

AP Statistics Practice Worksheet

Fifty questions on data analysis, data collection, probability, and inference. Questions 45 to 50 ask for written working.

QUESTIONS	50	MULTIPLE CHOICE	17	WRITTEN	33
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Instructions

State the procedure and check conditions before computing. Show every step.

1 Find the mean of: 4, 8, 6, 10, 12.

2 Find the median of: 3, 7, 9, 15, 21.

3 A data set has $Q1=10$, $Q3=18$. Find the IQR.

4 Using $Q1=10$, $Q3=18$, find the upper outlier boundary ($Q3 + 1.5 \text{ IQR}$).

5 Using $Q1=10$, $Q3=18$, find the lower outlier boundary ($Q1 - 1.5 \text{ IQR}$).

6 A correlation of $r = -0.9$ describes a relationship that is:

- A) Weak and positive
- B) Weak and negative
- C) Strong and positive
- D) Strong and negative

7 A correlation of $r = 0.1$ describes a relationship that is:

- A) Strong and positive
- B) Weak
- C) Strong and negative
- D) Perfect

8 A regression line is $\hat{y} = 5 + 2x$. Predict y when $x = 10$.

9 In $\hat{y} = a + bx$, what does b represent?

- A) The y -intercept
- B) The predicted y when $x=0$
- C) The slope, or predicted change in y per unit x
- D) The correlation

10 A study assigns subjects randomly to treatment and control groups. This is a(n):

- A) Observational study
- B) Randomized experiment
- C) Simple random sample
- D) Census

- 11** A study observes existing groups without assigning treatment. This is a(n):
- A) Observational study
 - B) Randomized experiment
 - C) Blind study
 - D) Stratified sample
- 12** Which design allows a cause-and-effect conclusion?
- A) Observational study
 - B) Convenience sample
 - C) Randomized experiment
 - D) Voluntary response survey
- 13** A deck has 52 cards. What is $P(\text{drawing a heart})$? (as a fraction)
- _____
- _____
- _____
- 14** Two fair coins are flipped. Find $P(\text{both heads})$. (as a fraction)
- _____
- _____
- _____
- 15** A bag has 3 red and 5 blue marbles. Find $P(\text{red or blue})$. (should be a whole event)
- _____
- _____
- _____
- 16** Events A and B: $P(A)=0.4$, $P(B)=0.3$, $P(A \text{ and } B)=0.1$. Find $P(A \text{ or } B)$.
- _____
- _____
- _____
- 17** If $P(A)=0.5$ and $P(B)=0.2$ and A, B are independent, find $P(A \text{ and } B)$.
- _____
- _____
- _____

- 18** Find $P(A|B)$ if $P(A \text{ and } B) = 0.12$ and $P(B) = 0.3$.

- 19** A random variable X has $P(X=0)=0.5$, $P(X=1)=0.3$, $P(X=2)=0.2$. Find the mean of X.

- 20** A binomial has $n=5$, $p=0.4$. Find the mean ($n \times p$).

- 21** Which condition is NOT part of the Random, 10%, Large Counts conditions for proportions?

- A) Random sampling
- B) Sample is less than 10% of the population
- C) np and $n(1-p)$ are both at least 10
- D) The population is normally distributed

- 22** A 95% confidence interval for a proportion is (0.42, 0.58). Find the point estimate (midpoint).

- 23** Using the same interval (0.42, 0.58), find the margin of error.

- 24** A smaller margin of error, holding confidence level constant, requires:

- A) A smaller sample size
- B) A larger sample size
- C) A lower confidence level
- D) No relationship to sample size

- 25** Increasing the confidence level (holding n constant) makes the interval:
- A) Narrower
 - B) Wider
 - C) Unchanged
 - D) Impossible to determine
- 26** A Type I error occurs when:
- A) A true null hypothesis is rejected
 - B) A false null hypothesis is not rejected
 - C) The sample size is too small
 - D) The p -value is exactly 0.05
- 27** A Type II error occurs when:
- A) A true null hypothesis is rejected
 - B) A false null hypothesis is not rejected
 - C) The sample size is too large
 - D) The confidence level is too high
- 28** A small p -value (below α) leads to:
- A) Failing to reject H_0
 - B) Rejecting H_0
 - C) Accepting H_0 as true
 - D) Increasing the sample size
- 29** A test has p -value = 0.03 and α = 0.05. What is the decision?
- _____
- _____
- _____
- 30** A test has p -value = 0.12 and α = 0.05. What is the decision?
- _____
- _____
- _____
- 31** A chi-square goodness-of-fit test is used to compare:
- A) Two population means
 - B) Observed counts to an expected distribution
 - C) Two regression slopes
 - D) Two sample proportions
- 32** A chi-square test of association analyzes:
- A) A single quantitative variable
 - B) The relationship between two categorical variables
 - C) A regression line's slope
 - D) Sample size requirements
- 33** A two-way table has row total 40, column total 25, and grand total 100. Find the expected count for that cell (row total $\times$ column total / grand total).
- _____
- _____
- _____
- 34** Inference for the slope of a regression line tests whether:
- A) The correlation equals exactly 1
 - B) The true slope is different from 0
 - C) The sample size is adequate
 - D) The residuals are normally distributed
- 35** A confidence interval for a mean is (48, 56). Find the sample mean (midpoint).
- _____
- _____
- _____
- 36** Which sampling method divides the population into groups and samples randomly within each?
- A) Simple random sample
 - B) Stratified sample
 - C) Convenience sample
 - D) Cluster sample
- 37** A survey mailed to everyone, relying on voluntary return, risks:
- A) Sampling error only
 - B) Nonresponse bias
 - C) No bias at all
 - D) A census, not a sample

