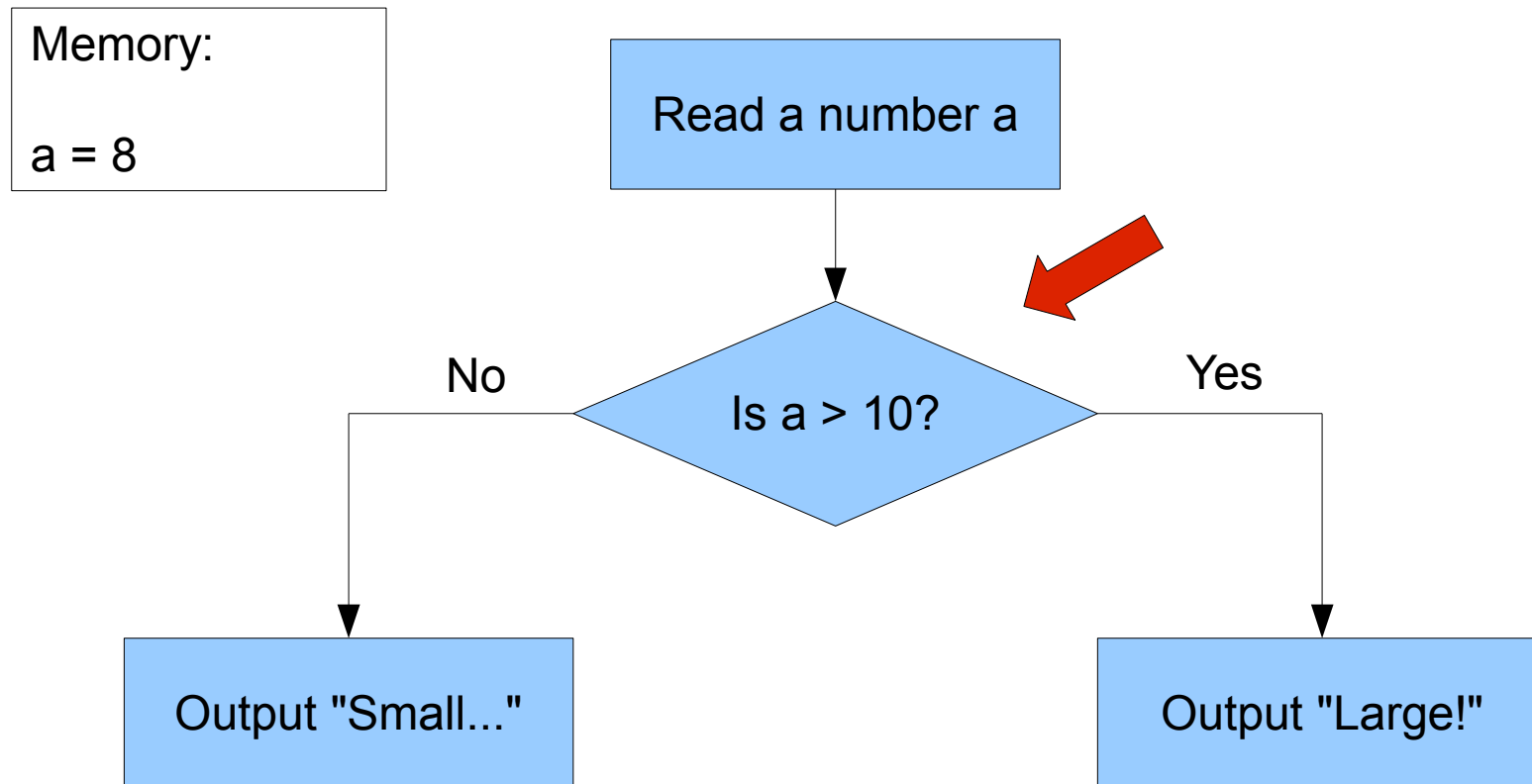
Output

8

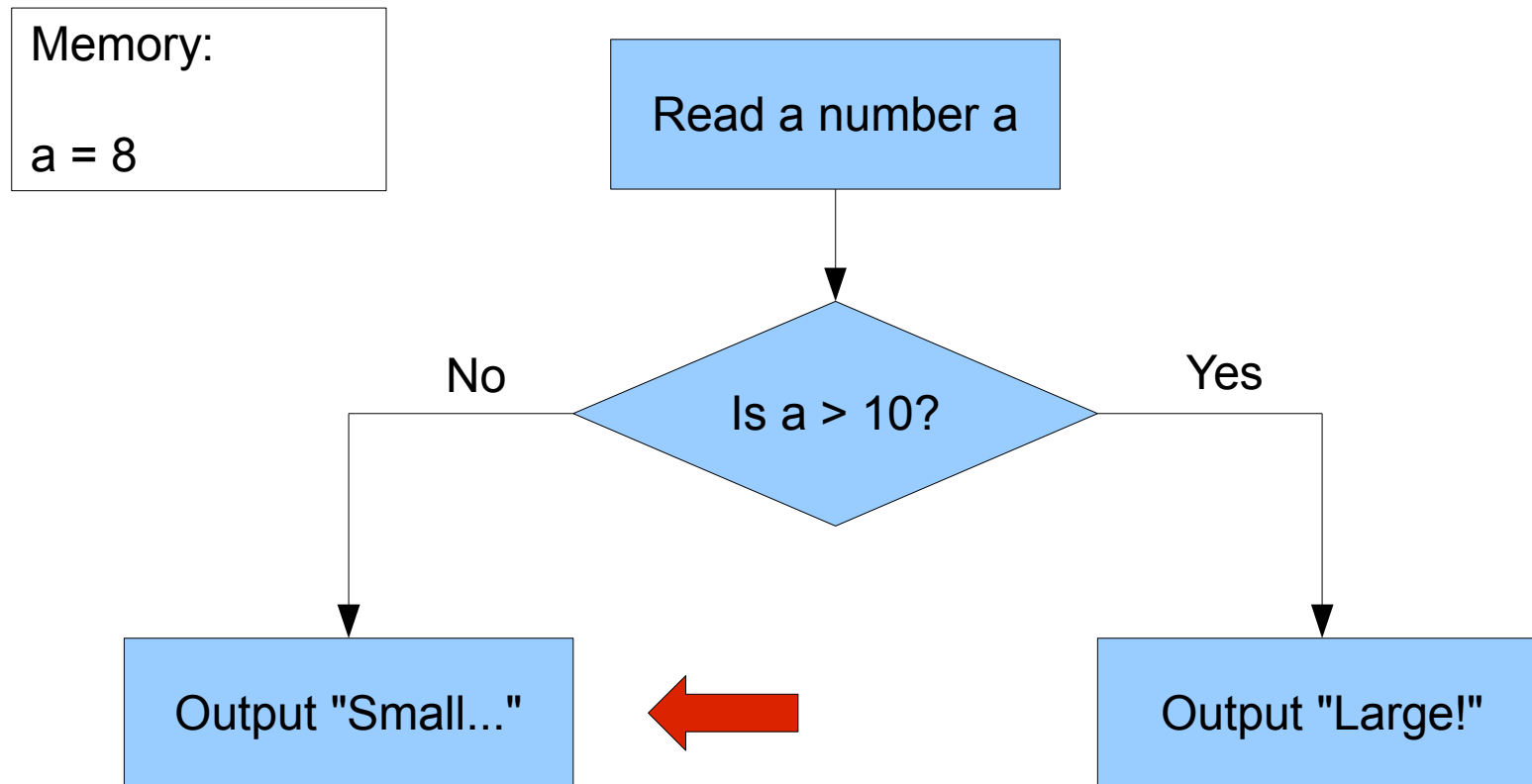
Decision



Decision

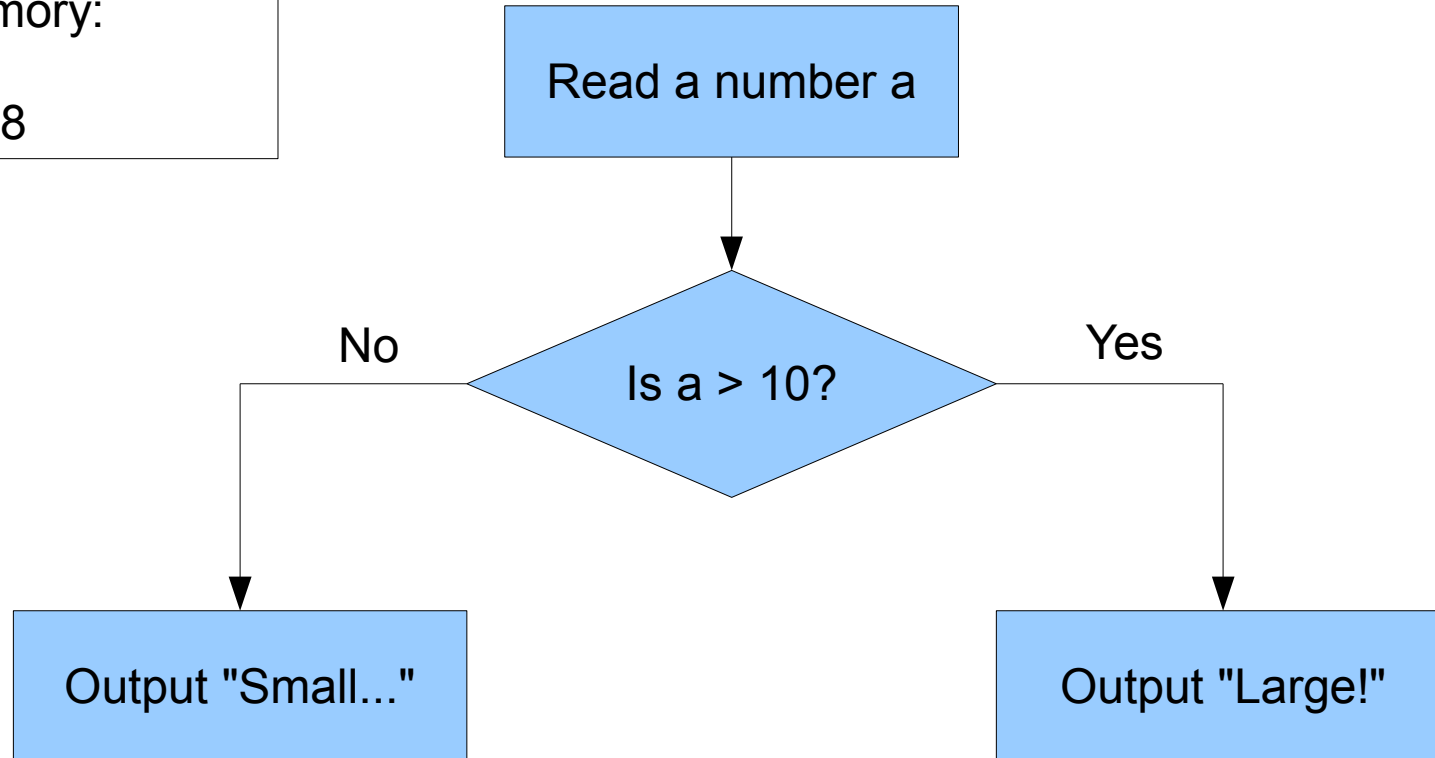


