

AP Statistics - Five-Number Summary, Boxplots and Comparing Distributions - Answer Key

Common Core AP STAT 1.8, AP STAT 1.9, HSS-ID.A.1, HSS-ID.A.2 · maths-pdf.fr/en/

Each solution lists the sorted data, the quartiles, and any fences before it draws a conclusion. Use full comparison sentences, because the AP exam rewards context and comparison words.

AP Statistics · Common Core State Standards: **AP STAT 1.8, AP STAT 1.9, HSS-ID.A.1, HSS-ID.A.2**

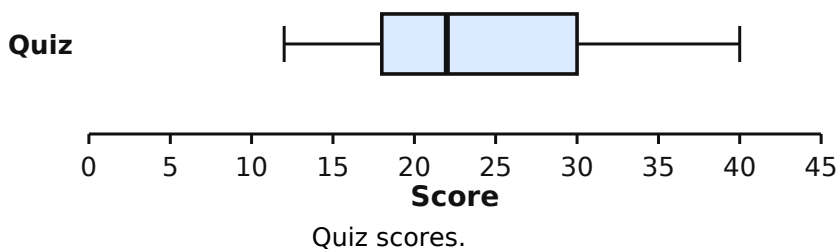
Exercise 1 - Five-number summary

The data are already ordered. The median is the 6th value, 34.

Lower half (22, 25, 27, 30, 31): $Q_1 = 27$. Upper half (36, 38, 41, 45, 60): $Q_3 = 41$.

22, 27, 34, 41, 60.

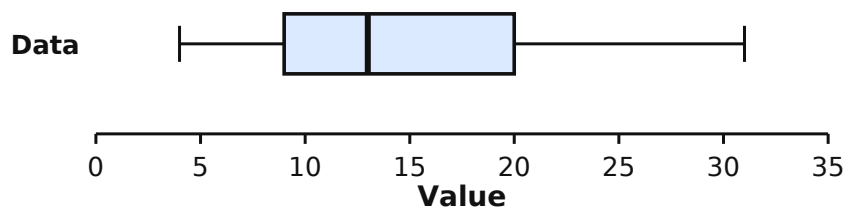
Exercise 2 - Read a boxplot



(a) 22. (b) $40 - 12 = 28$. (c) $30 - 18 = 12$. (d) The box holds the middle half of the data.

22; 28; 12; about 50%.

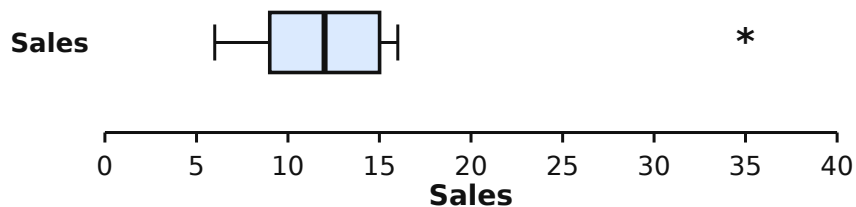
Exercise 3 - Draw a boxplot



$IQR = 20 - 9 = 11$. Fences: $9 - 16.5 = -7.5$ and $20 + 16.5 = 36.5$. Neither the minimum nor the maximum is beyond a fence.

No outliers; whiskers extend to 4 and 31.

Exercise 4 - Outliers and whiskers



$Q_1 = 9$, $Q_3 = 15$, $IQR = 6$. Upper fence: $15 + 9 = 24$.

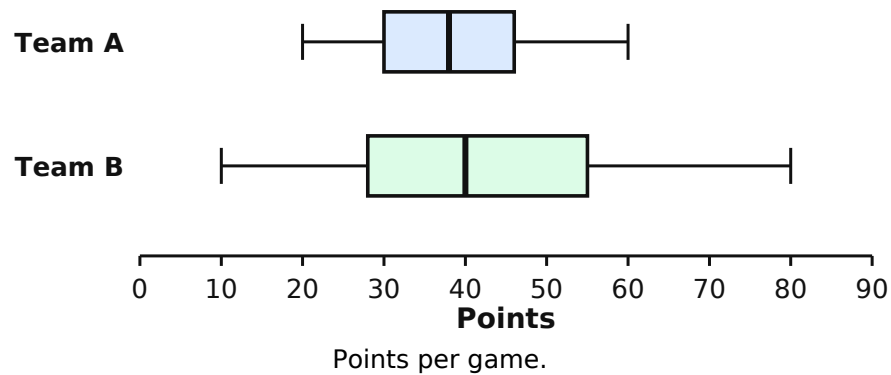
35 is an outlier; the upper whisker ends at 16, the largest value inside the fence.

Exercise 5 - Quarters of the data

Each section holds about 25% of the data: $0.25 \times 48 = 12$.

About 12 students in each section.

