

Measuring Center and Variability in Data

Grade 6 math · Worksheet Answer Key · Standards: 6.SP.A.3, 6.SP.B.5c, 6.SP.B.5d

Each solution shows the ordered list or the total, the formula and the result. Check that the median uses the ordered data and that every distance for the MAD is positive.

Standards: 6.SP.A.3, 6.SP.B.5c, 6.SP.B.5d · **Level:** Grade 6

Problem 1 Mean of five values

$18 + 21 + 15 + 20 + 26 = 100$. Then $100 \div 5 = 20$.

20 boxes

Problem 2 Median of an odd count

Order the values: 7, 15, 19, 23, 31. The middle value is the third one.

19

Problem 3 Median of an even count

Order the values: 9, 12, 15, 18, 20, 22. The two middle values are 15 and 18, and $(15 + 18) \div 2 = 16.5$.

16.5

Problem 4 Range of temperatures

The greatest is 66°F and the least is 47°F. $66 - 47 = 19$.

19°F

Problem 5 Fair share

$6 + 9 + 3 + 10 = 28$ marbles, and $28 \div 4 = 7$. The fair-share value is the mean.

7 marbles each; the mean

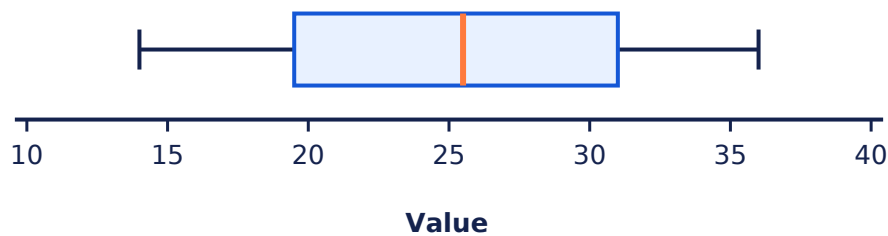
Problem 6 Mean and median from a dot plot

Sum: $2 + 3 + 3 + 4 + 4 + 4 + 5 + 5 + 6 + 8 = 44$, and $44 \div 10 = 4.4$. The ordered list has 4 and 4 in the middle (5th and 6th), so the median is 4.

mean 4.4 goals; median 4 goals

Problem 7 Quartiles and IQR

The median is $(25 + 26) \div 2 = 25.5$. Lower half 14, 18, 21, 25: $Q1 = (18 + 21) \div 2 = 19.5$. Upper half 26, 29, 33, 36: $Q3 = (29 + 33) \div 2 = 31$. $IQR = 31 - 19.5 = 11.5$.

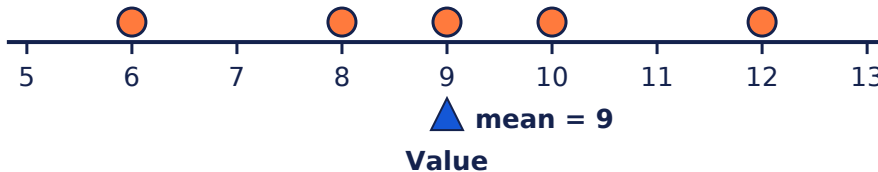


Box plot of the 8 values.

median 25.5; Q1 = 19.5; Q3 = 31; IQR = 11.5

Problem 8 Mean absolute deviation

Mean: $(6 + 8 + 9 + 10 + 12) \div 5 = 45 \div 5 = 9$. Distances from 9: 3, 1, 0, 1, 3, and the total is 8. $MAD = 8 \div 5 = 1.6$.



The mean of 9 balances the dots.

mean 9; MAD 1.6

Problem 9 Reading a box plot

- a. The line in the box is at 36.
- b. $58 - 22 = 36$.
- c. $IQR = 44 - 30 = 14$.

(a) 36 minutes; (b) 36 minutes; (c) 14 minutes

Problem 10 Effect of an outlier

Before: the sum is 50, so the mean is $50 \div 5 = 10$, and the median is 10. After adding 40: the sum is 90 and the mean is $90 \div 6 = 15$. The ordered list 8, 9, 10, 11, 12, 40 has middle values 10 and 11, so the median is 10.5.