Decision



Decision

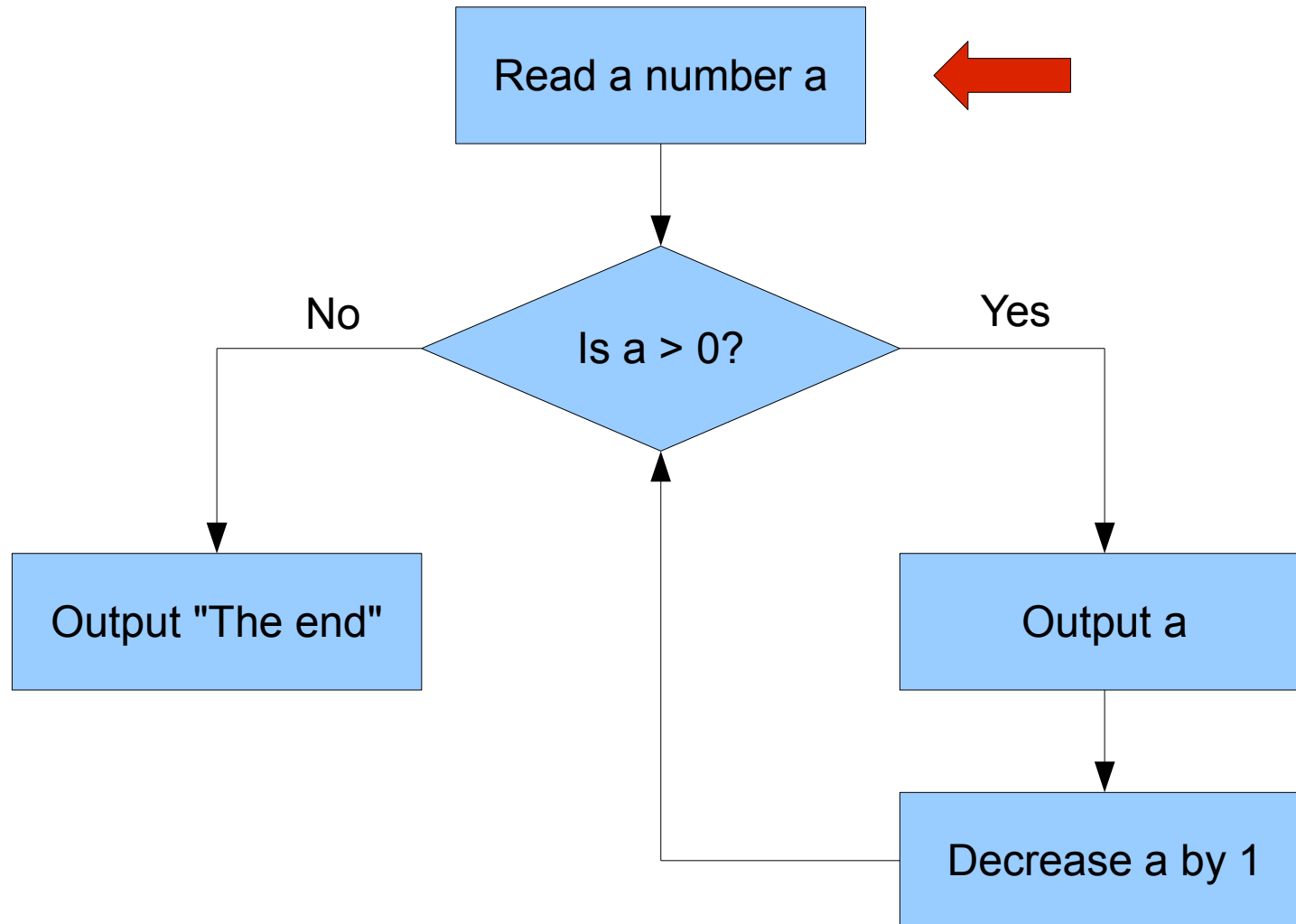
Memory:
a = 8



Output

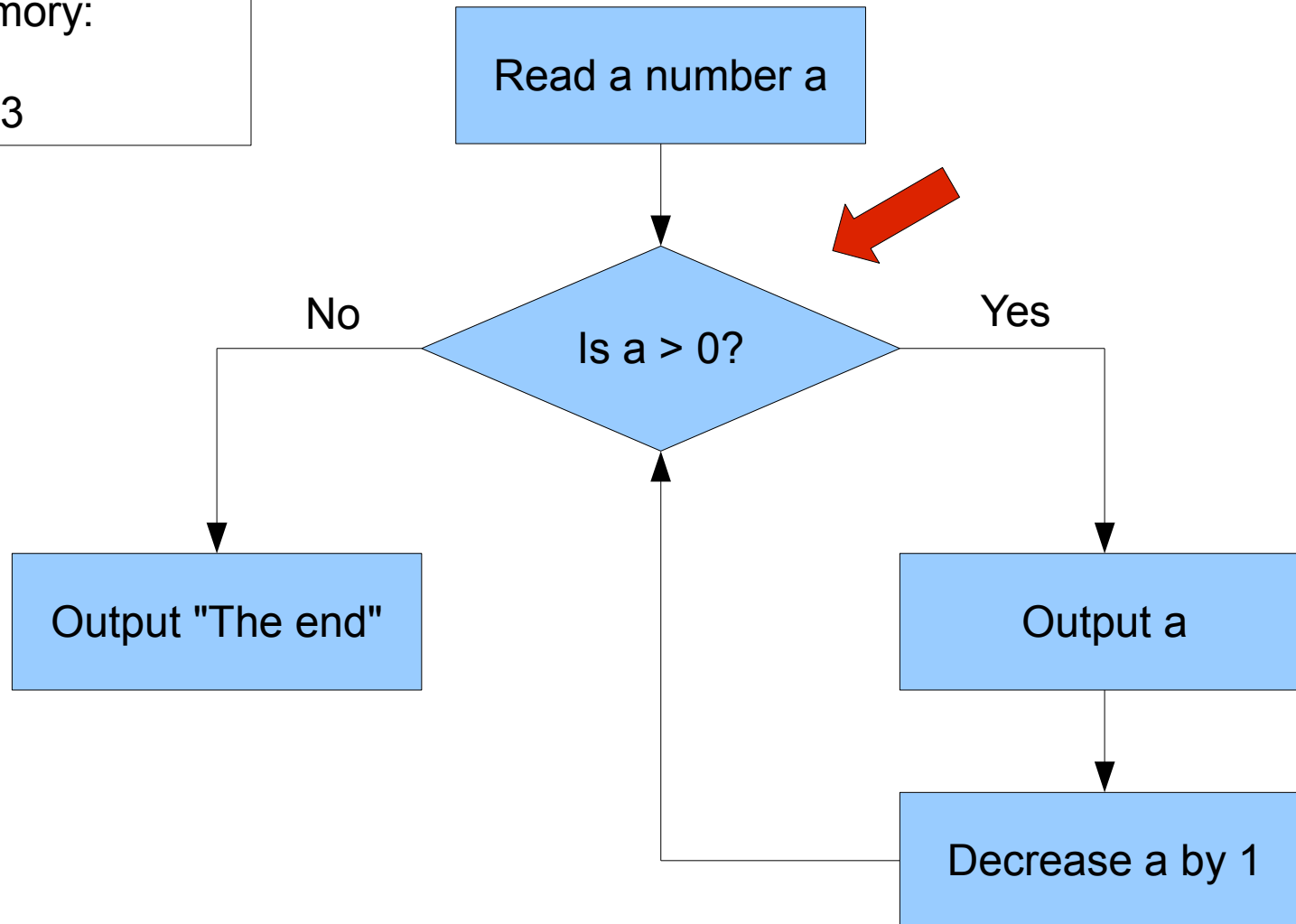
Small...

