Problem

In a garden, Levi travels through the labyrinth shown above from Entrance to Exit. He is only allowed to travel east, south, southeast, or southwest along a path. (He is never allowed to travel north, northeast, northwest, or west.) How many different routes can Levi take from Entrance to Exit?

Solution

We begin by labelling the Entrance with the letter $S$ for Start and the Exit with the letter $F$ for Finish. We will then label the other seven intersections in the maze as $A, B, C, D, E, G,$ and $H$, as shown. We will also place arrows on the paths to show the direction in which Levi can travel.

We shall then keep track of the number of routes from $S$ to each intersection. We will place the number of routes at each intersection as we go. We will work across three different horizontal levels.

Level 1

When we start at $S$ there is only one route to $A$ and only one route to $B$. Therefore, we place a 1 at $A$ to keep track of the number of routes from $S$ to $A$. We also place a 1 at $B$ to keep track of the number of routes from $S$ to $B$. Note: There is 1 route from $S$ to $S$. 
Level 2
To get to C, Levi could come directly from S or through A. To find the number of routes from S to C we need to sum the number of routes from S to S and the number of routes from S to A. Therefore, the number of routes is $1 + 1 = 2$. We place a 2 at C to keep track of the number of routes from S to C.

To get to D, Levi must come from either A, B or C. Therefore, the total number of routes from S to D is $1 + 1 + 2 = 4$. We place a 4 at D to keep track of the number of routes from S to D.

To get to E, Levi must come from B or D. Therefore, the total number of routes from S to E is $1 + 4 = 5$. We place a 5 at E to keep track of the number of routes from S to E.

Level 3
To get to G, Levi must come from C. Therefore, there are only 2 routes from S to G. We place a 2 at G to keep track of this.

To get to H, Levi must come from either C, D or G. Therefore, the total number of routes from S to H is $2 + 4 + 2 = 8$. We place an 8 at H to keep track of the number of routes from S to H.

To get to F, Levi must come from D, E or H. Therefore, the total number of routes from S to F is $4 + 5 + 8 = 17$. We place a 17 at F to keep track of the number of routes from S to F.

In total, there are 17 different routes that Levi can take from Entrance to Exit.