

Algebra 1
Box Plots and Outliers

Box Plots and Outliers | A1-U10-P05
96 problems · Four activity formats

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Topic focus
Across 96 tasks this topic asks for iQR, both fences, and each candidate classification, iQR, both fences, and each candidate classification, iQR, both fences, and each candidate classification, iQR, both fences, and each candidate classification, iQR, both fences, and each candidate classification and iQR, both fences, and each candidate classification.
8 PDFs and a README; 175 buyer pages.

Algebra 1

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Name: _____ Date: _____ Class: _____

Answer each question and record the matching bank letter. Give exact values. A value without its unit is not a complete answer.

One candidate equals the upper fence. For a dataset, $Q1 = 10$ and $Q3 = 20$ points. Under the supplied 1.5-IQR rule, values strictly below the lower fence or strictly above the upper fence are outliers. Classify the candidate observations 5, 10, 20, 35, 36. Fence equality remains included.

$q1$	10
$q3$	20
Candidate values	5, 10, 20, 35, 36
Unit	points
Rule	strictly outside $Q1 - 1.5 \cdot IQR$ and $Q3 + 1.5 \cdot IQR$

Bank label: _____

Candidates straddle both exact cutoff values. For a dataset, $Q1 = 4$ and $Q3 = 8$ units. Under the supplied 1.5-IQR rule, values strictly below the lower fence or strictly above the upper fence are outliers. Classify the candidate observations $-2, -3, 14, 15$. Apply the strict signs separately on the two sides.

$q1$	4
$q3$	8
Candidate values	$-2, -3, 14, 15$
Unit	units
Rule	strictly outside $Q1 - 1.5 \cdot IQR$ and $Q3 + 1.5 \cdot IQR$

Bank label: _____

Only the farthest upper candidate crosses its fence. For a dataset, $Q1 = 2$ and $Q3 = 6$ scores. Under the supplied 1.5-IQR rule, values strictly below the lower fence or strictly above the upper fence are outliers. Classify the candidate observations 0, 6, 12, 13. Do not compare values merely with $Q3$.

$q1$	2
$q3$	6
Candidate values	0, 6, 12, 13
Unit	scores
Rule	strictly outside $Q1 - 1.5 \cdot IQR$ and $Q3 + 1.5 \cdot IQR$

Bank label: _____

The low candidates lie on opposite sides of the cutoff. For a dataset, $Q1 = 5$ and $Q3 = 9$ minutes. Under the supplied 1.5-IQR rule, values strictly below the lower fence or strictly above the upper fence are outliers. Classify the candidate observations $-2, -1, 5, 9$. Use the computed lower fence rather than the minimum.

$q1$	5
$q3$	9
Candidate values	$-2, -1, 5, 9$
Unit	minutes
Rule	strictly outside $Q1 - 1.5 \cdot IQR$ and $Q3 + 1.5 \cdot IQR$

Bank label: _____

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Name: _____ Date: _____ Class: _____

Answer each question and show your reasoning in the workspace. Give exact values rather than decimals unless the question supplies a decimal. A value without its unit is not a complete answer.

Both quartiles coincide. For a dataset, $Q1 = 5$ and $Q3 = 5$ ratings. Under the supplied 1.5-IQR rule, values strictly below the lower fence or strictly above the upper fence are outliers. Classify the candidate observations 4, 5, 6, 5. With IQR zero, both fences equal 5.

$q1$	5
$q3$	5
Candidate values	4, 5, 6, 5
Unit	ratings
Rule	strictly outside $Q1 - 1.5 \cdot \text{IQR}$ and $Q3 + 1.5 \cdot \text{IQR}$

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Name: _____ Date: _____ Class: _____

Begin at START. Answer the card, then find the matching final answer at the top of another card. Use the recording sheet for your reasoning. Visit each card once and continue to FINISH.

Incoming: lower fence: -24 ; lower whisker: -18 ; outlier marks: ; upper fence: 20 ; upper whisker: 5

A signed dataset has no separated extremes. The ordered-source net-points data are $-6, -4, -2, 0, 2, 4, 6, 8$. Use median-of-halves quartiles and the modified-box rule: strict 1.5-IQR outliers are marked separately, while each whisker ends at the most extreme observed nonoutlier. Determine both whisker endpoints and every outlier mark. Preserve the negative lower coordinate.



