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***Data Analysis- Hot Car Experiment***

**Guiding Question**: How long will it take a parked car in the Florida sun to heat up, before it becomes dangerous to children?

* We will measure, “*The effect of an enclosed car on the internal temperature.”*

# *Read the following 2 articles, then answer the questions and generate a hypothesis:*

# Kids in Hot Cars Alert: Hidden Dangers By Vincent Iannelli, M.D. Updated July 05, 2014

Although experts often focus on more common safety measures, like using car seats correctly and basic childproofing, there are many less well known 'hidden dangers' that may put your kids at risk.

Your family car is one of these 'hidden dangers,' and it is not just because of car accidents. In addition to the risk of getting hit or run over by a car, being left or getting trapped in a hot car can be just as deadly a danger. In fact, at least 600 children have died after being left in a hot car (sometimes on relatively mild days with only 70 degree temperatures) since 1998.

Each year, an average of 37 kids die after being left in a hot car. In 2013, 44 children died in hot cars.

Situations in which kids get hurt in hot cars include when [infants](http://pediatrics.about.com/od/infants/) and [toddlers](http://pediatrics.about.com/od/toddlers/) are simply forgotten in their car seat, toddlers or [preschoolers](http://pediatrics.about.com/od/preschoolagechildren/) sneak into the car to play and can't get out, or when kids get trapped in the trunk

At high temperatures, kids are at great risk for [heat stroke](http://pediatrics.about.com/od/summersafety/a/heat_illness.htm), which can lead to a high fever, [dehydration](http://pediatrics.about.com/od/symptoms/a/05_symp_dehydtn.htm), seizures, stroke and death.

# Unattended Children and Cars

*http://www.nhtsa.gov/people/injury/enforce/childrenandcars/pages/unattend-hotcars.htm*

The Centers for Disease Control report that very high body temperatures can cause damage to the brain and other vital organs, as well as heat stroke and death. “Heatstroke occurs when the body’s temperature reaches 104 degrees Fahrenheit;”essentially, “the body becomes unable to control its temperature: the body’s temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. Body temperature may rise to 106 degrees F or higher within 10 to 15 minutes.” A “body temperature of 107 degrees is lethal. In many cases of hyperthermia, the child’s body temperature is reported to be 108 degrees, even an hour after they are discovered. It is important to note, however, that most thermometers will only measure temperatures up to 108° F. Therefore it is likely that the body temperatures of these children were well above 108° F.

Even knowing the obvious risk to children, caregivers continue to endanger them. In one survey, 25 percent of mothers interviewed admitted to leaving infants and toddlers in motor vehicles. Perhaps even more shocking, only one-third of these mothers favored leaving the windows half or fully opened. Some of these mothers apparently were more concerned about potential abductions than heatstroke.

Some of the most tragic incidents happen when adult caretakers forget a child is in the vehicle. This frequently happens when a parent or guardian breaks a well-established routine and leaves a child in the car. Many of these adults do not even realize that they left the child in the vehicle until hours later. These cases pose significant moral questions for prosecutors who face the dilemma of determining whether the tragedy of losing a child is sufficient punishment. Still, while we may prefer to label these deaths as “freak accidents,” their preventability disproves this claim.

**Reviewing the Reading:**

|  |  |
| --- | --- |
| 1. How many children are believed to have died in a hot car since 1998?
 |  |
| 1. What are some risks children may face if they are stuck in a locked car?
 |  |
| 1. At what temperature does heat stroke occur inside a humans body?
 |  |
| 1. According to the article, “Unattended Children and Cars,” how many of the parents surveyed admitted to leaving toddlers or infants in a parked car?
 |  |
| 1. According to the article, “Unattended Children and Cars,” when do the most accidents happen?
 |  |

**Procedure and Science Process**:

We have set up 2 temperature probes to collect data on a hot, sunny summer day in Deltona, Florida. One temperature probe is on the street by the car, the other is inside the closed car. We recorded data for one hour. We will measure the temperature in degrees Fahrenheit.

**Generate a hypothesis***: How long will it take before the temperature in the car becomes too dangerous for a human to survive?*

* A proper hypothesis is testable.
* Hypothesis must be a statement, not a question.
* Must provide what will happen and a reason why.

