

Algebra 2 · Data, Normal Distributions and Statistical Inference · Worksheet Answer Key

Common Core S-ID.A.4, S-IC.A.1, S-IC.B.3, S-IC.B.4 · mathovore.fr

This algebra 2 normal worksheet answer key solves all 22 problems of the data, normal distributions and statistical inference worksheet step by step.

Every solution shows the formula, the substitution and the final result in bold. Table values are rounded to four decimals, so a calculator may differ in the last digit. Study descriptions can be worded differently as long as they include random selection or random assignment where required.

Algebra 2 Common Core: S-ID.A.4 · S-IC.A.1 · S-IC.B.3 · S-IC.B.4

Algebra 2 Normal Worksheet Answer Key: problems 1-5

Problem 1: Find a mean

Add the scores: $12+15+9+20+14=70$.

Divide by 5: $\bar{x} = \frac{70}{5} = 14$.

Answer: **14 points per game.**

Problem 2: Standard deviation by hand

Mean: $\frac{2+4+4+4+5+5+7+9}{8} = \frac{40}{8} = 5$.

Squared deviations: 9,1,1,1,0,0,4,16, with sum 32.

$$\sigma = \sqrt{\frac{32}{8}} = \sqrt{4} = 2.$$

Answer: mean **5 minutes**, $\sigma = 2$ minutes.

Problem 3: Standard deviation with a root

The mean is $\frac{50}{5} = 10$.

Squared deviations: 16,4,0,4,16, sum 40.

$$\sigma = \sqrt{\frac{40}{5}} = \sqrt{8} \approx 2.83.$$

Answer: $\sigma \approx 2.83$.

Problem 4: Shift and scale

Adding a constant shifts the mean and does not change the spread; multiplying by k multiplies both.

- a. Mean $40+5=45$; standard deviation stays 6. Answer: \$45 **and** \$6.
- b. Mean $2 \times 40 = 80$; standard deviation $2 \times 6 = 12$. Answer: \$80 **and** \$12.

Problem 5: Compare two spreads

Town A: the sum is 300, so the mean is 50. Squared deviations 9,1,0,0,1,9 sum to 20, so $\sigma = \sqrt{\frac{20}{6}} \approx 1.83$.

Town B: the sum is 300, so the mean is 50. Squared deviations 100,36,0,0,36,100 sum to 272, so $\sigma = \sqrt{\frac{272}{6}} \approx 6.73$.

Answer: both means are 50°F , but **Town B** is more variable ($6.73 > 1.83$).

Algebra 2 Normal Worksheet Answer Key: problems 6-10

Problem 6: Intervals from the 68-95-99.7 rule

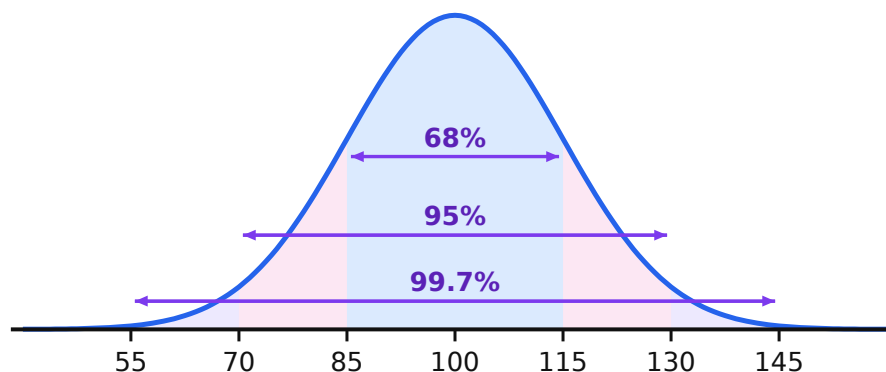
Go 1, 2 and 3 standard deviations (15, 30, 45) from 100.

68%: 100 ± 15 gives 85 to 115.

95%: 100 ± 30 gives 70 to 130.

99.7%: 100 ± 45 gives 55 to 145.

Answer: 85-115, 70-130, 55-145.



The three bands for mean 100 and SD 15.

