



## Problem of the Week

### Problem C and Solution

### Kick It Up a Notch

#### Problem

In football, the player who kicks the ball is referred to as the punter. During a recent football game, the punter, Khan Kickit, kicked the ball five times. His longest kick was 44 yards and he averaged 35 yards per kick. Each of his kicks was a different positive integer length.

Determine the minimum possible length of Khan's shortest kick.

#### Solution

To determine an average, determine the sum of the numbers in the set and divide by the number of numbers in the set. It follows that the sum of the numbers in a set is the average times the number of numbers in the set.

Since Khan's average was 35 yards per kick and he kicked the ball five times, the total length of all his kicks was  $5 \times 35 = 175$  yards. His longest kick was 44 yards, so his remaining kicks covered a total of  $175 - 44 = 131$  yards.

To find the minimum length of his shortest kick make the other three kicks as long as possible. Each of these kicks must be a different integer length less than 44 yards long. So for the three kicks to be as long as possible, they must be 43 yards, 42 yards, and 41 yards, respectively.

The minimum length of the shortest kick is therefore  $131 - 43 - 42 - 41 = 5$  yards.

As a side note, if he had been able to have different kicks with the same integer length, then the minimum length of his shortest kick would be  $175 - 4 \times 44 = -1$  yard. (It would have travelled backwards.) But the kicks all had to be positive integer lengths so his minimum shortest kick would have been 1 yard with his other kicks being such that the total yards travelled by all of his other four kicks would be 174 yards. There would be a few different possible kick lengths that would make this possible. For example, his five kicks could be 1, 44, 44, 44, and 42 yards each, respectively or 1, 44, 44, 43, and 43 yards each, respectively.