Loop



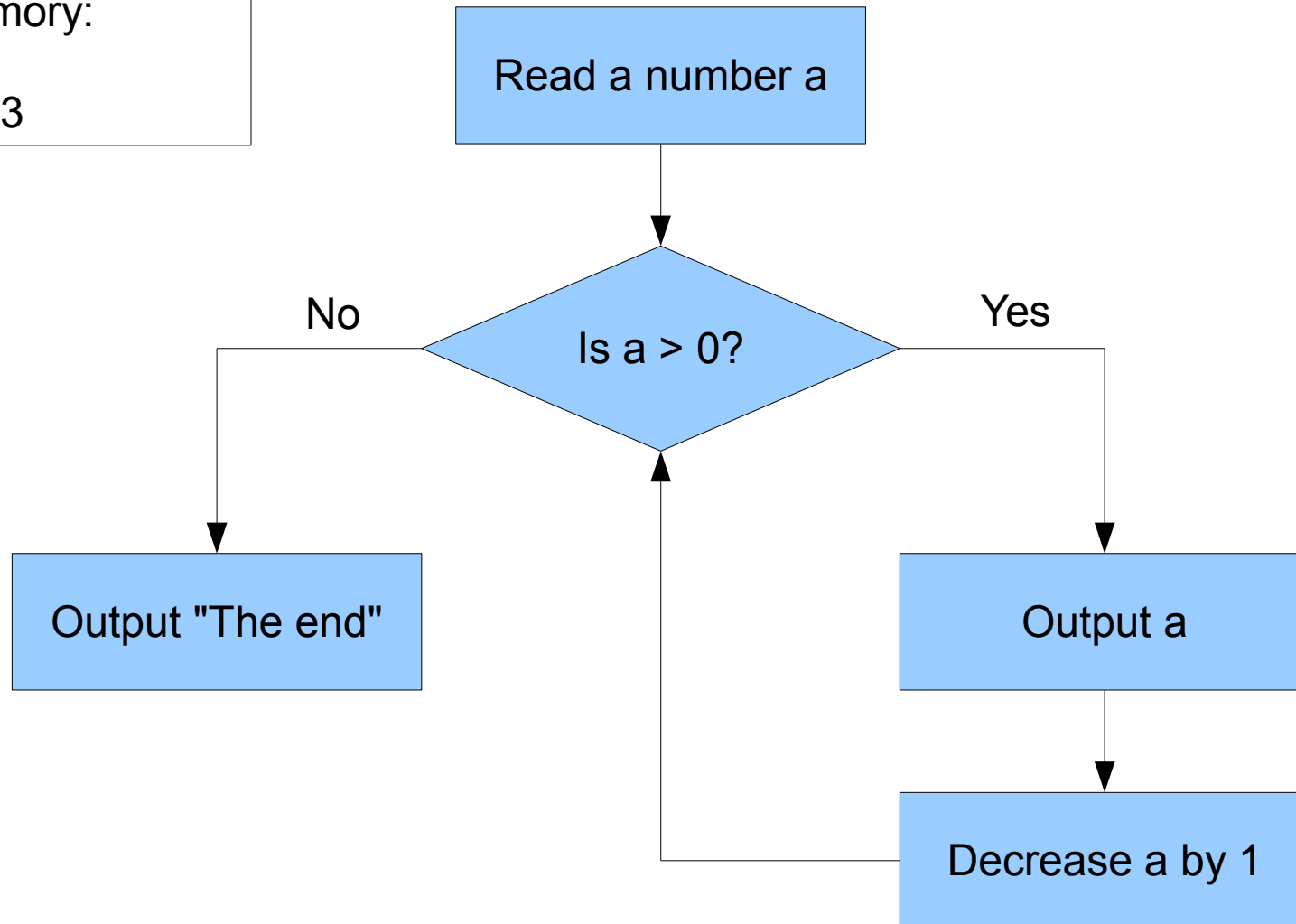
Loop

Memory:
a = 3



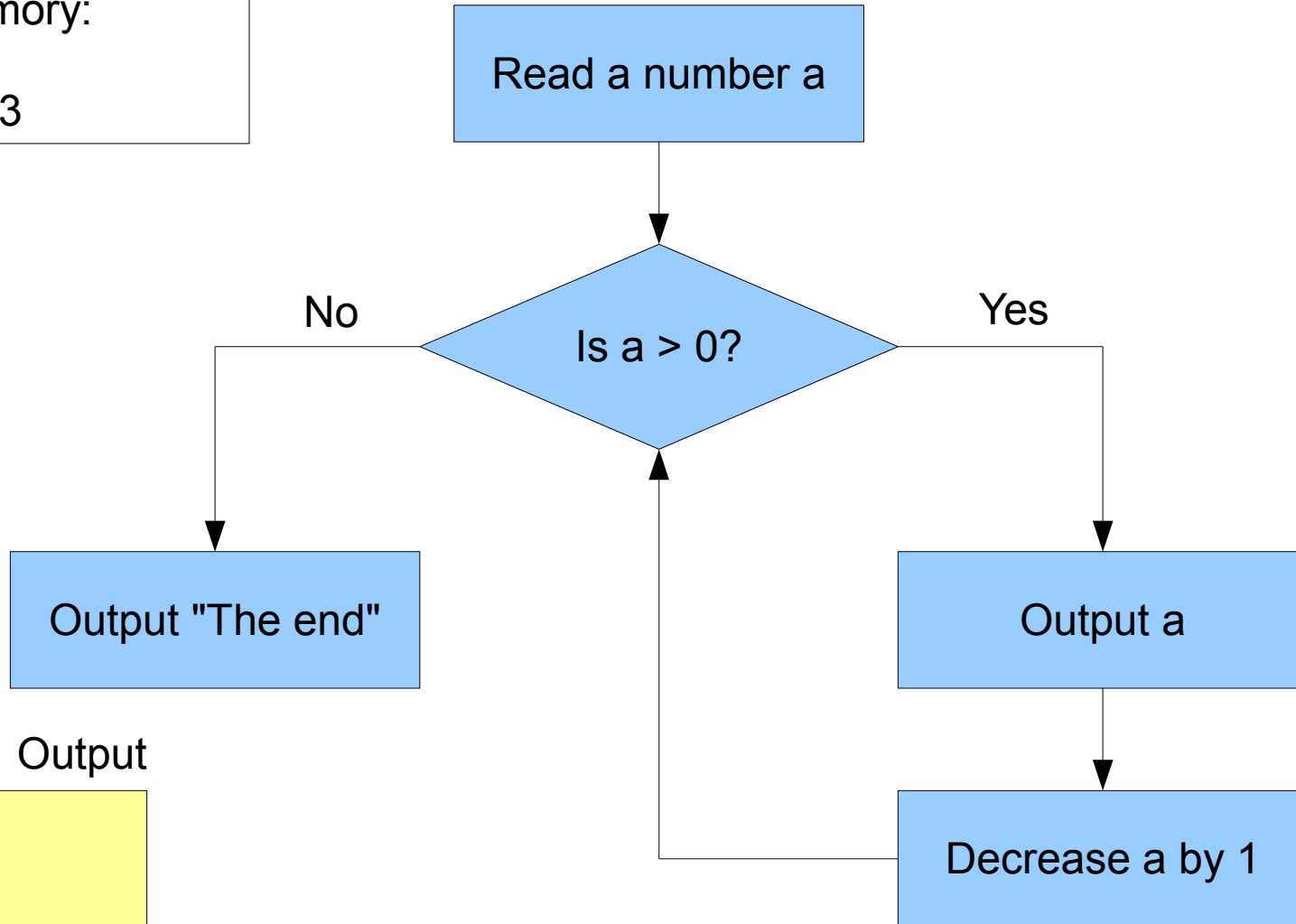
Loop

Memory:
 $a = 3$



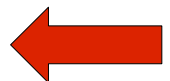
Loop

Memory:
a = 3



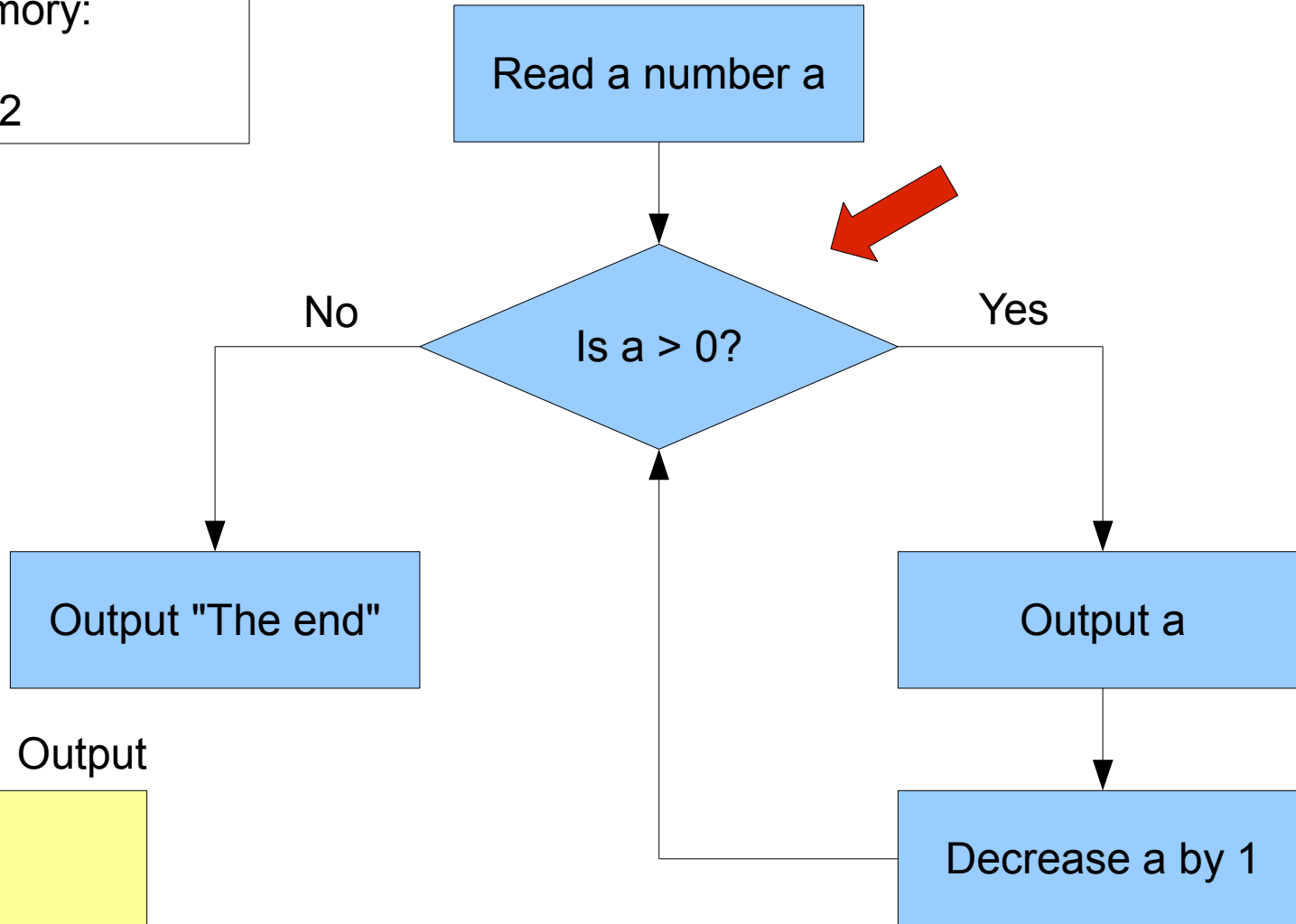
Output

3



Loop

Memory:
a = 2



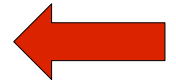
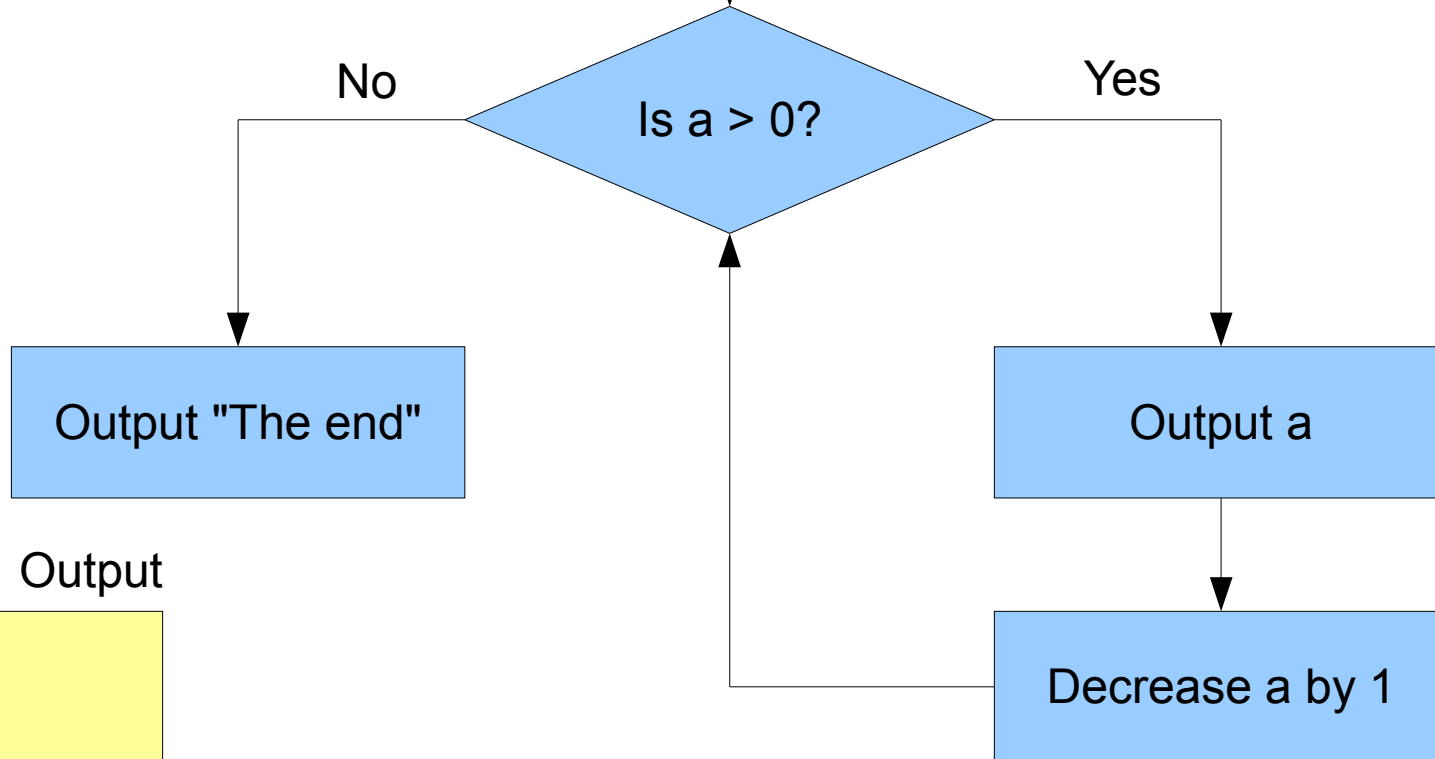
Output

