Outliers and What They Do

The 1.5 IQR rule: IQR, times 1.5, subtract from Q1 and add to Q3. Use the site's statistics tool or a graphing calculator for the before-and-after statistics.

Name _____ Date _____

Words we use

say the math word, then the plain English

WORD	PLAIN ENGLISH	WHAT YOU DO
Outlier	A value unusually far from the rest, by the 1.5 IQR rule.	Below the lower fence or above the upper fence.
Fence	The cutoff: Q1 – 1.5 IQR below, Q3 + 1.5 IQR above.	Build both, then judge every value.
Modified box plot	A box plot that shows outliers as separate dots, with whiskers stopping inside the fences.	The tool draws it automatically.
Resistant	Not pulled much by extreme values: the median and the IQR.	The mean and the standard deviation are not.
1.5 IQR rule	The rule that turns "looks far away" into a yes-or-no test.	IQR, times 1.5, subtract and add.

Part A Build the fences

Q1, Q3	IQR	1.5 × IQR	LOWER FENCE	UPPER FENCE
6.5, 18				
65, 68				
52.5, 67.5				

1. With fences –10.75 and 35.25, which of 0, 12, 32, 88 are outliers?

2. With fences 60.5 and 72.5, is 74 an outlier? Is 60?

Part B The basketball team

Nine players: 70, 64, 67, 66, 65, 63, 67, 67, 68. Then a 74 inch player joins.

STATISTIC	NINE PLAYERS	WITH THE 74	CHANGED?
mean			
median			

IQR

Part C The class periods

Eleven schools: 45, 50, 50, 55, 55, 60, 60, 60, 65, 70, 70. Then Cherry Lane's 100.

1. Which statistic best describes a typical player, and why?
1. Before and after: mean, median, IQR, σ.

2. Is 100 an outlier? Show the fence.

3. Why does σ nearly double?

Part D Draw it

1. Sketch the modified box plot of the songs data (5-number summary 0, 6.5, 12, 18, 88; fence 35.25). Where does the whisker stop, and where is the 88?

Part E Exit ticket

1. Q1 = 6.5, Q3 = 18: the fences, and whether 88 is an outlier.

2. Which statistics does an outlier pull? Which resist?

3. A height recorded as 740 inches: what do you do?

Answer key

Part A. 11.5, 17.25, –10.75, 35.25. 3, 4.5, 60.5, 72.5. 15, 22.5, 30, 90. 1. Only 88. 2. 74 yes; 60 yes.

Part B. Mean 66.3 to 67.1 (up). Median 67 to 67 (same). IQR 3 to 3 (same). σ 2.0 to 3.0 (up). 1. The median: it resists the outlier.

Part C. 1. Mean 58.2 to 61.7; median 60 to 60; IQR 15 to 15; σ 7.8 to 13.7. 2. Yes: the upper fence is 90. 3. Its distance from the mean is squared into the sum.

Part D. Box 6.5 to 18 with the line at 12; whiskers to 0 and to 32; the 88 as a separate dot.

Part E. 1. –10.75 and 35.25; yes. 2. Pulls the mean and standard deviation; the median and IQR resist. 3. It is a mistake: fix it.