Application and Inquiry

Name_____ Period_____

When scientists perform experiments the purpose is usually to find the cause of some natural phenomenon. Certain methods for discovering causes were developed by John Stuart Mill, an important 19th century English scientist and philosopher. Mill's methods help scientists divide the possible causes of a given phenomenon into classes. It then becomes easier to select the true cause.

One of Mill's methods is called the Method of Agreement. In this method, the scientist looks for one factor that is always present along with the effect. For example, all substances that have a crystalline structure have solidified from a liquid state. Using the Method of Agreement, the scientist would conclude that the cause of crystalline structures is solidification from a liquid state.

Use the following information to complete the chart. Then use Mill's Method of Agreement to answer questions1-2.

Five people eat together one evening. Alma has roast beef, spinach, and potatoes for her main course, and coffee and apple pie for dessert. Bob has roast beef, corn and potatoes for his main course, and tea and apple pie for dessert. Carol has steak, spinach, and potatoes for her main course, and coffee and apple pie for dessert. Doris has chicken, spinach, and potatoes for her main course and coffee and apple pie for dessert. Ed has steak, spinach, and corn for his main course, and milk and apple pie for dessert. Several hours later, all five people suffer from food poisoning.

Main course Dessert

	Roast Beef	Steak	Chicken	Spinach	Corn	Potatoes	Coffee	Tea	Milk	Pie
Alma										
Bob										
Carol										
Doris										
Ed										

_____ |. Which food is the probable cause of the food poisoning?
A. potatoes b. chicken c. milk d. apple pie

_____ 2. What could a scientist conclude if all five people had eaten potatoes as well as apple pie?

a. Both of these foods caused the poisoning.
b. Just one of these foods caused the poisoning.
c. At least one of the two foods caused the poisoning.
d. Some food eaten later caused the poisoning.

Name _____ Date _____ Class _____

Another of Mill's methods is called the **Method of Difference**. This method is related to the use of a control in scientific experiments. For example, a scientist uses a barometer to measure atmospheric pressure. Two readings are taken, one at the top of a mountain and the other at the bottom. The same instrument is used for both readings, and both readings are accurate. The scientist finds that the atmospheric pressure at the top of the mountain is considerably lower than the pressure at the bottom. Since the only difference between the conditions under which the two readings are taken is the higher elevation, the scientist concludes that elevation must be the cause of the lower pressure.

Use the following information to complete the chart. Then use Mill's Method of Difference to answer questions 4–6.

Five people eat together one evening. Several hours later, one of them becomes ill from food poisoning. Alma has roast beef, spinach, and potatoes for her main course, and coffee and apple pie for dessert. Bob has roast beef, spinach, and potatoes for his main course, and coffee and apple pie for dessert. Carol has roast beef, spinach, and potatoes for her main course, and coffee and apple pie for dessert. Doris has chicken, spinach, and potatoes for her main course, and coffee and apple pie for dessert. Ed has roast beef, spinach, and potatoes for his main course, and coffee and apple pie for dessert. Only Doris gets food poisoning. No one eats any other foods afterwards.

	Main Course					Dessert	
	Roast Beef	Steak	Chicken	Spinach	Potatoes	Coffee	Apple Pie
Alma							
Bob							
Carol							
Doris							
Ed							

_____ 4. Which food is the probable cause of Doris's food poisoning?
a. potatoes b. chicken c. coffee d. apple pie

_____ 5. What could a scientist conclude if Ed has also developed food poisoning?
a. The spinach was also poisonous.
b. No conclusion is possible; therefore, some factor other than these foods must be to blame.
c. The interaction of roast beef and potatoes was poisonous.
d. All the foods were poisonous.

_____ 6. If Ed ate steak instead of roast beef and was also poisoned, what could a scientist conclude?
a. No conclusion is possible; therefore, some factor other than these foods must be to blame.
b. The interaction of steak and spinach caused Ed's poisoning.
c. Both the steak and the chicken were poisonous.
d. All the foods were poisonous.