- 38** A binomial has $n=10$, $p=0.5$. Find $P(X=10)$, the probability all 10 trials succeed. (as p^n)

- 39** Explain, in context, what a 95% confidence interval means for repeated sampling.

- 40** A student concludes 'the p-value proves the null hypothesis is true' after a large p-value. Explain what is wrong with this statement.

- 41** Explain why random assignment in an experiment allows a cause-and-effect conclusion, while random sampling in an observational study does not.

- 42** A residual plot shows a clear curved pattern. Explain what this indicates about the appropriateness of a linear model.

- 43** Explain why increasing the sample size decreases the standard error of a sample proportion, referencing the formula $\sqrt{p(1-p)/n}$.

- 44** A study finds a strong correlation between ice cream sales and drowning deaths. Explain why this does not mean ice cream causes drowning.

- 45** Explain the difference between a parameter and a statistic, with an example of each.

- 46** A chi-square test yields a small p-value for a test of association between two categorical variables. State the conclusion in context.

- 47** Explain why checking the 'Large Counts' condition matters before running a proportion inference procedure.

- 48** A data value has a z-score of 2 in a distribution with mean 50 and standard deviation 5. Find the data value.

- 49** By the 68-95-99.7 rule, approximately what percent of a normal distribution falls within 1 standard deviation of the mean?

- 50** A sample of $n=64$ has standard deviation $s=8$. Find the standard error of the mean ($s/\sqrt{n}$).

Answer key

Direct answers only, in question order. Work the set first, then check.

1. 8	2. 9	3. 8	4. 30	5. -2
6. D) Strong and negative	7. B) Weak	8. 25	9. C) The slope, or predicted change in y per unit x	10. B) Randomized experiment
11. A) Observational study	12. C) Randomized experiment	13. 1/4	14. 1/4	15. 1
16. 0.6	17. 0.1	18. 0.4	19. 0.7	20. 2.0
21. D) The population is normally distributed	22. 0.5	23. 0.08	24. B) A larger sample size	25. B) Wider
26. A) A true null hypothesis is rejected	27. B) A false null hypothesis is not rejected	28. B) Rejecting H ₀	29. Reject H ₀ , since $0.03 < 0.05$	30. Fail to reject H ₀ , since $0.12 > 0.05$
31. B) Observed counts to an expected distribution	32. B) The relationship between two categorical variables	33. 10	34. B) The true slope is different from 0	35. 52
36. B) Stratified sample	37. B) Nonresponse bias	38. 0.0009765625	39. If the sampling process were repeated many times, approximately 95% of the resulting confidence intervals would capture the true population parameter	40. Failing to reject H ₀ does not prove H ₀ is true; it only means the data does not provide strong enough evidence against it

41. Random assignment balances both known and unknown confounding variables across groups, isolating the treatment's effect, while random sampling only ensures a representative sample and cannot rule out confounding variables affecting an observed association
42. A curved pattern in the residuals means the relationship between the variables is not linear, so a linear model is not appropriate even if r is fairly high
43. As n increases in the denominator inside the square root, the overall value of $\sqrt{p(1-p)/n}$ decreases, meaning sample proportions vary less from sample to sample
44. Both variables are likely driven by a confounding variable, such as hot weather, which increases both ice cream sales and swimming (and thus drowning risk), so the association does not imply causation
45. A parameter describes a population, such as the true population mean; a statistic describes a sample, such as the sample mean calculated from collected data, and is used to estimate the parameter
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46. There is convincing evidence of an association between the two categorical variables in the population, since the observed counts differ from what independence would predict
47. The sampling distribution of a sample proportion is only approximately normal when np and $n(1-p)$ are both sufficiently large (at least 10); with small counts, the normal approximation is unreliable
48. 60
49. 68%
50. 1

Error log

Bring this page to your next session so the tutor can start from what actually blocked you.

Questions I answered incorrectly:

Was it the concept, the setup, or the arithmetic?

The single topic I want to start the next session with:
