Problems & Solutions

Below are 12 integer quiz scores listed in order from least to greatest followed by a box-and-whisker plot of the data. What is the value of $X$?

$10, 12, 14, 14, 15, X, 20, 23, 26, 30, 33, 35$

According to the box-and-whisker plot, the median of the quiz scores is 18. Since there is an even number of scores, the median must be equidistant from the 6th and 7th quiz scores in the ordered list of 12 scores. In this case, 18 must be equidistant from $X$ and 20. Since 20 is 2 more than 18, it follows that $X$ must be 2 less than 18, which is 16.

It is also true that the median would be the average of the 6th and 7th quiz scores in the ordered list. In this case, the median must be the average of $X$ and 20. Solving algebraically, we have $(X + 20)/2 = 18 \rightarrow X + 20 = 36 \rightarrow X = 16$.

Below are 16 integer test scores listed in order from least to greatest followed by a box-and-whisker plot of the data. If 74 is the unique mode of the scores, what is the value of $B$?

$68, 69, 70, 72, 74, 74, 76, A, B, 83, 86, 91, 93, 94, 96, 100$

According to the box-and-whisker plot, the median of the test scores is 78. Since there is an even number of scores, the median must be equidistant from the 8th and 9th scores in the ordered list of 16 scores. In this case, 78 must be equidistant from $A$ and $B$. One possibility is if $A = 78$ and $B = 78$. But that means 78 is a mode, and we are told that the unique mode is 74. If we make $A$ and $B$ each a distance of 1 away from 78, we have $A = 77$ and $B = 79$. We could also try making $A$ and $B$ each a distance of 2 away from 78. The result would be $A = 76$ and $B = 80$. But we again have the issue of 76 being a mode, which cannot happen. If $A$ and $B$ are a distance greater than 2 away from 78, the list is no longer ordered. Therefore, it must be true that $A = 77$ and $B = 79$. 


What is the mean of the 16 test scores in the previous problem? Express your answer as a decimal to the nearest tenth.

The mean of the scores is (68 + 69 + 70 + 72 + 74 + 74 + 76 + 77 + 79 + 83 + 86 + 91 + 93 + 94 + 96 + 100) ÷ 16 = 1302 ÷ 16 = 81.375 ≈ 81.4.
Problems

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\[68, 69, 70, 72, 74, 74, 76, A, B, 83, 86, 91, 93, 94, 96, 100\]

What is the mean of the 16 test scores in the previous problem? Express your answer as a decimal to the nearest tenth.