**Shark Attacks Courtroom Scene**

Judge (*Leader*): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Plaintiff (*Materials*): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Defendant (*Liaison*): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Dr. Data (*Recorder*): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

This court case involves a lawyer (the plaintiff) in a fight to ban ice cream shops at the beach. Please assign the roles to everyone in your group, if you haven’t done so yet.

***Judge*** [Cough] I see in the reports that the plaintiff wants to ban ice cream from all beaches. What is your opening statement?

***Plaintiff*** I strongly believe that ice cream causes shark attacks. The more often people buy ice cream, the more it makes sharks want to attack us. This is why it is necessary for us to ban ice cream from all beaches. I have data to support this. I would like to call my first witness to the stand, Dr. Data.

# Dr. Data I have with me a table that gives the last year’s sales for an ice cream shop in Florida and the number of shark attack in Florida from 1926-2011.

|  |  |  |
| --- | --- | --- |
| Month | Ice CreamSales ($) | Number ofShark Attacks |
| January | 430 | 5 |
| February | 570 | 13 |
| March | 810 | 36 |
| April | 940 | 61 |
| May | 1100 | 47 |
| June | 1240 | 58 |
| July | 1340 | 73 |
| August | 1390 | 84 |
| September | 1240 | 95 |
| October | 1030 | 68 |
| November | 810 | 43 |
| December | 430 | 10 |

(Source: <http://www.flmnh.ufl.edu/fish/sharks/statistics/FLmonthattacks.htm>)

# Dr. Data I have created a scatter plot from the table. (The scatter plot is on the next page.)

#  (Task 1) Everyone in the courthouse needs to draw a trend line on the scatter plot below. This will summarize the relationship between ice cream sales and shark attacks.

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***Plaintiff*** As the data clearly shows, there is a strong positive correlation between ice cream and shark attacks.

***Defendant*** Objection, your honor! Scatter plots drawn by hand are just estimations. Therefore, this does not prove that ice cream causes shark attacks.

***Judge*** Sustained. We need to use graphing calculators to get an exact correlation.

***Dr. Data*** When *everyone* in the group has a graphing calculator we could use the data to find the coefficient of correlation, *r*. This number would show that ice cream needs to be banned. *[At this point, everyone in your group has a graphing calculator. Enter the data to find the regression line and the correlation coefficient.]*

***Plaintiff*** **(Task 2)** We all got a correlation coefficient value, *r* = \_\_\_\_\_\_\_\_.

**(Task 3)** Thus, the more people buy ice cream, the

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

So, ice cream causes shark attacks. The plaintiff rests, your honor.

***Judge*** Does the defendant have anything to add?

***Defendant*** Yes. I am here to tell you that **correlation** is not the same as **causation**. Just because two variables are related does not mean that one *caused* the other to occur. There may be a third factor, which may or may not be known.

***Dr. Data***Now I see. Ice cream sales *don’t* cause shark attacks to occur! Ice cream is usually sold during the summer, and it is during the summer that people are more likely to go swimming. The increased shark attacks are simply *caused by more time in the water*, not ice cream.

***Judge***I have come to a verdict. I rule in favor of the defendant. Just because two variables are correlated does not mean that one caused the other to happen. Let’s all try a practice problem to see if we understand.

***Dr. Data*** I have lots of data to look at! The table contains records on the number of car accidents compared to the amount of snowfall for the town of Rocky Hills.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Inches of Snow | 0 | 1.5 | 4 | 5 | 0.5 | 7 | 12 | 4 | 1.5 | 2.5 | 5.5 | 5.5 | 9 | 3 | 4.5 |
| Accidents | 2 | 5 | 6 | 5 | 1 | 10 | 15 | 3 | 5 | 2 | 6 | 7 | 11 | 4 | 8 |

***Judge*** I would really like to see what the value of the coefficient of correlation is.

 *[Everyone enters this data into their graphing calculator and finds r]*

***Dr. Data*** **(Task 4)** There is a strong correlation. *r* = \_\_\_\_\_\_\_\_. But now I’m confused. Does this mean that that the snow causes more accidents or not?

***Defendant*** It appears as if **causation** seems to require **more than just correlation**.

***Plaintiff*** What are you talking about?

***Judge*** Suppose that someone gets into an accident. He or she thinks that the cause was the snow. To prove this, thinks about the same person driving the same road with similar distractions, but it is not snowing.

***Dr. Data*** If we could rewind history and change one small thing (making the snow stop), then causation could be observed.

***Plaintiff*** But we can’t rewind history. It is impossible to directly observe causation. I could argue that aliens cause the ice to form and the cars to crash.

***Defendant*** But now you are arguing something that is unlikely. The icy roads probably caused the increase in car crashes. In fact, it’s this ability to make assumptions that make people able to “conduct experiments”.

***Dr. Data*** Wow I learned a lot today! I think we should play a game of true or false!

***Everyone*** Hooray!

***Judge*** **(Task 5)** The shorter the time someone holds a driver’s license, the more likely she is to have an accident. Therefore, new drivers cause more accidents. True/False? Why?

***Plaintiff*** **(Task 6)** The younger a driver is, the higher his or her car insurance premiums. Therefore, young age causes high premiums. True/False? Why?

***Defendant*** **(Task 7)** Increase of flu is correlated with lower outside temperature. Therefore, cold temperatures cause flu. True/False? Why?

***Dr. Data*** **(Task 8)** Higher incidence of lung and mouth cancer is correlated with increased use of tobacco products. Therefore, tobacco causes cancer. True/False? Why?

***Judge*** Let’s go ask a teacher if our answers are correct!

***Everyone*** Hooray again!