

# 6.1 Introducing Statistics: Why Be Normal?

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Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

Total: 8 marks

## Objective

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Build the skills to answer exam questions on **why the normal model matters for inference**.

**You must be able to:**

- explain that the **normal** 正态 approximation underlies inference for proportions
- state the **large counts condition** 大计数条件
- describe what inference estimates from a sample

## 1 Worked examples

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

### ■ Why normal?

Because the sampling distribution of  $\hat{p}$  is approximately **normal** (when conditions are met), we can use  $z$ -values to build confidence intervals and run tests about a population proportion.

### ■ The large counts condition

The normal model applies when  $np \geq 10$  **and**  $n(1 - p) \geq 10$ . Inference then uses the sample to estimate the unknown population proportion  $p$ .

## 2 Practice

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**2.1** State why the normal distribution is central to inference for proportions. [1]

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**2.2** State the large counts condition for a proportion. [1]

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**2.3** State what inference uses a sample to estimate. [1]

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### 3 Exam-style questions

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**3.1** Inference for proportions relies on the \_\_\_\_\_ distribution. [1]

- **A** binomial
  - **B** normal
  - **C** uniform
  - **D** skewed
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**3.2** The large counts condition requires  $np$  and  $n(1 - p)$  to each be at least [1]

- **A** 1
  - **B** 5
  - **C** 10
  - **D** 30
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**3.3** A sample proportion is used to estimate a population proportion.

(a) Name the distribution used for inference. [1]

(b) State the condition for it to apply. [1]

(c) State what we are estimating. [1]

### 4 Go further

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- work through the **6.1 Why Be Normal?** lesson on the **Learn** page;
- read the **Inference for Categorical Data: Proportions** section of the AP Statistics handout on the **Know** page.

## Solutions

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**2.1** the sampling distribution of  $\hat{p}$  is approximately normal, allowing  $z$ -based inference.

**2.2**  $np \geq 10$  and  $n(1 - p) \geq 10$ .

**2.3** the unknown population proportion  $p$ .

**3.1 B.**

**3.2 C.**

**3.3** (a) the normal distribution. (b)  $np \geq 10$  and  $n(1 - p) \geq 10$ . (c) the population proportion  $p$ .