

EQ:

Ex. Identify the experimental unit and treatment for each.

1. A cornfield is divided into 4 parts, each part treated with a different fertilizer.
2. A teacher practices different teaching methods on different groups in her class to see which yields the best results.
3. A doctor treats a patient with a skin condition with different creams to see which is most effective.

Ex. Identify the experimental units, treatment, factor, and level for each.

4. Runners were randomly assigned to groups in an experiment to determine how well a drug helped relieve muscle ache. Groups were randomly assigned the drug in either 5mg, 10mg, or 15 mg dosages.
5. Mice were randomly assigned to groups in an experiment to determine how well a lotion stimulated hair growth. Groups were randomly assigned to receive one of three lotions, A, B, and C.
6. Runners are randomly assigned to three different groups and are randomly assigned to receive three different training methods.

Ex. Does regularly taking aspirin help protect people against heart attacks? The Physicians Health Study looked at the affects of two drugs: aspirin and beta carotene. Their medical study involved 21,996 male physicians

Drug 2: \_\_\_\_\_

Drug 1: \_\_\_\_\_


Pop of Interest

Exp Units

Factor(s)

Level(s)

How many treatments were applied in this experiment?

Ex. Researchers are studying the absorption of a drug into the bloodstream. A drug is injected into 25 people. The concentration of the drug in the bloodstream is measured 30 minutes after the injection.

Exp Units

Explanatory Variable

Response Variable

How many factors and levels are present?

How many treatments exist?

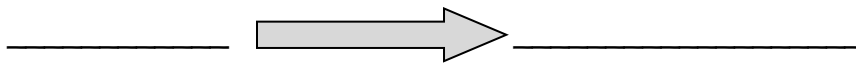
The researchers choose to inject three different dosages of the drug.

How many factors and levels are present?

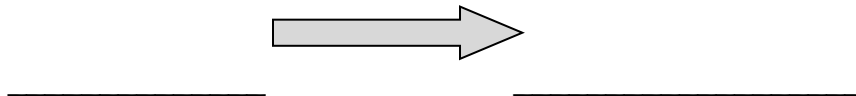
How many treatments exist?

➤ Assignment: p. 357 #33, 35, 37; p. 364 #41 - 43

RECALL: In Sampling Design:



In Experimental Design:



❖ Types of Design:

1. **Completely Randomized Design** --- subjects assigned to treatments completely at \_\_\_\_\_.

Ex. In an education study, students from several classrooms are randomly assigned to one of four treatment groups (three new types of a test and the standard). The total number of students in 4 classrooms is 96. \_\_\_\_\_ 1/4 of them, or 24 students, to each of the 4 types of tests. The treatments are the \_\_\_\_\_. The primary interest is the \_\_\_\_\_.

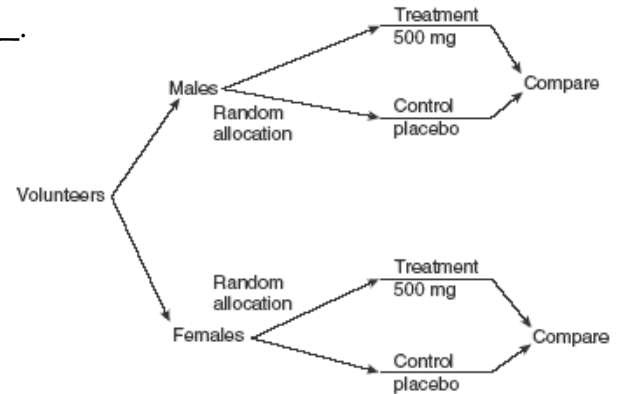
2. **Randomized Complete Block Design** --- subjects are divided into blocks according to some \_\_\_\_\_ characteristic within \_\_\_\_\_ block. Subjects in each block are then \_\_\_\_\_ to \_\_\_\_\_ so that \_\_\_\_\_ appear in \_\_\_\_\_.

- "Matched Pairs" --- pair units by height, race, age, gender, income, etc; each unit serves as a \_\_\_\_\_; each unit receives \_\_\_\_\_ treatments

❖ **Note: Matched Pairs** can occur in both \_\_\_\_\_ and \_\_\_\_\_

❖ **Blocks** ---- groups of experimental units that are formed to be as \_\_\_\_\_ as possible with respect to the block \_\_\_\_\_.

The term block comes from the agricultural heritage of experimental design where a large block of land was selected for the various treatments. The blocks of land had \_\_\_\_\_ soil, drainage, sunlight, and other important \_\_\_\_\_ characteristics. Homogeneous clusters improve the \_\_\_\_\_ of treatments by \_\_\_\_\_ levels of the \_\_\_\_\_ within each \_\_\_\_\_.



➤ Blocking helps \_\_\_\_\_ the effects of \_\_\_\_\_.

➤ You must give a \_\_\_\_\_ for your blocking method.

Ex. Block subjects by \_\_\_\_\_ because drug affects males and females in different ways.

Ex. Block plants with respect to \_\_\_\_\_ because of effect of light on growth.

❖ **KEYS to Blocking Design:**

- collect experimental units on a key \_\_\_\_\_; must be \_\_\_\_\_
- identify "block" before \_\_\_\_\_ experiment
- randomly assign \_\_\_\_\_ within blocks

\_\_\_\_\_ Blocking vs Randomization \_\_\_\_\_

- Blind Study --- \_\_\_\_\_ don't know which group they have been assigned to, \_\_\_\_\_ treatment or \_\_\_\_\_ group

- Double Blind Study --- both the \_\_\_\_\_ and the \_\_\_\_\_ are blind to the \_\_\_\_\_ information.

Ex. Women and men respond differently to advertising. An experiment to compare the effectiveness of three commercials for the same product will want to look at the reactions of men and women separately, as well as the overall response to the ads.

a) What is the treatment in this experiment? \_\_\_\_\_

b) What is the factor of the treatment? \_\_\_\_\_

c) What is/are the levels? \_\_\_\_\_

d) A completely randomized design considers all subjects, both men and women, as a single pool. This ignores the differences between men and women. Describe a design for this experiment.

e) A block design considers men and women separately. Randomly assign women to three groups then randomly assign men to three groups. Describe a design for this experiment.