Raw data	$-6, -4, -2, 0, 2, 4, 6, 8$
Unit	net-points
Quartile convention	median of halves; exclude overall median for odd n
Outlier rule	strictly outside 1.5-IQR fences

Your response: _____

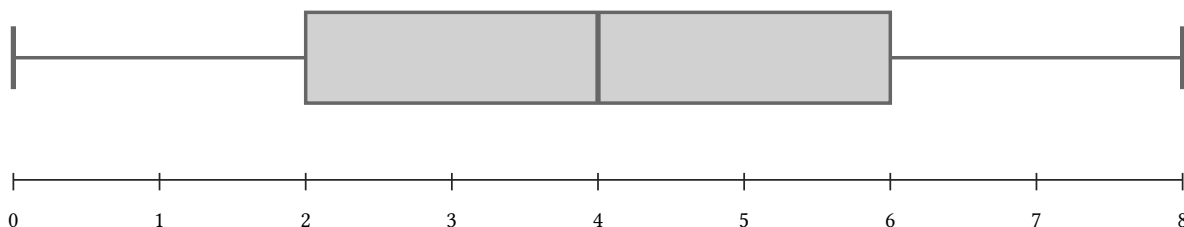
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Evaluate the supplied statement or method. Say whether it is correct, repair it if it is not, and verify the result exactly. Not every prompt contains an error.

The summary need not identify one sample. Use the median-of-halves convention, excluding the overall median for odd n . The required five-number summary is (0, 2, 4, 6, 8) in minimum/ $Q1$ /median/ $Q3$ /maximum order. Use 7 integer observations in each list. Give two different compatible samples. Before calculating or constructing, choose how to test compatibility: translate the summary into ordered-position constraints and use the additional stated restrictions, or use only a proposed total/mean. Explain which information your method must check, then carry out the original construction or impossibility proof.



Lower whisker	Q1	Median	Q3	Upper whisker	Outlier marks
0	2	4	6	8	none
Five number summary			0, 2, 4, 6, 8		
Quartile convention			median of halves; exclude overall median for odd n		
Conditions			Use 7 integer observations in each list.		

Box Plots and Outliers

Full Worked Solutions - excerpt

Worked example

Problem. The low candidates lie on opposite sides of the cutoff. For a dataset, $Q1 = 5$ and $Q3 = 9$ minutes. Under the supplied $1.5 \cdot \text{IQR}$ rule, values strictly below the lower fence or strictly above the upper fence are outliers. Classify the candidate observations $-2, -1, 5, 9$. Use the computed lower fence rather than the minimum.

$q1$	5
$q3$	9
Candidate values	$-2, -1, 5, 9$
Unit	minutes
Rule	strictly outside $Q1 - 1.5 \cdot \text{IQR}$ and $Q3 + 1.5 \cdot \text{IQR}$

Answer. classifications: (classification: low outlier; value: -2), (classification: not an outlier; value: -1), (classification: not an outlier; value: 5), (classification: not an outlier; value: 9); iqr: 4 ; lower fence: -1 ; upper fence: 15

Explanation and check.

$\text{IQR} = 4$. The lower fence is

$$5 - 1.5(4) = -1$$

and the upper fence is

$$9 + 1.5(4) = 15$$

-2 is low outlier; -1 is not an outlier; 5 is not an outlier; 9 is not an outlier. Only -2 is strictly below the lower fence -1 .

Worked example

Problem. Candidates straddle both exact cutoff values. For a dataset, $Q1 = 4$ and $Q3 = 8$ units. Under the supplied $1.5 \cdot \text{IQR}$ rule, values strictly below the lower fence or strictly above the upper fence are outliers. Classify the candidate observations $-2, -3, 14, 15$. Apply the strict signs separately on the two sides.

$q1$	4
$q3$	8
Candidate values	$-2, -3, 14, 15$
Unit	units
Rule	strictly outside $Q1 - 1.5 \cdot \text{IQR}$ and $Q3 + 1.5 \cdot \text{IQR}$

Answer. classifications: (classification: not an outlier; value: -2), (classification: low outlier; value: -3), (classification: not an outlier; value: 14), (classification: high outlier; value: 15); iqr: 4 ; lower fence: -2 ; upper fence: 14

Explanation and check.

$\text{IQR} = 4$. The lower fence is

$$4 - 1.5(4) = -2$$

and the upper fence is

$$8 + 1.5(4) = 14$$

-2 is not an outlier; -3 is low outlier; 14 is not an outlier; 15 is high outlier. The equality cases -2 and 14 are nonoutliers.