LESSON MAKER PRO

Inside the Box

Create and check box plots using five-number summaries.

GRADE 7 · 7.D.1.3

7.D.1.3 "Use technology to create and analyze box plots."

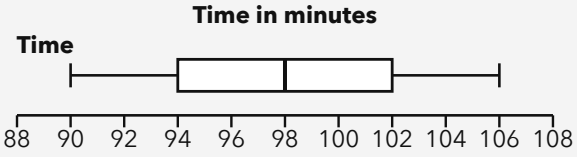
NAME _____ DATE _____

HOW A BOX PLOT WORKS

A graphing tool makes a box plot from five values: minimum, Q1, median, Q3, and maximum. To find Q1 and Q3, sort the data and find the medians of the lower and upper halves. Leave out the overall median if the data set has a middle value. The length of the box is Q3 minus Q1, called the interquartile range (IQR).

WORKED EXAMPLE

What is the IQR of this box plot?

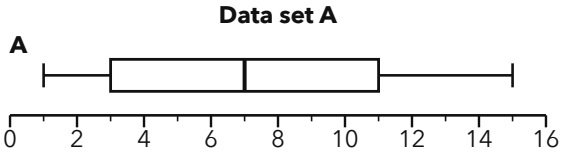


1. Read the left edge of the box: Q1 = 94.
2. Read the right edge of the box: Q3 = 102.
3. Subtract: 102 - 94 = 8.

Answer: The IQR is 8 minutes.

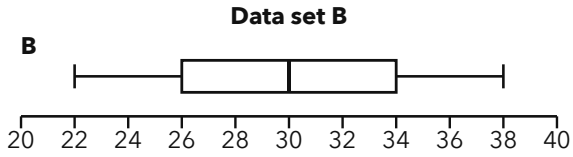
PRACTICE 6 problems

1 Read the box plot. What are its median and range?



ANSWER _____

2 What is the IQR shown by this box plot?

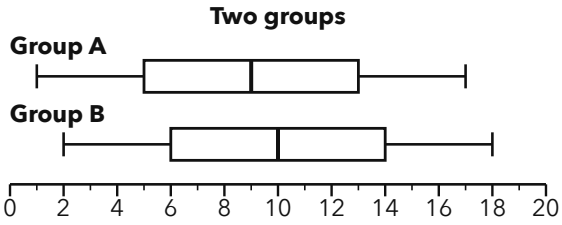


ANSWER _____

3 A graphing tool will make a box plot for 31, 33, 35, 37, 39, 41, 43, 45. What median should the plot show?

ANSWER _____

4 Compare the two box plots. Which group has the higher median, and by how much?



ANSWER _____

_____

5 A student enters 23, 25, 27, 29, 31, 33, 35, 37 into a box-plot tool. What value should the tool use for Q1?

ANSWER _____

6 Use the data 1, 1, 3, 3, 5, 5, 7, 7, 9. Write the five-number summary a box-plot tool needs. Then sketch the box plot above the axis.



ANSWER _____

_____

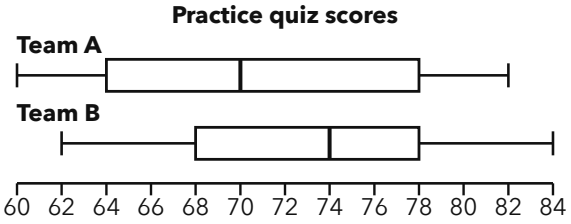
APPLY IT Show your work

1 An app records the minutes Mira plays a game on eight days: 51, 53, 55, 57, 59, 61, 63, 65. What median and IQR should its box plot show?

WORK SPACE

ANSWER _____

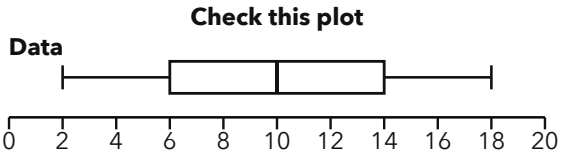
2 Two teams use an app to make box plots of their practice quiz scores. Which team's middle half of scores is less spread out, and by how many points?



ANSWER _____

CHALLENGE One step up

A graphing tool shows this box plot for the sorted data 2, 4, 6, 8, 10, 12, 14, 16, 18. Two quartiles on the plot are wrong. What should Q1 and Q3 be, and what is the corrected IQR? Explain how you found the quartiles.



WORK SPACE AND ANSWER

ANSWER KEY

Inside the Box

GRADE 7 · 7.D.1.3

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Read the box plot. What are its median and range?	**Median: 7; range: 14.**
2	What is the IQR shown by this box plot?	**8**
3	A graphing tool will make a box plot for 31, 33, 35, 37, 39, 41, 43, 45. What median should the plot show?	**38**
4	Compare the two box plots. Which group has the higher median, and by how much?	**Group B, by 1.**
5	A student enters 23, 25, 27, 29, 31, 33, 35, 37 into a box-plot tool. What value should the tool use for Q1?	**26**
6	Use the data 1, 1, 3, 3, 5, 5, 7, 7, 9. Write the five-number summary a box-plot tool needs. Then sketch the box plot above the axis.	**Minimum 1, Q1 2, median 5, Q3 7, maximum 9. The plot has a box from 2 to 7, a median line at 5, and whiskers extending to 1 and 9.**

PART 2 · APPLY IT

1. **Median: 58 minutes; IQR: 8 minutes.** The middle values are 57 and 59, so the median is 58. Q1 is 54 and Q3 is 62, giving an IQR of 62 - 54 = 8.
2. **Team B, by 4 points.** Team A's IQR is 78 - 64 = 14 points. Team B's IQR is 78 - 68 = 10 points, which is 4 points smaller.

CHALLENGE

Q1 should be 5, Q3 should be 15, and the corrected IQR is 10. Leaving out the median of 10, the lower half is 2, 4, 6, 8, whose median is 5. The upper half is 12, 14, 16, 18, whose median is 15.

For even-sized data sets, each quartile is the median of one half of the sorted data. For odd-sized data sets, leave out the overall median when finding quartiles. Accept an accurately sketched box plot in problem 6 even if it is not perfectly drawn.