

# 3.5 Introduction to Experimental Design

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

Total: 9 marks

## Objective

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Build the skills to answer exam questions on **experimental design**.

You must be able to:

- identify the **experimental units** 实验单位, **treatments** 处理, factors, and **response variable**
- explain the roles of **control** 对照, **randomization** 随机化, and **replication** 重复
- describe a **control group** 对照组 and a **placebo** 安慰剂

## 1 Worked examples

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

### ■ Parts of an experiment

- **Experimental units** —the who or what being treated.
- **Treatments** —the conditions applied (set by the **factor**, the explanatory variable).
- **Response** —the outcome measured.

### ■ Three principles

- **Control** —compare against a baseline group.
- **Randomization** —assign units to treatments by chance.
- **Replication** —use enough units to see a real effect.

A **control group** gets no treatment or a **placebo** (a fake treatment) for comparison.

## 2 Practice

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2.1 Name the three principles of experimental design.

[2]

**2.2** State the purpose of a control group. [1]

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**2.3** Define a placebo. [1]

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### 3 Exam-style questions

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**3.1** Assigning units to treatments by chance is [1]

- **A** control
  - **B** randomization
  - **C** replication
  - **D** bias
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**3.2** A fake treatment used for comparison is a [1]

- **A** factor
  - **B** placebo
  - **C** block
  - **D** response
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**3.3** A trial gives half the patients a real pill and half a sugar pill.

(a) Name the group given the sugar pill. [1]

(b) Name the sugar pill itself. [1]

(c) Name the principle of using enough patients. [1]

### 4 Go further

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- work through the **3.5 Introduction to Experimental Design** lesson on the **Learn** page;

- read the **Collecting Data** section of the AP Statistics handout on the **Know** page.

## Solutions

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**2.1** control, randomization, replication.

**2.2** to provide a baseline for comparison with the treated group(s).

**2.3** a fake treatment given for comparison.

**3.1 B.**

**3.2 B.**

**3.3** (a) the control group. (b) a placebo. (c) replication.