AP Statistics Practice Ladder

Use this key to check answers and read the explanations.

1. A class compares two watering schedules. It divides identical planters into sunny and shaded groups, then randomly assigns planters within each group to one of the two schedules. Why use the sunny and shaded groups as blocks?

A. To compare schedules among planters with similar light exposure
B. To make watering schedule and light exposure change together
C. To ensure every planter receives both watering schedules
D. To replace random assignment with a comparison between the two locations

Correct answer: A. To compare schedules among planters with similar light exposure
Comparing schedules within each light condition helps separate their effects from differences due to sunlight. Random assignment still occurs within each block.

2. A set of Celsius temperatures has a mean of 14 degrees and a standard deviation of 3 degrees. Fahrenheit equals 1.8 times Celsius plus 32. What are the mean and standard deviation in Fahrenheit?

A. Mean 46 and standard deviation 3
B. Mean 57.2 and standard deviation 37.4
C. Mean 57.2 and standard deviation 5.4
D. Mean 25.2 and standard deviation 5.4

Correct answer: C. Mean 57.2 and standard deviation 5.4
The mean transforms to 1.8 times 14 plus 32, or 57.2. Multiplication scales the distances from the mean by 1.8, giving a standard deviation of 5.4. Adding 32 shifts all values without changing their spread.

3. A distribution has mean 43 and standard deviation 6. What is the z-score of an observed value of 55?

A. 1
B. 2
C. 12
D. Negative 2

Correct answer: B. 2
Subtract the mean from the observation to get 12. Divide by the standard deviation of 6. The observation is 2 standard deviations above the mean.

4. In a regression of response y on explanatory variable x, which quantity does the least-squares line minimize?

A. The sum of the squared horizontal distances from the line
B. The sum of the absolute vertical residuals
C. The sum of the signed vertical residuals
D. The sum of the squared vertical residuals

Correct answer: D. The sum of the squared vertical residuals
For a given x, a residual is observed y minus predicted y. Squaring those vertical differences prevents positive and negative residuals from canceling, and least squares minimizes their sum.

5. A random-sample study reports a 95% confidence interval of 0.42 to 0.54 for the proportion of hikers in a region who carry a paper map. Which interpretation is appropriate?

A. There is a 95% chance that the fixed proportion of the region’s hikers is in this computed interval.
B. We are 95% confident that 42% to 54% of the region’s hikers carry a paper map.
C. Between 42% and 54% of all possible sample proportions must equal the true value.
D. The interval contains the responses of 95% of individual hikers.

Correct answer: B. We are 95% confident that 42% to 54% of the region’s hikers carry a paper map.
The interval estimates the population proportion. The 95% confidence level describes the long-run capture rate of intervals produced by the sampling method.

6. A sensor independently flags each of 3 calibration cards with probability 1/4. What is the probability it flags exactly 2 of the cards?

A. 9/64
B. 3/64
C. 1/64
D. 27/64

Correct answer: A. 9/64
A specific two-flag order has probability 1/4 times 1/4 times 3/4, or 3/64. There are three choices for the card that is not flagged, so the total is 9/64.

7. A one-proportion z-test uses a null proportion of 0.08 and a sample of 80. The large-counts check requires at least 10 expected successes and 10 expected failures under the null. Does the sample pass?

A. No, because the expected failure count is 6.4.
B. Yes, because the sample size is larger than 10.
C. Yes, because the expected failure count is 73.6.
D. No, because the expected success count is 6.4.

Correct answer: D. No, because the expected success count is 6.4.
Expected successes are 80 times 0.08, or 6.4. Expected failures are 80 times 0.92, or 73.6. Both counts must meet the rule.

8. A one-sided test asks whether a library's correct-shelving proportion exceeds 0.80. The p-value is 0.03. What does that number mean?

