GRADE 7 · UNIT 13 · LESSON 5–6

Comparing Data Sets and Their Graphs

MA.7.DP.1.2

I can compare two data sets from lists or a two-sided stem-and-leaf plot, using the same measures of center and variation for both, and say what they show.

Warm-Up

1. Box plot medians: Class A 74, Class B 81. How far apart?
2. Typical of 4, 5, 5, 6, 7, 30: mean or median? Range or IQR?
3. Solve: $-4x > 20$
4. Find the median: Stem 3: leaves 2, 5, 6, 9. Key: 3 | 2 means 32.

Warm-Up

1. Box plot medians: Class A 74, Class B 81. How far apart?

   7 points; B's is greater

2. Typical of 4, 5, 5, 6, 7, 30: mean or median? Range or IQR?

   Median and IQR: for what is typical, the 30 is an outlier

3. Solve: $-4x > 20$ $x < -5$

4. Find the median: Stem 3: leaves 2, 5, 6, 9. Key: 3 | 2 means 32.

   35.5

Vocabulary

two-sided stem-and-leaf plot

two data sets on one column of stems: one set's leaves run left from the stems, the other's run right, the least leaf nearest the stem. Also called back-to-back.

consistent

varies less: the data set with the smaller IQR (or range) is the more consistent one

Notes

I. Reading a two-sided stem-and-leaf plot

Daily high temperature (°F)

City A	Stem	City B
8	4	1 5 6
7 5 2	5	0 3 8
4 3 1	6	6
0	7	

Key for City A: 8 | 4 means 48

Key for City B: 4 | 1 means 41

Read from the stem outward. City A: 48, 52, 70. City B: 41, 53, 66.

Notes

II. Compare like with like

Compare like with like — mean with mean and range with range, or median with median and IQR with IQR.

To compare what is typical	Use, for both groups
No outlier in either set	mean with mean, range with range
An outlier in either set	median with median, IQR with IQR

To compare what is typical when either set has an outlier, use the median and the IQR for both.

If the extremes are the point, keep the mean and the range (Tuesday's purpose rule).

Notes

III. From numbers to a conclusion

Maya's bus, minutes: 18, 20, 21, 22, 22, 24, 25, 27, 40

Leo's bike, minutes: 12, 14, 15, 17, 19, 20, 22, 25, 26

	Maya	Leo
Median	22 min	19 min
IQR	5.5 min	9 min

Maya's trip is typically longer, by 22 – 19 = 3 minutes.

By the IQRs, Maya is more consistent; only the 40 makes her range longer.

Example 1

Points Ana and Bea scored in the same 8 games:

Ana: 12, 15, 9, 14, 10, 16, 11, 13

Bea: 8, 22, 15, 6, 19, 12, 18, 12

Who typically scores more? Whose points are more consistent?

Example 1

No outlier in either list: the mean and the range for both.

Ana: mean $100 \div 8 = 12.5$, range $16 - 9 = 7$

Bea: mean $112 \div 8 = 14$, range $22 - 6 = 16$

Answer: Bea typically scores 1.5 more; Ana is more consistent.

Your Turn

Laps Raj and Sam swam on the same 6 days:

Raj: 20, 35, 25, 30, 40, 30

Sam: 18, 30, 22, 28, 26, 32

Who typically swims more laps? Whose laps are more consistent?

Your Turn

Laps Raj and Sam swam on the same 6 days:

Raj: 20, 35, 25, 30, 40, 30

Sam: 18, 30, 22, 28, 26, 32

Who typically swims more laps? Whose laps are more consistent?

Raj: mean $180 \div 6 = 30$, range $40 - 20 = 20$

Sam: mean $156 \div 6 = 26$, range $32 - 18 = 14$

Answer: Raj typically swims 4 more; Sam is more consistent.

Example 2

Backpack prices at two stores:

Backpack price (dollars)

Store A	Stem	Store B
	2	1 2 4 5 6 7 9
8 7 6 5 4 3 1	3	2 3
0	4	
8	5	

Key for Store A: 1 | 3 means 31

Key for Store B: 2 | 1 means 21

Use the medians and the IQRs: which store's prices are typically higher, and which vary less?

Example 2

Store A, in order: 31, 33, 34, 35, 36, 37, 38, 40, 58

Store B, in order: 21, 22, 24, 25, 26, 27, 29, 32, 33

58 is far from the rest: an outlier. Median and IQR for both.

