AP STATISTICS • EXERCISE SHEET

3.6 Selecting an Experimental Design

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

Objective

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

You must be able to:

- describe a **completely randomized design** 完全随机设计
- explain how **blocking** 区组 reduces variability
- describe a **randomized block design** and a **matched-pairs design** 配对设计

1 Worked examples

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

Completely randomized design

All experimental units are assigned to the treatments **entirely at random**.

Blocking

Blocking groups similar units together (e.g. by age), then randomizes **within** each block. This **reduces variability** from that known factor, making treatment differences clearer.

Matched pairs

A **matched-pairs design** is a special case: two similar units per block (or the same unit measured twice, before and after).

2 Practice

2.1 Describe a completely randomized design. [1]

2.2 State the purpose of blocking. [1]

2.3 State what a matched-pairs design is. [1]

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3 Exam-style questions

3.1 Blocking is used to [1]

- **A** add bias
- **B** reduce variability from a known factor
- **C** avoid randomization
- **D** increase error

3.2 A design that randomizes within groups of similar units is a [1]

- **A** completely randomized design
- **B** randomized block design
- **C** census
- **D** voluntary response survey

3.3 Researchers block by age group before assigning treatments.

(a) Name this design. [1]

(b) State why they block by age. [1]

(c) Name a design that pairs two similar units. [1]

4 Go further

- work through the **3.6 Selecting an Experimental Design** lesson on the **Learn** page;
- read the **Collecting Data** section of the AP Statistics handout on the **Know** page.

Solutions

2.1 all units are assigned to the treatments entirely at random.

2.2 to reduce variability from a known factor, so treatment effects are clearer.

2.3 two similar units (or the same unit twice) form each pair, split between treatments.

3.1 B.

3.2 B.

3.3 (a) a randomized block design. (b) to reduce variability caused by age. (c) a matched-pairs design.