

Inference for Means with t Procedures

Grade 12 – AP Statistics math · Test · Standards: AP Statistics Unit 4 (2026-27)

Name: _____ Date: _____ Class: _____

This 45-minute test has eight AP-style questions worth 20 points. State hypotheses and conditions, show the standard error and test statistic, give the degrees of freedom, and write conclusions in context.

Standards: AP Statistics Unit 4 (2026-27) · **Level:** Grade 12 AP Statistics

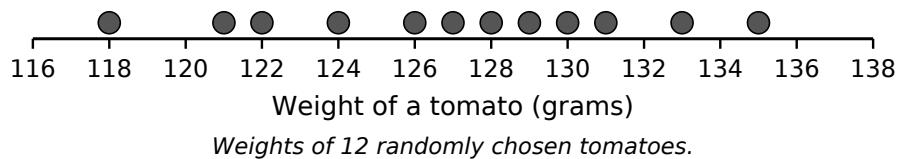
Time: 45 minutes · 8 questions · Total: 20 points · Calculator: as allowed by your teacher

Question 1 Margin of Error (2 points)

A random sample of 20 hikers has a mean trip length of 52 miles with a standard deviation of 7.5 miles. Find the standard error and the margin of error for a 95% confidence interval.

Question 2 One-Sample t Interval (3 points)

A random sample of 12 tomatoes from a very large harvest was weighed. The dotplot shows the weights in grams.



- (a) Check the conditions for a t interval. (b) Find a 95% confidence interval for the mean weight. (c) Interpret the interval. (The sample mean is 127.00 and the standard deviation is 5.063.)

Question 3 One-Sample t Test (3 points)

A company claims its energy bars contain 50 grams of protein on average. A random sample of 25 bars from a large batch has a mean of 48.3 g and a standard deviation of 6.2 g, and a graph

shows no strong skew or outliers. Test $H_0: \mu = 50$ against $H_a: \mu < 50$ at $\alpha = 0.05$. State the test statistic, p-value and a conclusion.

Question 4 Paired or Independent (2 points)

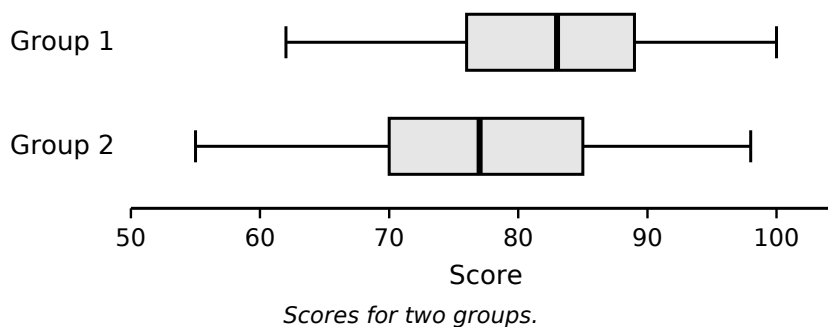
A coach wants to know whether a stretching routine improves flexibility. Option 1: measure 20 athletes before and after the routine. Option 2: give the routine to 20 randomly chosen athletes and not to another 20 athletes. (a) Which option is paired? (b) Name the procedure for each option.

Question 5 Paired t Test from Summary (3 points)

Fifteen randomly chosen students were timed on a task before and after training sessions; the differences (before minus after) have mean 2.8 seconds and standard deviation 4.1 seconds, with no outliers. Test $H_0: \mu_d = 0$ against $H_a: \mu_d > 0$ at $\alpha = 0.05$.

Question 6 Two-Sample t Test (3 points)

Independent random samples gave Group 1: $n = 30$, mean 82.4, standard deviation 9.6; Group 2: $n = 28$, mean 77.1, standard deviation 11.2. The boxplots are shown.



(a) Verify the conditions. (b) Find the standard error and test statistic. (c) The p-value is 0.059; state a conclusion for $H_a: \mu_1 \neq \mu_2$ at $\alpha = 0.05$.

Question 7 Using an Interval (2 points)

A 95% confidence interval for the mean difference in weight loss (Plan A minus Plan B) is (0.6, 3.4) pounds. (a) Does it give convincing evidence of a difference between the plans? (b) Interpret the interval.

Question 8 Choosing a Procedure (2 points)

Name the procedure and one condition to check for each situation. (a) Estimate the mean cost of a textbook using one random sample of 40 students. (b) Compare the proportions of students who own a bike at two schools using independent random samples.