

AP Statistics · Inference for Means · Worksheet Answer Key

Common Core AP Statistics Unit 4 (2026-27) · mathovore.fr

This ap statistics means worksheet answer key solves all 24 problems of the inference for means worksheet step by step.

Each solution shows the degrees of freedom, the critical value or test statistic, and a conclusion in context. Critical values and P-values come from a t table or calculator; small differences in the last decimal are caused by rounding.

AP StatisticsCommon Core: AP Statistics Unit 4 (2026-27)

AP Statistics Means Worksheet Answer Key: problems 1-5

Problem 1: Degrees of freedom and t^*

$df = n - 1 = 18 - 1 = 17$. The area to the left of t^* is 0.975, so $t^* = 2.110$.

Problem 2: Finding t^* values

- a. $df = 7$; the area to the left is 0.995: $t^* = 3.499$.
- b. $df = 24$; the area to the left is 0.95: $t^* = 1.711$.

Problem 3: Comparing t^* and z^*

The sample standard deviation s only estimates the population standard deviation, which adds uncertainty. The t-distribution with 9 degrees of freedom has **heavier tails** than the normal curve, so a larger critical value is needed to capture the middle 95%.

Problem 4: Checking the Normal/Large Sample condition

The sample size is 12, which is less than 30, so the graph must be checked. The distribution is **strongly skewed to the right with an outlier at 24 minutes**.

The condition is not met, so a t interval is not appropriate.

Problem 5: Standard error of the mean

$$SE = \frac{s}{\sqrt{n}} = \frac{4.2}{\sqrt{36}} = \frac{4.2}{6} = 0.7 \text{ minute.}$$

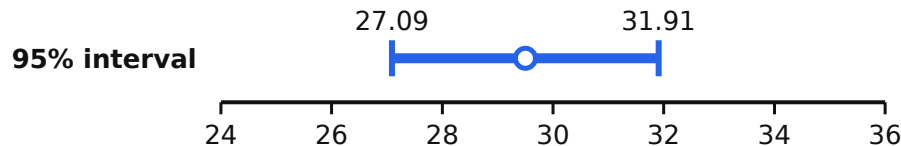
AP Statistics Means Worksheet Answer Key: problems 6-10

Problem 6: One-sample t interval

$$\bar{x} = 29.5, s = 3.375, n = 10, df = 9, t^* = 2.262.$$

$$SE = \frac{3.375}{\sqrt{10}} = 1.067, ME = 2.262(1.067) = 2.414.$$

The interval is 29.5 plus or minus 2.414: **(27.09, 31.91) minutes**.



Interval for the mean commute time.

Problem 7: Interpreting a t interval

We are 95% confident that the interval from 27.09 to 31.91 minutes captures the true mean commute time of all workers at the office.

Problem 8: Mean and margin of error from an interval

$$\bar{x} = \frac{23.4 + 26.8}{2} = 25.1 \text{ and } ME = \frac{26.8 - 23.4}{2} = 1.7.$$

Problem 9: Effect of sample size

$$n = 25: df = 24, t^* = 2.064, ME = 2.064 \cdot \frac{6}{5} = 2.48.$$

$$n = 100: df = 99, t^* = 1.984, ME = 1.984 \cdot \frac{6}{10} = 1.19.$$

Quadrupling the sample size roughly halves the margin of error because SE depends on $\frac{1}{\sqrt{n}}$, and t^* also gets smaller.

Problem 10: Writing hypotheses

Let μ be the true mean battery life, in hours, of this phone model.

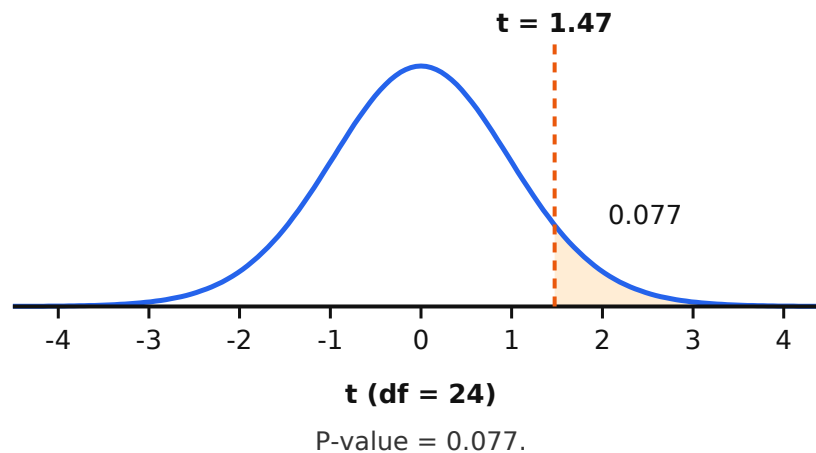
$$H_0: \mu = 12 \text{ and } H_a: \mu < 12.$$

