40 50 60 80 80 90

Algebra 1 0.12

Find measures of central tendency, variation, and position 417.14

variable
data
measurement
qualitative (categorical)
quantitative (numerical)
univariate
central tendency
- mean
- median
- mode

variation
- range
- quartile
- IQR
- outlier
- 5-number summary

$\bar{x} = \frac{460}{7} \approx 65.7$

med = 60

mode = 60, 80

min 40
Q_1 50
med. 60
Q_3 80
max 90

Activity: grab cubes

KeyConcept Measures of Center

- The **mean** is the sum of the values in a data set divided by the total number of values in the set.
- The **median** is the middle value or the mean of the two middle values in a set of data when the data are arranged in numerical order.
- The **mode** is the value or values that appear most often in a set of data. A set of data can have no mode, one mode, or more than one mode.

Example 1 Measures of Center

BASEBALL The table shows the number of hits Marcus made for his team. Find the mean, median, and mode.

Team Played	Hits
Badgers	3
Hornets	6
Bulldogs	5
Vikings	2
Rangers	3
Panthers	7

mean ≈ 4.3

med 4

mode 3

range 5

2 3 3 5 6 7

Example 3 Five-Number Summary

FUNDRAISER The number of boxes of donuts Aang sold for a fundraiser each day for the last 11 days were 22, 16, 35, 26, 14, 17, 28, 29, 21, 17, and 20. Find the minimum, lower quartile, median, upper quartile, and maximum of the data set. Then interpret this five-number summary.

$$\frac{\text{total}}{n} = \frac{245}{11} \approx 22.3$$

min	14
Q_1	17
med	21
Q_3	28
max	35

14 16 17 17 21 22 26 28 35

IQR

Outlier

$Q_3 - Q_1 = 89 - 75 = 14$

$14 \cdot 1.5 = 21$

Example 4 Effect of Outliers

TEST SCORES Students taking a make-up test received the following scores: 88, 79, 94, 90, 45, 71, 82, and 88.

a. Identify any outliers in the data.

45 71 79 82 88 88 90 94

min 45
Q_1 75
med 85
Q_3 89
max 94

Outlier 45

110

b. **Find the mean and median of the data set with and without the outlier. Describe what happens.**

Data Set	Mean	Median
with outlier	$\frac{88 + 79 + 94 + 90 + 45 + 71 + 82 + 88}{8}$ or about 79.6	85
without outlier	$\frac{88 + 79 + 94 + 90 + 71 + 82 + 88}{7}$ or about 84.6	88

20 pt.

18 20 17 16 15 6 19 20

16 15 16

6 15 15 16 16 16 17 18 19 20 20

min 6

Q_1 - 15 →

med 16

Q_3 + 19 → 25

max 20

19 - 15 = 4

4(1.5) = 6