Answer: Median and IQR for both

Example 2

Store A: median 36; halves 31, 33, 34, 35 and 37, 38, 40, 58

Q1 = 33.5, Q3 = 39; IQR = 39 – 33.5 = 5.5

Store B: median 26; halves 21, 22, 24, 25 and 27, 29, 32, 33

Q1 = 23, Q3 = 30.5; IQR = 30.5 – 23 = 7.5

Medians: 36 – 26 = 10 dollars.

Answer: Store A is typically $10 higher; by the IQRs, Store A varies less.

Your Turn

Weights of dogs at two shelters, in pounds:

Shelter A: 18, 22, 25, 27, 29, 31, 34, 36, 61

Shelter B: 32, 35, 38, 40, 41, 43, 45, 47, 52

Use the medians and the IQRs: whose dogs are typically heavier, and by how much? Whose weights vary less?

Your Turn

Weights of dogs at two shelters, in pounds:

Shelter A: 18, 22, 25, 27, 29, 31, 34, 36, 61

Shelter B: 32, 35, 38, 40, 41, 43, 45, 47, 52

Use the medians and the IQRs: whose dogs are typically heavier, and by how much? Whose weights vary less?

Medians: A 29, B 41; $41 - 29 = 12$

IQRs: A $35 - 23.5 = 11.5$, B $46 - 36.5 = 9.5$

Answer: B's dogs, by 12 pounds; B's vary less

Whiteboards · Question 1 of 9

What is Group A's greatest time?

Seconds to solve a puzzle

Group A	Stem	Group B
	1	9
6 1	2	4 8
7 4 0	3	3 5 6 9
5 2	4	1 7
8 3	5	2

Key for Group A: 1 | 2 means 21
Key for Group B: 1 | 9 means 19

Answer it.

Whiteboards · Question 1 of 9

What is Group A's greatest time?

Seconds to solve a puzzle

Group A	Stem	Group B
	1	9
6 1	2	4 8
7 4 0	3	3 5 6 9
5 2	4	1 7
8 3	5	2

Key for Group A: 1 | 2 means 21
Key for Group B: 1 | 9 means 19

Group A: the left side.

Stem 5, leaves 3 and 8:

53 and 58. Greatest: 58

Answer: 58 seconds

Whiteboards · Question 2 of 9

What is Group A's median time?

Seconds to solve a puzzle

Group A	Stem	Group B
	1	9
6 1	2	4 8
7 4 0	3	3 5 6 9
5 2	4	1 7
8 3	5	2

Key for Group A: 1 | 2 means 21
Key for Group B: 1 | 9 means 19

Answer it.

Whiteboards · Question 2 of 9

What is Group A's median time?

Seconds to solve a puzzle

Group A	Stem	Group B
	1	9
6 1	2	4 8
7 4 0	3	3 5 6 9
5 2	4	1 7
8 3	5	2

Key for Group A: 1 | 2 means 21
Key for Group B: 1 | 9 means 19

In order: 21, 26, 30, 34,

37, 42, 45, 53, 58

The 5th of 9: 37

Answer: 37 seconds

Whiteboards · Question 3 of 9

What is the range of Group B's times?

Seconds to solve a puzzle

Group A	Stem	Group B
	1	9
6 1	2	4 8
7 4 0	3	3 5 6 9
5 2	4	1 7
8 3	5	2

Key for Group A: 1 | 2 means 21
Key for Group B: 1 | 9 means 19

Answer it.

Whiteboards · Question 3 of 9

What is the range of Group B's times?

Seconds to solve a puzzle

Group A	Stem	Group B
	1	9
6 1	2	4 8
7 4 0	3	3 5 6 9
5 2	4	1 7
8 3	5	2

Key for Group A: 1 | 2 means 21
Key for Group B: 1 | 9 means 19

Group B: the right side.

Least 19, greatest 52

Range: 52 – 19 = 33

Answer: 33 seconds

Whiteboards · Question 4 of 9

Ivy's quiz scores: 8, 10, 2, 9, 7, 8

Max's quiz scores: 6, 7, 8, 8, 9, 9

Which pair of measures compares their typical scores?

A. Median and IQR

B. Mean and range

C. A different pair for each

D. Median and range

Answer it.

Whiteboards · Question 4 of 9

Ivy's quiz scores: 8, 10, 2, 9, 7, 8

Max's quiz scores: 6, 7, 8, 8, 9, 9

Which pair of measures compares their typical scores?

Ivy's 2 is far from her other scores: an outlier.

Ivy's mean is $44 \div 6 \approx 7.3$; her median is 8.

One outlier in either set: the median and the IQR, for both.