3

Loop

Memory:
a = 2

Read a number a

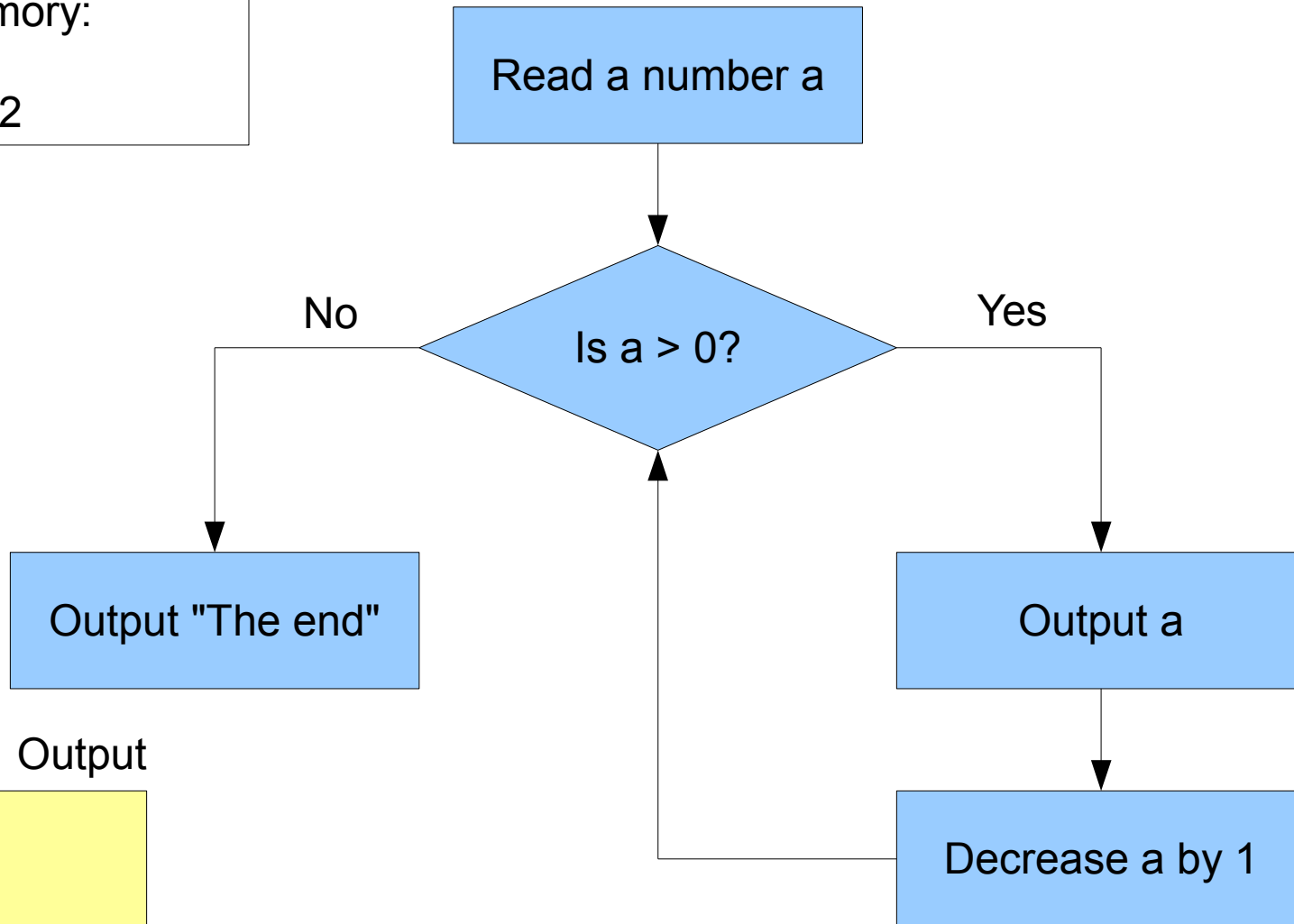


Output

3

Loop

Memory:
a = 2



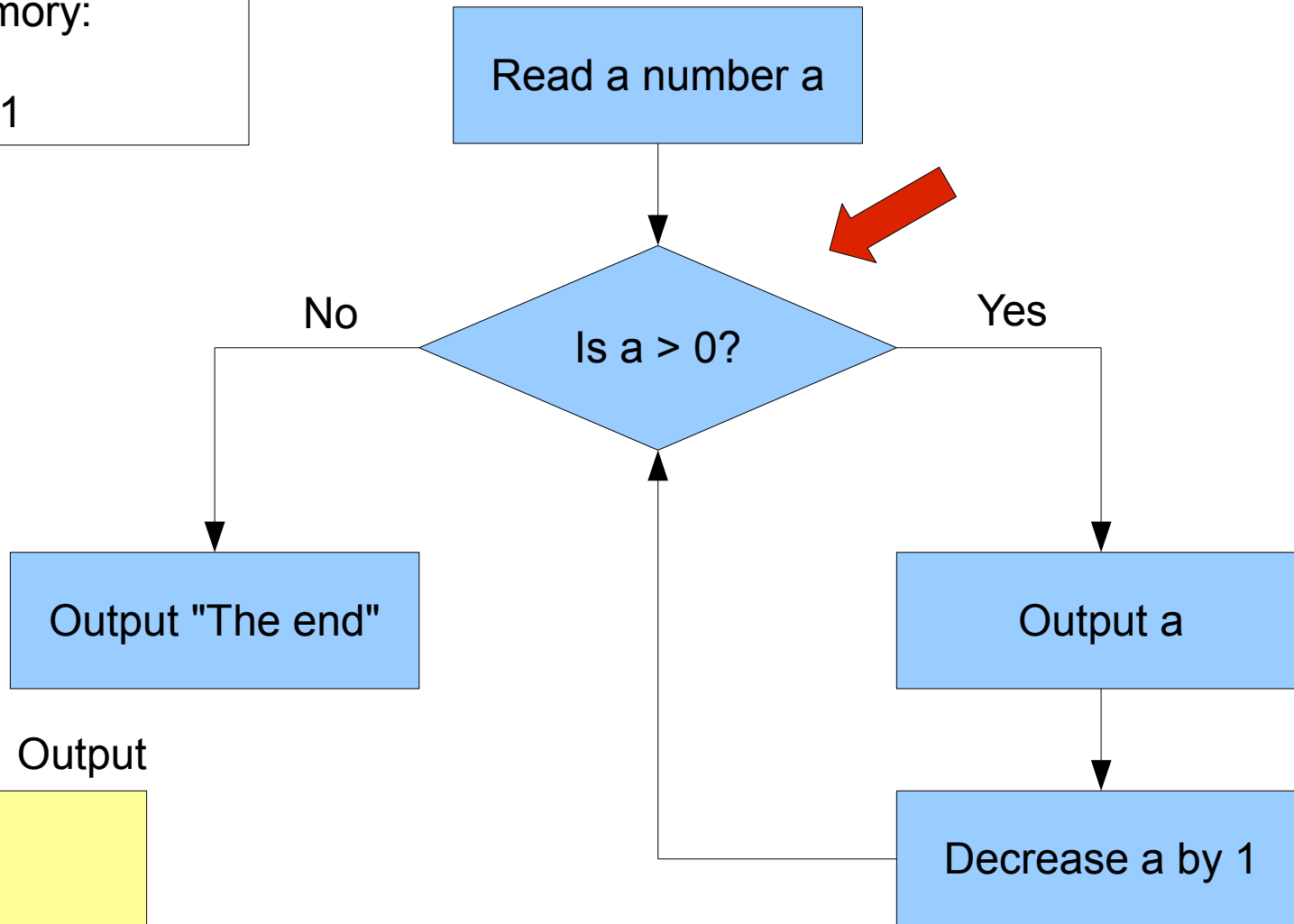
Output

3
2



Loop

Memory:
a = 1

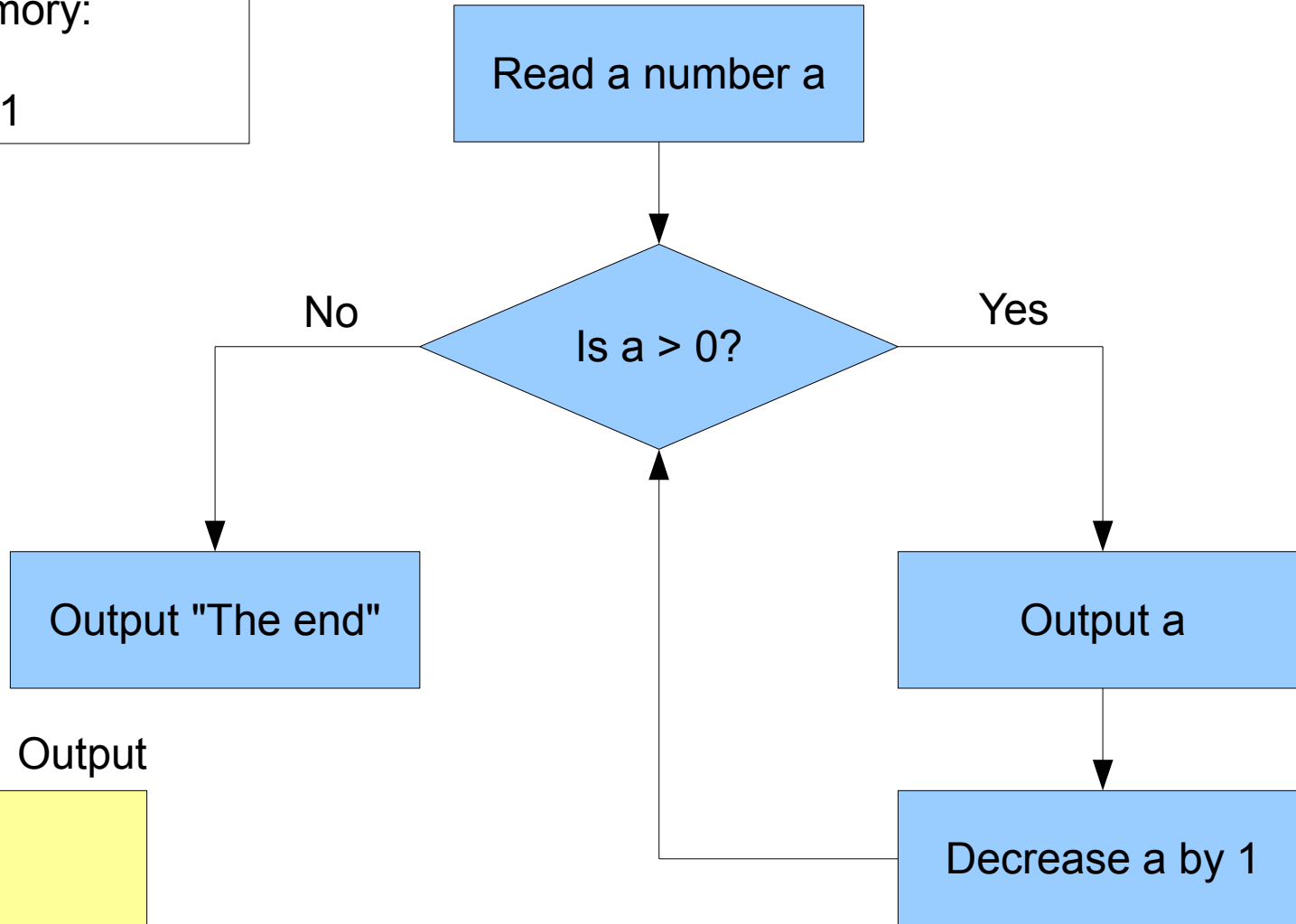


Output

3
2

Loop

Memory:
a = 1

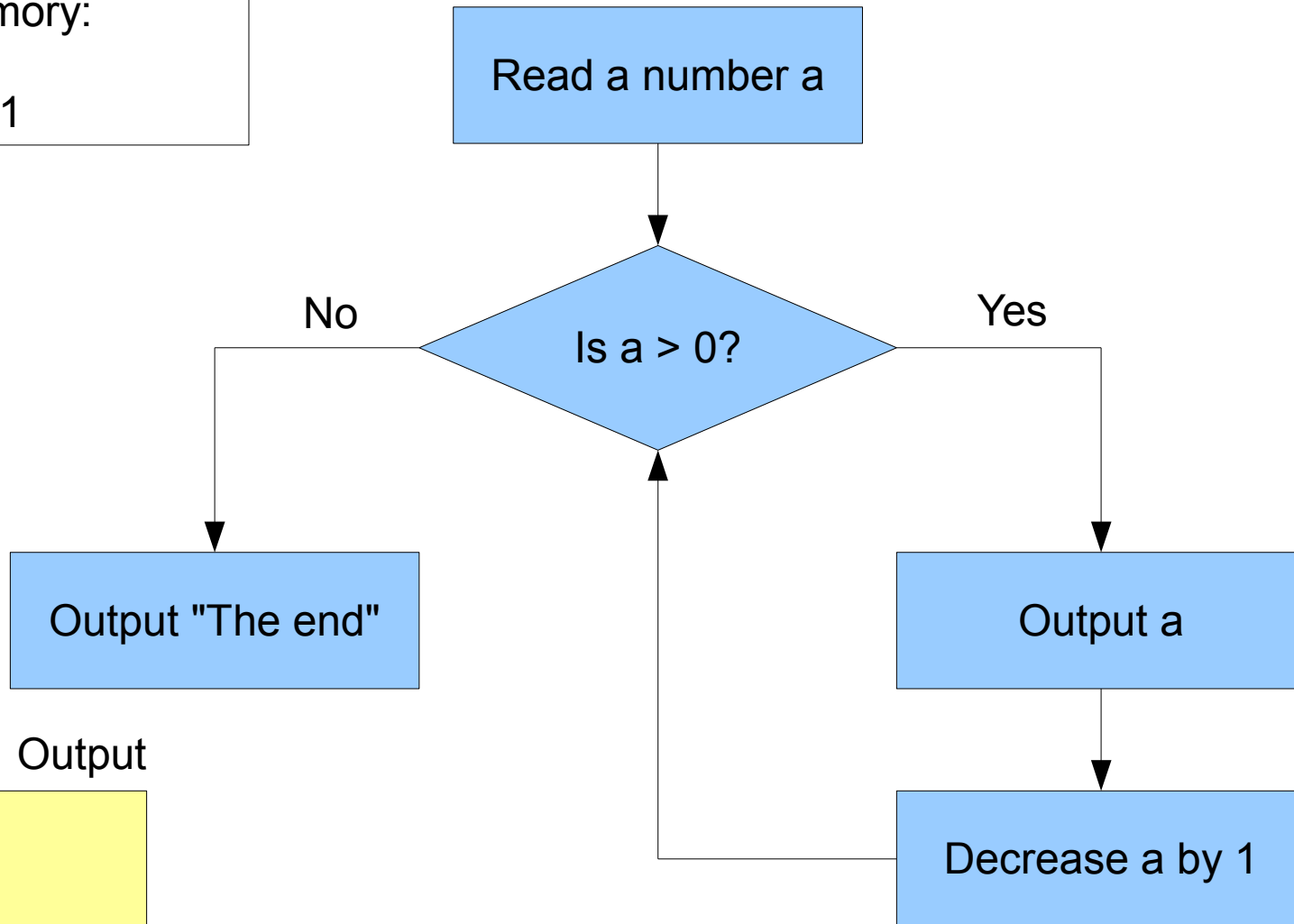


Output

3
2

Loop

Memory:
a = 1



