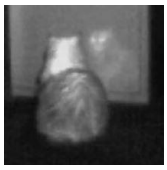

ENERGY USE AT HOME

Thermal Radiation

Take-Home Experiment

On the morning of a clear, hot summer's day, a dark blue Honda Civic was parked in the shade with a Data Logger in it which recorded the temperature each minute. At 1.30 pm, the car was moved from the shade to the sun and stayed there for the rest of the day. When the car was moved to the sun, the ambient temperature in the shade was 26°C and at the end of the experiment it was 23°C. Over the course of the experiment, the car heated up at a rate of 0.9°C per minute to a final temperature of 62°C (figure 1).

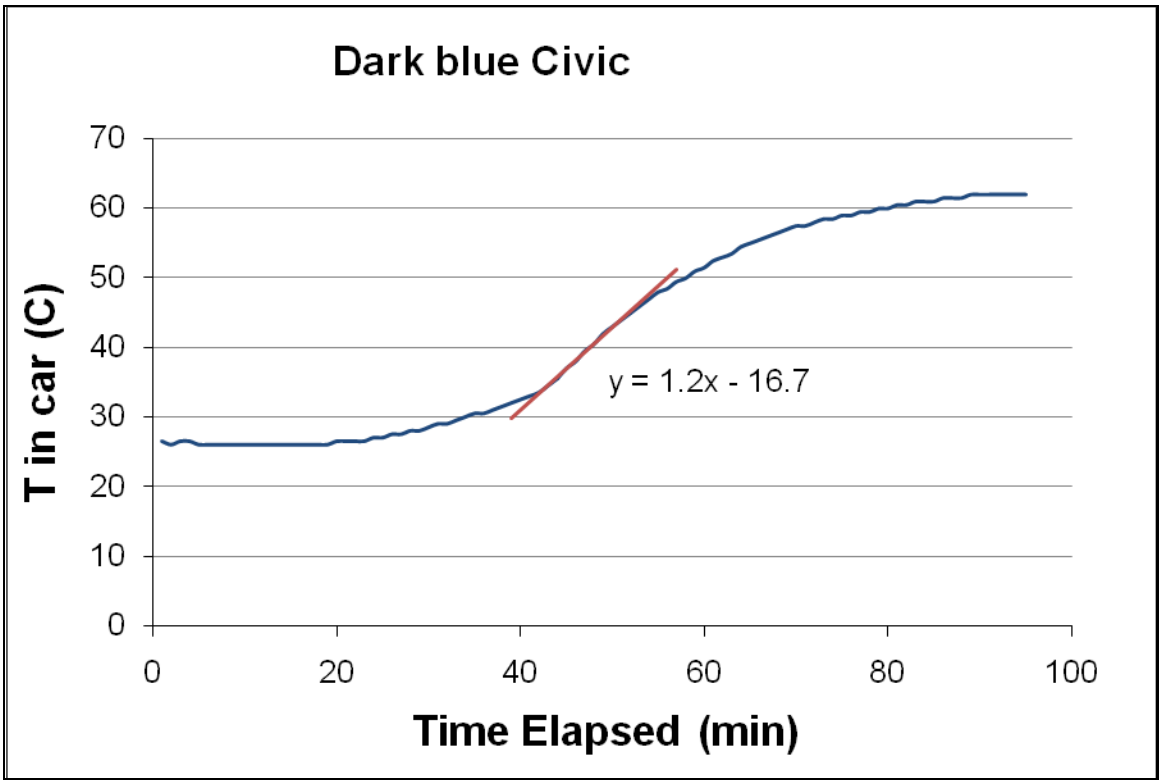

Figure 1. The heating of a dark blue Honda Civic – when left in the sun on a hot day, the car heated up at a rate of 1.2°C/min to a final temperature of 62°C.

On another day, which was equally as hot but less clear, a white Nissan Silvia, with a Data Logger in it that recorded the temperature each minute, was parked in a garage. At 11:40 am, the car was moved from the sun to the shade and stayed there for a few hours. At the beginning of the experiment, the temperature in the shade was 24°C, and at the end was 27°C. Over the course of the experiment, the car heated up at a rate of 0.2°C per minute to a final temperature of 46°C (figure 2).