A. The chance that the study's alternative is correct is 0.97.
B. The chance that the true proportion is exactly 0.80 is 0.03.
C. If the true proportion is 0.80, the chance of a result at least as favorable to the alternative as this one is 0.03.
D. Exactly 3% of the books in the sample were shelved incorrectly.

Correct answer: C. If the true proportion is 0.80, the chance of a result at least as favorable to the alternative as this one is 0.03.
A p-value is calculated under the null hypothesis. Here it measures the chance of a sample result as high as or higher than the observed one, assuming the null proportion.

9. Each of 18 volunteers does the same timed task with two keyboard layouts in randomly assigned order. What should a paired analysis use as its 18 observations?

A. Each volunteer's time with one layout minus that volunteer's time with the other
B. The 18 shortest times, regardless of layout or person
C. All 36 individual times as independent observations
D. The two overall layout averages with no information about individual volunteers

Correct answer: A. Each volunteer's time with one layout minus that volunteer's time with the other
Each volunteer supplies a natural pair. Taking one difference per volunteer preserves the pairing and captures the variation between volunteers' differences.

10. A least-squares regression predicting seedling height from hours of light has R-squared equal to 0.64. What does 0.64 describe?

A. The change in height predicted for one extra hour of light
B. The fraction of seedlings whose heights the model predicts exactly
C. The chance that extra light causes a seedling to grow taller
D. The fraction of observed variation in height accounted for by the linear model using hours of light

Correct answer: D. The fraction of observed variation in height accounted for by the linear model using hours of light
R-squared describes the share of variation in the response accounted for by the fitted linear model. The slope, not R-squared, gives the change in predicted height per extra hour.

11. A test has null proportion 0.50. In a random sample of 100 observations, 61 are successes. What is the one-proportion z-statistic?

A. 0.11
B. 0.22
C. 2.2
D. Negative 2.2

Correct answer: C. 2.2
The observed proportion is 0.61. Under the null, the standard error is the square root of 0.50 times 0.50 divided by 100, or 0.05. Divide the difference of 0.11 by 0.05 to get 2.2.

12. In two independent samples, 36 of 60 participants in group A and 16 of 40 in group B choose the same response. What pooled proportion is used for the standard error in a z-test of equal population proportions?

A. 0.50
B. 0.52
C. 0.60
D. 0.40

Correct answer: B. 0.52
The null assumes a common proportion. Pool the successes to get 52 and pool the sample sizes to get 100. The estimate is 52/100, rather than the unweighted mean of the separate proportions.

13. Nine paired differences have mean 2.4 minutes and sample standard deviation 3.6 minutes. Assume the conditions for a paired t-test are met. What is the t-statistic for a null mean difference of 0?

A. 6.0
B. 0.67
C. 1.2
D. 2.0

Correct answer: D. 2.0
The standard error is 3.6 divided by the square root of 9, which is 1.2 minutes. The difference from the null is 2.4 minutes, so the statistic is 2.4 divided by 1.2, or 2.0.

14. A simple least-squares regression with an intercept has a positive slope and R-squared equal to 0.81. What is the correlation coefficient?

A. Positive 0.90
B. Negative 0.90
C. Positive 0.81
D. Positive 0.6561

Correct answer: A. Positive 0.90
Take the square root of 0.81 to get the magnitude 0.90. The correlation has the same sign as the slope, so it is positive.

15. A two-sided 95% one-sample t interval for a population mean runs from 23.1 to 27.2. Using the same data and assumptions, what is the decision for the matching two-sided test of a null mean of 25 at the 0.05 significance level?

A. Accept the null as proven because 25 lies in the interval.
B. Reject the null because 25 lies in the interval.
C. Fail to reject the null because 25 lies in the interval.
D. Reject the null because the interval does not contain 0.

Correct answer: C. Fail to reject the null because 25 lies in the interval.

A matching two-sided test rejects values beyond the corresponding interval. Here 25 lies between 23.1 and 27.2, so the data do not provide sufficient evidence that the mean differs from 25.