

QUICK DRILL · CBSE CLASS 12

Inferential Statistics

Applied Mathematics · Chapter 5 · 15 MCQs · 20 minutes · PYQ-tagged with time budgets

DATE	TOTAL MARKS	DURATION	MARKING	TARGET
_____	15	20 min	+1 / 0	≥ 12/15

OBJECTIVES

Reinforce the four core topics of Inferential Statistics via 15 PYQ-derived MCQs. Identify weak sub-topics via concept-node IDs (see answer key). Build per-question time budget habit.

INSTRUCTIONS

Attempt all 15. Time budget shown per Q (use it as pacing guide). Mark answers (A/B/C/D) in the margin. Answer key + explanations on the last page. **Don't peek — score yourself honestly.**

SECTION · QUICK DRILL

Q 1-15 · 20 MIN

Q1. Which of the following is a PARAMETER?

(A) \bar{x}

(C) μ

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(B) s

(D) \hat{p}

Q2. The standard error of the sample mean is:

(A) σ^2/n

(C) σ/\sqrt{n}

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(B) σ/n

(D) $\sqrt{(\sigma/n)}$

Q3. The Central Limit Theorem applies when:

(A) Population is normal

(C) σ is known

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(B) n is large (typically > 30)

(D) Sampling is stratified

Q4. For a 95% confidence interval for a population mean (large sample), the z-critical value is:

(A) 1.645

(C) 2.33

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(B) 1.96

(D) 2.58

Q5. For a 99% CI for μ (large sample), z-critical is:

(A) 1.96

(C) 2.58

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(B) 2.33

(D) 3.00

Q6. A sample of $n = 100$ has $\bar{x} = 50$, $\sigma = 10$. The 95% CI for μ is:

(A) (48.04, 51.96)

(C) (48, 52)

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(B) (47.5, 52.5)

(D) (40, 60)

Q7. The null hypothesis H_0 is usually stated as:

(A) An equality ($\mu = \mu_0$)

(C) A strict inequality ($\mu > \mu_0$)

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(B) An inequality ($\mu \neq \mu_0$)

(D) A range of values

Q8. Type I error is the probability of:

(A) Rejecting H_0 when H_0 is true

(C) Rejecting H_0 when H_0 is false

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(B) Failing to reject H_0 when H_0 is true

(D) Failing to reject H_0 when H_0 is false

Q9. A random sample of 64 bolts has $\sigma = 4$ mm. The SE of the sample mean is:

- (A) 0.25 mm (B) 0.5 mm
(C) 1.0 mm (D) 4.0 mm

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Q10. Sampling every 10th item off an assembly line is an example of:

- (A) Simple random sampling (B) Stratified sampling
(C) Systematic sampling (D) Cluster sampling

PYQ 2024 · Delhi · 1m · 30s

Q11. Picking 50 boys and 50 girls in proportion to school strength is:

- (A) Simple random (B) Stratified
(C) Systematic (D) Convenience

PYQ 2022 · All India · 1m · 30s

Q12. If $|z_{\text{calc}}| = 2.10$ and z_{critical} (two-tailed 5%) = 1.96, the decision is:

- (A) Reject H_0 (B) Accept H_0
(C) Fail to reject H_0 (D) Need more data

PYQ 2023 · Delhi · 1m · 30s

Q13. The p-value approach rejects H_0 when:

- (A) $p > \alpha$ (B) $p < \alpha$
(C) $p = 0.5$ (D) $p > 0.5$

PYQ 2024 · All India · 1m · 30s

Q14. For a sample of $n = 25$ from a non-normal population, the appropriate distribution for \bar{x} is:

- (A) Standard normal (B) t-distribution (df = 24)
(C) Chi-square (D) Binomial

PYQ 2022 · Delhi · 1m · 30s

Q15. The chi-square test of independence has degrees of freedom:

- (A) $n - 1$ (B) $r + c$
(C) $(r - 1)(c - 1)$ (D) rc

PYQ 2023 · All India · 1m · 30s

ANSWER KEY & EXPLANATIONS

Q 1-15 · MARK YOUR SCORE

Q1. Answer: C

μ is a population parameter (fixed unknown). \bar{x} , s , \hat{p} are sample statistics.

Q2. Answer: C

By the CLT, $SE(\bar{x}) = \sigma/\sqrt{n}$. The variance is σ^2/n ; the SD is its square root.

Q3. Answer: B

CLT requires only large n ; population can be of any shape.

Q4. Answer: B

$z = 1.96$ gives a central area of 0.95 under the standard normal curve.

Q5. Answer: C

99% confidence \leftrightarrow central area 0.99 $\leftrightarrow z = 2.58$.

Q6. Answer: A

$SE = 10/10 = 1.0$; $E = 1.96 \times 1.0 = 1.96$; $CI = 50 \pm 1.96 = (48.04, 51.96)$.

Q7. Answer: A

H_0 contains the equality sign by convention; the alternative H_1 takes \neq , $>$, or $<$.

Q8. Answer: A

Type I = rejecting a true H_0 ; its probability is α (the level of significance).

Q9. Answer: B

$SE = \sigma/\sqrt{n} = 4/\sqrt{64} = 4/8 = 0.5$ mm.

Q10. Answer: C

Selecting every k -th unit after a random start is the definition of systematic sampling.

Q11. Answer: B

Sampling proportionally from each subgroup (stratum) is stratified sampling.

Q12. Answer: A

$|z_{\text{calc}}| = 2.10 > 1.96 \rightarrow$ reject H_0 at $\alpha = 0.05$.

Q13. Answer: B

Reject H_0 if p -value $< \alpha$. A small p -value means the observed data would be very unlikely under H_0 .

Q14. Answer: B

$n < 30 + \sigma$ likely unknown \Rightarrow use t-distribution with $df = n - 1 = 24$.

Q15. Answer: C

For an $r \times c$ contingency table, $df = (r - 1)(c - 1)$.