

Materials:

- Video of the puzzle
- Pen and paper

Puzzle

- Mini-golf -

The Puzzle

In golf, *par* is the number of strokes a good player normally requires to get the ball inside a particular hole.

For example, a par-two hole would typically require 2 strokes to get the ball inside the hole. However, the number of strokes can be greater or fewer than the indicated par. For example, for a par-three hole, it should take 3 strokes to get the ball in the hole, and that is what a good player would play. But, it can be done in 2 or 4 strokes.

The mini-golf of Mathville is an 18-hole mini-golf course.

Nine of the 18 holes are par-two holes and the other nine are par-three holes.

Michael has just completed the mini-golf course. Even though he **never equaled the par assigned to each hole**, he played as well as a good player would, and overall hit **a total of 45 strokes**. He also got **one hole-in-one**.



What is the minimum number of holes Michael played in 3 strokes?







Puzzle Solution



The answer:

Michael played a minimum of 6 holes in 3 strokes.

Possible solution:

We know that Michael played a total of 45 strokes, which is equivalent to a good player. **A good player** plays the par associated with each hole. As there are 9 par-two holes and 9 par-three holes, this means par for the whole course is 45 since (9x2) + (9x3) = 45.

Since we know that "he never equaled the par assigned to each hole", we know that Michael played either a greater or fewer number of strokes than the par assigned for each hole.

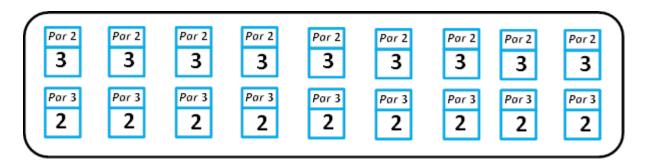
If we want the final number of strokes to equal 45, we must continuously try to bring ourselves back to the average number of final strokes (45) without having the same number of par associated to each hole. For example, if for a par-three hole Michael did 4 strokes, he did one more stroke than the par. So, for another hole, Michael must then do one less stroke than the indicated par for his total number of strokes to return to the total par (45).

Additionally, we know that there is a maximum of 9 holes for which Michael hit 3 strokes (the nine par-two holes), and a maximum of 9 holes for which he hit 2 strokes (the nine par-three holes).

To properly solve this puzzle, we can start with the maximum number of holes played in 3 strokes and then try to reduce this quantity to get to the minimum number of holes played in 3 strokes.

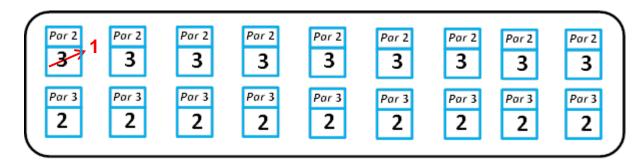
Let's start with the possibility that all the par-two holes were done in 3 strokes and all the par-three holes were done in 2 strokes (this will allow us to easily have our final number of 18 holes played in 45 strokes).

This possibility would allow us to get 9 holes played in 2 strokes and 9 holes played in 3 strokes.



However, we know that Michael did one hole-in-one. So, we must change our possibility.

To satisfy the criteria of having the least number of holes played in 3 strokes, let's change one hole of 3 strokes for the hole played in 1 stroke. We now have 2 points less than the required 45. [(9x2) + (8x3) + 1 = 43]



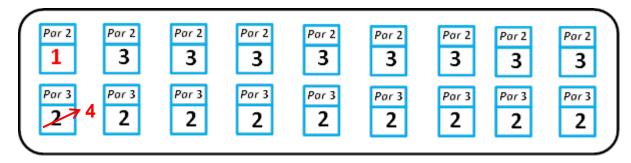
Puzzle Solution (continued)



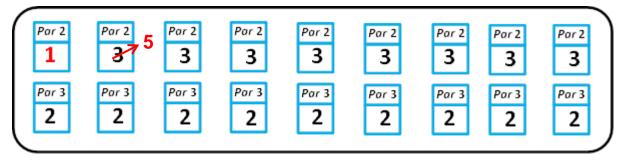


To have a total of 45 strokes, we must add a total of 2 more strokes to one or more holes. Here are the different possibilities:

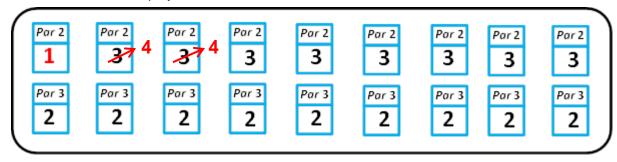
• If we add 2 strokes to a hole that was played in 2 strokes, we get a hole played in 4 strokes. We would then have 8 holes played in 2 strokes, 8 holes played in 3 strokes, 1 hole played in 4 strokes, and 1 hole played in 1 stroke, for a total of 18 holes played in 45 strokes.



• If we add the 2 missing strokes to a hole played in 3 strokes, we would then get 1 hole played in 1 stroke, 1 hole played in 5 strokes, 7 holes played in 3 strokes, and 9 holes played in 2 strokes, for a total of 18 holes played in 45 strokes.



• If we add the 2 missing strokes to 2 different holes played in 3 strokes, we would get 1 hole played in 1 stroke, 2 holes played in 4 strokes, 6 holes played in 3 strokes, and 9 holes played in 2 strokes, for a total of 18 holes played in 45 strokes.



Now, we cannot take off one stroke from the holes that were played in 3 strokes, because they are partwo holes and Michael **did not play any of the pars assigned.** We also cannot take off 2 strokes from a hole that was played in 3 strokes, because that would mean that Michael would have done more than one hole-in-one.

Thus, we can conclude that the minimum number of holes played in 3 strokes is 6.