

Exercise walk-through

Setting Up a Test for a Population Proportion ■ 6.4

eXercise

You must be able to

- state the **null** 零假设 and **alternative hypotheses** 备择假设

- write the test statistic
$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1 - p_0)}{n}}}$$

- state the conditions for the test

Method — Hypotheses

- **Null** $H_0 : p = p_0$ (a specific value — “no effect”).
- **Alternative** $H_a : p \neq p_0$ (or $< p_0$, or $> p_0$).

Method — Test statistic

$$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1 - p_0)}{n}}}.$$

The standard error uses the **null value** p_0 . Conditions: **random, independent** (10% rule), and **large counts** ($np_0 \geq 10$, $n(1 - p_0) \geq 10$).

Practice 2.1 ■ 1 mark

State the null hypothesis for a test about a proportion.

Solution 2.1

Method: Test statistic

Worked steps

$H_0 : p = p_0$ (a specific value) **B1**.

Practice 2.2 ■ 1 mark

Write the test-statistic formula for a proportion.

Solution 2.2

Method: Test statistic

Worked steps

$$z = \frac{\hat{p} - p_0}{\sqrt{p_0(1 - p_0)/n}} \quad \text{B1}.$$

Practice 2.3 ■ 1 mark

State one condition needed to run the test.

Solution 2.3

Worked steps

any one of: random sample, independence (10% rule), large counts **B1**.

Exam-style 3.1 ■ 1 mark

The null hypothesis H_0 usually states that

- A** there is an effect
- B** there is no effect (a specific value)
- C** the sample is biased
- D** nothing at all

Solution 3.1

- A** there is an effect
- B** there is no effect (a specific value) 
- C** the sample is biased
- D** nothing at all

Worked steps

B.

Exam-style 3.2 ■ 1 mark

The test statistic for a proportion computes the standard error using

A $\hat{p}$

B p_0 (the null value)

C zero

D the sample size only

Solution 3.2

Method: Test statistic

A $\hat{p}$

B p_0 (the null value)



C zero

D the sample size only

Worked steps

B.

Exam-style 3.3 ■ 1 mark

A test checks whether $p \neq 0.5$, using $\hat{p} = 0.6$ and $n = 100$.

- (a) Write H_0 .
- (b) Write H_a .
- (c) Compute the test statistic z .

Solution 3.3

Method: Test statistic

Worked steps

(a) $H_0 : p = 0.5$ **B1**. (b) $H_a : p \neq 0.5$ **B1**. (c) $z = \frac{0.6 - 0.5}{\sqrt{0.5(0.5)/100}} = \frac{0.1}{0.05} = 2.0$
M1 A1.