Selecting an Experimental Design Quiz

1. The quality-control manager of a large factory is concerned about the number of defective items produced by workers. Thirty workers at the factory agree to participate in a study of three different incentive plans to help reduce the number of defective items produced. The plans will be randomly assigned to the workers so that 10 workers received each plan. The reduction in the number of defective items produced by each worker will be recorded two weeks after the plans are implemented.

Which of the following best describes why a completely randomized design is an appropriate design to use in this situation?

(A) There is no blocking variable, and incentive plans will be randomly assigned to the workers. ✓

(B) There is no blocking variable, and the workers were selected at random.

(C) Each incentive plan is a block, and a completely randomized design is not blocked.

(D) Each plan will be randomly assigned to 10 pairs of workers who share a similar characteristic.

(E) The number of workers participating in the study was greater than or equal to 30.

Answer A

Correct. The treatments, which are the incentive plans, will be randomly assigned to the 30 workers.

2. A market research firm is studying the effects of price and type of packaging on sales of a particular product. Twenty-seven stores with shoppers of similar characteristics will be used in the study. The nine combinations of three price levels and three packaging types are the treatments of interest. Total sales of the product over a seven-week period will be recorded. Which of the following describes the best design to use for the study?

(A) A completely randomized design. Randomly assign the nine combinations of price level and packaging type so that three stores use each combination. ✓

(B) A completely randomized design. Randomly assign the three price levels so that nine stores use each price level.

(C) A completely randomized design. Randomly assign the three packaging types so that nine stores use each type of packaging.

(D) A randomized block design. Use packaging as a block. Randomly assign the nine combinations of three price levels and three packaging types so that three stores use each combination.

(E) A randomized block design. Use packaging as a block. Randomly assign nine stores to each packaging type, then randomly assign price level to three stores within each block.

Answer A

Correct. Because the stores have similar shoppers, a completely randomized design is appropriate. The description of the design, in which the combinations of treatments are randomly assigned to the stores, is correct.

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3. A researcher is studying the effect of genetically modified (GM) and nongenetically modified (nGM) corn on the weight gain of lambs. The sex and genetics of the lambs can affect their weight gain. Five sets of male twin lambs and five sets of female twin lambs—for a total of twenty lambs—are available for the study. The lambs will be randomly assigned to a diet of either GM or nGM diet of corn. Weight gain will be recorded for each lamb after five weeks on the diet. Which of the following designs would be best to use in the study?

(A) A completely randomized design. Randomly assign ten lambs to the GM diet and ten lambs to the nGM diet.

(B) A stratified randomized design. Divide the lambs into males and females. Within each group, randomly assign the GM diet to one half and the nGM diet to the other half.

(C) A randomized block design. Randomly assign ten lambs to the GM diet and ten lambs to the nGM diet.

(D) A randomized block design. Randomly assign the GM diet to the male lambs and the nGM diet to the female lambs.

(E) A matched pairs design. For each set of twins, randomly assign one twin to the GM diet and the other twin to the nGM diet. ✓

Answer E

Correct. Twin lambs are matched because they are the same sex and have similar genetic factors that affect weight gain. Randomly assigning one twin to each diet provides the best way of investigating the effects of the diet.