*Example*: If I close all of the windows in a car on a hot day, then it will take 45 minutes for the car to reach a dangerous 105 degrees, because the car is exposed directly to the sunlight.

*Example*: A car with closed windows on a hot day will increase its temperature to a dangerous 110F in 30 minutes, because of the seats absorbing all of the heat.

In both examples, I indicated what I was doing in the experiment, what temperature is dangerous, the amount of time it would take to reach the temperature I thought was dangerous, and why I thought the temperature would go up.

* **Write your hypothesis below:**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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* **What is the control group?** *(Remember, the control is used for comparison by the researcher, it lacks the testing variable)*
* **What is the independent (testing) variable?** *(Remember, the testing variable is the one thing that varies in the experiment; it is the one thing that the researcher is able to manipulate).*
* **What is the dependent (outcome) variable?** *(Remember, the outcome variable is what the researcher is measuring/collecting data on)*
* **What are some constants in this experiment?** *(Remember, constants are things kept the same between the control test and experimental test)*

**Analyzing the data from the experiment**

Directions: Below you will see 2 tables indicating data from 2 different tests. You need to take the data and turn it into a 2 line graph. All data was collected on August 25, 2014 between the hours of 1:30pm and 2:30pm in the front parking lot of Heritage Middle School in Mrs. Miller’s car. Using the data on both tables, complete the graph filling in a key, title, label the axis and number the graph.

|  |  |
| --- | --- |
| **Data table for temperature probe outside** | **Data for temperature probe inside car** |
|

|  |  |
| --- | --- |
| **Time in min** | **Temperature in F** |
| 0 | 87 |
| 3 | 88 |
| 6 | 88 |
| 9 | 89 |
| 12 | 88 |
| 15 | 89 |
| 18 | 90 |
| 21 | 90 |
| 24 | 90 |
| 27 | 90 |
| 30 | 91 |
| 33 | 91 |
| 36 | 91 |
| 39 | 91 |
| 42 | 91 |
| 45 | 91 |
| 48 | 91 |
| 51 | 91 |
| 54 | 90 |
| 57 | 91 |
| 60 | 90 |

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|  |  |
| --- | --- |
| **Time in min** | **Temperature in F** |
| 0 | 87 |
| 3 | 100 |
| 6 | 107 |
| 9 | 110 |
| 12 | 112 |
| 15 | 114 |
| 18 | 116 |
| 21 | 119 |
| 24 | 120 |
| 27 | 121 |
| 30 | 122 |
| 33 | 122 |
| 36 | 123 |
| 39 | 124 |
| 42 | 125 |
| 45 | 125 |
| 48 | 126 |
| 51 | 128 |
| 54 | 130 |
| 57 | 132 |
| 60 | 134 |

 |



Title:

Key:

**Thinking critically about the data:** *(You may not use the words hot, hotter, warm, heat etc in this part). You must use numbers to explain the change in temperature!*

1. Summarize what happened to the temperature outside of the car.
2. Summarize what happened to the temperature inside the car.
3. What differences were there between the temperature inside and outside of the car?
4. How did the data compare to your initial hypothesis? Does the data support your hypothesis? How do you know?

**Writing your conclusion:** The conclusion is where you tie all of the components of the lab together.. The hypothesis, research, data collection, and ideas for further experimentation should all be included. Conclusions should be written in paragraph format and address all of the information below.

* Restate your hypothesis at the beginning of the conclusion.
* State, “the data collected supports my hypothesis,” or, “the data collected fails to support my hypothesis,” immediately after stating your hypothesis.
* Explain how the test was completed. “In this experiment, we took 2 thermometers, placed one in a car…” (Use the vocabulary words control, test variable, outcome variable, and constants in this section!)
* Summarize what the data told you. What happened to the temperature inside the car, what happened outside the car.
* Explain HOW this data supports or does NOT support your hypothesis.
* Include any research (readings) that support your conclusion.
* Give suggestions for further testing. *If I were to do this again…*

We conducted an experiment to determine the effect \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ has on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

My hypothesis was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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After testing, I can conclude that the data collected \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ support my hypothesis. I conducted this test by

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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When I was analyzing the data, I noticed that the temperature inside the car \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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This was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than the temperature outside of the car, which \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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This \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ my hypothesis because\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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According to my research, a car becomes dangerous when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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If I were to do this experiment again, I would \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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