

Section 16-4: The Mean, the Median, and the Mode

The Mean

- 080402a, P.I. 6.S.5
Rosario and Enrique are in the same mathematics class. On the first five tests, Rosario received scores of 78, 77, 64, 86, and 70. Enrique received scores of 90, 61, 79, 73, and 87. How much higher was Enrique's average than Rosario's average?
[A] 2 points [B] 3 points
[C] 4 points [D] 15 points
- 080535a, P.I. 6.S.5
Seth bought a used car that had been driven 20,000 miles. After he owned the car for 2 years, the total mileage of the car was 49,400. Find the average number of miles he drove *each month* during those 2 years.

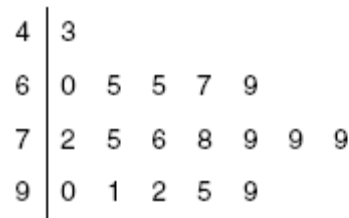
The Median

- 010005a, P.I. 6.S.5
What was the median high temperature in Middletown during the 7-day period shown in the table below?

Daily High Temperature in Middletown	
Day	Temperature (°F)
Sunday	68
Monday	73
Tuesday	73
Wednesday	75
Thursday	69
Friday	67
Saturday	63

- [A] 69 [B] 75 [C] 73 [D] 70

- 060321a, P.I. 6.S.5
The student scores on Mrs. Frederick's mathematics test are shown on the stem-and-leaf plot below.



Key: 4 | 3 = 43 points

Find the median of these scores.

- 080714a, P.I. 6.S.5
The accompanying stem-and-leaf plot represents Ben's test scores this year.



Key: 7 | 2 = 72

What is the median score for this set of data?

- [A] 80 [B] 79 [C] 73 [D] 81

- 010321b, P.I. A.S.4
Two social studies classes took the same current events examination that was scored on the basis of 100 points. Mr. Wong's class had a median score of 78 and a range of 4 points, while Ms. Rizzo's class had a median score of 78 and a range of 22 points. Explain how these classes could have the same median score while having very different ranges.

The Mode

7. 060509a, P.I. 6.S.5

Jorge made the accompanying stem-and-leaf plot of the weights, in pounds, of each member of the wrestling team he was coaching.

Stem	Leaf
10	9
11	
12	3 8
13	2 4 4 6 8
14	1 3 5 5 9
15	2 3 7 7 9
16	1 3 7 8 8 8 9
17	3 8

Key: 16 | 1 = 161

What is the mode of the weights?

- [A] 168 [B] 152 [C] 145 [D] 150

8. 060637a, P.I. 6.S.5

Sara's test scores in mathematics were 64, 80, 88, 78, 60, 92, 84, 76, 86, 78, 72, and 90. Determine the mean, the median, and the mode of Sara's test scores.

9. 080501a, P.I. A.S.4

The weights of all the students in grade 9 are arranged from least to greatest. Which statistical measure separates the top half of this set of data from the bottom half?

- [A] mean [B] average
[C] median [D] mode

10. 010118a, P.I. A.S.4

From January 3 to January 7, Buffalo recorded the following daily high temperatures: 5°, 7°, 6°, 5°, and 7°. Which statement about the temperatures is true?

- [A] mean < median [B] mean = mode
[C] median = mode [D] mean = median

11. 010315a, P.I. A.S.4

The ages of five children in a family are 3, 3, 5, 8, and 18. Which statement is true for this group of data?

- [A] median > mean [B] mean > median
[C] mode > mean [D] median = mode

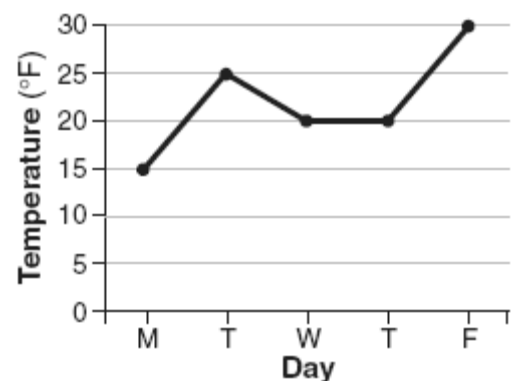
12. 010618a, P.I. A.S.4

Melissa's test scores are 75, 83, and 75. Which statement is true about this set of data?

- [A] mean = median [B] mode < median
[C] mean < mode [D] mode = median

13. 080608a, P.I. 6.S.5

The accompanying graph shows the high temperatures in Elmira, New York, for a 5-day period in January.



Which statement describes the data?

- [A] median = mean [B] median = mode
[C] mean = mode [D] mean < mode

14. 069929a, P.I. A.A.6

The mean (average) weight of three dogs is 38 pounds. One of the dogs, Sparky, weighs 46 pounds. The other two dogs, Eddie and Sandy, have the same weight. Find Eddie's weight.

