

Center, Spread and Data Displays Compared

Grade 9 – Algebra 1 math · Worksheet · Standards: S-ID.A.1, S-ID.A.2, S-ID.A.3

Name: _____ Date: _____ Class: _____

These 20 problems train standards S-ID.A.1, S-ID.A.2 and S-ID.A.3. The first problems find the mean, median and range and read dot plots, histograms and box plots. Later problems use quartiles, the $1.5 \times \text{IQR}$ outlier rule and standard deviation.

The last six problems compare real-world data sets and explain how outliers and scaling change the summaries.

Standards: S-ID.A.1, S-ID.A.2, S-ID.A.3 · **Level:** Grade 9 Algebra 1

Problem 1 Mean of Five Values (easy)

Five hikers in a trail club logged 17, 21, 14, 19 and 24 miles last month. Find the mean.

Problem 2 Median, Odd Count (easy)

Find the median of 41, 38, 45, 39, 50, 36, 43.

Problem 3 Median, Even Count (easy)

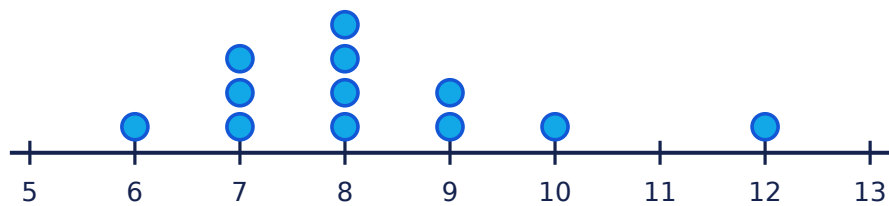
Find the median of 7, 12, 9, 15, 11, 10.

Problem 4 Range and IQR from a Summary (easy)

A five-number summary is: minimum 14, Q1 22, median 29, Q3 35, maximum 52. Find the range and the IQR.

Problem 5 Read a Dot Plot (easy)

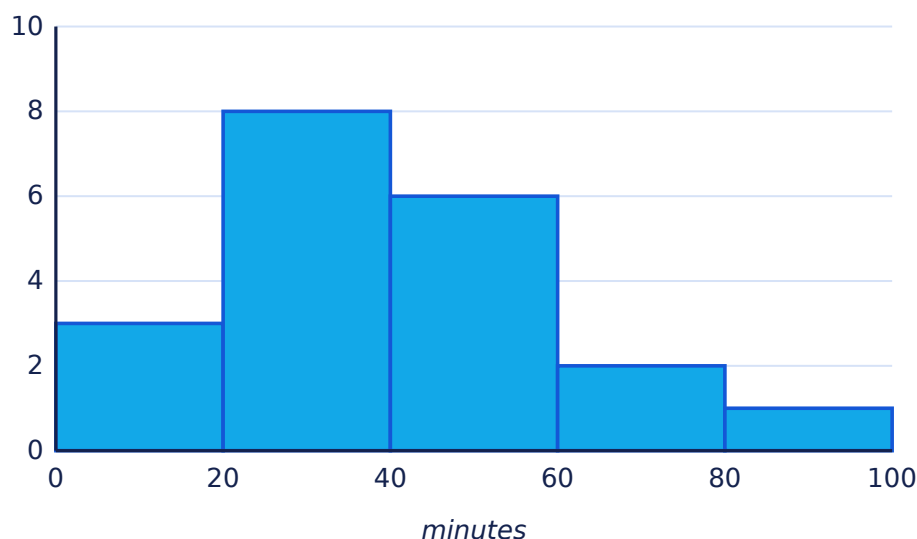
The dot plot shows the shoe sizes of 12 students. Find the mode, the median and the range.



Shoe sizes in a class of 12.

Problem 6 Read a Histogram (easy)

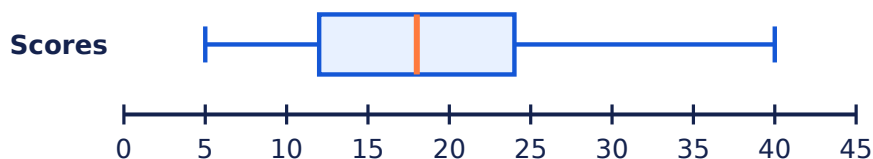
The histogram shows homework minutes for 20 students. Which interval has the most students? How many students worked at least 60 minutes, and what percent is that?



Minutes spent on homework.

Problem 7 Read a Box Plot (medium)

The box plot shows 40 quiz scores. Find the range, the IQR and the percent of scores between 12 and 24. Is 40 an outlier?



A box plot of 40 scores.

Problem 8 Five-Number Summary, Odd Count (medium)

Find the five-number summary and the IQR of 4, 6, 7, 9, 10, 12, 13, 15, 18, 20, 26.

Problem 9 Five-Number Summary and Outliers (medium)

Find the five-number summary of 21, 24, 24, 27, 30, 31, 33, 35, 39, 58. Use the $1.5 \times \text{IQR}$ rule to test for outliers.

Problem 10 Outlier and the Mean (medium)

The data 14, 16, 17, 19, 20 have a new value: 20 is replaced with 70. Find the mean and median before and after.

