

Your Photo with Science Fair Project

A short quote from your project that conveys importance to sustainability.

EXAMPLE:

Knowing the R-value of insulation is important for many reasons

The three most important reasons are:

- 1. People can save money on energy bills,*
- 2. They will waste less energy,*
- 3. And their house's resale value will increase.*

Student Name

Science Fair Project Title/ Topic/Research Question

Introduction/Rationale/Purpose

Approximately 300-400 words; to find the number of words, go to File, Properties, and Statistics

EXAMPLE:

Do you know what your house's R-value is? Do you even know what R-value is? R-value is something that most people do not think about. It is a material's resistance to heat flow and is the measurement of insulation's effectiveness. Knowing the R-value of insulation is important for many reasons. The three most important reasons are: people can save money on energy bills, they will waste less energy, and their house's resale value will increase. These are also the reasons I chose to do this project.

In these harsh economic times, many people are looking for ways to lower their budget. They do not want to spend an excessive amount on their heating and cooling bills. With power companies raising their rates, anything families can do to lower their bill will be helpful. Having good quality insulation can prevent money from going out the wall, and the higher the R-value, the better the insulation.

Secondly, people today are looking for new ways to conserve energy and make the Earth a cleaner and greener place. One way to achieve this is to turn down your thermostat during the winter and use less energy. This is only possible if you have insulation with a high R-value to trap in as much heat as possible and keep the house warm. The same is true in the summer. Houses with superior insulation save more energy in summer because they hold in the cool air better.

Finally, due to the poor housing market, people are trying to do anything they can to increase their house's resale value. Being able to advertise a home as energy-efficient makes it more likely to sell, because buyers are looking for ways to save money. Even something as small as a house's insulation can make or break a sale. This is an easy upgrade that can really make a difference.

Knowing the R-value of your insulation can save you time, energy, and money. If you find that your R-value is below average, it would be wise to change your insulation. You will be helping the environment by conserving energy. You will be helping your family by saving your bank account through lower energy bills. You will also be helping yourself by not wasting time trying to sell a house that nobody wants. For these reasons, I am testing various insulations to determine the highest R-value.

Hypothesis

Approximately 300-400 words; to find the number of words, go to File, Properties, and Statistics

EXAMPLE:

If I test various insulations (loose fill fiberglass, fiberglass batting, polystyrene, cellulose, air, and spray foam) to see which one has the highest R-value by putting insulation around small boxes that are set inside larger boxes, then I hypothesize that spray foam will have the highest R-value, and cellulose will have the lowest R-value. I believe this will be the outcome because, author Carrie Shea Thomas, when talking about spray foam, states that, "When the insulation is applied it begins to expand to fill in cracks and crevices. This process can produce insulation 5 to 10 times its size when wet."

Spray foam creates an airtight seal. This is good because an airtight seal allows no heat to be lost in winter and no cool air in the summer. Therefore, the R-value will increase after the application of the spray and will not decrease over time. This makes spray foam more cost effective as well because people will not have to replace it even after many years.

Cellulose, on the other hand, will not fill every crack, and it also settles, so the R-value decreases over time. Having the insulation not fill every crack and crevice allows air to leave and enter a structure. Settling decreases the R-value because surface area diminishes and there is less of a barrier between the outside and the inside of a structure. I will use air as the control portion of my experiment because air is the substance that I am trying to trap. I will do this to see how much air affects the temperature change in a structure when no insulation is present. I believe that fiberglass and polystyrene will not be as effective as spray foam because they will not fill all the little air spaces as well.

Materials

The list of materials you used.

EXAMPLE:

- 6 laboratory thermometers (which measure Fahrenheit and Celsius)
- 6 Food Storage Containers 17cm X 17cm X 6cm each with a snap on lid
- 1 pair of safety goggles
- 1 surgical mask
- 1 pair of work gloves
- 1 notebook and a pencil to record data
- 1 roll of polystyrene insulation
- 1 bottle of spray-foam insulation
- 1 pound bag of loose-fill fiberglass insulation
- 1 roll of fiberglass batting
- 1 bag of cellulose insulation
- Air

- 1 Calculator
- 1 Marker
- 1 pair of scissors

Procedures/Experiment

The procedures you followed for your experiment.

EXAMPLE:

1. Purchase all of the supplies (Lowes or Home Depot).
2. Find an airy, unheated place (outside).
3. Calculate the volume of one plastic box using the formula for volume (length X width X height) and the volume of one food storage box (plastic box is 34 cm X 13.5 cm X 26cm = 11,934cm³ and the food storage box is 17cm X 17cm X 6cm= 1,734cm³).
4. Subtract the food storage box's volume from the plastic box's volume to know the volume of each insulation required to fill the box (volume is 10200 cm³).
5. Label each box by the name of insulation that will be in it with the marker (Air, Polystyrene, Sprayfoam, Fiberglass, Fiberglass loose-fill, Cellulose).
6. Check the temperature of the room in Celsius and record it in a notebook.
7. Put on safety goggles, gloves, and a surgical mask.
8. Put one thermometer in each food storage container, fill with one type of insulation, and snap the lid on.
9. Place one of the containers in the plastic box labeled "air"; snap on the lid.
10. Put the food storage container filled with cellulose in the large plastic box labeled "cellulose"; fill the box with cellulose insulation; snap on the lid.
11. Repeat step 10 for sprayfoam, loose-fill, fiberglass batting, and polystyrene (use scissors to cut polystyrene and fiberglass batting).
12. Spread the boxes apart in the room and leave them there for 3 hours for cold and 1 hour for warm.
13. After the time is over, put on the gloves and mask again, remove the lids of the large plastic boxes, carefully remove the thermometers, and record the temperature for each in Celsius in the notebook.
14. Then, if the outside temperature goes down, subtract that amount from all of the types insulation's original temperatures. If the room/outside temperature goes up, add that amount to the insulation's original temperature.
15. Use the formula for R-value (temperature difference x area x time)/heat loss to find R-value of each insulation and record in the notebook.
16. Repeat step 6 and steps 12-15, but put the boxes in a very warm enclosed room near a heater to simulate warm weather.

Results/Conclusion

Approximately 100-200 words; to find the number of words, go to File, Properties, and Statistics. Include graphs, photos, etc.

EXAMPLE:



