

Exploring One-Variable Data: Shape, Center, Spread

Grade 12 – AP Statistics math · Worksheet Answer Key · Standards: AP Statistics Unit 1 (2026-27)

This answer key shows every step, including the quartile method used (the median of each half) and the normal-model values. Compare the setup and the interpretation in context, not just the final number.

Standards: AP Statistics Unit 1 (2026-27) · **Level:** Grade 12 AP Statistics

Problem 1 Classifying Variables

(a) Blood type puts students in groups: categorical. (b) Height is a measured number: quantitative. (c) Number of siblings is a count: quantitative. (d) A zip code is a label; averaging zip codes is meaningless: categorical.

(a) categorical, (b) quantitative, (c) quantitative, (d) categorical

Problem 2 Relative Frequency Table

Divide each count by 50: Tacos $18/50 = 36\%$, BBQ $14/50 = 28\%$, Pizza $11/50 = 22\%$, Ramen $7/50 = 14\%$.

Tacos 36%, BBQ 28%, Pizza 22%, Ramen 14%

Problem 3 Reading a Bar Graph

(a) $142 + 96 + 38 + 24 = 300$. (b) $96/300 = 32\%$. (c) $142 - 38 = 104$.

(a) 300 students, (b) 32%, (c) 104 more students

Problem 4 Mean and Median of Scores

Sorted: 9, 11, 13, 14, 15, 17, 19, 22, 28. The median is the 5th value, 15. The sum is 148, so the mean is $148/9 = 16.44$.

Mean ≈ 16.44 points, median = 15 points

Problem 5 Five-Number Summary

Sorted: 47, 49, 52, 55, 58, 59, 61, 64, 66, 70, 73. Median = 6th value = 59. Lower half (5 values): 47, 49, 52, 55, 58, median 52. Upper half: 61, 64, 66, 70, 73, median 66.

Min 47, Q1 52, median 59, Q3 66, max 73

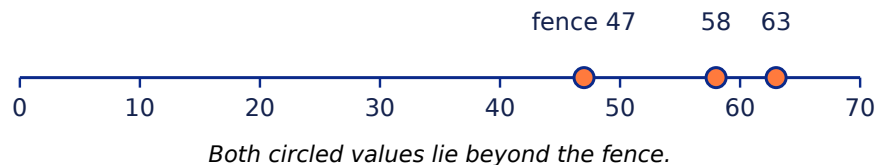
Problem 6 Range and IQR

Range = $52 - 8 = 44$. IQR = $29 - 15 = 14$. Upper fence = $29 + 1.5(14) = 50$. Since $52 > 50$, the maximum is beyond the fence.

Range \$44, IQR \$14; yes, \$52 is an outlier (fence \$50)

Problem 7 Checking Plotted Outliers

IQR = $26 - 12 = 14$, and $1.5 \times 14 = 21$. Upper fence = $26 + 21 = 47$. Lower fence = $12 - 21 = -9$, so nothing is low. Both 58 and 63 exceed 47, and the whisker end 41 is inside the fence.



Upper fence = 47 minutes; 58 and 63 are outliers

Problem 8 Standard Deviation by Hand

Mean = $135/5 = 27$. Deviations: $-4, 4, 0, 8, -8$. Squares add to 160. Divide by $n - 1 = 4$: 40. Square root: 6.32.

$s \approx 6.32$ cups

Problem 9 Percentile from a Dotplot

15 of the 20 students read fewer than 7 books, so the percentile is $15/20 = 75\%$. The right tail (9 and 12) is longer.

75th percentile; skewed right

Problem 10 Computing z-Scores

$$z = (95.0 - 86.4)/4.8 = 1.79. z = (79.2 - 86.4)/4.8 = -1.50.$$

$z \approx 1.79$ and $z = -1.50$

Problem 11 Reading a Histogram

(a) Most bikes are cheap and the tail stretches right: skewed right. (b) Cumulative counts are 4, 13, 20; the 15th and 16th values are in \$300-\$400. (c) $(5 + 3 + 2)/30 = 10/30 = 33.3\%$. (d) The long right tail pulls the mean up.

(a) skewed right, (b) \$300-\$400, (c) 33.3%, (d) the mean is larger

Problem 12 Effect of an Outlier

Before: mean $76/5 = 15.2$, median 15, range 6. After: mean $116/5 = 23.2$, median 15, range 46.