15. 089913a, P.I. A.A.6
If 6 and x have the same mean (average) as 2, 4, and 24, what is the value of x ?
[A] 5 [B] 14 [C] 10 [D] 36
16. 060204a, P.I. A.A.6
During each marking period, there are five tests. If Vanita needs a 65 average to pass this marking period and her first four grades are 60, 72, 55, and 80, what is the *lowest* score she can earn on the last test to have a passing average?
[A] 80 [B] 100 [C] 58 [D] 65
17. 080110a, P.I. A.A.6
The exact average of a set of six test scores is 92. Five of these scores are 90, 98, 96, 94, and 85. What is the other test score?
[A] 91 [B] 86 [C] 92 [D] 89
18. 010432a, P.I. A.A.6
TOP Electronics is a small business with five employees. The mean (average) weekly salary for the five employees is \$360. If the weekly salaries of four of the employees are \$340, \$340, \$345, and \$425, what is the salary of the fifth employee?
19. 010230a, P.I. A.A.6
The students in Woodland High School's meteorology class measured the noon temperature every schoolday for a week. Their readings for the first 4 days were Monday, 56° ; Tuesday, 72° ; Wednesday, 67° ; and Thursday, 61° . If the mean (average) temperature for the 5 days was exactly 63° , what was the temperature on Friday?
20. 060017a, P.I. A.A.6
For five algebra examinations, Maria has an average of 88. What must she score on the sixth test to bring her average up to exactly 90?
[A] 92 [B] 94 [C] 98 [D] 100
21. 010026a, P.I. A.A.6
Judy needs a mean (average) score of 86 on four tests to earn a midterm grade of B. If the mean of her scores for the first three tests was 83, what is the *lowest* score on a 100-point scale that she can receive on the fourth test to have a midterm grade of B?
22. 060703a, P.I. A.A.6
In his first three years coaching baseball at High Ridge High School, Coach Batty's team won 7 games the first year, 16 games the second year, and 4 games the third year. How many games does the team need to win in the fourth year so that the coach's average will be 10 wins per year?
[A] 13 [B] 9 [C] 3 [D] 10
23. 080227a, P.I. A.A.6
Tamika could not remember her scores from five mathematics tests. She did remember that the mean (average) was exactly 80, the median was 81, and the mode was 88. If all her scores were integers with 100 the highest score possible and 0 the lowest score possible, what was the *lowest* score she could have received on any one test?
24. 060738a, P.I. A.A.6
Angelo, Brandon, and Carl work in the same office. Angelo's age is 4 years more than twice Carl's age. Brandon is 5 years younger than Carl. The average of the three ages is 41. Find the age of *each* of the men.

25. 060438a, P.I. A.A.6

On the first six tests in her social studies course, Jerelyn's scores were 92, 78, 86, 92, 95, and 91. Determine the median and the mode of her scores. If Jerelyn took a seventh test and raised the mean of her scores exactly 1 point, what was her score on the seventh test?

[1] B

[2] 1,225, and appropriate work is shown, such as solving an equation or writing an explanation.

[1] Appropriate work is shown, but one computational error is made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] Appropriate work is shown, but the conversion from years to months is incorrect, but an appropriate solution is found.

or [1] 1,225, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[2] incorrect procedure.

[3] A

[2] 77, and appropriate work is shown, such as $(76 + 78) \div 2$.

[1] 76 and 78 are identified.

or [1] 77, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[4] incorrect procedure.

[5] A

[2] An appropriate explanation is given, such as:

One very high or very low score in either class would have a great effect on the range for that class, but might not affect the median at all. The range is the difference between the two most extreme values, the lowest and the highest. The median, being the middle value, is not very sensitive to outliers or to extreme values.

or [2] Specific examples are shown to illustrate the situation.

[1] An understanding of median and range is demonstrated, but the specific situation is not explained.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[6] incorrect procedure.

[7] A

[3] Mean = 79, median = 79, and mode = 78, and appropriate work is shown.

[2] Appropriate work is shown, but only two of the three measures of central tendency are determined and identified correctly.

or [2] Appropriate work is shown and all three measures of central tendency are determined correctly, but the measures are not identified or are identified incorrectly.

[1] Appropriate work is shown, but only one of the three measures of central tendency is determined and identified correctly.

or [1] Mean = 79, median = 79, and mode = 78, but no work is shown.

[0] 79, 79, and 78, but no work is shown, and the answers are not identified or are identified incorrectly.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[8] obviously incorrect procedure.

[9] C

[10] D

[11] B

[12] D

[13] B

[3] 34 and an appropriate explanation is given, such as $38 = \frac{46 + 2x}{3}$.

