

ENVIRONMENT - THE SUN AS A SOURCE OF HEAT AND LIGHT

SENSOR(S) - Internal Light
 - Internal Temperature

INVESTIGATE • How the heat and light produced by the sun changes over time
 • Whether the amount of sunlight affects the temperature
 • How to analyse results and draw conclusions

INTRODUCTION TO THE INVESTIGATION

The Sun provides heat and light energy (amongst other forms of energy) that is vital for life on Earth. This investigation is designed to look at the relationship between the amount of light observed at a particular point and the associated air temperature as well as how the amount of light varies over a period of time.

It can be carried out over a short period of time or as part of a larger project - spread over the different seasons to see how the amount of sun light changes through the year. The investigation can also form part of a larger study into the how the Earth rotates on its axis, to give us night & day, and how it orbits the Sun to give us the seasons.

Discussion can also be entered into on how the sun (light) can be blocked and that this forms shadows. This effect will most likely be seen on the graph as clouds reduce the amount of light. The Explorer could be quickly used to show this effect by using a low wattage lamp as the sun and passing objects in front to show the drop in light level.

If an external temperature sensor is available this could be used in conjunction with the light sensor's fibre optic light extension to carry out the investigation without having to place the Explorer outside – simply place the sensors through a window, being careful not to trap the cables.

RESOURCES

- Explorer datalogger, datalogging software, computer, LogIT computer link cable.

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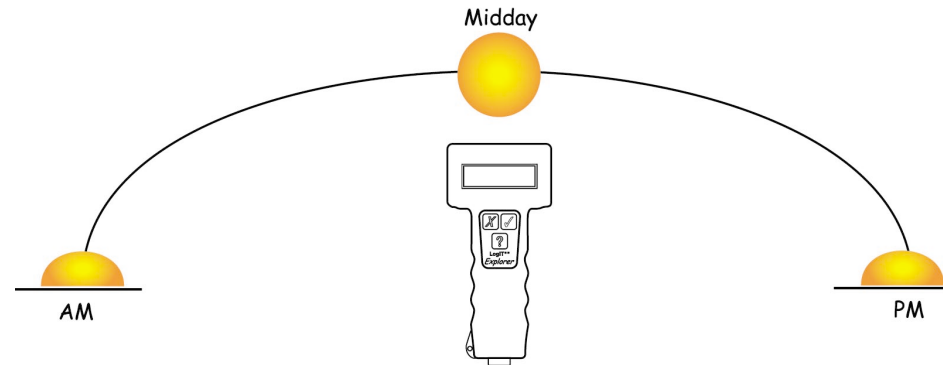
WHAT TO DO

- Find a secure and weather protected place for the Explorer – avoid direct wind which could affect the result.
- Set up the Explorer either first thing in the morning or last thing in the afternoon.
- Press the Explorer green button (Run) to start logging.
- Leave the Explorer to log for a chosen length of time - at least 24 hours.
- After the time period turn on the Explorer (any button) and press the Red Button to stop logging.
- Upload your results to the computer and view the graph.

The best location for the Explorer is outside away from the effects of wind and damp. The Explorer should also be at 90° to the path of the Sun through the sky. Ensure that the sun will not shine directly on the Explorer case (see the section on the light sensor in part 1 of the manual).

If an outside location is not possible the Explorer can be placed facing out of a window - again making sure that it can track the full path of the Sun. It is not the best of solutions since the Explorer's built in temperature sensor will be affected by the conditions of the room i.e. heating and also the thermal retention properties of the glass and walls. An external temperature sensor and fibre optic could be used to eliminate these problems. **DO NOT POINT THE EXPLORER OR FIBRE OPTIC DIRECTLY AT THE SUN.**

DIAGRAM



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SAFETY

- Children should be supervised at all times.
- Do not allow pupils to look directly at the Sun – explain the dangers of doing so.
- Ensure that the Explorer cannot come into contact with water or damp.

ABOUT THE RESULTS

- Did the temperature change ?
- Did the light level change ?
- Did the changes take place at the same time ?
- Was this a fair test ? - think about the location of the Explorer and shadows ?
- Was it a cloudy day - can you see when clouds passed in front of the Sun ?
- What time was the light level / temperature the lowest ?
- What time was the light level / temperature the highest ?

EXTENSION ACTIVITIES

- Try the experiment on different days - were the high and low points of the light level sensor the same ?
- Carry out the investigation on a sunny day in winter and compare to a sunny day in Summer - light levels were probably similar but temperatures different. Discuss the tilt of the earth.
- Discuss how the ‘intensity’ of the sun, both light and temperature, varies depending on your location on the planet - your proximity to the equator.
- Carry out research into the effects of Solar Eclipses - see if you can find light and temperature data recorded during an eclipse.