AP Statistics Means Worksheet Answer Key: problems 11-15

Problem 11: One-sample t test, right-tailed

$$SE = \frac{9.5}{\sqrt{25}} = 1.90, \text{ so } t = \frac{52.8 - 50}{1.90} = \mathbf{1.47} \text{ with } df = 24.$$

$$P\text{-value} = P(t_{24} > 1.47) = \mathbf{0.077}.$$



Problem 12: Two-sided t test

$$SE = \frac{0.9}{\sqrt{16}} = 0.225, t = \frac{7.55 - 8}{0.225} = \mathbf{-2.00}, df = 15.$$

$$P\text{-value} = 2P(t_{15} < -2.00) = \mathbf{0.064}.$$

Problem 13: Interpreting a P-value

If the true mean session length were 50 minutes, there would be about a 7.7% chance of getting a sample mean of 52.8 minutes or more by random sampling variability alone.

Problem 14: Drawing a conclusion

At $\alpha = 0.05$: $0.077 > 0.05$, so fail to reject H_0 . **There is not convincing evidence that the mean session length is greater than 50 minutes.**

At $\alpha = 0.10$: $0.077 < 0.10$, so reject H_0 . **The conclusion changes:** there is convincing evidence that the mean exceeds 50 minutes.

Problem 15: Interval and test agree

- 5 is inside (4.1, 5.9): **fail to reject** H_0 . There is not convincing evidence that $\mu \neq 5$.
- 6 is outside the interval: **reject** H_0 . There is convincing evidence that $\mu \neq 6$.

AP Statistics Means Worksheet Answer Key: problems 16-20

Problem 16: Paired or independent?

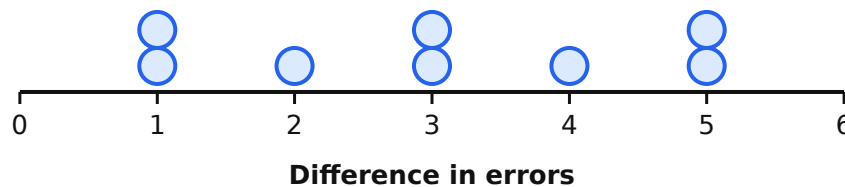
- Paired:** two measurements on each runner.
- Two independent samples:** unrelated groups.
- Paired:** the twins form matched pairs, so the analysis uses the difference within each pair.

Problem 17: Paired t interval

Differences (before minus after): 4, 2, 5, 1, 3, 3, 1, 5. $\bar{x}_d = 3.000$, $s_d = 1.604$, $df = 7$, $t^* = 2.365$.

$ME = 2.365 \cdot \frac{1.604}{\sqrt{8}} = 1.341$. The interval is **(1.66, 4.34) errors**.

We are 95% confident that the mean decrease for all such students is between 1.66 and 4.34 errors.



Differences (before minus after), roughly symmetric with no outliers.

Problem 18: Paired t test

$H_0: \mu_d = 0$, $H_a: \mu_d > 0$, where μ_d is the mean change (after minus before).

$SE = \frac{4.1}{\sqrt{10}} = 1.297$, $t = \frac{3.2 - 0}{1.297} = 2.47$, $df = 9$, P-value = **0.018**.

Since $0.018 < 0.05$, reject H_0 : **there is convincing evidence that the review session increases the mean quiz score.**

Problem 19: Two-sample t interval

$\bar{x}_1 - \bar{x}_2 = 5.3$. $SE = \sqrt{\frac{8.2^2}{30} + \frac{9.5^2}{28}} = 2.338$. Calculator: $df = 53.5$, $t^* = 2.005$.