Mean: 10 to 15; median: 10 to 10.5

Problem 11 Choose the best measure

Sum: $210 + 225 + 230 + 240 + 1,200 = 2,105$ (thousands), so the mean is $2,105 \div 5 = 421$, or \$421,000. The median is the middle price, \$230,000. The \$1,200,000 home is an outlier that pulls the mean up, so the median is better.

mean \$421,000; median \$230,000; the median is better

Problem 12 Find the missing score

The total of four scores is $4 \times 85 = 340$. The known scores total $82 + 90 + 78 = 250$. The fourth score is $340 - 250 = 90$.

90

Problem 13 Same mean, different spread

Both means are 10: Team A has $50 \div 5 = 10$ and Team B has $50 \div 5 = 10$. Team A distances: 2, 1, 0, 1, 2, so $MAD = 6 \div 5 = 1.2$. Team B distances: 6, 3, 0, 3, 6, so $MAD = 18 \div 5 = 3.6$. A smaller MAD means more consistent.

Team A is more consistent (MAD 1.2 compared with 3.6)

Problem 14 Comparing two grades

- a. Grade 6 median is 8 and Grade 7 median is 10, so Grade 7.
- b. Grade 6: $20 - 2 = 18$. Grade 7: $15 - 3 = 12$. Grade 6 has the greater range.
- c. Grade 6: $12 - 5 = 7$. Grade 7: $13 - 6 = 7$. The IQRs are equal.

(a) Grade 7; (b) Grade 6; (c) neither, both are 7

Problem 15 Bowling scores

Sum: $142 + 156 + 138 + 160 + 149 + 151 + 148 + 152 = 1,196$, so the mean is $1,196 \div 8 = 149.5$. Ordered: 138, 142, 148, 149, 151, 152, 156, 160. The median is $(149 + 151) \div 2 = 150$.

Range: $160 - 138 = 22$. $Q1 = (142 + 148) \div 2 = 145$ and $Q3 = (152 + 156) \div 2 = 154$, so $IQR = 9$.

mean 149.5; median 150; range 22; IQR 9

Problem 16 Delivery times

- a. Sum: $22 + 25 + 24 + 27 + 26 + 23 + 25 + 62 = 234$, and $234 \div 8 = 29.25$.
- b. Ordered: 22, 23, 24, 25, 25, 26, 27, 62. The median is $(25 + 25) \div 2 = 25$.
- c. The median, because the 62-minute delivery is an outlier that pulls the mean above almost every other time.

(a) 29.25 minutes; (b) 25 minutes; (c) the median

Problem 17 Monthly rainfall

Mean: $(2 + 4 + 6 + 6 + 8 + 10) \div 6 = 36 \div 6 = 6$. Distances: 4, 2, 0, 0, 2, 4, total 12, so $MAD = 12 \div 6 = 2$. Median: $(6 + 6) \div 2 = 6$. Lower half 2, 4, 6 gives $Q1 = 4$. Upper half 6, 8, 10 gives $Q3 = 8$. $IQR = 4$.

mean 6 inches; MAD 2 inches; median 6 inches; IQR 4 inches

Problem 18 Adding a value

The new mean is $(70 + 14) \div 6 = 14$, so the mean stays 14. The distances are now 4, 2, 0, 2, 4, 0 with a total of 12, so the MAD is $12 \div 6 = 2$. The added value sits at the mean, so the mean is unchanged and the MAD drops from 2.4 to 2.

The mean stays 14; the MAD decreases to 2

Problem 19 Skewed messages

- a. Ordered: 1, 1, 2, 2, 2, 3, 3, 4, 6, 12. The middle values are 2 and 3, so the median is 2.5.
- b. The mean (3.6) is greater, because the large value 12 pulls the mean toward the right tail.
- c. The median, because the data are skewed right.

(a) 2.5; (b) the mean; (c) the median

Problem 20 Laps run

- a. Sum: $2 + 3 + 4 + 4 \times 5 + 4 \times 6 + 7 = 60$, so the mean is $60 \div 12 = 5$. Middle values (6th and 7th) are both 5, so the median is 5.
- b. Range: $7 - 2 = 5$. Lower half 2, 3, 4, 5, 5, 5 gives $Q1 = (4 + 5) \div 2 = 4.5$. Upper half 5, 6,

6, 6, 6, 7 gives $Q3 = 6$. $IQR = 1.5$.

c. Distances from 5: 3, 2, 1, 0, 0, 0, 0, 1, 1, 1, 1, 2, total 12, so $MAD = 12 \div 12 = 1$.

(a) mean 5, median 5; (b) range 5, IQR 1.5; (c) MAD 1