Problem 7: Apply the rule to heights

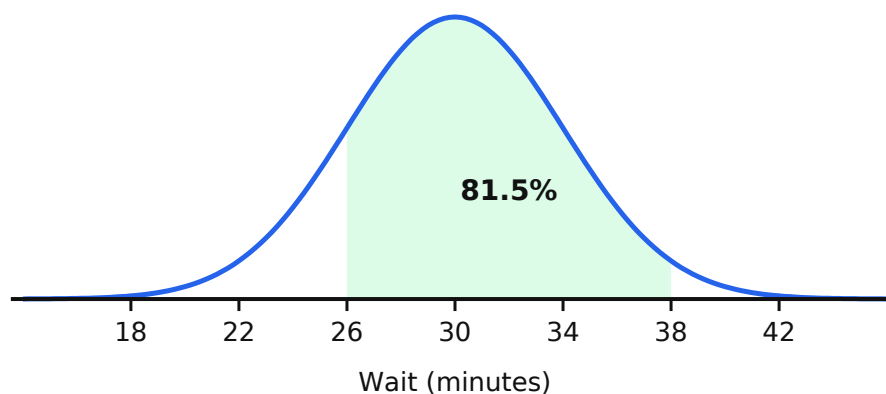
$59 = 64 - 2(2.5)$ and $69 = 64 + 2(2.5)$, so the interval is $\pm 2\sigma$.

- About 95%.
- $66.5 = 64 + 2.5$ is one standard deviation above the mean. Half the data is above the mean, and 34% is between μ and $\mu + \sigma$, so $50\% - 34\% = 16\%$. Answer: about 16%.
- $56.5 = 64 - 3(2.5)$, so it is 3σ below the mean. Outside $\pm 3\sigma$ lies 0.3%, split into two tails, so 0.15% is below. Answer: about 0.15%.

Problem 8: Waiting times

$26 = 30 - 4$, $38 = 30 + 2(4)$ and $42 = 30 + 3(4)$.

- From -1σ to $+2\sigma$: $34\% + 34\% + 13.5\% = 81.5\%$. Answer: about 81.5%.
- Above $+3\sigma$ lies 0.15%. Answer: about 0.15%.



The shaded part runs from 26 to 38 minutes.

Problem 9: Compute a z-score

$$z = \frac{85 - 70}{6} = \frac{15}{6} = 2.5.$$

Answer: $z = 2.5$; Ethan's score is 2.5 standard deviations above the mean.

Problem 10: Negative z-score

$$z = \frac{41 - 50}{4.5} = \frac{-9}{4.5} = -2.$$

Answer: $z = -2$; this delivery was 2 standard deviations faster than average.

Algebra 2 Normal Worksheet Answer Key: problems 11-15

Problem 11: Value from a z-score

Use $x = \mu + z\sigma$.

a. $x = 68 + (-0.8)(5) = 68 - 4 = 64$. Answer: **64**.

b. $x = 68 + (1.4)(5) = 68 + 7 = 75$. Answer: **75**.

Problem 12: Compare two scores

Mei: $z = \frac{78-70}{5} = 1.6$. Noah: $z = \frac{84-75}{7} \approx 1.29$.

Answer: **Mei** did better relative to her class, since $1.6 > 1.29$.

Problem 13: Area to the left

a. The table value for 1.25 is 0.8944, about 89.4%.

b. The table value for -0.75 is 0.2266, about 22.7%; it is less than 0.5 because z is negative.

Problem 14: Area between two z-scores

Subtract the left areas: $0.9332 - 0.3085 = 0.6247$.

Answer: **0.6247**, about 62.5% of the data.

Problem 15: Name the study

a. Residents are randomly selected and asked a question: **sample survey**.

b. Treatments are randomly assigned by the researcher: **experiment**.

c. Groups formed on their own and nothing is assigned: **observational study**.

Only the experiment can support a conclusion about cause and effect.

Algebra 2 Normal Worksheet Answer Key: problems 16-20

Problem 16: Spot the bias

Students at a basketball game are more likely to enjoy sports, so they overrepresent students who favor more PE. Not every student had an equal chance of being asked.

Better method: number the students 1 to 800, use a random number generator to pick 50 different numbers, and survey exactly those students.

Problem 17: Design an experiment

Number the classmates 1 to 30 and use a random number generator to choose 15 for the music group; the other 15 form the no-music (control) group. Both groups study the same material for the same time, then take the same quiz.

Compare the two mean quiz scores. If the difference is larger than random assignment alone

would usually produce, the music is a plausible cause. Because the groups were assigned randomly, a cause-and-effect claim is justified for these 30 students; generalizing further needs a random sample of students.