[2] An appropriate method or equation is shown, but one computational mistake is made.

or [2] The student does not take into consideration two dogs of equal weight and gives an answer of 68.

[1] The student understands weighted average in that three dogs averaging 38 pounds must have a total weight of 114 pounds but does not subtract the known weight.

or [1] 34 and no explanation is given.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[14] incorrect procedure.

[15] B

[16] C

[17] D

[2] \$350, and appropriate work is shown, such as $\frac{1450 + x}{5} = 360$ or trial and error with

at least three trials and appropriate checks.

[1] Appropriate work is shown, but one computational error is made.

or [1] The total of the five salaries is shown to be $5 \times 360 = 1800$, but no further correct work is shown.

or [1] \$350, but no work is shown or fewer than three trials with appropriate checks are shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[18] incorrect procedure.

[3] 59 or 59°, and appropriate work is shown, such as $63 = \frac{256 + x}{5}$ or

$56 + 72 + 67 + 61 = 256$, $63 \times 5 = 315$, and $315 - 256 = 59$.

[2] Appropriate work is shown, but one computational error is made.

or [2] A value is chosen for Friday's temperature that rounds to 63, such as 57 or 61,

but whose mean is not exactly 63, and appropriate work is shown.

[1] A limited understanding of the concept of the mean is shown, such as the sum of the temperatures must be 315, but the given temperatures are not subtracted.

or [1] The correct mean of the four given temperatures is calculated.

or [1] 59 or 59°, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[19] incorrect procedure.

[20] D

[3] 95 and an appropriate method is shown that obtains an answer, such as $344 - 249$ or a similar equation or method.

or [3] Four scores are tried that round off to an average of 86, such as 93 or 94. Round off to 86 must be shown.

[2] An appropriate method is shown, but one computational mistake is made.

[1] The student understands weighted average and shows that the average of 83 for 3 tests is a total of 249 points.

or [1] 95 and no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[21] incorrect procedure.

[22] A

[3] 63, and appropriate work is shown, such as $400 - (81 + 88 + 88)$ and determining the highest and lowest possible scores remaining that total 143.

[2] Appropriate work is shown, but one computational error is made.

[1] A total of 400 is shown, but one conceptual error is made, such as 257 is subtracted, and then 143 is split into 72 and 71, resulting in an answer of 71.

or [1] Appropriate work is shown, but more than one computational error is made.

or [1] No answer or an incorrect answer is found, but a list such as ____, ____, 81, 88, 88 is shown.

or [1] 63, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[23] incorrect procedure.

[4] Angelo is 66, Brandon is 26, and Carl is 31, and appropriate work is shown, such as solving an equation or trial and error with at least three trials and appropriate checks.

[3] Appropriate work is shown, but one computational error is made.

or [3] 66, 26, and 31, and appropriate work is shown, but the solutions are not labeled or are labeled incorrectly.

[2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] The trial-and-error method is used to find a correct solution, but only two trials and appropriate checks are shown.

or [2] The trial-and-error method is attempted and at least six systematic trials and appropriate checks are shown, but no solution is found.

or [2] Carl is 31, and appropriate work is shown, but the ages of the other men are not found.

or [2] An incorrect equation of equal difficulty is solved appropriately.

[1] Appropriate work is shown, but one conceptual error and one computational error are made.

or [1] A correct equation is written, but no further correct work is shown.

or [1] Angelo is 66, Brandon is 26, and Carl is 31, but no work or only one trial with an appropriate check is shown.

[0] Angelo is 66 *or* Brandon is 26 *or* Carl is 31, but no work is shown.

or [0] 66, 26, and 31, but no work is shown, and the answers are not labeled or are labeled incorrectly.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[24] obviously incorrect procedure.

[4] Median = 91.5, mode = 92, and seventh test score = 96, and appropriate work is shown.

[3] Appropriate work is shown, but one computational error is made.

or [3] Seventh test score = 96, but only the median or the mode is found correctly, but appropriate work is shown.

or [3] 91.5, 92, and 96, and appropriate work is shown, but the median and mode are not labeled or are labeled incorrectly.

[2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] Both the median and the mode are found and labeled correctly, and appropriate work is shown, but the seventh test score is not found or is found incorrectly.

or [2] Seventh test score = 96, and appropriate work is shown, but the median and the mode are not found or are found incorrectly.

[1] Either the median or the mode is found and labeled correctly, and appropriate work is shown, but no further correct work is shown.

or [1] Median = 91.5, mode = 92, and seventh test score = 96, but no work is shown.

[0] Median = 91.5 or mode = 92 or seventh test score = 96, but no work is shown.

or [0] 91.5, 92, and 96, but no work is shown and the answers are not labeled.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[25] obviously incorrect procedure.