Mean 15.2 $\rightarrow$ 23.2; median stays 15; range 6 $\rightarrow$ 46

Problem 13 Comparing Two Distributions

Center: the medians are 70 (Section A) and 72 (Section B), so Section B is slightly higher.

Spread: IQR is $78 - 61 = 17$ for A and $77 - 66 = 11$ for B; the ranges are 47 and 33. Section A scores are more spread out.

Section B has a slightly higher median (72 vs 70) and less variability (IQR 11 vs 17)

Problem 14 Using the Empirical Rule

(a) 226 and 274 are 2σ below and above the mean: 95%. (b) 238 and 262 are 1σ away: 68%. (c) $286 = 250 + 3(12)$; 99.7% lie within 3σ , so 0.3% lie outside and half of that, 0.15%, lie above.

(a) 95%, (b) 68%, (c) 0.15%

Problem 15 Normal Probability Between Values

z for 8.0: $(8.0 - 9.6)/1.4 = -1.14$. z for 11.0: $(11.0 - 9.6)/1.4 = 1.00$. Area = $0.8413 - 0.1265 = 0.7148$.

About 0.715 (71.5%) of the tablets

Problem 16 Finding a Percentile Value

The 90th percentile has $z = 1.282$, so $x = 48 + 1.282(7.5) = 57.6$. By symmetry the 10th percentile has $z = -1.282$: $x = 48 - 9.61 = 38.4$.

10th percentile $\approx$ 38.4 minutes (finish faster than this); 90th percentile $\approx$ 57.6 minutes

Problem 17 Comparing Standardized Scores

Math: $z = (83 - 74)/6 = 1.50$. Science: $z = (91 - 82)/11 = 0.82$. A higher z-score means farther above the class mean.

Math: 1.50 standard deviations above the mean beats science at 0.82

Problem 18 Two Outlier Rules

(a) $18.4 + 2(4.1) = 26.6$. Since $27 > 26.6$, the member is an outlier by this rule. (b) $IQR = 6$, upper fence $= 21 + 9 = 30$. Since $27 < 30$, the member is not an outlier by this rule.

Outlier by the 2σ rule only; not an outlier by the $1.5 \times IQR$ rule

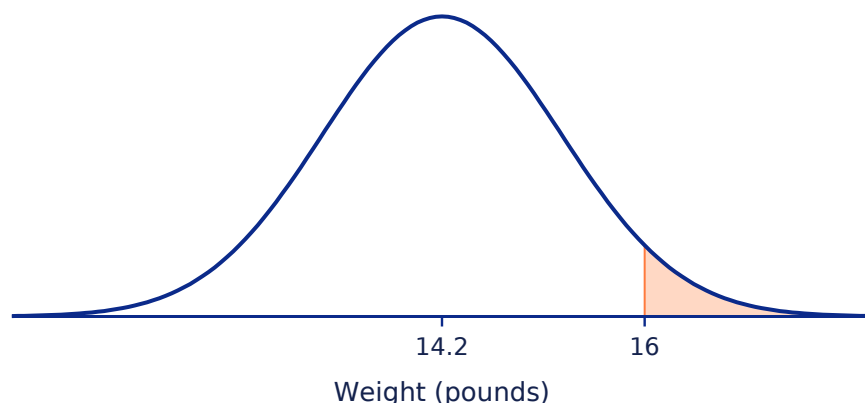
Problem 19 Changing Units of Measurement

Center values use the full formula: mean $= 1.8(18.5) + 32 = 65.30$, median $= 1.8(19) + 32 = 66.2$. Spread values ignore the added 32 and are only multiplied by 1.8: SD $= 1.8(2.5) = 4.5$, IQR $= 1.8(3.5) = 6.3$.

Mean 65.30°F , median 66.2°F , SD 4.5°F , IQR 6.3°F

Problem 20 Finding an Unknown Spread

The 15th percentile has $z = -1.036$. Solve $-1.036 = (13.1 - 14.2)/\sigma$, so $\sigma = 1.1/1.036 = 1.06$. For 16 pounds, $z = (16 - 14.2)/1.06 = 1.70$, and the area to the right is 0.0449.



The shaded tail is the proportion above 16 pounds.

$\sigma \approx 1.06$ pounds; about 4.5% of bags weigh more than 16 pounds