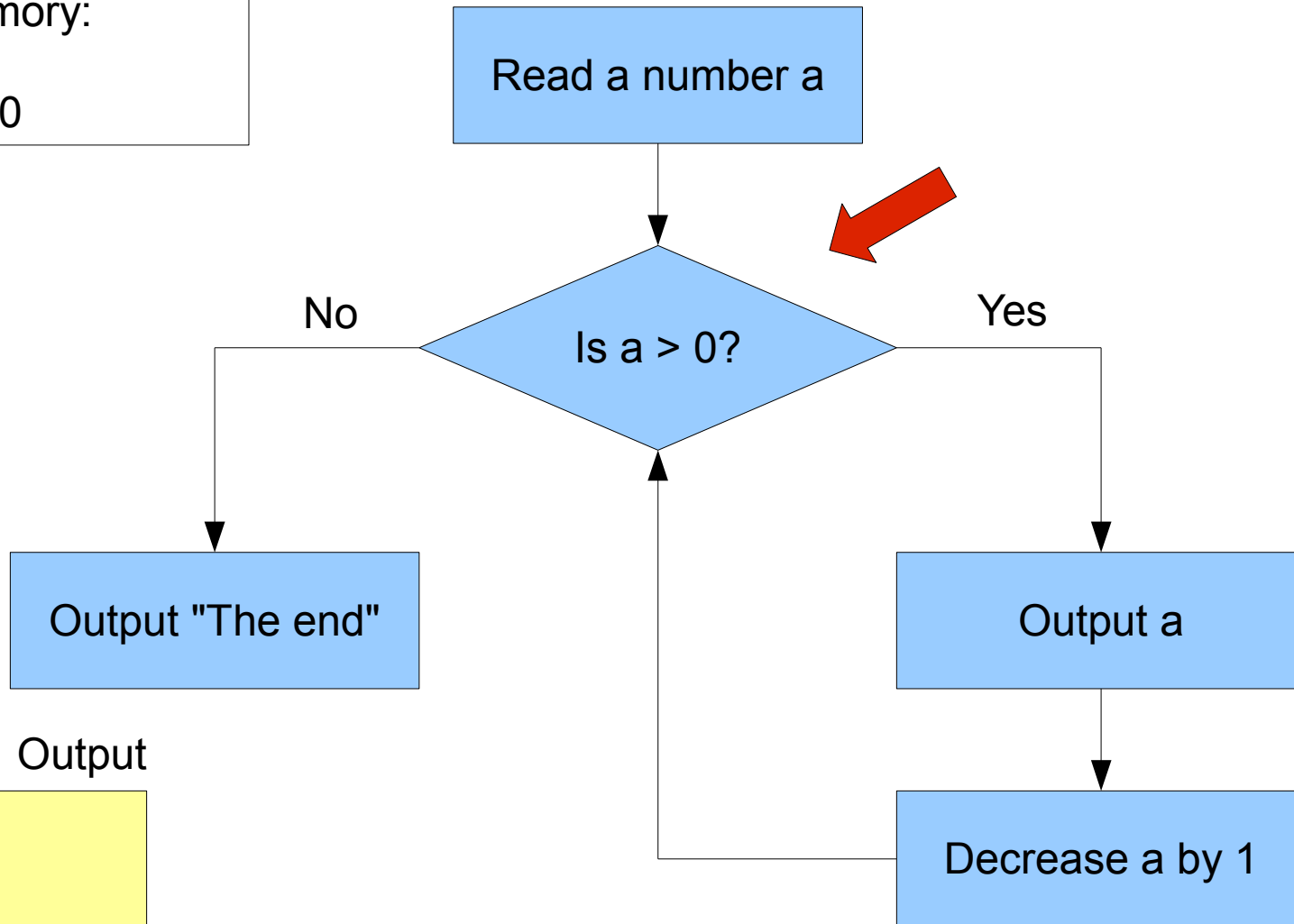
Output

3
2
1



Loop

Memory:
a = 0

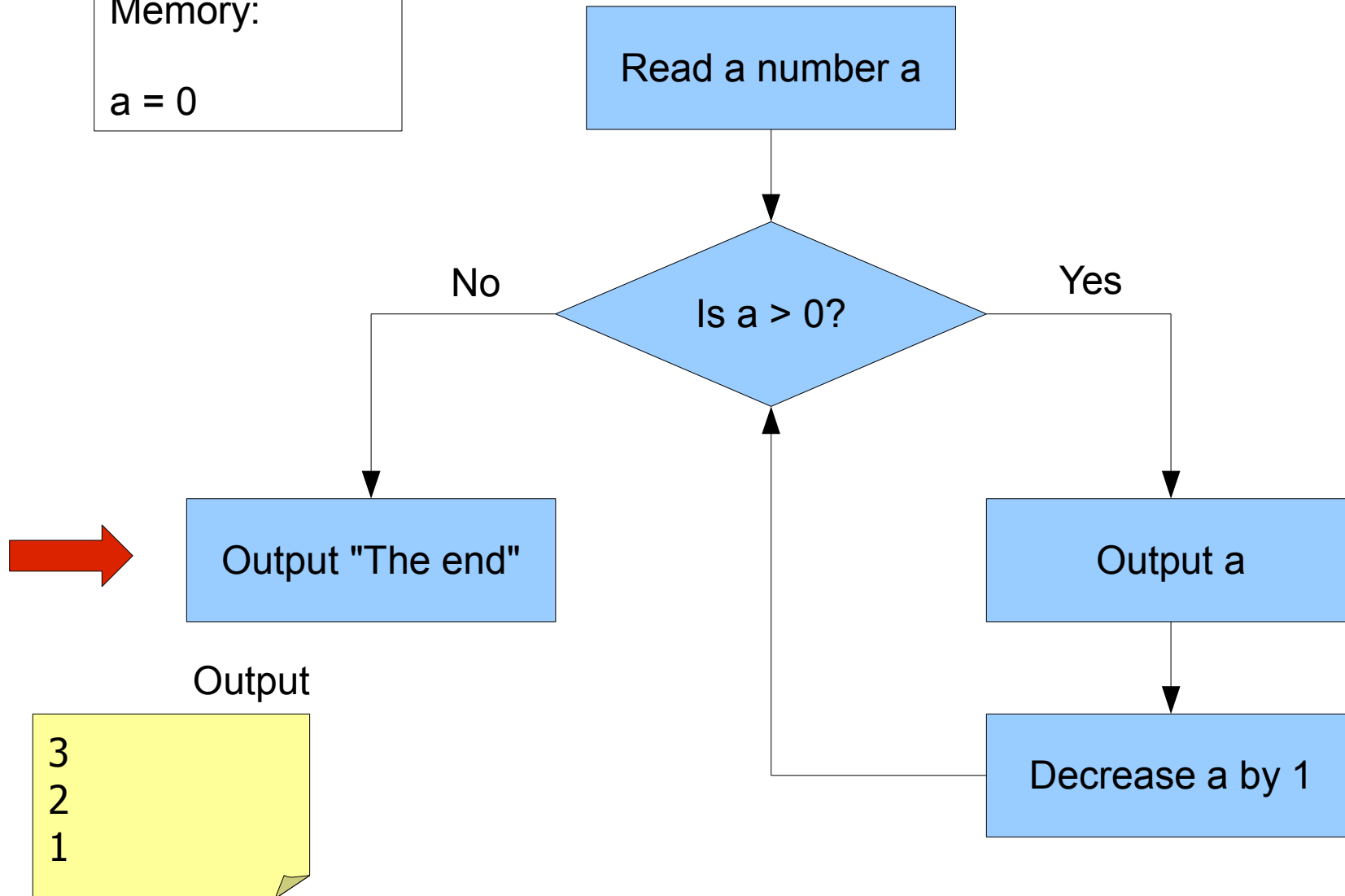


Output

3
2
1

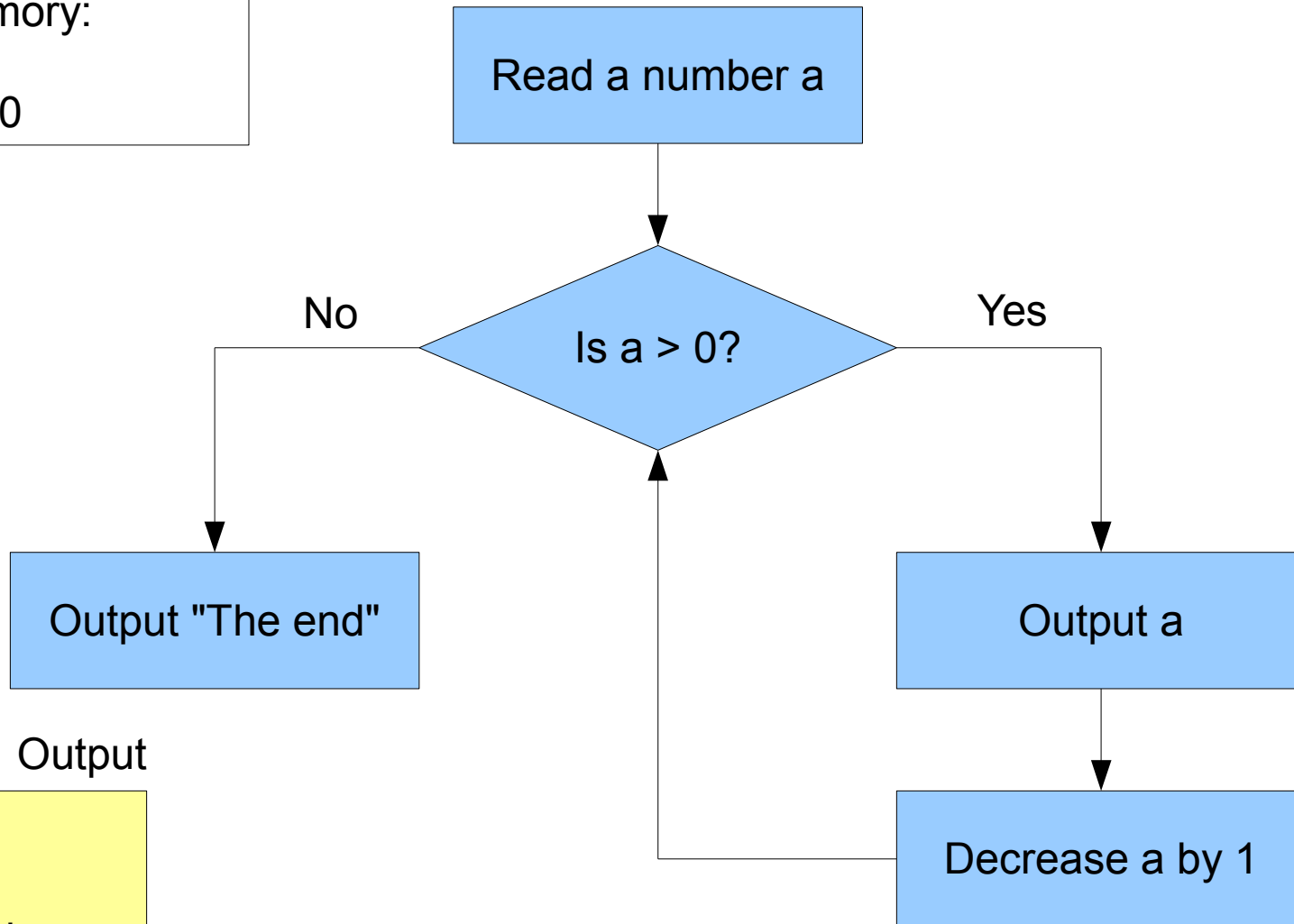
Loop

Memory:
a = 0



Loop

Memory:
a = 0



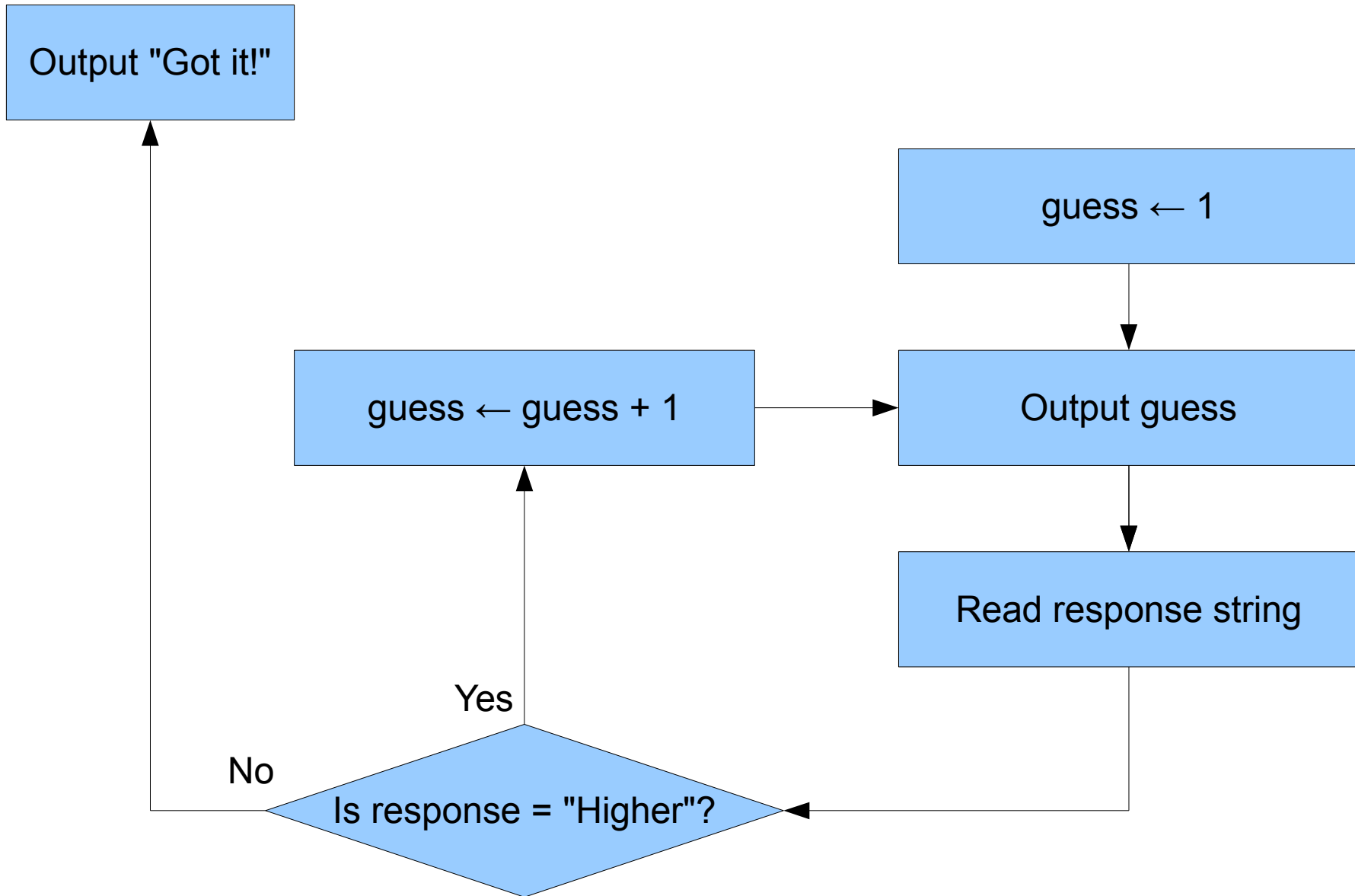
Output

2
1
The end

Higher or lower

- ▶ Player A chooses a number.
- ▶ Player B has to guess the number that player A chose.
- ▶ The game involves repeated rounds. In each round:
 - ▶ Player B guesses a number.
 - ▶ If the number player B guessed is equal to the number A chose, the game ends.
 - ▶ Otherwise, if the number A chose is lower than the guess, player A says “Lower”. If the number A chose is higher than the guess, player A says “Higher”.

