

OPEN OR CLOSED DOOR?

Researchers in the Firefighter Safety Research Institute (FSRI) have an amazing fire lab the size of two football fields near Chicago, Illinois. These fire scientists and engineers use this lab to answer the questions about how to keep firefighters safe and how to read a fire scene to solve a fire case.

In 2017, fire scientists and engineers worked in the fire lab for one month to answer one question: “What is the impact of **ventilation** on a house fire?”

To answer this question, they built a one-story house in the lab and set it on fire under two conditions – with a **closed front door (unvented)** and with an **open front door (vented)**. This house had a kitchen, living room, and two bedrooms, just like a house that we could find in any town in the United States. The house was furnished – it had beds, chairs, sofas, and appliances. The fire set by the researchers always started in the corner of the sofa in the living room.

This data was collected using highly sensitive sensors placed around the structure from the floor to the ceiling every four inches up from the floor. The tests were controlled, down to the exact placement and weight of the furniture and furnishings in the structure. The only variable was the front door – open (vented) or closed (unvented).

Three of the variables in this fire lab investigation are:

1. **Oxygen levels.** This is measured as percentages. Our atmosphere is 21% oxygen.
2. **Air pressure.** This is measured as units of pressure (Pascals) written as Pa.
3. **Temperature.** This is measured in degrees Celsius. The average human body temperature is 98.6 degrees Fahrenheit, which is 37 degrees Celsius. The average room temperature is 70 degrees Fahrenheit, which is 21.11 degrees Celsius.

Why spend an entire month doing repeated burns to test one question? Why is this an important question for fire fighters and fire investigators to know the answer to?

Look through the data collected at the fire lab on oxygen, air pressure, and temperature and see what claims you can make about the difference between an open door and a closed one.