Association and Causation Worksheet

> Directions:
>
> Suppose studies were to be done on the following.
>
> Part a) Determine if you believe the association would be positive, negative, or none.
>
> Part b) Then decide if the relationship would most likely be causation, common response, or confounding
>
> Part c) If it is common response, identify the hidden variable affecting both. If it is confounding, identify the hidden variable affecting the response variable.

The following are the 12 studies you will analyze:

1. When you are on a diet, the amount of calories you eat daily vs. the amount of weight you lose.

2. The number of pets you own vs. the amount you spend on pet food.

3. How much you pay for a house vs. how much you pay for a car.

4. How much you study vs. your GPA.

5. The number of policeman that are visible on a stretch of road vs. the speed you travel.

6. How a student does in algebra vs. the student does in geometry.

7. A person's height vs. the amount of money that person has.

8. The number of wins the Indians have and the total amount of money spent on concessions at Indians games.

9. The number of people who smoke cigarettes vs the number of people who get lung cancer.

10. The number of people in a family vs. the number of cars the family owns.

11. The number of problems on a math test vs. the amount of time it takes students to complete the exam.

12. The amount of gasoline purchased on the Ohio Turnpike daily vs the total length of time it takes vehicles to travel the Ohio Turnpike.

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Name_____

Study #	Association +	−	None	Relationship Causation	Confounding	Common Response	Possible Hidden Variable
1							1. 2. 3.
2							1. 2. 3.
3							1. 2. 3.
4							1. 2. 3.
5							1. 2. 3.
6							1. 2. 3.
7							1. 2. 3.
8							1. 2. 3.
9							1. 2. 3.
10							1. 2. 3.
11							1. 2. 3.
12							1. 2. 3.

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Answers:

1. A negative association. Mostly Causation. But there are some lurking variables that affect the weight you lose such as body type, general health, etc.

2. Positive association. Causation. Having pets force people to buy food for them. The more pets you have, the more you will spend.

3. Probably a positive association although there are certainly exceptions. But it is not a cause-effect –more of a common response. The common factor is the person himself as well as the amount of money that the person has. People who can afford big houses can afford expensive cars.

4. A positive association. Teachers would like you to believe that it is cause and effect but there are lurking variables making it confounding. Such lurking variables are how smart you are, if you cheat, the difficulty of the courses you take, etc.

5. A negative association. Hopefully a causation situation. Police presence is meant to make people travel slower.

6. Probably a positive association although there are exceptions, This is a common response situation mostly – the common factor is the student's ability to think mathematically.

7. No association. Clearly a confounding situation. There are too many lurking variables to even mention.

8. A positive association. But it is confounding. There are many factors as to how many concessions the team will sell such as weather, size of the stadium. Note that saying this is common response doesn't quite work. The common factor is the number of people at the game. A winning team tends to bring in more people. The more people, the more they spend on concessions. But in common response, z affects x and z affects y. The number of people in the stadium doesn't usually affect the number of wins the team has (although that in itself is an interesting experiment).

9. A positive association – statistically shown. There is tremendous evidence that this is causation, but the cigarette industry will dispute this. They say that there are confounding factors – people's general health, heredity, whether they inhale, etc.

10. A positive association. But this is confounded. One of the factors is the how rich the family is. Another is the age of family members.

11. A positive association. Mostly cause and effect although it could be argued that how much one cares about the exam would affect the amount of time it takes to complete.

12. A positive association. Common response. The more cars on the road, the more gas purchased. But the more cars on the road, the more traffic and the amount of time increases.