AP® Statistics (Operational)
2004 Sample Student Responses

A1

2. Researchers who are studying a new shampoo formula plan to compare the condition of hair for people who use the new formula with the condition of hair for people who use the current formula. Twelve volunteers are available to participate in this study. Information on these volunteers (numbered 1 through 12) is shown in the table below.

Volunteer	Gender	Age
1	Male	21
2	Female	20
3	Male	47
4	Female	60
5	Female	62
6	Male	61
7	Male	58
8	Female	44
9	Male	44
10	Female	24
11	Male	23
12	Female	46

(a) These researchers want to conduct an experiment involving the two formulas (new and current) of shampoo. They believe that the condition of hair changes with age but not gender. Because researchers want the size of the blocks in an experiment to be equal to the number of treatments, they will use blocks of size 2 in their experiment. Identify the volunteers (by number) that would be included in each of the six blocks and give the criteria you used to form the blocks.

Block 1	Block 2	Block 3	Block 4	Block 5	Block 6
#1 M 21	#11 M 23	#9 M 44	#3 M 47	#7 M 58	#6 M 61
#2 F 20	#10 F 24	#8 F 44	#12 F 46	#4 F 60	#5 F 62

Age was used to form the blocks. Similar ages were blocked together.

(b) Other researchers believe that hair condition differs with both age and gender. These researchers will also use blocks of size 2 in their experiment. Identify the volunteers (by number) that would be included in each of the six blocks and give the criteria you used to form the blocks.

Block 1	Block 2	Block 3	Block 4	Block 5	Block 6
#1 M 21	#2 F 20	#8 F 44	#3 M 47	#4 F 60	#6 M 61
#11 M 23	#10 F 24	#12 F 46	#9 M 44	#5 F 62	#7 M 58

Blocks were composed of volunteers of the same gender and similar age.

(c) The researchers in part (b) decide to select three of the six blocks to receive the new formula and to give the other three blocks the current formula. Is this an appropriate way to assign treatments? If so, describe a method for selecting the three blocks to receive the new formula. If not, describe an appropriate method for assigning treatments.

This method is not appropriate. One volunteer from each block should be randomly assigned to the new formula and the remaining volunteer should recieve the current formula. Random assignment should be conducted using a random numbers table with lower-numbered volunteers being assigned to 0-4 and higher-numbered volunteers being assigned to 5-9. The first number to come up starting at row 13 should be assinged the new formula. This should be repeated for each block moving along the row.

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B1

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Because gender is not a factor, I would just pair my volunteers as closely as possible by age. My pairings are as follows:

Block 1 : 1, 2
Block 2 : 3, 12
Block 3 : 5, 6
Block 4 : 4, 7
Block 5 : 8, 9
Block 6 : 10, 11

B2

(b) Other researchers believe that hair condition differs with both age and gender. These researchers will also use blocks of size 2 in their experiment. Identify the volunteers (by number) that would be included in each of the six blocks and give the criteria you used to form the blocks.

On this experiment, I paired the subjects based on similar age and the same gender. My pairings would be as follows:

Block 1: 1, 11
Block 2: 2, 10
Block 3: 3, 9
Block 4: 4, 5
Block 5: 6, 7
Block 6: 8, 12

(c) The researchers in part (b) decide to select three of the six blocks to receive the new formula and to give the other three blocks the current formula. Is this an appropriate way to assign treatments? If so, describe a method for selecting the three blocks to receive the new formula. If not, describe an appropriate method for assigning treatments.

I don't think that this is an appropriate way for assigning treatments because both age and gender are a factor, and correct results can not be obtained this way. I would randomly assign one person in each block to recieve the new formula and the other person to recieve the current formula. That way, the results of each block can be compared because this is a matched pairs design blocked by age & gender.