AP STATISTICS • EXERCISE SHEET

5.3 The Central Limit Theorem

Name: _____ Class: _____ Date: _____ **Total: 8 marks**

Objective

Build the skills to answer exam questions on **the Central Limit Theorem**.

You must be able to:

- state the **Central Limit Theorem** 中心极限定理: for large n, the sampling distribution of $\bar{x}$ is approximately normal
- use the guideline $n \geq 30$
- explain that this holds **regardless** of the population's shape

1 Worked examples

Study these first. Each one shows the method for a question type used later.

The Central Limit Theorem

For a **large enough** sample (a common guideline is $n \geq 30$), the sampling distribution of the sample mean $\bar{x}$ is approximately **normal** —**whatever** the shape of the original population.

Why it matters

It lets us use normal-based methods to make inferences about a population mean, even from skewed populations.

2 Practice

2.1 State what the Central Limit Theorem says about the distribution of $\bar{x}$. [1]

2.2 State the common sample-size guideline for the CLT. [1]

2.3 State whether the CLT depends on the population's shape. [1]

3 Exam-style questions

3.1 By the Central Limit Theorem, the sampling distribution of $\bar{x}$ is approximately [1]

- **A** skewed
- **B** normal for large n
- **C** uniform
- **D** binomial

3.2 A common sample-size guideline for the CLT is [1]

- **A** $n \geq 5$
- **B** $n \geq 30$
- **C** $n \geq 100$
- **D** $n = 1$

3.3 A population is strongly skewed. Samples of size 50 are taken.

(a) State the approximate shape of the sampling distribution of $\bar{x}$. [1]

(b) Name the theorem responsible. [1]

(c) State whether the population itself must be normal. [1]

4 Go further

- work through the **5.3 The Central Limit Theorem** lesson on the **Learn** page;
- read the **Sampling Distributions** section of the AP Statistics handout on the **Know** page.

Solutions

2.1 for a large sample it is approximately normal.

2.2 $n \geq 30$.

2.3 no —it holds regardless of the population's shape.

3.1 B.

3.2 B.

3.3 (a) approximately normal. (b) the Central Limit Theorem. (c) no.