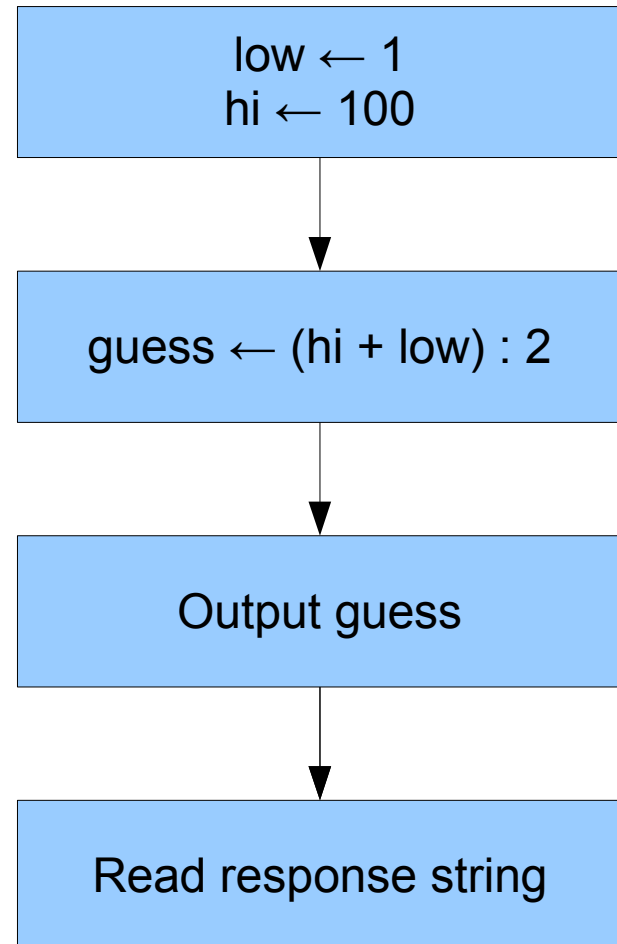
Higher or lower – simple algorithm



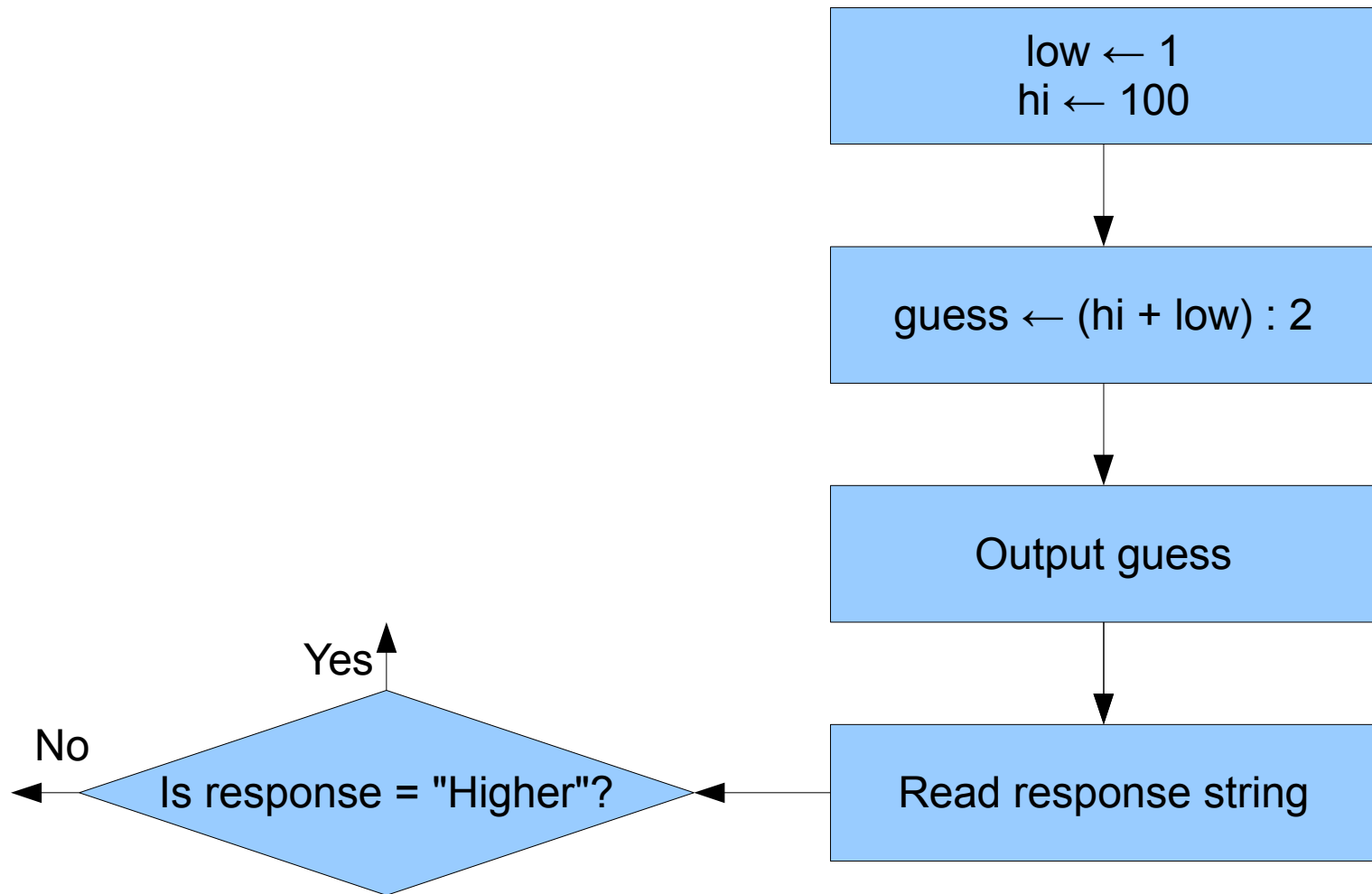
Higher or lower – better algorithm

```
low ← 1  
hi ← 100
```

