

Algebra 1 - Data Distributions and Summary Statistics - Answer Key

Common Core S-ID.A.1, S-ID.A.2, S-ID.A.3 · maths-pdf.fr/en/

This answer key explains every problem on the data distributions worksheet. Final answers are in bold, and the lines above them show how each result was found. Use it to correct mistakes and to look for patterns in the errors you make most often.

Algebra 1 · Common Core State Standards: **S-ID.A.1, S-ID.A.2, S-ID.A.3**

Exercise 1 - Mean

Sum: $4+8+6+10+12=40$. Divide by 5.

$$\frac{40}{5}=8$$

Exercise 2 - Median

Order the first set: 1,3,5,7,9. The middle value is 5.

The second set has two middle values, 15 and 18: $\frac{15+18}{2}=16.5$.

5 and 16.5

Exercise 3 - Range and mode

Greatest 14, least 6: range $14-6=8$.

The value 9 appears three times.

Range 8; mode 9

Exercise 4 - Five-number summary

Ordered: 2,4,5,7,8,9,12. Median: 7 (the 4th value).

Lower half 2,4,5: $Q1=4$. Upper half 8,9,12: $Q3=9$.

Minimum 2, Q1 4, median 7, Q3 9, maximum 12

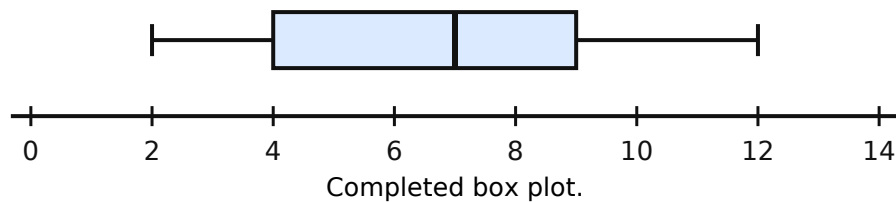
Exercise 5 - Interquartile range

Lower half 3,5,6,8: $Q1 = \frac{5+6}{2} = 5.5$. Upper half 10,12,15,16: $Q3 = \frac{12+15}{2} = 13.5$.

$IQR = 13.5 - 5.5 = 8$.

8

Exercise 6 - Draw a box plot



Draw a number line, a box from 4 to 9 with a line at 7, and whiskers to 2 and 12.

Box from 4 to 9, median line at 7, whiskers to 2 and 12

Exercise 7 - Read a dot plot

The 5th of 9 ordered values is 5.

The value 5 has the tallest stack of dots, 3 dots.

Median 5; mode 5

Exercise 8 - Read a histogram

Add the first three bars: $2+5+9=16$.

$\frac{16}{25} = 0.64 = 64\%$.

16 students; 64%

Exercise 9 - Shape of a distribution

The bars are tallest on the left and have a long tail to the right.

Skewed right

Exercise 10 - Test for outliers

Lower half 12,14,15,15: $Q1 = 14.5$. Upper half 16,17,18,45: $Q3 = 17.5$. $IQR = 3$.

Fences: $14.5 - 1.5(3) = 10$ and $17.5 + 1.5(3) = 22$.

The value 45 is above 22.

45 is an outlier

Exercise 11 - Effect of an outlier

Statistic	With 45	Without 45
Mean	19	15.3
Median	15.5	15

The mean reacts more to the outlier.

With 45: $\text{mean} = \frac{152}{8} = 19$, median $\frac{15+16}{2} = 15.5$.

Without 45: $\text{mean} = \frac{107}{7} \approx 15.3$, median 15.

The mean dropped by about 3.7; the median dropped by 0.5.

The mean changes more

Exercise 12 - Standard deviation

x	2	4	4	4	5	5	7	9
x - 5	-3	-1	-1	-1	0	0	2	4
squared	9	1	1	1	0	0	4	16

Deviations from the mean.

Mean: $\frac{40}{8} = 5$. Squared deviations: $9+1+1+1+0+0+4+16 = 32$.

Variance: $\frac{32}{8} = 4$. Standard deviation: $\sqrt{4} = 2$.

2

Exercise 13 - Standard deviation with a calculator

Mean 7. Squared deviations: $16+4+0+4+16 = 40$. Variance $\frac{40}{5} = 8$.

$\sigma = \sqrt{8} \approx 2.8$.

2.8

Exercise 14 - Compare two data sets

Both means are 14.

Team A: $\sigma = \sqrt{8} \approx 2.8$. Team B: $\sigma = \sqrt{32} \approx 5.7$.

Team B's scores are more spread out.

Same mean 14; $\sigma_A \approx 2.8$ and $\sigma_B \approx 5.7$

Exercise 15 - Best measure of center

Mean: $\frac{9+10+10+11+25}{5} = \frac{65}{5} = 13$. Median: 10.

The \$25 price is an outlier that raises the mean. Most shops charge about \$10.

Mean \$13, median \$10; the median is more typical

Exercise 16 - Test scores

Mean: $\frac{748}{9} \approx 83.1$. Median: 82.

Lower half 72,75,78,80: $Q1 = 76.5$. Upper half 85,88,90,98: $Q3 = 89$.

$IQR = 89 - 76.5 = 12.5$.

Mean 83.1; median 82; IQR 12.5

Exercise 17 - Race times

Runners under 14 seconds: $3+7=10$ out of $3+7+9+4=23$.

$\frac{10}{23} \approx 0.435$, about 43.5%.

$\frac{10}{23}$, **about 43.5%**

Exercise 18 - Compare box plots

Class A: median 76, IQR $84-68=16$, range $95-55=40$.

Class B: median 75, IQR $80-70=10$, range $90-60=30$.

The medians are similar, but Class A has more variability.

Medians 76 and 75; IQRs 16 and 10; ranges 40 and 30

Exercise 19 - Daily steps

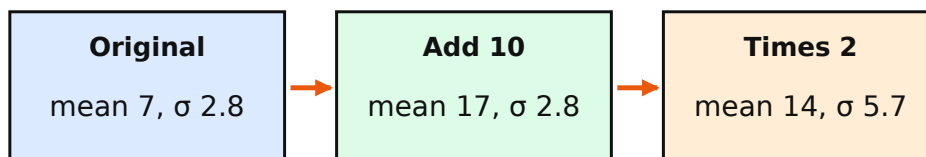
Lower half 6,7,7,8: $Q_1=7$. Upper half 9,9,10,31: $Q_3=9.5$. IQR = 2.5.

Upper fence: $9.5+1.5(2.5)=13.25$. The value 31 is an outlier.

Report the median and IQR, because the mean and standard deviation are distorted by the outlier.

31 is an outlier; use median and IQR

Exercise 20 - Change every value



Effects of changing every value.

(a) Every value shifts by 10, so the mean becomes 17 and the spread is unchanged: $\sigma \approx 2.8$.

(b) The mean doubles to 14 and the spread doubles: $\sigma = 2\sqrt{8} \approx 5.7$.

(a) mean 17, $\sigma \approx 2.8$; (b) mean 14, $\sigma \approx 5.7$