Exercise 6 - Compare in context



Medians: A 38, B 40. IQRs: A $46 - 30 = 16$, B $55 - 28 = 27$. Ranges: A 40, B 70.

Team B has a slightly higher median (40 compared with 38 points) and is more variable (IQR 27 compared with 16, range 70 compared with 40).

Exercise 7 - Skew from a boxplot

The median is close to Q1 (2 above it) and far from Q3 (18 below it), and the upper whisker is long.

Skewed right.

Exercise 8 - Which has more spread?

By the IQR, Class 1 is more spread out in the middle half. By the range, Class 2 is more spread.

The IQR is resistant to extreme values, so Class 1 is more variable overall; the range of Class 2 is probably inflated by an extreme score.

Exercise 9 - Limits of a boxplot

A boxplot shows only five numbers. Different data can share those numbers while having one peak or two peaks.

No. A boxplot can hide gaps, clusters, and bimodality.

Exercise 10 - Percent above Q3

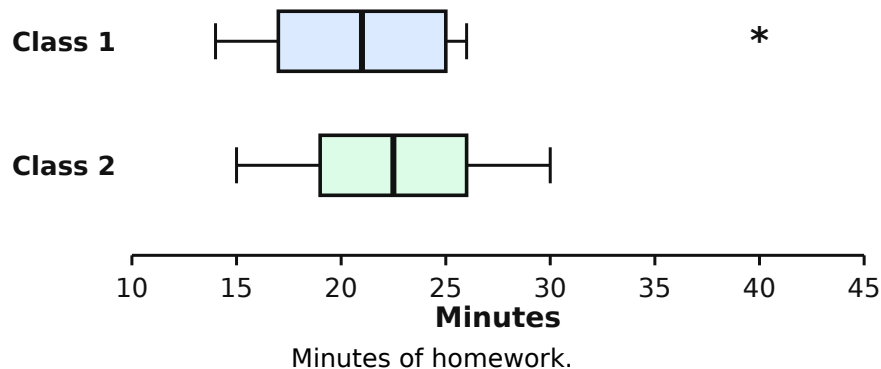
Above Q3: $0.25 \times 120 = 30$. Between the median and Q3: also 25%, which is 30.

About 30 students in each.

Exercise 11 - Build two boxplots

Class 1: 14, 17, 21, 25, 40. $IQR = 8$, upper fence 37, so 40 is an outlier.

Class 2: 15, 19, 22.5, 26, 30. $IQR = 7$, no outliers.



Class 1: 14, 17, 21, 25, 40 (outlier 40). Class 2: 15, 19, 22.5, 26, 30.

Exercise 12 - Overlapping boxes

Overlap shows the middle halves share values. A boxplot alone cannot prove a difference; inference is needed.

No; overlap and a small difference in medians do not by themselves show a real difference.

Exercise 13 - Find a missing quartile

$Q_1 = 52 - 18 = 34$. Lower fence: $34 - 1.5(18) = 7$. Upper fence: $52 + 27 = 79$.

$Q_1 = 34$; fences 7 and 79.

Exercise 14 - Delivery times

Median $\frac{27+29}{2} = 28$. Lower half 18-27: $Q_1 = 23.5$. Upper half 29-70: $Q_3 = 36$. $IQR = 12.5$, upper fence $36 + 18.75 = 54.75$.

Summary 18, 23.5, 28, 36, 70; 70 is an outlier; the data are skewed right.

Exercise 15 - Salaries at two companies

Company X: 45, 49, 55, 62.5, 70. Company Y: 40, 53.5, 58, 63, 120.

IQR: X $62.5 - 49 = 13.5$, Y $63 - 53.5 = 9.5$.

Company Y has a higher median (58 compared with 55) and a smaller IQR, but it has an outlier at 120 thousand dollars, while Company X has no outliers.

Exercise 16 - Fix the comparison

A good comparison uses comparison words and context.

The median score in Class B (78) is higher than in Class A (72), but Class B scores are more variable (IQR 18 compared with 10).

Exercise 17 - Percentiles from the box

Her score 84 is above $Q3 = 83$.

She is in the top quarter, above the 75th percentile.

Exercise 18 - Multi-step

Only the maximum changes: now 51, 68, 76, 83, 90.

The range changes from $97 - 51 = 46$ to $90 - 51 = 39$, while the median, quartiles, and IQR $83 - 68 = 15$ stay the same.

Only the maximum and range change.

Exercise 19 - Median position

A: the median is centered in the box (8 from each quartile) and the whiskers are 12 on each side.

B: the median is 3 above $Q1$ but 25 below $Q3$, and the upper whisker is long.

A is roughly symmetric; B is skewed right.

Exercise 20 - Interpret the IQR

$$IQR = 79 - 61 = 18.$$

The middle 50% of the quiz scores span 18 points, from 61 to 79.