

# Problem of the Week

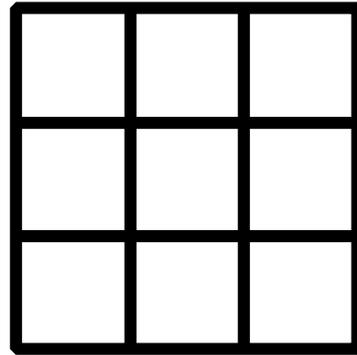
## Problem A and Solution

### Letter Clues

#### Problem

Using the following clues, place the letters A, B, C, D, E, F, G, H, and I in the correct boxes. Two boxes are touching if they share a side.

- A is touching C and D
- B is directly under H
- C is on the left
- D is on the bottom, on the right
- E is touching H
- F is not touching D
- G is in the centre
- H is on the left
- I is touching D



#### Solution

Two of the clues, *G is in the centre* and *D is on the bottom, on the right*, describe the exact placement letters in the grid. This is a good place to start.

	G	
		D

From the clues, *C is on the left* and *A is touching C and D*, then C must be on the bottom row, in the left corner, and A must be in the bottom row in the centre.

	G	
C	A	D

From the clues, *H is on the left* and *B is directly under H*, we can place H and B in the grid.

H		
B	G	
C	A	D

At this point, based on the clue, *E is touching H*, the only place that E fits is in the centre of the top row. Since *F is not touching D*, then F must be on the right side of the top row. Now, there is only one place for I, which is touching D.

H	E	F
B	G	I
C	A	D





## Teacher's Notes

This problem has exactly one solution. The solution can be determined through logical steps; it is not necessary to make any guesses. Some students may choose a “guess and check” approach. This is an example of a **brute force** algorithm. Unlike this one, some problems can only be solved using brute force. However, we try to avoid using brute force to solve problems whenever possible since it is very inefficient. At the very least, we want to limit the number of guesses that must be checked.

Sudoku puzzles are a good way to practice using logic to narrow the number of possible solutions to a problem. Some of the easier puzzles can be solved without having to make any guesses. For more difficult problems, it may be necessary to make a guess and see if it works out. If it does not work out, you need to undo all of the decisions you made based on that guess, make a different guess, and try again from that point. This type of approach is called **backtracking**, which is a standard algorithm used to solve many different types of problems. Backtracking is most effective when you have a small number of choices to make at any point during the process of solving the problem.