Problem 18: Interpret a poll

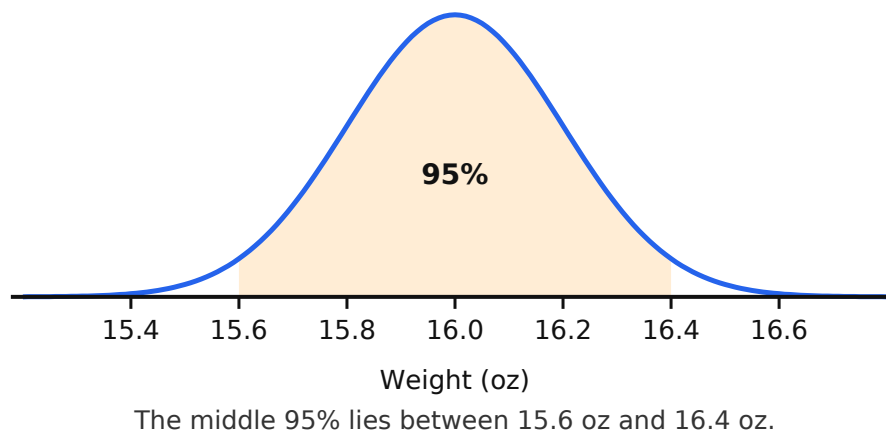
- $52\% \pm 3\%$ gives 49% **to** 55%.
- No. The interval contains values below 50% (for example 49%), so a majority is possible but not established.

Problem 19: Exam percentiles

- $90 = 72 + 2(9)$, so $z = 2$. The area to the left is $50\% + 34\% + 13.5\% = 97.5\%$. Answer: about the **97.5th percentile**.
- $63 = 72 - 9$, so $z = -1$. The area to the left is $50\% - 34\% = 16\%$. Answer: about the **16th percentile**.
- $100\% - 97.5\% = 2.5\%$ and $0.025 \times 400 = 10$. Answer: about **10 students**.

Problem 20: Filling machine

- $15.6 = 16.0 - 2(0.2)$, so $z = -2$. About 2.5% of bags.
- $16.6 = 16.0 + 3(0.2)$, so $z = 3$. $0.15\% \times 2000 = 3$. About **3 bags**.
- $16.0 \pm 2(0.2)$ gives **15.6 oz to 16.4 oz**.



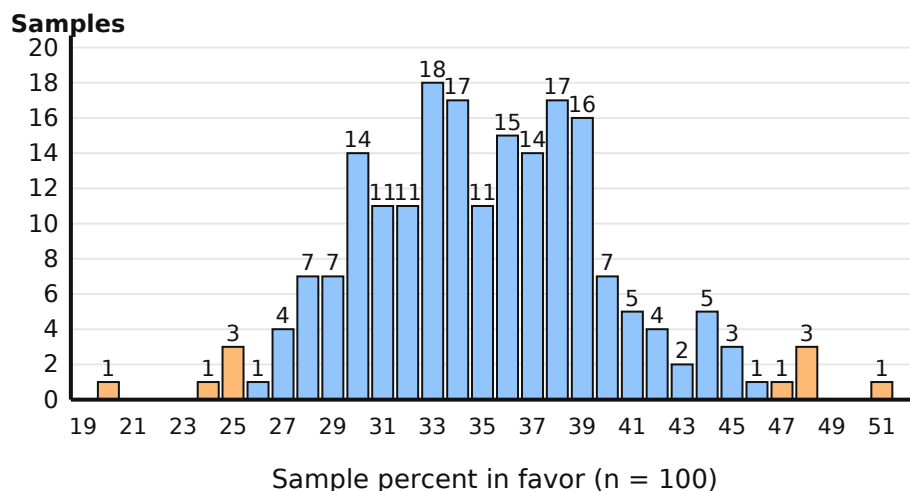
Algebra 2 Normal Worksheet Answer Key: problems 21-22

Problem 21: Percentile of a test score

- $z = \frac{1310 - 1050}{200} = 1.3$. Answer: $z = 1.3$.
- The table value for 1.3 is 0.9032, so he scored above about 90% of test takers.
- $x = 1050 + (-0.5)(200) = 950$. Answer: **950**.

Problem 22: Margin of error by simulation

- a. Counting from the left, the bars below 26% contain 5 samples, and the bars above 46% contain 5 samples. The middle 95% runs from 26% **to** 46%.
- b. $\frac{46-26}{2} = 10$. Answer: about **10 percentage points**.
- c. $41\% \pm 10\%$ gives 31% **to** 51%. Since $31 < 35 < 51$, 35% is plausible.



The blue bars are the middle 95%: 26% to 46%.

How to use this algebra 2 normal worksheet answer key

Read this algebra 2 normal worksheet answer key after trying each problem yourself, and redo any problem you missed.

