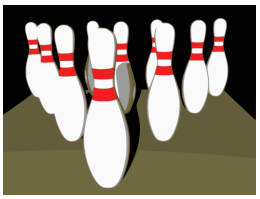

Problem of the Week
Problem D and Solution
An Average Bowl

Problem

In his latest game, Mark Striker bowled 199 and raised his average from 177 to 178. Mark would like to raise his average to 180 after bowling his next game.

What would Mark need to bowl on his next game to accomplish his goal?

Solution

Solution 1

Let n be the number of games bowled to achieve his 177 average. His total points scored in n games is his average times n. Therefore, Mark has $177n$ total points in n games.

To compute his average after bowling the 199 game, we take his new total points and divide by $n+1$, the new number of games.

$$\begin{aligned} \text{Average} &= \frac{\text{Total Points}}{\text{Games Played}} \\ 178 &= \frac{177n+199}{n+1} \\ 178(n+1) &= 177n+199 \\ 178n+178 &= 177n+199 \\ n &= 21 \end{aligned}$$

Prior to bowling the 199 game, Mark had bowled 21 games. So after bowling the 199 game, Mark has bowled 22 games. Mark wants to have a 180 average after bowling his 23rd game. The difference between his total points after 23 games with a 180 average and his total points after bowling 22 games with a 178 average must be his score on the 23rd game.

$$\text{Score on 23rd Game} = 23 \times 180 - 22 \times 178 = 4140 - 3916 = 224$$

Therefore Mr. Striker must bowl 224 on his next game to raise his average from 178 to 180.

Solution 2

Mark's score of 199 is $199 - 177 = 22$ points above his previous average. Mark raised his average 1 point. Therefore, his latest game with the 199 score must have been his 22nd game.

To raise his average 2 points in his 23rd game he must bowl $2 \times 23 = 46$ points above his 178 average. He must bowl $178 + 46 = 224$ in his next game.

$\therefore$ Mark must bowl 224 in his next game to move his average from 178 to 180.

We can verify our results:

Average on 21 games is 177.

$$\text{Average on 22 games} = \frac{21 \times 177 + 199}{22} = \frac{3916}{22} = 178$$

$$\text{Average on 23 games} = \frac{22 \times 178 + 224}{23} = \frac{4140}{23} = 180$$