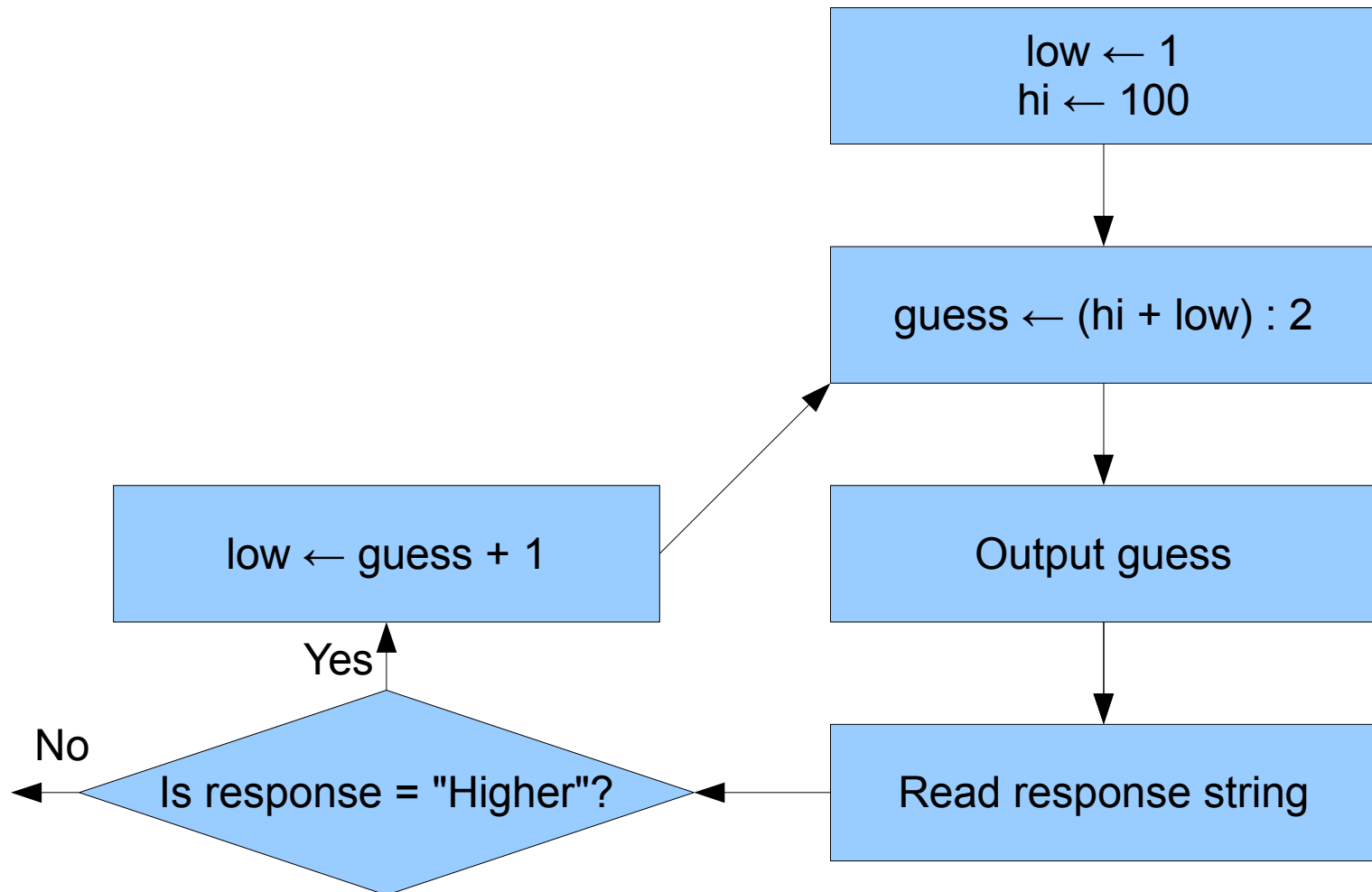
Higher or lower – better algorithm



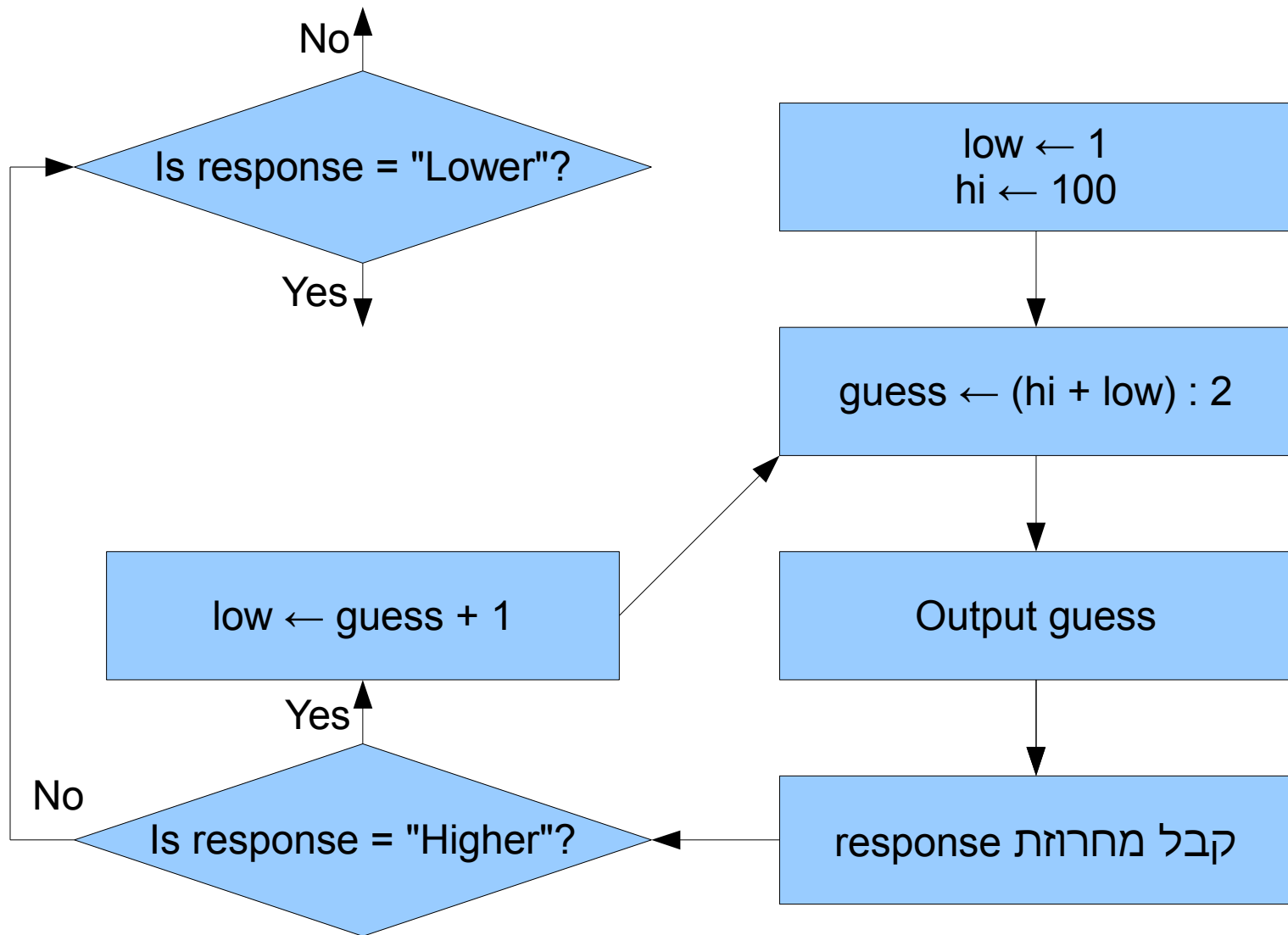
Higher or lower – better algorithm



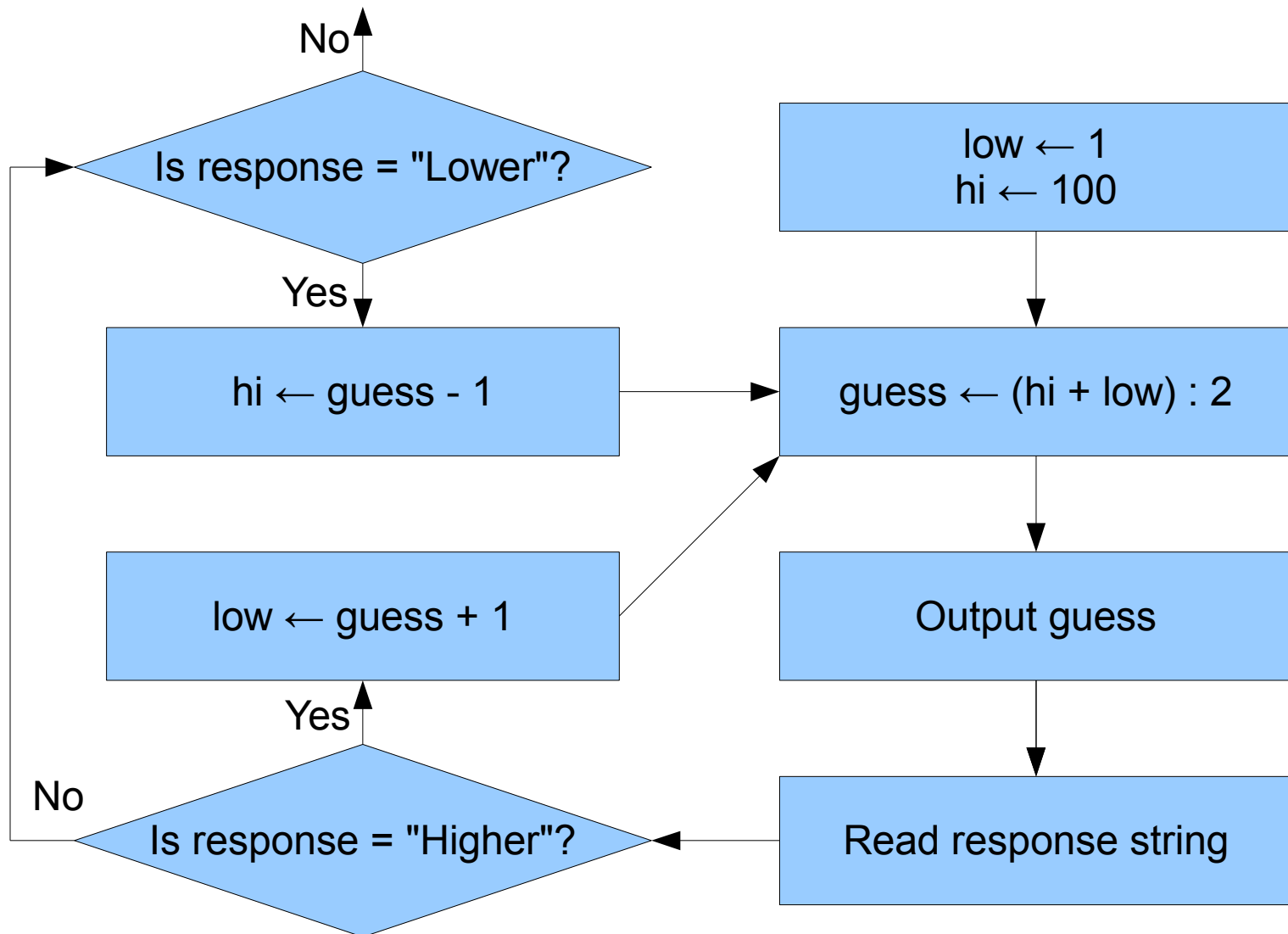
Higher or lower – better algorithm



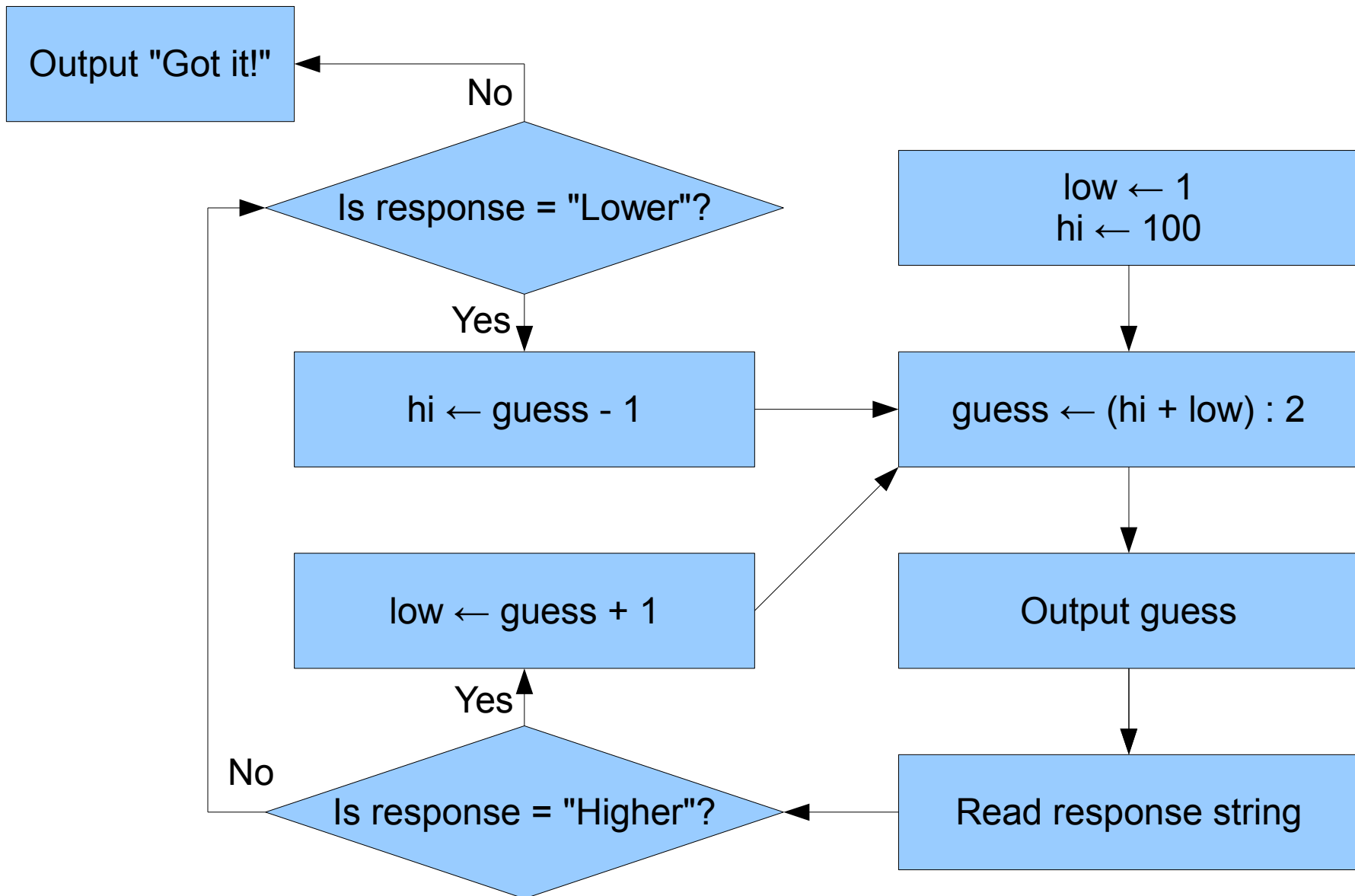
Higher or lower – better algorithm



Higher or lower – better algorithm



Higher or lower – better algorithm



Further study

Introductory programming exercises:
<http://code.org>