



## ENERGY USE AT HOME

Thermal Radiation

Take-Home Experiment

### Purpose:

To measure how the sun's radiation warms the interior of your car.

### Introduction:

When your car is sitting in the sun on a hot day, the sun's radiation energy can enter the car through the windows. The car's interior then absorbs almost all of the radiation energy from the sun and then radiates it back to the air as heat. The windows in the car act like a greenhouse and initially allow more heat to enter the car than exit the car. As a result of this, the temperature in the car rises, and as the temperature difference increases, the car begins to radiate and conduct energy back to the environment through the windows.

### Challenge:

To compare the rate at which your car heats up when it is left in the sun on a hot day, to that of other coloured cars. Does colour make a difference?

### Equipment:

- Car
- Thermometer. The best option is to use a Data Logger (a device that records data (such as temperature) at set intervals). If this is not available to you, you can use a thermometer.

### Key Concepts:

- Radiation

### Skills:

- Data collection and experimental design.
- Graphical analysis and linear curve fitting.

### Method:

On a clear, sunny day, park the car in the shade (a cool place) so that the temperature on the inside of the car is the same temperature as the ambient temperature. Then, move the car into the sunshine and record the temperature for the rest of the afternoon (at least 4 hours if not more). While you are recording the temperature, do not open the car doors, turn on the car, or disturb it at all. Using a data logger to record the temperature is the best option, but if that is not plausible, place a thermometer in the car in such a way that you can read it from the outside of the car. Compare your results with that of a friend who has a different colour car (preferably compare a dark to a light car).

**WARNING: Do not sit in the car while running this experiment, as it could lead to heat exhaustion or heat stroke, a medical emergency.**

**Questions to Think About:**

Does the colour of the car affect the rate at which it heats up?

Does the colour of the car affect the final temperature of the interior of the car?

How does the weather impact the heating process?

**Suggested assigned time:**

1-2 weeks.

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