Answer: A — median and IQR, for both

Whiteboards · Question 5 of 9

Shop A sold 14, 18, 15, 20, 13 pies on five days.

Shop B sold 22, 19, 25, 21, 23 pies on the same days.

On average, how many more pies a day did Shop B sell?

Answer it.

Whiteboards · Question 5 of 9

Shop A sold 14, 18, 15, 20, 13 pies on five days.

Shop B sold 22, 19, 25, 21, 23 pies on the same days.

On average, how many more pies a day did Shop B sell?

Shop A: $(14 + 18 + 15 + 20 + 13) \div 5 = 16$

Shop B: $(22 + 19 + 25 + 21 + 23) \div 5 = 22$

$22 - 16 = 6$

Answer: 6 more pies a day

Whiteboards · Question 6 of 9

Team A: median 18, IQR 9. Team B: median 15, IQR 4.

Whose points are more consistent?

A. Team A: its median is greater

B. No one can tell: we need the ranges

C. Team B: its IQR is smaller

D. Team A: its IQR is greater

Answer it.

Whiteboards · Question 6 of 9

Team A: median 18, IQR 9. Team B: median 15, IQR 4.

Whose points are more consistent?

Consistent is about spread: compare the IQRs.

4 < 9: Team B's middle half is narrower.

Answer: C — Team B: its IQR is smaller

Whiteboards · Question 7 of 9

Trip minutes: Bus 1, mean 24, range 6; Bus 2, mean 20, range 18.

Which conclusion do these measures support?

A. Bus 2 is faster than Bus 1 on every trip.

B. Bus 1 is typically faster and more consistent.

C. Bus 2 is typically faster and more consistent.

D. Bus 2 is typically faster; Bus 1 is more consistent.

Answer it.

Whiteboards · Question 7 of 9

Trip minutes: Bus 1, mean 24, range 6; Bus 2, mean 20, range 18.

Which conclusion do these measures support?

Center: $20 < 24$, so Bus 2's trips are typically shorter.

Spread: $6 < 18$, so Bus 1's times vary less.

Answer: D — Bus 2 is typically faster; Bus 1 is more consistent

Whiteboards · Question 8 of 9

Pat's Pizza sold 30, 42, 35, 38, 40 pizzas a day, at $12 each.

Joe's Pizza sold 25, 50, 33, 44, 28 pizzas a day.

Whose daily sales have the greater range?

Answer it.

Whiteboards · Question 8 of 9

Pat's Pizza sold 30, 42, 35, 38, 40 pizzas a day, at $12 each.

Joe's Pizza sold 25, 50, 33, 44, 28 pizzas a day.

Whose daily sales have the greater range?

Pat's: $42 - 30 = 12$

Joe's: $50 - 25 = 25$

Answer: Joe's: 25 pizzas, against 12

Whiteboards · Question 9 of 9

Store A's shirts: $9, $22, $24, $25, $27

Store B's shirts: $14, $16, $17, $18, $20

Jay says Store A is cheaper because its lowest price is lower.

Is one price enough? What should Jay compare?

Write your answer in sentences.

Whiteboards · Question 9 of 9

Store A's shirts: $9, $22, $24, $25, $27

Store B's shirts: $14, $16, $17, $18, $20

Jay says Store A is cheaper because its lowest price is lower.

Is one price enough? What should Jay compare?

One shirt is not the store; 9 is an outlier: medians.

Store A 24, Store B 17: $24 - 17 = 7$

Answer: No. Compare medians: B is typically $7 cheaper.

Independent Practice

1. Team A's points in 7 games: 14, 6, 17, 12, 23, 11, 15. Find the mean.
2. Team B's points in the same games: 19, 22, 17, 25, 20, 21, 23. Find the mean.
3. Find the range of Team A's points.
4. Find the range of Team B's points.
5. Which team typically scores more, and by how much?
6. Which team's points vary more? How do you know?

Before You Go

Read each side of a two-sided plot from the stem outward.

Compare like with like — mean with mean and range with range, or median with median and IQR with IQR. To compare what is typical when either set has an outlier, use the median and the IQR for both. If the extremes are the point, keep the mean and the range (Tuesday's purpose rule).

Monday: categorical and numerical data, and choosing a display.

IXL

1. Open IXL and start today's skills.
2. Work on paper where the question needs work. The answer box does not show it.
3. Every skill listed is required, to a SmartScore of 60. Due by the Unit 13 test.

Today's skills — all required

Compare populations using measures of center and spread (JQW)