$ME = 2.005(2.338) = 4.687$. The interval is **(0.61, 9.99)**.

Problem 20: Two-sample t test

$H_0: \mu_1 = \mu_2$. $SE = \sqrt{\frac{3.1^2}{20} + \frac{2.8^2}{18}} = 0.957$, $t = \frac{14.2 - 12.1}{0.957} = 2.19$, $df = 36.0$.

P-value = 0.017. Since the P-value is less than 0.05, reject H_0 : **there is convincing evidence**

that method 1 has the higher mean score.

AP Statistics Means Worksheet Answer Key: problems 21-24

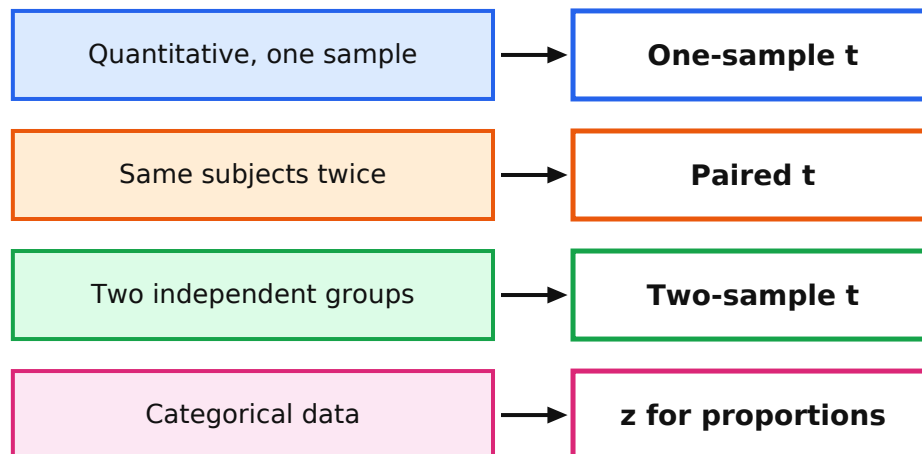
Problem 21: Justifying a claim with an interval

Interval A: yes. All values are positive and 0 is not in the interval, so there is convincing evidence that $\mu_1 > \mu_2$.

Interval B: no. It contains 0 (and negative values), so a difference of 0 is plausible and the data do not give convincing evidence that $\mu_1 > \mu_2$.

Problem 22: Selecting a procedure

- One-sample z interval for a proportion** (categorical data, one sample).
- One-sample t interval for a mean** (quantitative data, one sample).
- Paired t test** on the 12 differences.
- Two-sample t procedure** for $\mu_1 - \mu_2$.
- Two-proportion z procedure** (categorical data, two groups).



Choosing a procedure.

Problem 23: Four-step two-sample test

State. $H_0: \mu_A = \mu_B$, $H_a: \mu_A > \mu_B$, where μ_A and μ_B are the true mean heights with each fertilizer; $\alpha = 0.05$.

Plan. Two-sample t test. Conditions: random assignment; the box plots show no strong skewness or outliers in either group, so the Normal/Large Sample condition is reasonable.

Do. $\bar{x}_A = 23.59$, $s_A = 1.262$; $\bar{x}_B = 21.83$, $s_B = 1.063$. $SE = 0.456$, $t = 3.86$, $df = 24.0$, P-value = 0.0004.

Conclude. Since the P-value is less than 0.05, reject H_0 . **There is convincing evidence**

that fertilizer A produces a greater mean height than fertilizer B.

Problem 24: Four-step paired test

State. $H_0: \mu_d = 0$, $H_a: \mu_d > 0$, where μ_d is the true mean improvement (before minus after) in minutes for all such runners.

Plan. Paired t test. Random sample; the 9 differences are roughly symmetric with no outliers.

Do. Differences: 0.6, 1.1, -0.2, 1.3, 0.9, 0.7, 1.6, -0.1, 1.3. $\bar{x}_d = 0.800$, $s_d = 0.622$, $SE = 0.207$, $t = 3.86$, $df = 8$, P-value = 0.0024.

Conclude. Since the P-value is less than 0.05, reject H_0 . **There is convincing evidence that the program reduces the mean 5K time.**

How to use this ap statistics means worksheet answer key

Read this ap statistics means worksheet answer key after trying each problem yourself, and redo any problem you missed.