Problem 11 Compare Spread with Standard Deviation (medium)

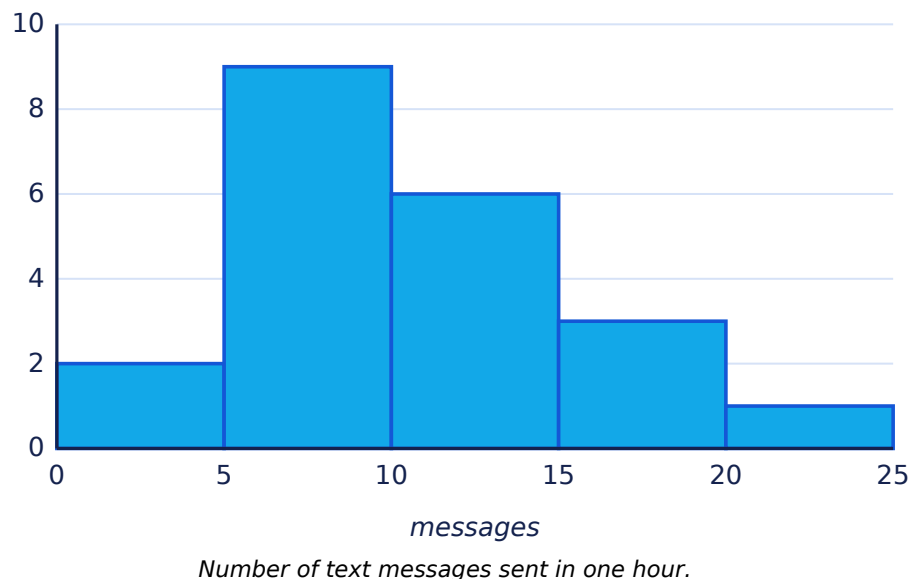
Sets $A = \{3, 5, 5, 7\}$ and $B = \{1, 5, 5, 9\}$ have the same mean. Find the mean and the standard deviation of each (population version), rounded to the nearest hundredth.

Problem 12 Mean or Median? (medium)

Prices of homes on one street (in thousands of dollars) are 210, 225, 230, 240, 250 and 1,900. Find the mean and the median. Which better describes a typical home?

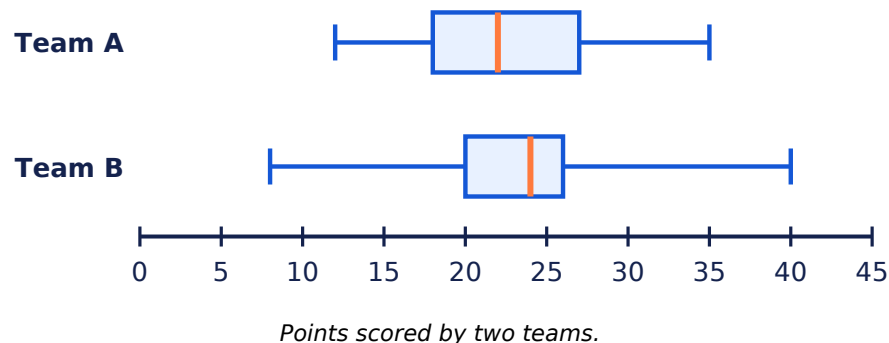
Problem 13 Describe a Histogram (medium)

The histogram shows text messages sent in one hour by 21 students. Describe the shape. Is the mean likely to be greater or less than the median?



Problem 14 Compare Two Box Plots (medium)

The box plots show points scored by two teams over a season. Compare the medians, the IQRs and the ranges, and say which team is more consistent.



Problem 15 Mean from a Frequency Table (hard)

A survey of 20 students asked how many pets each has: 0 pets: 5 students; 1 pet: 8; 2 pets: 4; 3 pets: 2; 4 pets: 1. Find the mean and the median number of pets.

Problem 16 Find the Missing Score (hard)

Dev scored 84, 91, 78 and 88 on four quizzes. What must he score on the fifth quiz for a mean of 86?

Problem 17 Adding a Seventh Value (hard)

Six numbers have a mean of 14. A seventh number, 28, is added. Find the new mean, and say what value would leave the mean unchanged.

Problem 18 Two Bakeries (hard)

Daily sales (in hundreds of dollars) at two bakeries have these five-number summaries. Bakery X: 40, 52, 60, 70, 95. Bakery Y: 45, 55, 58, 62, 70. Which bakery has the higher typical sales, and which is more consistent? Test X for an outlier.

Problem 19 Consistent Runner (hard)

Runner P ran 5K races in 24, 25 and 26 minutes. Runner Q ran 22, 25 and 28 minutes. Both have the same mean. Calculate the standard deviation of each (population version) and decide who is more consistent.

Problem 20 Shifting and Scaling Data (hard)

The data set $\{2, 4, 6, 8\}$ has a standard deviation of $\sqrt{5} \approx 2.24$. Find the mean and the standard deviation after (a) adding 10 to every value, and (b) doubling every value of the original set. Explain the pattern.