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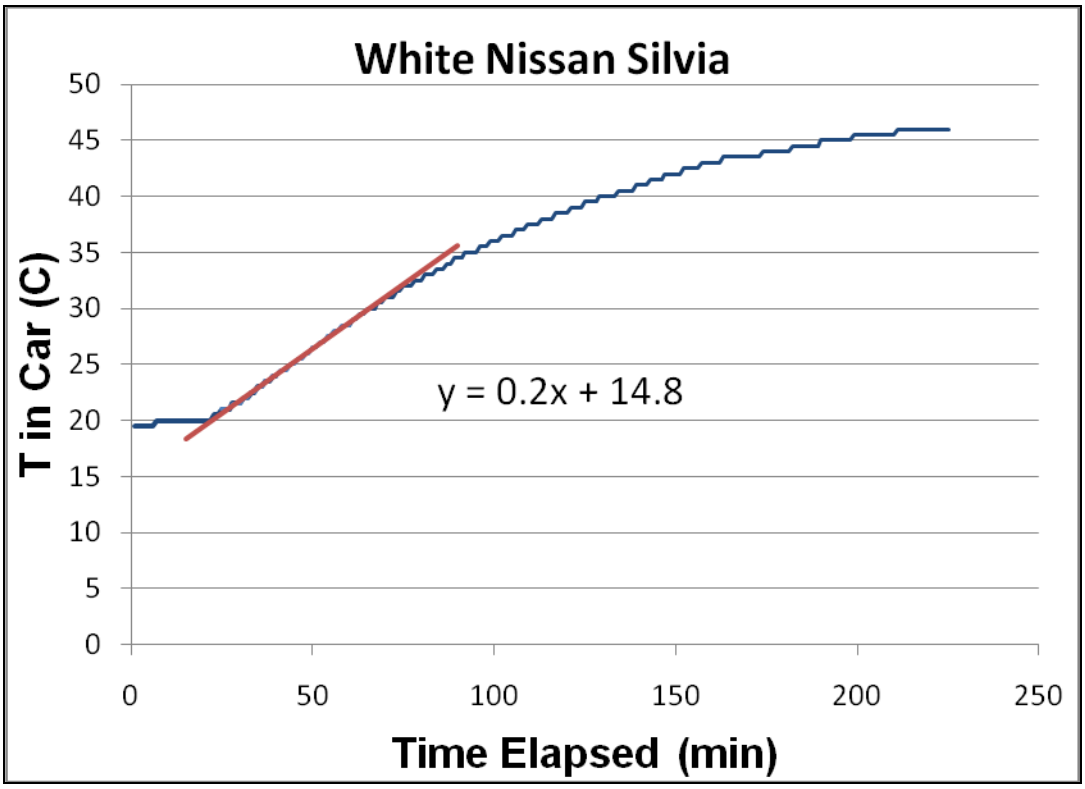

Figure 2. The heating of a white Nissan Silvia – when left in the sun on a hot day, the car heated up at a rate of 0.2°C/min to a final temperature of 46°C.

For both of the above graphs, the rate of heating was taken at the tangent line when the car initially started heating up. The data for the dark blue Honda Civic was taken on a clear day, while the data for the white Nissan Silvia was taken on a day which started out quite clear, but which got hazy over the course of the day due to a nearby forest fire. The difference in clarity relates to the final temperature that the cars get to as on a clear day, more of the sun's radiation can reach the car and is not obstructed by clouds. This likely accounts for the dark car reaching 62°C while the white car only reached 46°C. When comparing the rates of the two cars, we find that the white car heats up at a rate of 0.2°C/min while the dark car heats up at 1.2°C/min. This suggests that the white car heats up at a substantially slower rate than the dark car does. However, it should be noted that the difference in the ambient temperature (26°C to 23°C for the dark car vs. 24°C to 27°C for the white car) may have influenced this, as well as the weather on that day and the temperature.

In the future this experiment should be run with a black and white car of the same model on the same day at the same time.

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