

MCIS

Mathematicians Can Investigate Stuff

The Case of the Cooling Coffee

0. The Hot Stuff Cup Company and the Burns family are entangled in a lawsuit. Iam Burns claims that he was injured when he accidentally spilled a cup of coffee on himself that his wife, one Emma Burns, purchased at the drive through of a McRonal'd's restaurant. The restaurant has ample warning posted about the (apparently not well known) dangers of their piping hot coffee and is not a defendant in the case. The Hot Stuff Cup Company has no such warnings on their cups, but claims that while their cups are great at keeping things hot, the coffee would have cooled so much on the way home with Emma that it could not have caused Iam's injuries.
1. Your MCIS team's job is to collect and analyze data relevant to the case. In this role, your team can request access to evidence collected by the police department and you can use all of the high tech forensics equipment available to you (OK, you can use calculators, CBLII, and whatever else is laying around here). Many of the facts of the case will not come out until the trial so you will need to be able to respond to any situation that arises as the testimony proceeds without running back to the lab to conduct more experiments.
2. As a team, establish a plan to accomplish your mission. Be sure it includes what you will need in terms of equipment and evidence. Try to determine what data you will need and how to get it through experimentation. Decide what you will do with the data and what contingences you will need to be ready for as additional facts come out in the testimonies. Sketch out your plan below.

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3. The following is what you know prior to going to court.

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- McDonalds sells coffee in three different sizes (e.g. Big, Bigger, and Biggest). The Hot Stuff Cup Company has supplied samples of these which you can use. The police report does not specify which one Emma purchased.
 - The MCIS team has access to the coffee maker used at the restaurant.
 - The new, metrically friendly, 113 Gramer sandwich contains 73% of the recommended daily intake of saturated fat and is ranked "yummy".
4. Using the equipment and evidence available to your team, perform any experiments needed to get necessary data for the trial. Organize and analyze the data and create mathematical models for it. Be prepared to demonstrate how conclusions about the case can be determined from your experiments. Document your work carefully since the attorneys and jurors may not be mathematicians.

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FACTS OF THE CASE REVEALED IN TESTIMONY

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- Expert witness for the defense, Dr. Eyeof Newton (a really cooling guy) states under oath that given the right conditions coffee will cool. The good doctor also pontificates that laws should be passed about it.
- Expert witness for the prosecution, Dr. Thurman Ometer (his friends just call him Thurm) will testify that Iam's injuries were caused by liquid that was at least 65⁰C.
- Emma drives a 1974 AMC Pacer and did not have the windows down, the air conditioner or heater running, and it was early morning. "Before the sun came up", she stated.
- Emma and Iam have been married for 31 years and have one child (a son of course).
- Emma's sister, Goldie, wife of Thad Locks, will recall that she advised Emma in her selection of the size coffee purchased noting that the "Big" size was too small and the "Biggest" size was too big but the "Bigger" size was just right.
- Both sisters testified that they took the coffee straight home to Iam with only a short 5 minute stop to buy a paper.
- The meteorologist report for the day will indicate that the temperature that day was (fortunately) almost the same as the conditions your team collected their data under.
- The police officer states that the Burns' house is 6.5 miles from the restaurant and that, with stops; a law-abiding citizen would average around 25 mph for the trip.

5. Now that you have the testimony, prepare your statement for the court explaining whether or not Iam could have been injured by the coffee and why. Be sure to support your conclusions with as much expertise as possible. Judges and attorneys are almost as picky as math teachers about this. Jurors, however, are part of the 99.9% of the human population that “just didn’t get math”, so make sure that you explain in common terms any charts, graphs, etc. that you will be displaying.

Check with your facilitator

6. Do you think that your conclusions would have been altered if this incident happened in January on a day when the high temperature was 10 °F? Explain your reasoning.
7. Do you think that your conclusions would have been altered if Emma had purchased the “Biggest” size coffee? Explain your reasoning.
8. Give an example of one fact that had no relevance to your conclusions about the case.

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