Exercise walk-through

Selecting an Experimental Design ▪ 3.6

eXercise

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

Method — Completely randomized design

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

Method — 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.

Method — Matched pairs

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

Practice 2.1 ▪ 1 mark

Describe a completely randomized design.

Solution 2.1

Method: Completely randomized design

Worked steps

all units are assigned to the treatments entirely at random B1.

Practice 2.2 ▪ 1 mark

State the purpose of blocking.

Solution 2.2

Worked steps

to reduce variability from a known factor, so treatment effects are clearer B1.

Practice 2.3 ▪ 1 mark

State what a matched-pairs design is.

Solution 2.3

Method: Matched pairs

Worked steps

two similar units (or the same unit twice) form each pair, split between treatments B1.

Exam-style 3.1 ▪ 1 mark

Blocking is used to

A add bias

B reduce variability from a known factor

C avoid randomization

D increase error

Solution 3.1

A add bias

B reduce variability from a known factor ✓

C avoid randomization

D increase error

Worked steps

B.

Exam-style 3.2 ▪ 1 mark

A design that randomizes within groups of similar units is a

A completely randomized design

B randomized block design

C census

D voluntary response survey

Solution 3.2

Method: Blocking

A completely randomized design

B randomized block design ✓

C census

D voluntary response survey

Worked steps

B.

Exam-style 3.3 ▪ 1 mark

Researchers block by age group before assigning treatments.
(a) Name this design.
(b) State why they block by age.
(c) Name a design that pairs two similar units.

Solution 3.3

Method: Matched pairs

Worked steps

(a) a randomized block design B1. (b) to reduce variability caused by age B1. (c) a matched-pairs design B1.